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ROLE OF SUSTAINED DEMOCRACY IN US FOREIGN POLICY DURING PRESIDENCY OF JOSEPH R. BIDEN*

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Abstract. Value-based foreign policy has always been a point of controversy, and the situation is no different today. This question becomes all the more controversial in the event that its executor is to be a pre-eminent power - the United States of America. In this respect, the present is not so different from the recent past, and in the context of the great power rivalry of the USA, especially with the PRC and the Russian Federation, analogies with the Cold War are offered and often brought. It was precisely at that time that both (super)powers claimed to a certain extent that they carried out their foreign policy in accordance with their values, which they considered to be key and not in favor of the cold calculation of national interests. The choice was not binary then and it has not become so even today, and even if during the mentioned period both superpowers supported different groups in different sections and entered into conflicts under the different pretexts, neither side could actually claim the title of valuable foreign policy. Although comparisons with the Cold War are often exaggerated, indeed the newly renewed (or never ended) and growing great power rivalry shaping to a large extent the current international system, at least in the case of the US, complicates the never-ending formal commitment to supporting democracy and democratic regimes in its foreign relations. Also, on the basis of the mentioned facts, we decided to investigate this phenomenon and through the article we want to contribute to the debate about the role of democracy in international politics and foreign relations of the current J. Biden administration as a whole.

Keywords: United States; foreign policy; democracy; values

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1. Introduction

The idea of promoting democracy in American foreign policy is not a new characteristic, but a constant practically since the beginning of the 20th century (Adeniran et al., 2023). Some of the authors already tried to present the American occupation of the territories acquired after the war with Spain through the prism of instilling democracy and liberalism in the new territories (and in principle even before the time when the American westward expansion was passed off as a civilizing mission spreading, among other things, democracy and progress). Later, democracy, the right of nations to self-determination and liberalism in general was one of the main points of American participation in both world wars. However, the Cold War and great power rivalry with the USSR often required cooperation (or direct support) with non-democratic and illiberal regimes around the world. "Its commitment to liberal principles and rules were inconsistently applied because its fear of the USSR led it to double standards and hypocrisy in the service of national security or, as was said at the time, national survival." (Duffy Toft & Kushi, 2023, p. 261) Graduation of its preferred ideology took place in the context of the fact that neither of the competing powers was seriously afraid of a domestic coup, and was therefore rather a tool for expanding its sphere of influence (or stopping the spread of the other) (O'Rourke, 2018) Also because of this, the American side had no problem with the rhetoric of the fight for freedom and democracy (which, especially during the R. Reagan administration, became virtually synonymous with anti-communism) and at the same time providing support to illiberal anti-communist fighters all over the world. (Jackson, 2023) Although the US foreign policy of the past and present is an actively and significantly researched issue, our goal is to contribute to the beginning of the discussion about this aspect of American foreign policy in the era of President J. Biden.

2. Short historic review of democracy promotion in US foreign policy

In its modern form, after the end of the Cold War, democracy promotion was again prominently pushed forward under President G.W. Bush (the rhetoric of democracy and freedom, as well as real but selective actions during the G.H.W. Bush and W. Clinton administrations had an important place) through the so-called Agendas of freedom. Despite the fact that during his presidential campaign, G. W. Bush was fundamentally opposed to foreign interventions intended for nation-building, according to all accounts (and his own record), the events of 9/11 changed the president's position, and subsequently Bush Jr. adopted a policy of unilateral and preemptive regime change to democratize rogue states that became known as the Bush Doctrine. (O'Rourke, 2018 p. 231-232) During his second inaugural address (in January 2005), noted that "The survival of liberty in our land increasingly depends on the success of liberty in other lands. The best hope for peace in our world is the expansion of freedom in all the world." (NPR, 2005, para. 5) President Bush then formally pronounced democratization doctrine. "So, it is the policy of the United States to seek and support the growth of democratic movements and institutions in every nation and culture, with the ultimate goal of ending tyranny in our world" (NPR, 2005, para. 7). In the State of the Union Address in February 2005, President Bush reiterated the role of democracy in US foreign policy:

> In the long-term, the peace we seek will only be achieved by eliminating the conditions that feed radicalism and ideologies of murder. If whole regions of the world remain in despair and grow in hatred, they will be the recruiting grounds for terror, and that terror will stalk America and other free nations for decades. The only force powerful enough to stop the rise of tyranny and terror, and replace hatred with hope, is the force of human freedom. Our enemies know this, and that is why the terrorist Zarqawi recently declared war on what he called the "evil principle" of democracy. And we've declared our own intention: America will stand with the allies of freedom to support democratic movements in the Middle East and beyond, with the ultimate goal of ending tyranny in our world (The White House, 2005, para. 38).

In the context of this, he also reminded that democracy (also in Iraq) should also guarantee the security of the United States of America itself: "We are standing for the freedom of our Iraqi friends, and freedom in Iraq will make America safer for generations to come." (The White House, 2005, para. 51) "Confirmation" of democratization as a goal of the Bush administration then came with the publication of the National Security Strategy in 2006. (Braumoeller, 2012) However, the change occurred, primarily under the influence of the absence of evidence of an active Iraqi program and arsenal of weapons of mass destruction as the main reason

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for the intervention in Iraq as also under the influence of the ideological orientation of the closest presidential advisers and cabinet members.

As a result of not finding WMD, the Bush administration began to justify the continued occupation of Iraq by spreading democracy to end terrorism. D. Feith, Undersecretary of the US Department of Defense and a prominent supporter of the intervention in Iraq, was also surprised by the change in rhetoric:

> The president and his key communications advisers apparently decided that the failure to find WMD stockpiles was such an embarrassment that the President should not even try to explain it or put it in context. Rather, the Administration tried to change the subject. (Hanania, 2022, p.156)

Bahador, Moses and Youmans (2018), after analyzing key texts and speeches, found that if until March 2003, when the US intervened in Iraq, 6.7% of the justifications contained democracy and human rights, and in the period after that, and only until March 2004, up to 44.7% of justifications were focused on the role of democracy. "As far as presidential rhetoric is concerned, freedom is America's comfort blanket." (Nichols & Milne, 2022 p. 472) As American historian Eric Foner wrote, "freedom" is the key word of American history, and American foreign relations are no exception. "Ideas of freedom encourage larger promises from leaders when they explain their actions. Realpolitik is never sufficient for the American polity." (Suri, 2022, p. 282) The democratization rhetoric also arose on the basis and background of the ideological orientation of cabinet members and key presidential advisers. Neoconservatives, whose representatives primarily included R. Perle (advisor to the Minister of Defense D. Rumsfeld) and P. Wolfowitz (deputy minister of defense), as well as the so-called The Vulcans (a group of conservative "hawks" who were foreign policy advisers to G.W. Bush's candidacy before the 2000 election) including future National Security Advisor and Secretary of State C. Rice were all vocal advocates of American "engagement" even before the events September 11. And precisely under the influence of the ideology of neoconservatism, the administration did not hesitate to use military force for "value purposes". "Passive measures are not sufficient and neoconservatives advocate active measures alone or with others to realise this fundamental goal of spreading democracy. The export and defense of democracy is the way to long-term security" (Ritchie & Rogers, 2007, p.145). The contradiction between values and security interests was prominently shown in the case of Uzbekistan, which at the time hosted one of the largest American bases – Karsi-Khanabad. Anti-government protests took place in the state in May 2005 in the city of Andijan, which were violently suppressed. In the end, Uzbekistan itself decided on the hesitant attitude of the US on how to react to the unfavorable situation and decided to close the base, while American troops definitively left the country at the end of 2005. Not only in Uzbekistan, but also under the influence of regime changes and armed conflicts, the United States failed in democracy promotion. Although revolutions took place in Ukraine and Georgia during the first and second Bush administrations, which brought pro-Western political forces into the government, the subsequent internal and foreign policy direction of both countries only further complicated the situation. (Dundich, 2013) (Herring, 2017) "The president and his "neoconservative" advisers had grossly exaggerated the power and appeal of hegemonic claims about American freedom, and their actions motivated mass resentment at home and abroad" (Suri, 2022 p. 294-295).

With the election of President Obama (and under the influence of continuing and increasingly negatively perceived military operations abroad), the new administration expressed and proceeded more cautiously about the role of democracy in foreign relations. Even during the largest pro-democracy-oriented civil protests in the Middle East and North Africa in modern history, the US behaved with restraint and selectively supported democratic movements and the status quo elsewhere. "The President praised the 'victory of the will of the people' in Tunisia, where US interests were negligible. In other countries, the United States took varied approaches depending on the severity of the oppression and the importance of its interests." (Herring, 2017, p. 681) This was especially evident in the approach to Bahrain, where, despite the protests and the subsequent intervention led by Saudi Arabia, the US behaved restrained no doubt primarily due to the importance of Bahrain as important regional security partner and critically important location where the USN Fifth Fleet is based. In the case of Egypt, US non-military intervention happened after long discussions within the administration, when mainly younger advisers and its members (B. Rhodes, S. Power) with the support of H. Clinton advised President Obama for American intervention and pushing Mubarak to resign. This pressure and the stubbornness of the Egyptian leader unwilling to make concessions led to the intervention of the American president and on February 1, 2011, he called on his Egyptian counterpart to leave this post, Mubarak then actually relinquished

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power on February 11 (Dyer & Saleh, 2016). Later, in the case of Libya, the pressure of S. Power, who worked in the National Security Council as a special assistant to the president and senior director for multilateral affairs and human rights, and the US permanent representative to the UN, S. Rice, was important. With the support of H. Clinton (the then Secretary of State, who herself claimed that she decided to intervene in Libya after meeting with representatives of the rebels, who were supposed to convince her that Libya would become a democratic state that cares about human rights), they were able to convince President Obama to intervene primarily by arguing about the humanitarian disaster (in the context of the absence of an American response to the Rwandan genocide in 1994), which may arise in the absence of such action, even despite the protest of the then Secretary of Defense Gates and little public support. (Boucher, David & Prémont, 2020; Hanania, 2022)

3. J. Biden a democracy in US foreign policy

In the context of events in the United States itself, it is understandable that the current administration is primarily trying to pass off the political rivalry with D. Trump and the Republican Party more broadly as a struggle for democracy with its opponents led by D. Trump. During his inaugural speech, just two weeks after the violent protest by D. Trump's supporters, President Biden called the election victory and the transfer of power a "triumph of democracy" and warned that "democracy and truth are under attack." (The White House, 2021a) Atypical domestic political attention to the defense of democracy, which Americans take for granted, does not mean that democracy in foreign relations (or at least its rhetorical support) is given less attention. In addition to the already typical at least rhetorical support for democracy for the American political system and foreign relations, the administration of President J. Biden is primarily trying to pass off the current rivalry not only with the PRC as a rivalry between democracies and autocracies. During the first press conference of the new American president, J. Biden, he said:

> So, I see stiff competition with China. China has an overall goal, and I don't criticize them for the goal, but they have an overall goal to become the leading country in the world, the wealthiest country in the world, and the most powerful country in the world. That's not going to happen on my watch because the United States are going to continue to grow and expand. (The White House, 2021b, para. 183)

Later, in addition to the need to invest more in research and science and China's achievements in it, Biden also named the rivalry from the ideological side, saying that the 21st century will be "a battle between the utility of democracies in the 21st century and autocracies." (The White House, 2021b, para. 187) During his address on the occasion of the 77th session of the United Nations General Assembly, President Biden mentioned:

> Now, it's no secret that in the contest between democracy and autocracy, the United States — and I, as President — champion a vision for our world that is grounded in the values of democracy. The United States is determined to defend and strengthen democracy at home and around the world. Because I believe democracy remains humanity's greatest instrument to address the challenges of our time (The White House, 2022a, para. 22-23).

The Russian invasion of Ukraine and the support of Ukraine, especially by the democratic states of the West, should be proof of the determination to support democracy, which faces the invasion of an authoritarian state. However, during the speech delivered during the State of the Union in 2023, Biden also highlighted the support of Ukraine and the world position of democratic states in the context of the Ukrainian war. "We face serious challenges across the world. But in the past two years, democracies have become stronger, not weaker. Autocracies have grown weaker, not stronger" (The White House, 2023a, para. 270). In March 2024, on the same occasion, however, he again mentioned the phenomenon of the weakening of democracy " What makes our moment rare is that freedom and democracy are under attack at — both at home and overseas at the very same time." (The White House, 2024, para. 8) Indeed, the trend of democratization has not been favorable recently and according to the World State of Democracy index from the Swedish organization IDEA "Across every region of the world, democracy has continued to contract, with declines in at least one indicator of democratic performance in half of the countries covered in the Report" (International Institute for Democracy and Electoral Assistance, 2023, p.8). The findings of the Economist Intelligence Unit were similar and in its report on the state of democracy in the world for 2022, the report claims that democracy is stagnating (Crowley, 2023).

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In the context of this position, the American side also decided to host the online Summit of Democracy, which took place on 9-10. December 2021, 110 states were invited, in addition to the states, representatives of civil society, journalists, human rights defenders and representatives of the private sector were also invited to the Summit (The White House, 2021c). Commentators noted that Bolivia or Sierra Leone, for example, were not among the invitees, but countries such as Serbia, Pakistan, Iraq, the Philippines, Angola, the Democratic Republic of the Congo and Kenya were invited despite their significantly worse record of democratic practices. In addition, among the uninvited states were the People's Republic of China, the Russian Federation, Hungary, Turkey and all the countries of the Persian Gulf (Faiola, 2021). The Chinese and Russian ambassadors in the USA, criticizing the aforementioned move, jointly wrote an article for the National Interest in which, in addition to the fact that the USA is putting itself in the position of a decisive country that determines who is and who is not a democracy, they wrote that the action is the result of the Cold War mentality which "will stoke up ideological confrontation". Later in the article, the ambassadors described both their countries as democratic. Finally, both ambassadors urged that truly democratic states should also support democracy in international relations and not support hegemony (Antonov & Gang, 2021). In response to the non-invitation of the Hungarian side to the summit, the Hungarian Embassy in the USA described the decision as "disrespectful", and the Hungarian opposition to the speech of the President of the European Commission, U. von der Leyen, in turn limited her speech (Hudson & Parker, 2023). Taiwan's participation also became controversial. The Chinese side condemned Taiwan's invitation and called the move a mistake (Qingqing, 2021). The result of the summit was to be and was announced concrete commitments of the states in the areas of strengthening democracy and defense against authoritarianism, fighting corruption and promoting and respecting human rights. In addition, the commitments contained, for example, the fight against disinformation, the support of electoral integrity or the fight against financial corruption. The Presidential Initiative for Democratic Restoration, a set of measures and initiatives aimed at strengthening democracy, human rights and the fight against corruption worldwide, was also adopted. 424 mil. USD was allocated for the initiative (The White House, 2021c).

Second Summit for Democracy, which took place in March 2023, featured expanded list of participants (eight more states were invited, but invitation was not extended to Turkey and Hungary once again) - Honduras, Ivory Coast, Gambia, Mauritania, Mozambique, Tanzania, Bosnia and Herzegovina, and Lichtenstein (Detsch-Gramer, 2023). The very nature of the Summit gives rise to the feeling that through the invitations the United States divides the countries of the world into democracies - states that were invited to the summit and non-democracies - those that were not, and takes on the role of referee. Nevertheless, the list of countries invited to the Summit in 2023 shows that the majority (about two-thirds) actually meet the parameters (in this case, according to the Freedom House report) of a “free society”, almost a third then belong to “partly free” societies (India, Pakistan, Indonesia, Mexico, Nigeria, Kenya), three states were “not free” - Iraq, Angola and the Democratic Republic of the Congo (Brown, 2023). Several initiatives emerged from the second Democracy Summit. At the second Summit, the Biden administration presented the initiative Advances in Technology for Democracy, within the framework of which the participating states should focus on supporting the use of technology for democratic governance and not actively fight against it. As part of this agenda, the participating states expressed their support for increasing the population's access to reliable information, expanding access to the Internet, increasing cyber security, and the fight against spyware (The White House, 2023b). Eight new initiatives ranging from supporting the fight against corruption to strengthening the protection of human rights and the free electoral process were also presented by USAID. (US Agency for International Development, 2023) American side (with help of its allies) plans to continue the initiative, and the third Summit for Democracy took place in March 2024 in South Korea (Summit for Democracy, 2024).

This new format is not only characterized by unclear commitments and muted media response, but new forum represents US with possibility of getting foreign state and non-state representatives and other stakeholders familiar with the concept of “struggle of democracies against autocracies”.

4. Values and American strategic documents of the current administration

Critically, the administrations' policy statements through strategic documents also reflect traditional American statements of democracy support at home and around the world, with the present being labeled a "competition

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between democracies and autocracies" in the National Security Strategy released in October 2022. Autocracies, on the other hand, according to the US side, "work overtime to undermine democracy and export a model of governance marked by repression at home and coercion abroad. “In addition, the United States speaks out in support of democracies worldwide: "So, the United States will continue to defend democracy around the world, even as we continue to do the work at home to better live up to the idea of America enshrined in our founding documents.” (The White House, 2022b, p.3) In the subsection "our permanent role", the document re-formulates the nature of the current international situation as a competition between autocracies and democracies, placing the United States in the position of the leader of the "democratic camp":

> The need for a strong and purposeful American role in the world has never been greater. The world is becoming more divided and unstable. The risk of conflict between major powers is increasing. Democracies and autocracies are engaged in a contest to show which system of governance can best deliver for their people and the world (The White House, 2022b, p.7).

Nevertheless, especially under the influence of competition with the PRC, Russia and other antagonistic states, the United States does not intend to limit the freedom of action even in cooperation with non-democratic states, if they support the current international order:

> The range of nations that supports our vision of a free, open, prosperous, and secure world is broad and powerful. It includes our democratic allies in Europe and the Indo-Pacific as well as key democratic partners around the world that share much of our vision for regional and international order even if they do not agree with us on all issues, and countries that do not embrace democratic institutions but nevertheless depend upon and support a rules-based international system. (The White House, 2022b, p.8)

However, a line later, the NSS claims that:

> We will work to strengthen democracy around the world because democratic governance consistently outperforms authoritarianism in protecting human dignity, leads to more prosperous and resilient societies, creates stronger and more reliable economic and security partners for the United States, and encourages a peaceful world order. (The White House, 2022b, p.8)

But that doesn't mean the U.S. won't work with non-democratic states, and in the interest of making US coalitions as “inclusive as possible we will also work with any country that supports a rules-based order while we continue to press all partners to respect and advance democracy and human rights” (The White House, 2022b, p.16).

And that's also because, according to the NSS, "the most pressing problem facing the United States is an authoritarian state with revisionist policies." This not-so-thinly veiled reference primarily to the Russian Federation and to PRC. It is China that is supposed to be "the only competitor that intends to reshape the international order and increasingly also the economic, diplomatic, military and technological power to achieve this goal", and together these competitors are supposed to create a new international order “favorable to a highly personalized and repressive type of autocracy”. Based on the NSS, the American side will also fight against anti-democratic measures such as weaponization of information, corruption, repression and measures against a free and fair election process.

In addition to the NSS, democracy promotion is prominently present in separate strategic documents for the regions (Indo-Pacific region and Africa). However, Latin America as a "key region for American security and prosperity" and the US relationship to democracy in it is mentioned in the NSS. In the aforementioned section, the United States recognizes that "democratic stability" in the region is advantageous to the US from security and economic areas. The US also pledges to support "partners working to build transparent, inclusive and accountable institutions" in the region. In addition to such and other support measures for democratic processes, law and justice, the fight against corruption and other measures, the US also speaks for “the democratic self-determination of the people of Venezuela, Cuba, Nicaragua and any country where the popular will is suppressed” (The White House, 2022b, p.41).

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The promotion and support of democracy also appears in regional and individual state strategies (integrated country strategy). In the regional strategy for sub-Saharan Africa, the Biden administration has set four goals, two of which are directly related to the promotion of democracy and the openness of the societies of African states: 1. To promote openness and open societies and the second goal: to provide democratic and security dividends. Under the second objective, the US will:

> seek to stem the recent tide of authoritarianism and military takeovers by working with allies and partners in the region to respond to democratic backsliding and human rights abuses, including through a targeted mix of positive inducements and punitive measures such as sanctions. (The White House, 2022c, p.7-8)

The United States is also committed to supporting open societies in its Indo-Pacific Strategy, and the promotion of a "Free and Open" Indo-Pacific is the first goal of this strategy. As part of the said objective, the document says that “Through our diplomatic engagement, foreign assistance, and work with regional organizations, the United States will be a partner in strengthening democratic institutions, the rule of law, and accountable democratic governance” (The White House, 2022d, p.8).

Strategies for individual states (integrated country strategies) also emphasize the importance of democracy, its strengthening, or in the case of non-democratic states, the transition to it, as the most optimal system of government organization and preferred by the United States of America. Nevertheless, even in accordance with the more pragmatic aspects of the NSS and American foreign policy in general, the US does not renounce cooperation with non-democratic, illiberal states or directly even with the governments of states that came to power through a coup. After analyzing the ICS documents for African states, where there is the largest representation of non-democratic, illiberal states, the American approach is clear from the ICS as well. Indeed, the US considers (at least rhetorically) democracy, human rights, strong institutions and civil society to be critically important (with mentions of them appearing in every ICS for African states). However, this does not mean that the absence of an establishment respecting these principles is an obstacle to (including and above all security cooperation). Although in the ICS of coup states (Burkina Faso, Chad, Mali, Sudan, Guinea, except for Niger and Gabon, in which military coups have taken place since the publication of their ICS) the priority is the return to a legally elected and democratic government, so cooperation is not refused. In the case of Burkina Faso, it is explicitly written in the document:

> Given this urgency, we will engage where we can under Section 7008 restrictions. However, we will need to be strategic, and identify areas where we are allowed to engage, where doing so fits within our national security interests, and where it is justifiable given the government’s progress towards a democratic transition. At this moment, we intend to lean forward until and unless the transition government’s actions force us to reassess (US Department of State, 2022a, p.4).

Security relations are prioritized not only in the case of Burkina Faso. In the ICS for countries such as Saudi Arabia, the United Arab Emirates, "democratization efforts" or similar formulations are also not listed among the goals. On the contrary, among American opponents (about whom ICSs are published) such as For Venezuela (and Nicaragua), practically the entire document is dedicated to the transition to democracy, freedom and respect for human rights. (US Department of State, 2022b) (US Department of State, 2022c) (US Department of State, 2023a) (US Department of State, 2023b)

In the case of Africa (as well as in other parts of the world), the security cooperation formats are extensive and the American side actively supports, exercises with, or shares information with states with different institutions, but also with states where governments came to power through coups. Although understandable, thanks to the at times overblown rhetoric about the "struggle of democracies against autocracies" and the leading position of the US in the "free camp", then the mentioned aspects of American foreign policy and security cooperation cause "image" problems for the government. In the case of Africa, precisely in response to such concerns, after the findings that the US armed forces also cooperate with the states in which the coup took place (when in several cases US troops trained the masterminds of these actions), the US Department of Defense was also forced to limit its activities, but not completely cancel in all cases with states in which a coup has taken place, or their armed forces violate human rights. (Hauslohner & Horton, 2024)

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5. Case studies

Primarily due to the topicality and absence of a number of primary sources necessary for a more complete analysis, even on the basis of the information already available today, it is possible to at least outline the approach of the Biden administration to democracy and its promotion in US foreign policy. In the context of a truly global weakening of democratic systems, the American side faces this challenge in virtually all regions of the world.

Brazil, as the largest Latin American country with deep ties to the United States of America, is one of the publicly known cases of American intervention aimed at maintaining the country's democratic system. The United States of America directly through the pressure of the administration of President Biden, members of the cabinet and even members of Congress and former high government officials on high officers of the Brazilian armed forces, who hesitantly approached the challenges of the then president J. Bolsonaro, who also planned, with the help of the armed forces, to stay in power and not accept the results of the elections in which he lost. In addition to direct pressure, announcements about the potential deterioration of Brazil's international reputation and position, the threat of stopping cooperation in the security field, US officials strengthened the Brazilian electoral system with support measures and recognized the new president practically immediately after the announcement of the election results in Brazil, with the aim of international legitimization and deterring elements, which could attempt a coup. International pressure, and above all the demonstrations of Brazilian citizens, finally helped to stop the hesitant representatives and the results of the elections were recognized and their winner, L. de Silva, took the post of president (Stuenkel, 2024).

Later, after the surprise victory of B. Arevalo in the Guatemalan presidential elections held in June 2023 and after subsequent government efforts to effectively nullify the results, US side through pressure on Guatemalan government officials and members of Congress (which led to revocation of their visas), as well as by repeated visits by US government officials and members of the US Congress, helped the democratic transition of power. Immediately on the day of the inauguration of the new President Arevalo, January 15, 2024, US side congratulated the new president helping solidify his position. The stability of Guatemala is also increasingly important for the US side due to the increased pressure on its southern border by emigrants coming from Guatemala (Bernal, 2023; US Department of State, 2024; Reinhard, Schaffer & Swaine, 2024)

Haiti, which is mired in civil unrest, that has practically turned into a war of gangs among themselves and at the same time against a weakened government, also provides us with a view of US approach to regional political crisis. After initially supporting A. Henry as an interim (unelected) prime minister (after the assassination of President Moïsse in 2021), he was denied access to the Dominican Republic while returning from his foreign visit to Kenya where he wanted to land after domestic gang leaders called on him to step down as president and prevented him from coming to Haiti. Also due to domestic unpopularity, according to the information available so far, the United States called on him to leave office during his return flight from Kenya and, according to one Caribbean diplomat, even gave him a resignation speech. Although the information about the direct call for resignation was rejected by the US officials, they restated their goal and interest in Henry "accelerating the transition for an empowered and inclusive governance structure that will rapidly help the country prepare for a multinational security support mission to address the security situation and prepare the ground for free and fair elections," the absence of support for Henry was also confirmed by American statements that the US does not provide him with logistical support for his return to Haiti. Despite the critical situation in Haiti, and despite some regional and domestic voices, the United States does not intend to intervene directly with the deployment of its own troops and therefore supports the idea of an international mission of police forces to help stabilize the situation (Osborn, 2024; Mérancourt & Schmidt, 2024). Henry finally announced his resignation from the post of prime minister on March 12, 2024, under considerable domestic and international pressure. (Grant, 2024)

Venezuela and the approach to it of the current administration of President J. Biden rather reflects "learning" from the course of the so-called. maximum pressure campaign, the ultimate goal of which was regime change. The campaign of maximum pressure began after the inauguration of US President D. Trump, who between 2017 and 2019 introduced one of the toughest sanctions regimes in history. However, the economic collapse caused by both sanction measures (not only American) and widespread Venezuelan corruption and inadequate

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management of state-owned enterprises has strengthened the weakened state's cooperation with American competitors Russia and the People's Republic of China. (Not only) the United States, in addition to economic pressure (also by confiscating foreign reserves), stopped recognizing N. Maduro as the legitimate and legal president of Venezuela, thereby trying to strengthen international isolation, directly supporting the opposition candidate in his coup attempt (and indirectly threatening military intervention) (LaMothe & Rosenberg, 2019; Bahar, Bustos, Morales & Santos, 2019; Singh, 2022; Ramsay & McCarry, 2024). Due to lack of success that this large-scale campaign achieved (and efforts to stabilize oil markets), the current administration decided to change the approach from direct support (or interventions for) regime change to attempt an agreement in areas of possible cooperation (undoubtedly also under the influence of the humanitarian disaster and the high increase of Venezuelan emigrants trying to reach the USA). Therefore, in the fall of 2023, both parties (the Venezuelan government and the Venezuelan opposition) signed the Barbados Accords, which in exchange for the release of some political prisoners (and the exchange of other detainees) and democratization promises of Venezuelan government, the US provided a temporary softening of the sanctions pressure. However, the non-rigid democratization promises and the subsequent ban on the main opposition candidate from participating in the presidential elections will not mean a return to the old policy of trying to change the regime, but rather a modification of the sanctions measures (which would not violate the American interest in exporting Venezuelan oil to the USA). Interest in measures to make fuel less expensive for American voters, reducing the number of Venezuelan emigrants trying to get to the USA and limiting the unnecessarily high pressure that would push Venezuela even more into the hands of American adversaries are the main drivers of the current American policy towards the South American country (International Crisis Group, 2023; Mawad, 2024; DeYoung & Schmidtt, 2024; Ramsay & McCarry, 2024).

Pragmatism, mainly under the influence of already global rivalry with the PRC, is also shown by the United States in cases of (new) partnerships with non-democratic, illiberal states. After the events of the last few years, partnerships threatened by coups have become a new challenge, which puts the American side in the difficult position of protecting its interests by cooperating even with such regimes.

Angola is one of the cases of new developing partnerships (in the past, Angola was also an important supplier of oil to the USA) between the USA and the so-called of the global South. Efforts to limit Chinese influence (the PRC provided Angola with tens of billions of USD for infrastructure and other projects primarily within the framework of the BRI program, and Angola was the largest recipient of Chinese economic assistance in Africa) combined with support for the diversification of suppliers of mineral raw materials (also important for the "green" transformation) is the main reason for renewed American interest. That is also why the American side announced the financing of a study and, together with the EU, of a railway project to connect Angola with its neighbors, which will facilitate and speed up the export of important minerals (together with the project of financing a container port in Sri Lanka, which is, however, independently American, these are the first similar foreign infrastructure projects). To highlight American support, the US Secretary of State A. Blinken even visited "unfree" Angola in January 2024 (and US President Biden also promised to visit Angola during the visit of the Angolan president to US in November 2023) (Freedom House, 2024; Birnbaum, 2024; Nyabiage, 2023; Nyabiage, 2024).

After military coups took place in a number of African states during the summer of 2023, the actions also affected American interests. In Niger, a country where approximately 1,000 members of the US Armed Forces are permanently stationed primarily at a drone base near the city of Agadez – which is the second largest military facility in Africa, the armed forces of the Niger overthrew US ally and democratically elected president M. Bazouma (back in March 2023, A. Blinken became the first US Secretary of State in history to personally visit Niger). Nevertheless, thanks to American diplomacy, the US was able to maintain a presence in the country until March 2024, although French troops were forced to leave the African state (the last members of the French armed forces left Niger in December 2023). However, in the context of the development of contacts with Russia, the People's Republic of China and Iran, as well as the development of cooperation with other military regimes in its neighborhood (as well as due to the suspension of most of American aid), Nigeria decided in March 2024 to terminate military relations with the American side, and the American presence was described as "illegal" (Hudson, 2024; South China Morning Post, 2024; Stepansky, 2023; US Department of State, 2023c). The American side condemned the coup (although it called the actions of the armed forces in Niger a coup after

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more than two months only in October 2023), suspended most of the financial resources provided to Niger in the framework of foreign security and other aid, but did not voluntarily give up the partnership and tried to maintain an important object in an unstable part of Africa (discussions about the possible transfer of the object and adjustment of security relations are being conducted by the USA with Ghana, Togo, Benin, Ivory Coast), in which, in addition to the fight against terrorism, it competes with Russia and especially the PRC for influence. (Birnbaum-Chason, 2024) The pragmatic American approach and cooperation even with the government established by the coup was directly confirmed in an interview for Africa Report by Molly Phee, Assistant Secretary of State for African Affairs and head of the delegation of the American side in Niger:

> What we have tried to do in Niger was […] to say, we would like to work with you, we would like to maintain this partnership, which is demonstrably beneficial to you and to our interests in the region, because of course we're very concerned about the stability of Nigeria and coastal West Africa. (Pecquet, 2024, para. 10)

The list of cases is not exhaustive, and mainly shows the new ones, in addition to the mentioned non-democratic states developing their relations with the USA during the Biden administration. List can also include Vietnam, which due to the growing rivalry with the People's Republic of China in September 2023 (as part of the visit of US President J. Biden) upgraded its relations with the US to a comprehensive strategic partnership, the highest level of Vietnamese foreign relations, thereby moving bilateral relations (surprisingly up to) two degrees to the level of those with the PRC, India, the Russian Federation and South Korea (Vietnam Pictorial, 2023; Wee, 2023; WTO Center VCCI, 2023). The importance of the 2-day visit to Vietnam is highlighted by the fact that it was one of only 16 foreign visits so far (until April 2024) made by the current US President J. Biden, most of which took place as participation in international summits and visits to America's traditional allies and partners. Although still a democracy, the "value partnership" with US also becomes more complicated in the case of India. Increasing cooperation not only within initiatives such as QUAD (elevated to the level of heads of state) but also through unprecedented technology transfer and intelligence sharing (as well as increasing frequency of mil-mil contacts) also primarily under the influence of growing rivalry with the PRC comes despite questionable steps by the Indian side at home and abroad, which to some extent raise questions to their commitment to the ideas of democracy and liberalism (The White House, 2023c; Razdan, 2023).

Conclusions

Based on the research, we have reached the conclusion that indeed the United States today (as well as in its recent past) (at least) rhetorically upholds the principles of democracy and liberalism in its foreign relations. In order to support the communication strategy, in addition to the already existing various partial programs, initiatives and forums that exist through the American government bodies and other institutions, US also organizes new ones - for example, the Summit for Democracy. Nevertheless, primarily under the influence of security cooperation and strategic global competition, a certain discrepancy arises between the frequent (but also not completely uniform) statements of the highest representatives and strategic documents on the support of democracy around the world. Although, despite the often exaggerated and flamboyant rhetoric not fully corresponding to the character of its important allies and partners, the United States is willing to intervene in the case of the defense of the democratic establishment of the state. However, as a result of the change in the international system and the weakening of the American role in it, as well as the reputational damage that the previous period and military interventions with often unclear reasons of the USA caused, the nature of the role of democracy and "value-based" interventions has changed.

According to the information available so far, the current administration of President J. Biden does not intend to change undemocratic and illiberal systems abroad if it can establish correct and mutually beneficial relations with them (however, these efforts do not always translate into American success). Undoubtedly, much of the rhetoric is a political cover for the rivalry with the PRC and the strengthening of the "unity" of the balancing coalition consisting primarily of democratic states led by the US.

Geographical character also plays a role, according to preliminary research - the Western Hemisphere, states in the neighborhood of the United States of America appear to be those where the US intervenes to protect the democratic establishment (but not openly and directly in order to change undemocratic regimes), unlike in

other parts of the world. In the future, with expanded literature and primary sources, it will be possible to examine more closely the real intentions, interests and actions of the American party and the role of democracy and liberal values in their foreign policy.

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EXPLORING THE INTERSECTION OF STRATEGIC HUMAN RESOURCE MANAGEMENT AND INDUSTRY 5.0: A SYSTEMATIC LITERATURE REVIEW*

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Abstract. The concept of Industry 5.0 (I5.0) represents a new form of industrial transformation that emphasizes the synergy of human resources (HR) with advanced technology. This concept has been appearing in the literature since 2020. It is only associated with certain areas of HR issues. The relationship with Strategic Human Resource Management (SHRM) provides a space for identifying new insights in this area. In the context of I5.0, SHRM is a key tool that contributes to sustainability through building a flexible and resilient workforce. This study aims to identify critical areas where the link between SHRM and I5.0 can be explored, with further discussion and an outlook on future research opportunities. A bibliometric analysis was undertaken, and a PRISMA diagram was developed. The areas where we find a link between SHRM and Industry 5.0 based on a systematic literature review are big data analytics in human resource management, IT cost and technology change management, digital transformation and its impact on innovation or organizational resilience.

Keywords: Industry 5.0; strategic human resource management; transformation; technology; human resource

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1. Introduction

The proliferation of digital technologies is driving dramatic changes in industry and society. For the industry to become a real driver of prosperity, it must embrace social, environmental, and societal aspects (Chen et al., 2022; Androniceanu & Georgescu, 2022). The symbiosis of the three segments - technological, social, and environmental - forms the essence of I5.0 (Grabowska et al., 2022). Ghobakhloo et al. (2022) define I5.0 as a paradigm shift in managing digital industrial transformation to achieve sustainable economic and socio-environmental development. Industry 5.0 is a new concept in the Industrial Revolution that emphasizes the synergistic relationship between people, machines, and technology, increasing enterprises' competitiveness and enhancing their ability to contribute to sustainable development and environmental goals. In the era of digital innovation, HR departments around the world are using digital applications, artificial intelligence, and robots to create "employee experience platforms" to support the ever-changing needs of employees (Zhang & Chen, 2023). The information systems create an inevitable condition for effective work with human resources (Vlacsekova & Mura, 2017). One of the most important barriers to its development is the availability of skilled human resources (Leon, 2023).

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This concept brings with it new challenges and opportunities for strategic human resource management (HRSM). Therefore, HRSM must address the issues of how to ensure that employees have the necessary skills and abilities for new jobs. Also, the challenges that Industry 5.0 will bring within the HR field are social changes or ethical issues. Industry 5.0 also brings opportunities for HR, such as new opportunities for employee development, improved productivity, or new business opportunities. The main responsibilities of HR departments include conducting job analyses, creating job descriptions or identifying business processes. HRM departments will need to restructure much of their work before incorporating robots into their businesses (Demir et al., 2019). With the huge amount of data (Big data) that will help in an even better selection of candidates, the tasks of the human resource manager will become more difficult. HR managers, HR executives, and HR practitioners will need to acquire a new set of competencies that match their evolving duties and responsibilities if they want to sustain the transformation of the HR management function (Tataru, 2019). It is, therefore, necessary to address these challenges and opportunities to ensure that employees and organizations are prepared for the new era of the industrial revolution, and to emphasize human capital and its development, which is key to the ability of companies to adapt to a dynamic environment while supporting the creation of innovative and sustainable business models.

The main aim of the study is to identify critical areas where the link between SHRM and I5.0 can be explored, with further discussion and outlook on future research opportunities. This paper provides a systematic review of studies that address strategic human resource management in the context of Industry 5.0. In line with the stated aim of the study, the wording of the research question is as follows: RQ: What is the current knowledge on the relationship between strategic human resource management and Industry 5.0, and in which areas are there research gaps that could provide the impetus for further research?

This paper is structured as follows. The next section describes the theoretical background of this study. The methodology used in this study is then explained, followed by a description of the findings and a discussion of studies that have focused on the research topic. Finally, the conclusions and implications for future research are presented.

2. Theoretical background

Industry 5.0 and Society 5.0 are key to supporting efforts to achieve the Sustainable Development Goals (Kasinathan, et al. 2022). Maddikunta et al. (2022) argue that Industry 5.0 represents the next step in industrial development, which focuses on harnessing the creativity of human experts combined with intelligent machines to achieve resource-efficient manufacturing solutions that are both resource-friendly and meet user preferences. It represents a new revolution that follows Industry 4.0 and is characterised by the mass personalisation of existing technologies such as data analytics, cyber-physical systems, artificial intelligence, machine learning, and the Internet of Things. Related to this transition is the adaptation of the human resource management of organizations (Ganer, et al. 2022).

The authors Cabrilo and Dahms (2018) found that structural and relational capital have a direct impact on innovation performance, with human capital influencing innovation in conjunction with strategic knowledge management (SKM). The study also identified different combinations of conditions that can lead to higher innovation and market performance. SKM strategies, as discussed in the study, can play a key role in the development and management of human resources in Industry 5.0. Acquiring, sharing, and effectively leveraging the knowledge and experience of employees is essential to ensure the successful implementation of digital technologies and innovation processes. SKM strategies can also support agile learning and contribute to workforce agility in the context of the rapid changes brought about by Industry 5.0. Ultimately, strategic human resource management and SKM strategies are crucial in preparing organisations for the challenges and opportunities of Industry 5.0. The integration of these approaches can help organisations achieve more effective use of human resources in an environment of rapid digitisation and automation.

Authors Hamilton and Sodeman (2020) examined the impact of big data analytics on human resource management with an emphasis on strategic human capital. They discuss how big data analytics can address

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strategic human capital issues and contribute to overall firm performance. The authors also analyze new data sources that enable real-time assessment of workforce performance and identification of key players in the company. They also address regulatory and ethical challenges, including privacy and GDPR. In the article, they discuss how big data analytics can facilitate strategic change in HR and across the organization. The article is also relevant in the context of Industry 5.0, highlighting the integration of modern technology with the human factor. It highlights the importance of considering big data analytics in the effective use of human capital in new technological environments and highlights the ethical challenges, which is crucial in the era of rapid technological innovation in Industry 5.0. Cheng et al. (2023) used a synthesis of the information technology (IT) cost management literature and a resource-based view to develop a research model. This model seeks to examine whether IT compensation affects the strategic alignment of IT and business and, consequently, organizational performance. At the same time, the authors analyse how human IT resources enhance the effects of IT compensation. The findings of the study show that IT compensation promotes strategic alignment and organizational performance, but only for firms with business-competent CIOs and not for business managers with IT competencies. In this case, significant linkages with strategic human resource management can be observed in the context of Industry 5.0. In the new industrial era, this concept emphasizes the integration of advanced technologies such as the Internet of Things (IoT), artificial intelligence, and automation with human factors in industrial processes. It is important for organisations to have skilled human resources that are capable of managing and implementing these new technologies. In this context, strategic human resource management can be closely linked to IT cost management issues such as IT compensation analysis.

A study by Visvizi et al. (2022) looks at the drivers of innovation management in contemporary organizations, with a focus on data-driven companies. The authors argue that organizations that integrate a strategic orientation based on data, human capabilities, and proactive management are more effective in fostering innovation. The findings of the study identified key factors that support the development of innovation in data-driven organisations. They also reveal that these companies can develop different innovation patterns depending on the capabilities activated. The study provides evidence of how a combination of data-driven culture, skills enhancement, and human resource support can positively influence the emergence of innovation. How organisations manage innovation processes in a data-driven environment is important in strategic human resource management. In Industry 5.0, where technological innovation is combined with human labour, data-driven innovation management can contribute to the achievement of HR objectives.

Minbaeva (2021) discusses future research directions to bridge the gaps in human resource (HR) management and focuses on three global megatrends - flexible workforce, digitization of business models, and artificial intelligence and machine learning. It examines the impact of these megatrends on human resource management (HRM) in general and in the context of the Covid-19 pandemic. In the context of Industry 5.0, where the integration of advanced digital technologies and human capital is emphasized, HRM research is crucial to the success of organizations. Research in HRM can help organizations better understand the impact of Industry 5.0 on human resource management and develop strategies that will merge digital technologies with human capital for competitive advantage. Flechsig et al. (2022) showed that the adoption of robotic process automation depends on the readiness and digital maturity of organizations in the area of purchasing and supply management. The authors identify technical, organizational, and environmental barriers as well as differences between the private and public sectors in implementing robotic process automation. Although its adoption in human resource management is not directly mentioned, some parallels can be observed with the development and adaptation of new technologies in the corporate environment. In the context of Industry 5.0, which emphasises the integration of people and technology in the industrial environment, the implementation of technologies such as robotic process automation could also influence strategic human resource management. This is about how organisations integrate new technologies with human resources and how these technologies affect the work process and employee performance in the context of the industrial revolution. The findings of Krakowski et al. (2023) highlight that AI-based technological change can transform sources of competitive advantage and require managers to develop new capabilities to remain relevant in an AI-based competitive environment. In the context of Industry 5.0, which is characterised by the integration of advanced technologies, automation, and collaboration between humans and machines, the findings highlight the need for HR managers and organisations to adapt their strategic human resource management. The new capabilities that are emerging due to technological change could require the development and improvement of employee competencies that are key

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to competitiveness in this new industrial era. This could include the development of digital skills, the ability to work effectively with automated systems, and adaptability to change concerning new technologies.

The findings of He et al. (2023) suggest that investment in technology contributes to the systematic control of organisations and sustaining operations in crisis situations. The authors found various impacts of organisational resilience dimensions on the organisation and employees, providing insights into the complex relationship between digital transformation and an organisation's ability to cope with uncertain conditions. Here, we can observe the interconnection in various aspects such as digital transformation and human resources, employee adaptability, culture and transformation management, and organizational resilience in the context of Industry 5.0 in the context of strategic human resource management. When implementing Industry 5.0, where technological innovations happen quickly, employees need to be able to adapt quickly to new technologies and workflows. There is also a need for leaders to be able to effectively manage the transformations associated with digitalization and automation, as well as build a culture that supports adaptability. In the context of Industry 5.0, where organisations are exposed to rapid change and challenges, it is important that they have strong crisis response capabilities. This includes not only technological but also human and organisational aspects.

Nafizah et al. (2023) found that micro-enterprises should be encouraged to adopt artificial learning and machine learning to compensate for their limited resources and capabilities in the innovation process. They emphasize that digital technologies have the potential to transform the way firms operate and that the right strategic approach to adopting these technologies is key to achieving innovation benefits. In the context of Industry 5.0, it is important to understand that the development of technologies such as artificial intelligence and machine learning is not only about technological transformation but also about the transformation of the working environment and the collaboration between people and technology. Strategic human resource management must adapt to the new dynamics of the work environment, where micro-enterprises can use advanced technologies to improve innovation capabilities and collaborate effectively with technology. Belitski et al. (2023) find that the relationship between the breadth of knowledge collaboration and innovation depends on several factors, including the geographic location of the collaborating partner, the type of partner, and the absorptive capacity of the firm. Investing in digital technologies and increasing the share of graduates in science, technology, engineering, and mathematics have been found to be factors that affect the absorptive capacity and transaction costs associated with R&D collaborations. The authors' study indirectly touches on strategic human resource management in the context of Industry 5.0 by analysing the impact of digital collaboration on product and process innovation in firms. In the context of Industry 5.0, which is the integration of digital technologies and human labour, it is crucial to understand how collaborative research and development (R&D) influences firm innovation processes. Recognising the importance of digital collaboration and its relationship to innovation outcomes may have implications for human resource management strategies in the Industry 5.0 era. As the study has shown that the relationship between R&D collaboration and innovation is influenced by absorptive capacity and partner type, HR managers may be challenged to develop human capital that can absorb new knowledge quickly and collaborate effectively with different types of partners, be they regional, national or international entities.

The authors Li et al. (2018) find that HIWS with employee experience is positively related to innovation, and this positive effect is amplified by all three activators of emergence (i.e., experience homogeneity in HIWS, strategic importance of innovation, and turnover in human resources). Here, we can observe several connections between Industry 5.0 and HRSM. In Industry 5.0, where it is important to achieve synergy between people and technology, HIWS can be a key tool to foster innovation. High employee engagement, thus, can lead to better performance and a willingness to collaborate on the implementation of new technologies. Kot and Leszczynski (2022) point out significant differences in the informational, strategic, transactional, and transformational dimensions of value when using conversational agents compared to other technologies. The value created by AI is shown to be dynamic, context-dependent, and, in many ways, ambiguous. In addition, the authors highlight the role of the interaction of resources and non-technological factors that enable conversational agents to reflect and replace human actions. The integration of conversational agents may imply the need to rethink work processes and employee skills. Strategic human resource management may need to take into account the new relationship between artificial intelligence and human work. It is important to assess how conversational agents

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can improve the efficiency and performance of human resources, but also to identify areas where human interaction is needed and where other technological and human resources could be leveraged.

Lang et al. (2023) examined the impact of human capital (HC) and structural social capital (SSC) on the performance growth of small and medium-sized enterprises (SMEs) in the context of digital transformation (DT). They found that these resources and capabilities, especially in a DT environment, have a key impact on the growth of SMEs. The integration of digital technologies and human capital can be a key factor in the success of SMEs in Industry 5.0. AI enables organizations to process data quickly, leading to improvements in their marketing and sales strategies. Research by Masih and Josih (2023) and Quyet (2024) highlights the transformational impact of AI on all areas of an organization, including human resource management, marketing, and sales, contributing to their efficiency and financial performance.

3. Research objective and methodology

The main aim of this paper is to identify critical areas where the link between SHRM and I5.0 can be explored, with further discussion and an outlook on future research opportunities. We used bibliometric analysis and the PRISMA four-phase flow diagram to conduct a systematic literature review. In line with the stated aim of the paper, the wording of the research question is as follows:

RQ: What is the current knowledge on the relationship between strategic human resource management and Industry 5.0, and in which areas are there research gaps that could provide impetus for further research? When conducting a Prisma analysis, it is important to select the right keywords that will be relevant to the topic. Initially, it was planned to use the keywords 'strategic management', 'human resources', and 'Industry 5.0'. However, in the initial analysis, there were only 3 articles in the database that contained all three keywords. This may be because the topic of Industry 5.0 is relatively new and research in this area is still in its early stages. Considering that enough articles is needed for the analysis, only two keywords were used, namely "strategic management" and "human resources". In the last step of the analysis, the abstracts of the articles were then selected based on which addressed the relationship between strategic management and human resources in the context of Industry 5.0 (e.g., digital transformation, artificial intelligence, big data, sustainability, etc.). This approach thus allowed us to obtain enough articles for analysis.

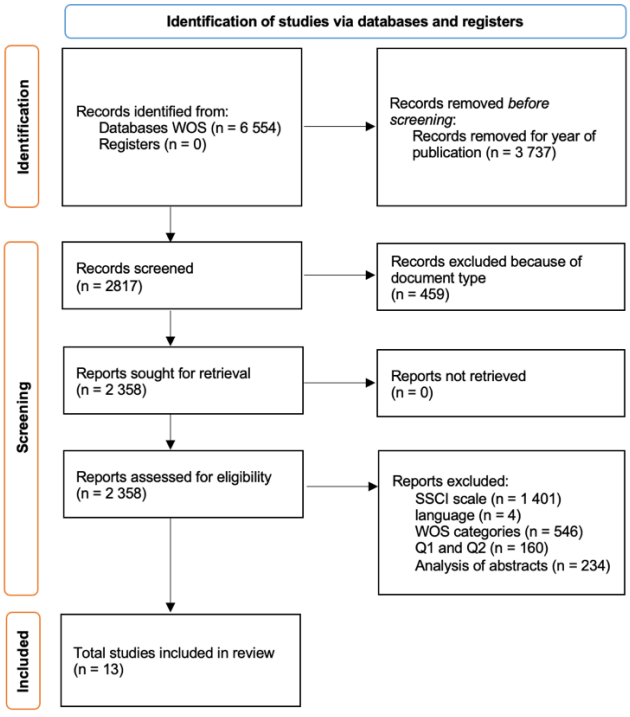


Figure 1. Results of a systematic literature review - PRISMA diagram
Source: own processing

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The keywords "strategic management" and "human resources" were used in the search, which resulted in an initial set of scholarly research (n=6,554). One of the criteria was to only display research that was published between 2018 and 2023 (n=3,737). The next step was to select according to document type, where only articles were selected (n=459). Next, selection based on the SSCI ranking of the journals (n=1401). The next step was selection based on language, where 4 articles were excluded (n=4). Based on Journal Citation Report (JCR), those in Q1 or Q2 were selected resulting in the identification of a total of 247 articles, with 160 articles published in Q3 and Q4. After this step, the research that were analysed in more detail were identified (n=247). The final selection was focused on the analysis of the abstracts of each research, and it can be stated that 234 articles were excluded that were not related to the issue at hand. Figure 1 shows the sequence of steps involved in the analysis in the form of a PRISMA diagram. From the 6554 scientific research initially included, 13 of the most relevant ones in relation to strategic human resource management in the context of Industry 5.0 were identified in this way.

4. Results and discussion

Bibliometric analysis allows researchers to highlight the theoretical underpinnings of a particular research area, identify the main findings of previous studies, and identify future research ideas (Ellili, 2022). This analysis was based on the analysis of the keywords "strategic management" and "human resources". In the first step, the keywords: strategic management and human resources were identified. 6554 results were extracted. Subsequently, criteria for further selection were defined:

- Publication period: 2018-2023
- Document type - article
- Web of Science Index: Social Sciences Citation Index (SSCI)
- Language - English

From the above keywords- 4 clusters were identified. Cluster 1 contains 12 items, cluster 2 contains 11 items, cluster 3 contains 10 items and cluster 4 contains 2 items. In academic papers focusing on strategic management and human resources, the most common key items are for example: performance, strategy, innovation, knowledge, competitive advantage, influence, and firm performance.

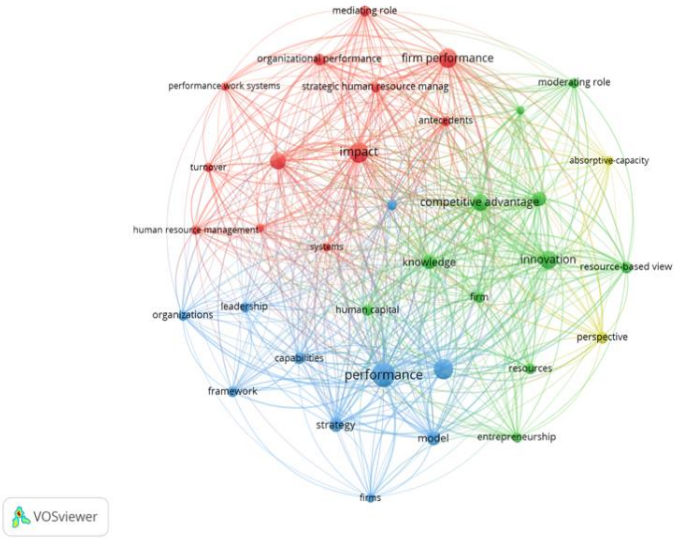


Figure 2. VOSviewer - high occurrence keyword map
Source: own processing

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The keywords that have been shown to be most frequently associated with strategic management and human resources are, for example, knowledge, influence, performance, innovation, competitive advantage, firm performance, capabilities, productivity, efficient work systems, etc. The keywords that are most frequently associated with strategic management and human resources are also relevant to Industry 5.0. For example, knowledge is key to the successful implementation of Industry 5.0 technologies and employee capabilities are key to success in the new industrial era.

Table 1. Studies included in review – author's results

Authors	Results
Belitski et al. (2023)	The relationship between the breadth of knowledge collaboration and innovation depends on several factors. Investment in digital technologies and increasing the share of graduates in science, technology, engineering and mathematics have been shown to be factors that affect the absorptive capacity and transaction costs associated with R&D collaboration.
Cabrilo and Dahms (2018)	Structural and relational capital have a direct impact on innovation performance, while human capital influences innovation in conjunction with strategic knowledge management.
Flechsig et al. (2022)	Identification of technical, organisational and environmental barriers as well as differences between the private and public sectors in the implementation of robotic process automation.
Hamilton and Sodeman (2020)	The impact of big data analytics on HRM with an emphasis on strategic human capital.
He et al. (2023)	Identify the different impacts of organisational resilience dimensions on the organisation and employees, providing insights into the complex relationship between digital transformation and an organisation's ability to cope with uncertain conditions.
Cheng et al. (2023)	IT compensation supports strategic alignment and organizational performance.
Kot and Leszczyński, (2022)	Significant differences in the informational, strategic, transactional, and transformational dimensions of value when using conversational agents compared to other technologies.
Krakowski et al. (2023)	AI-driven technological change can transform sources of competitive advantage and require managers to develop new capabilities to stay relevant in an AI-driven competitive environment.
Lang et al. (2023)	HC and SSC, especially in the DT environment, have a key impact on the growth of SMEs.
Li et al. (2018)	HIWS with employee experience is positively related to innovation, and this positive effect is amplified by all three activators of emergence (i.e., experience homogeneity in HIWS, the strategic importance of innovation, and turnover in human resources).
Minbaeva (2021)	The impact of three megatrends (flexible workforce, digitalisation of business models, artificial intelligence and machine learning) on human resource management.
Nafizah et al. (2023)	Digital technologies have the potential to transform the way businesses operate, and the right strategic approach to deploying these technologies is key to achieving innovation benefits.
Visvizi et al. (2022)	Identifying the key factors that support the development of innovation in data-driven organisations.

Source: own processing

Hamilton and Sodeman (2020) highlight how big data analytics can address strategic issues relating to human capital and how it can contribute to the overall performance of the firm, however, privacy and ethical challenges such as GDPR must be considered. Other studies (Cheng et al., 2023; Krakowski et al., 2023) address specific aspects of IT cost management and technological change, highlighting the importance of competencies in this area. Research related to innovation and digital transformation (Visvizi et al., 2022; He et al., 2023) provides evidence of how the combination of data-driven culture and human capabilities can positively impact innovation and organizational resilience. At the same time, Li et al. (2018) find that HIWS positively impacts innovation

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by shaping the alignment, directionality, and adaptability of collective interactions. In the area of digital transformation, authors Lang et al. (2023) find that human capital and structural social capital have a significant impact on the performance growth of SMEs. In the context of robotic process automation, Flechsig et al. (2022) argue that successful adoption of this technology depends on the digital maturity of organizations and identifies technical, organizational, and environmental barriers as well as differences in its implementation between the private and public sectors. The development of technologies such as artificial intelligence and machine learning brings new challenges and opportunities for human resource management. It is essential to assess how these technologies affect the work of employees and identify the necessary skills and competencies (Nafizah et al., 2023). The necessary skills for implementing new technologies are also discussed by Kot and Leszczynski (2022), who found that the integration of conversational agents may require a restructuring of work processes and employee skills, while strategic human resource management must consider the new relationship between artificial intelligence and human work.

A research gap that emerged from the literature search conducted is the focus on how, for example, artificial intelligence, machine learning, etc. are changing the nature of work, and what are the requirements for new skills, abilities, and competencies in specific job roles, as also highlighted by Nafizah et al. (2023) who emphasise the need to assess the impact of technology on the work of employees and identify the necessary skills. Thus, there is a need to examine what specific skills and competencies will be needed in the digital environment for employees, and how organisations should adapt to develop and support these skills. We also consider it important to explore the impact of digital technologies on interpersonal relationships and collaboration in organisations, and how these technologies can be used to support more effective communication and teamwork. Based on the systematic literature review conducted and the research gap identified, we propose the following implications (I) for further research:

- I1: Optimizing employee training and development in the digital era - Identifying effective models for employee training and development that are best suited for adaptation in the context of digital transformation.
- I2: Skills and competencies for digital transformation - Analysing the necessary skills and competencies for employees in the context of digital transformation and then implementing strategies for their development.
- I3: Impact of digital technologies on working relationships - Exploring the impact of digital technologies on workplace dynamics and interpersonal relationships, including communication, collaboration and team building.
- I4: Artificial Intelligence in Human Resource Management - Exploring the impact of AI on strategic HR decision-making and identifying the best approaches to integrate AI into recruitment, assessment and talent management processes.

Based on a systematic literature review we can answer RQ. We found out, that the areas where we find a link between SHRM and Industry 5.0 are:

- big data analytics in human resource management,
- IT cost and technology change management,
- digital transformation and its impact on innovation
- or organizational resilience.

Based on the conducted systematic literature review several research gaps have emerged, which consist of:

- focusing on such as artificial intelligence, machine learning, etc. can change the nature of work and what are the requirements for new skills, abilities, and competencies in specific job positions,
- the need to examine what specific skills and competencies will be needed in the digital environment for employees and how organizations should adapt to develop and support these skills,
- exploring the impact of digital technologies on interpersonal relationships and cooperation in organizations and how these technologies can be used to support more effective communication and teamwork.

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Conclusions

In this study, we focused on identifying critical areas where the link between Strategic Human Resource Management (SHRM) and Industry 5.0 (I5.0) can be explored, and proposed future research directions. Based on a systematic literature review, several areas were found where SHRM and I5.0 intersect. These areas include big data analysis in HR management, managing IT costs and technological changes, digital transformation, and its impact on innovation and organizational resilience.

We identified a research gap concerning how artificial intelligence, machine learning, and other technologies influence the nature of work and the new skills and abilities required for specific job positions. It is important to investigate the skills necessary in a digital environment and how organizations can support their development. Another crucial area for exploration is the impact of digital technologies on interpersonal relationships and collaboration in organizations, examining how these technologies can enhance communication and teamwork.

Based on the literature review, we proposed several implications for further research. These include identifying effective models for employee training and development in the context of digital transformation, analyzing the necessary skills and competencies, implementing strategies for their development, and examining the impact of artificial intelligence on strategic decision-making in HR and identifying best practices for integrating AI into recruitment, assessment, and talent management processes. These suggestions provide direction for future research in the SHRM and I5.0 domains.

Future research should delve deeper into these relationships and identify the specific strategies and approaches to help organizations thrive in a fast-paced technological environment. Such efforts can lead to better utilization of the potential of digital technologies, while also contributing to sustainability and enhancing the competitiveness of organizations in the world of Industry 5.0.

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APPROACHES TOWARDS HUMAN CAPITAL MANAGEMENT IN SMES*

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Abstract. Human capital management (HCM) impacts enterprises and is a challenge for small and medium-sized enterprises (SMEs). The article aims to explain the essence of HCM and find out how SMEs perceive the concept of HCM and which activities they perform and consider necessary for the future. We used scientific methods such as content analysis, synthesis, induction, deduction, comparison, and modelling. In addition, Cronbach's alpha, descriptive statistics and chi-square test were calculated. The data we process are the result of a questionnaire survey from 2020 (682 subjects) and from 2021 (477 subjects). We found that SMEs in 2021 considered the HCM concept more relevant to their future. In 2020, up to 40.76% of SMEs in Slovakia still perceived employees only as costs. The positive impact of the HCM concept on the company's financial situation and competitiveness was also confirmed.

Keywords: Human Capital; Human Capital Management; SMEs; Financial Performance; Competitiveness.

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JEL Classifications: J01, J08, J53

1. Introduction

Since a large enterprise has more than 250 employees and an annual turnover of more than 50 million euros, it is natural that the concept of HCM and modern digital technologies go hand in hand and, in this area, are often used. However, looking at small and medium-sized enterprises (SMEs), which comprise Slovakia's most significant part of the economy, is also necessary. Slovakia is considered the centre of Europe and an automotive powerhouse, so paying attention to companies operating in this country is essential.

Domestic and foreign literature provides ample information on the issues encountered by SMEs. Nevertheless, only a few authors have addressed SMEs' linkage with the HCM concept. The literature emphasizes the great importance of SMEs in countries' economies. This type of enterprise contributes significantly to the gross domestic product and increased employment. Their biggest problem tends to be penetrating foreign markets because they do not have the technology or the perception to compete with foreign firms.

The importance of human resources (employees), which are made up of human capital (knowledge, skills, competencies, motivation, attitudes, values, behaviour of people) has been confirmed by exploring the

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sustainability of businesses (Androniceanu & Georgescu, 2023; De la Rosa-Navarro et al., 2024), corporate innovation (Wang et al., 2024), corporate culture and values (Wieschollek & Dlouhý, 2022), and business performance (Popescu, 2022; Wood et al., 2023).

A comprehensive overview of changes, roles and continuities within HRM/human capital is provided by Cayrat and Boxall (2023), who found that strategic HRM must also consider stakeholders' values, goals and strategies; thereby, the performance and competitiveness of enterprises will be supported.

Many factors influence SMEs, and changes in the market environment and the country's economy are more challenging to small enterprises than large ones. In 2020, Slovakia experienced an outbreak of COVID-19, which limited the activities of SMEs until the end of 2021. At that time, the owners and managers of these businesses realised what was most important to them and changed their position vis-à-vis their employees.

We were therefore interested in how this perception of SMEs towards employees changed at the onset of COVID-19 but also at its peak and decline (2020-2021). Thus, this paper aims to explain the essence of HCM and to find out how SMEs in Slovakia perceive the concept of HCM and which of its activities they perform and consider important for the future functioning of the business.

2 Theoretical backgrounds

2.1 Small and Medium-Sized Enterprises (SMEs) in optics of HCM

Small and medium-sized enterprises (SMEs) form a vital part of the economy of any country with the most tremendous potential for growth and impact on economic stabilisation. Their success or failure depends not only on know-how, capital, or machinery but also on people, which is one of their competitive advantages and a critical success factor (Hitka et al., 2021). Existing studies confirm the importance of SMEs to any country's economy, even though often these enterprises are less financially supported than larger ones and thus have more difficulty implementing the modern technologies that drive the current economy (Vlasov, 2020; Shou, 2022; Chen et al., 2022).

According to the European Commission, which issued a Recommendation in 2003 defining the size criteria for enterprises, there are four basic types of enterprises (Table 1).

Table 1. Enterprise size and characteristics

Enterprise category	Number of Employees	Annual turnover	Annual Balance Amount
Micro	0 to 9	≤ € 2 million	≤ € 2 million
Small	10 to 49	≤ € 10 million	≤ € 10 million
Medium–Sized	50 to 249	≤ € 50 million	≤ € 43 million
Big	250 and more	> € 50 million and more	> € 43 million and more

Source: processed by EC – Eur-Lex, 2003; EC, 2023

We can categorize SMEs from other enterprises according to the European Commission (2020) as follows:

- Independent enterprises - independent to other enterprises in the market, or one or sometimes more partnerships, but with a minority shareholding (less than 25%), i.e. an enterprise may have a maximum of 25% shareholding in another enterprise or enterprises in the market have a maximum of 25% shareholding in a given enterprise,
- Partner enterprises - established mutual partnerships with other enterprises in the market with shareholdings ranging from 25 % to 50 %,
- Affiliated enterprises - SMEs in which other enterprises in the market have more than 50 % ownership

Successful businesses need to invest in human capital, which is considered the cornerstone of success, i.e. business growth and development. People drive individual businesses forward or make companies stagnate in one place (Castillo et al., 2019). Through human capital, SMEs can increase their competitiveness in the

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marketplace and gain some competitive advantage, enabling the business to grow and develop further (Strielkowski et al., 2021). These advantages are even more significant in SMEs if companies use digital technologies like Big Data (Koman et al., 2022). Despite these advantages, Zhao and Thompson (2019) and (Lu et al., 2023) point to the underinvestment in human capital in the SME environment. Investing in HC deepens the knowledge and improves the skills of managers, which can contribute to better managers' decision-making skills in times of risk and thus support the growth potential of the enterprise.

Various surveys (Andalib & Halim, 2019; Pech & Vrchota, 2020; Hernita et al., 2021) have pointed out that SMEs face different challenges and to sustain in a highly competitive market, they should use some of the digital technologies that Industry 4.0 brings with it. Government and owners and managers have the most significant influence on the sustainability of businesses. In addition to supporting the digital sphere of SMEs, the owners and managers of such enterprises should also pay attention to the development of human capital, which significantly impacts the economic performance and sustainability of such enterprises. Based on research by Mura et al. (2023), if the enterprise is open to innovation and knowledge is transferred by using electronic devices, the enterprise supports new ideas, and the employees are free to express their opinions.

Human capital development is about deepening the knowledge and skills needed to use the digital technologies that a business introduces. This confirms the fact that the technological development of enterprises must be linked to the development of human capital. However, according to experts, we should avoid cyber attacks, which are becoming more intense and complex as they reflect an increasing level of sophistication (Steingartner et al., 2021a, 2021b).

2.2 Human Capital Management - essence, measurements

HCM is a relatively new concept of managing people in organisations. In the literature, we encounter its various definitions. We have compared some of them to develop a more comprehensive view of the concept by defining the essence, objectives, activities (mainly focused on measuring human capital and its use) and the meaning of HCM for the enterprise.

We can also define HCM as an effort to maintain and further develop the human capital in an enterprise through its employees and their capabilities. The primary reason for using these capabilities is to create an advantage over competitors. HCM provides a way of aligning people's views from an economic and human perspective.
Of course, financial reporting standards do not allow human capital to be accounted for in the same way as financial capital. However, it can be considered as something of value, i.e., if properly managed, it can be recognised and used to make more than short-term profit. While measurement in HCM for HRM is essential, it is more of a way to lead people to great results. HCM is about creating enterprise value through people. By focusing on keeping employees happy and achieving their full potential, the performance of the business is improved, and so is its bottom line.

The HCM concept frequently appears in all spheres of the economy. Zhyvko et al. (2020), in turn, investigated the increase in the level of human capital within the framework of the implementation of the HCM process as a basis for ensuring the economic security of the enterprise. Related to the above is the research of Nikitochkina (2021), who, based on the analysis of domestic and international research, identified the characteristics of HCM and the factors influencing the recruitment, retention and development process of employees of generations X, Y and Z.

Human capital consists of the knowledge, experience, skills, and other qualities an organisation's workforce displays. Management then means knowing how to use quantitative tools to measure these qualities (worker performance measures) and using them most effectively. HCM represents the ability to reinforce the belief that people are an asset rather than a cost, the need to create a strategy and adapt HRM processes to make the value needed to achieve the organisation's goals, the way to develop the necessary strategy, the need for partners in the form of HR specialists, the ability to learn what to measure and how to measure it, the way to demonstrate that a well-managed employee delivers excellent results and points the direction in which the strategy should be heading.

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2.3 Human Capital Management - strategic approach, relationship to performance and competitiveness

Several authors, documents and institutions emphasize the strategic approach to HCM. For example, the European Public Policy Partnership (2016) describes the area of human capital as a fundamental determinant of the future success of any business, given that its value increases over time, so there is a need to understand the importance of HCM and to look at people as a resource rather than just as a cost item. Therefore, HCM should be conceptualised as a strategic, thoughtful and logical approach to managing the people working in an enterprise, contributing individually or collectively to achieving its goals—the strategic orientation towards human capital and investment in HR that leads to improved business performance. Also, according to the HCM, it is a strategic approach to people management that focuses on critical issues for organisational success. This approach considers people management as a high level of strategic decision-making and consists of systematically analysing, measuring and evaluating how people create value. Khosroeva et al. (2019) emphasise strategic HCM at the macroeconomic level as an essential factor in the innovative development of the economy. They note that human capital needs adequate and modern governance mechanisms to change the impact of identified negative trends in socio-economic development. The solution to the problem of economic growth, improving the population's quality of life, and increasing human capital is mainly in balance and is determined by budget allocations to education and health. Planning under HCM enables organizations to create and shape a pool of resources ready to achieve strategic goals. This attitude provides several benefits to organizations, including development, career counselling and recruitment efforts; using resources more efficiently and effectively, ensuring the same or more work is accomplished by fewer employees; providing realistic staffing projections for budgeting purposes; helping to maintain or strengthen human capital; helping to prepare for human capital formation and development; and providing a clear rationale for training and retraining expenditures, to name a few. However, it is also necessary to emphasize the possible depreciation of the components of human capital, e.g., forgetting, a natural process in humans that usually occurs with increasing age or illness.

The importance of HCM for HC development is also underlined by researchers (Samoilovych et al., 2022). Implementing HCM in enterprises is of practical importance if it increases performance, efficiency and competitiveness. Within the enterprise-level research, HCM has remained in a narrower scope, referring to the measurement and analysis of HR metrics such as employee turnover, cost per employee, and training and learning effectiveness. This aspect of HCM can provide meaningful feedback for assessing the functioning and effectiveness of the broader HCM system. However, its limitations are a need for more emphasis on efficiency, effectiveness, and evaluation of results. Several authors have disputed this in their research papers and have sought tools to demonstrate the linkage between HCM and business outcomes.

HCM describes some activities that manage human capital in an organization to increase organizational competitive value through individual capabilities to achieve higher performance levels. The impact of working capital management on corporate profitability has also been investigated by (Deari et al., 2022). A remarkable result of this study is an inverted U-shaped relationship between working capital management and firm profitability. Lin et al. (2017) empirically tested the relationships between HCM, employee value and uniqueness, and organizational competitiveness. Their research found that people development and onboarding practices and the design of job-specific training led to increased employee value and uniqueness, but companies could not retain them. It is the successfully implemented HCM that should address this challenge. Human capital, together with structural capital, represents intellectual capital. Osibanjo et al. (2020) examined the impact of selected HCM dimensions on employer-employee relationships, collaboration and communication and employee engagement in hospitals. The analysis revealed that when employers invest in the human capital of their employees, their commitment to perform their work effectively increases, thus contributing to the improvement of the company. These findings were also confirmed in the research by Salau et al. (2018). According to (Toszewska-Czerniej, 2018), the creation of competitive advantage is based on the ability of the enterprise to provide value to the customer. The critical factor here is human capital, which employees carry in enterprises. Asri et al. (2021) examined the impact of physical and human capital on the financial situation of regions and found a strong positive effect of human capital on the financial situation of regions in all regression models used. Human capital affects not only the economic situation but also the environmental situation and institutional conditions. Zulkifli et al. (2018) and Sprajc et al. (2018) emphasize that HCM tends to increase the

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performance and value of the firm, thus moving towards competitiveness. Iwamoto and Suzuki (2019) confirmed that HCM is an essential factor contributing to the success of corporate social responsibility activities and the implementation of quality management. Cameron (2023) even confirmed the positive impact of effectively implemented HCM on communication, efficiency and work team performance in a surgery department in Maryland, USA. Koman et al. (2023) confirmed in their research that the success of HCM and HRM also depends on using information systems that speed up, simplify and improve individual personnel processes. They emphasize that paying attention to the possible risks of digitisation is also essential.

It can sometimes be challenging to demonstrate a clear link between the effectiveness of HCM and the success of a business. It is for this reason that we conducted our questionnaire survey.

3. Methodology, materials and hypothesis

The article aims to explain the essence of HCM and to find out how Slovak SMEs perceive the concept of HCM and which activities they perform and consider necessary for the future functioning of the enterprise. We used methods such as analysis, synthesis, induction, and deduction, as well as content analysis, modelling methods, or comparison when comparing the opinions of individual authors. We calculated Cronbach's alpha and descriptive statistics and used the chi-square test to detect dependencies between variables.

We used a questionnaire survey in 2020/2021 and 2021/2022 to achieve the article's aims. The respondents were managers or owners of Slovak SMEs. We set a confidence level of 95% and a significance level of $\alpha = 5\%$ (0.05). In 2020/2021, 682 SMEs participated in the survey and 2021/2022, it was 477 SMEs.

In the core of the questionnaire, a Likert scale from 1 to 5 was used, while its interpretation depended on the answer, which could refer to the actual application (reality), in which case 1 – do not apply, 2 – do not apply yet, 3 – do not know, 4 – apply partially, and 5 –apply, or degrees of importance (future), when 1 – unimportant, 2 – rather unimportant, 3 – do not know, 4 – rather important and 5 – important. Answers 4 and 5 are considered "applicable" and "important". Answers 1 and 2 are understood as "not applicable" and "unimportant". Answer 3 will tell us more about the management staff's awareness of HCM.

To find out how Slovak SMEs perceive the concept of HCM and which of its activities they perform and consider important for the future functioning of the company, we looked for answers to 6 research questions (RQ):
RQ1: Are employees considered wealth (an intangible asset) in your enterprise?
RQ2: Does your enterprise have an HCM concept in place?
RQ3: Is the size and value of HC measured in your enterprise?
RQ4: Do you evaluate turnover costs in the enterprise?
RQ5: Does HCM improve the enterprise´s financial situation?
RQ6: Does the HCM concept increase the enterprise's competitiveness?
The research questions formed the framework for the hypotheses. We also set out two scientific hypotheses that will help us to understand further the perception of the concept of HCM among SMEs in Slovakia in 2021/2022:
H1: The introduction and use of the HCM concept has a demonstrably positive effect on the enterprise financial situation.
H2: The introduction and use of the HCM concept demonstrably increase the enterprise's competitiveness.

4. Results and implications in practice

We found that Cronbach's alpha is 0.98 ($\alpha > 0.70$), which means that the created and processed questionnaire is reliable, consistent, and suitable for investigating the issue of HCM use in SMEs. We focused on the SME category (Table 2), and in 2020/2021, 682 SMEs participated in the survey, and in 2021/2022 it was 477 SMEs.

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Table 2. Number of responses from the questionnaire in terms of the size of the economic entity

Size Criterion	2020		2021	
	Relative abundance	Absolute abundance	Relative abundance	Absolute abundance
Micro (1 to 9)	268	39.30 %	245	51.36 %
Small (10 to 49)	212	31.08 %	133	27.88 %
Medium-Sized (50 to 249)	202	29.62 %	99	20.76 %
SME total	**682**	**100.00 %**	**477**	**100.00 %**

Source: own processing

We used four questions from the questionnaire (Table 3), which focus on how SMEs perceive the HCM concept and which activities they perform and consider substantial for the future functioning of the enterprise.

Table 3. HCM concept - real application

Concept HCM	2020			2021		
Employees are treated as wealth (intangible asset)	278	211	193	78	100	299
The entity has a HCM concept	264	206	212	155	146	176
The entity ascertains the size and value of HC	257	204	221	136	126	215
The entity evaluates turnover costs	319	170	193	165	133	179

Source: own processing

It is striking that in 2020/2021, as many as 278 SMEs (40.76%) considered their employees just a cost. So, they looked at them mainly through personal costs. Even though in the case of the degree of importance for the future, 281 SMEs (41.20%) identified it as substantial to perceive employees as wealth, i.e., an intangible asset. In 2021/2022, there was a change probably caused by the disease COVID-19, when employers valued their employees more, and employees were grateful for their work. In the given year, 299 SMEs (62.68%) indicated that they consider their employees as an intangible asset, and 316 SMEs (66.25%) considered such a positive attitude towards employees to be important in the future.

More than a third of SMEs (264; 38.71%) in 2020/2021 did not have an HCM concept in place, and what is worse, up to 30.21% of SME managers and owners did not know whether they had such a concept in place or not. Up to 68.92% of SMEs still needed the HCM concept in 2020/2021. As part of the question regarding the degree of importance for the future, up to 44.57% consider it unimportant that the HCM concept be introduced in SMEs. In 2021/2022, managers perceived the issue of HCM positively, and only 36.90% (176) of SMEs stated that they had implemented the HCM concept. On a positive note, it is possible to assess the level of importance, as 218 (45.70%) SMEs stated that this is an important activity the enterprise should have in place. The results are almost identical in both years regarding the degree of importance for the future.

In 2020/2021, only 32.40% (221) of SMEs devoted themselves to determining the size and value of HC, while 37.68% did not perform this activity at all, and 29.91% of SMEs could not answer the question because they did not have sufficient knowledge of the issue. Interestingly, as part of the level of importance for the future, 41.06% of SMEs considered it substantial to determine the size and value of the HC of their employees. In 2021/2022, the positive expectations of the enterprises were fulfilled and 45.07% (215) of SMEs determined the size and value of HC. This positive tendency is likely to continue, as even in 2021/2022, almost half of SMEs (49.06%) considered this area substantial for the future of the enterprise.

The last question dealt with turnover costs. Fluctuation represents the movement of employees to and from the enterprise, i.e., the ratio between terminated employment and the average number of employees. High turnover causes increased costs of recruiting and onboarding new employees, while high HC employees may leave the enterprise. In 2020/2021, up to 46.77% (319) of SMEs did not monitor turnover costs, while 36.80% considered it very important for the future of the enterprise. The problem can be a need for more information from managers and business owners about what they should imagine under the term turnover costs, how they should calculate

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them and what they can use the obtained results for. In 2021/2022, only 37.53% tracked these costs, while 34.59% did not track them, and 27.88% did not know about them. We can positively evaluate the fact that in 2021/2022, 41.93% of SMEs were aware of the importance of this type of cost for the future of the enterprise. The impact of HCM implementation on the results of SMEs (Table 4) can be an improvement in the enterprise's financial situation and an increase in competitiveness.

Table 4. Impact of HCM on the subject - real application

Impacts of HCM	2020			2021		
The HCM concept improves the entity's financial situation.	275	223	184	129	147	201
The HCM concept increases the competitiveness of the entity.	259	202	221	119	147	211

Source: own processing

Only 26.98% of SMEs were aware of the positive impact of the HCM concept on the enterprise's financial situation in 2020/2021, while up to 40.32% did not consider that their financial situation would improve thanks to the HCM concept. In 2020/2021, as part of evaluating the degree of importance for the future, 38.12% of SMEs considered that HCM improves their financial situation to be substantial. In 2021/2022, 42.14% of SMEs were aware that HCM positively impacts their financial side, and up to 49.27% considered it substantial for the future. In 2020/2021, 32.40% of SMEs were aware of increasing the enterprise's competitiveness thanks to an established HCM concept, and 39.74% of SMEs considered it substantial to have an established HCM concept to increase their competitiveness. In 2021/2022, the numbers increased, and up to 44.23% of SMEs said that the HCM concept helped them to increase their competitiveness. Up to 50.10% of SMEs consider the mentioned idea towards the future to be substantial. From this, SMEs, based on the experience of other enterprises, will introduce the HCM concept to improve their position in the market and increase their competitiveness.

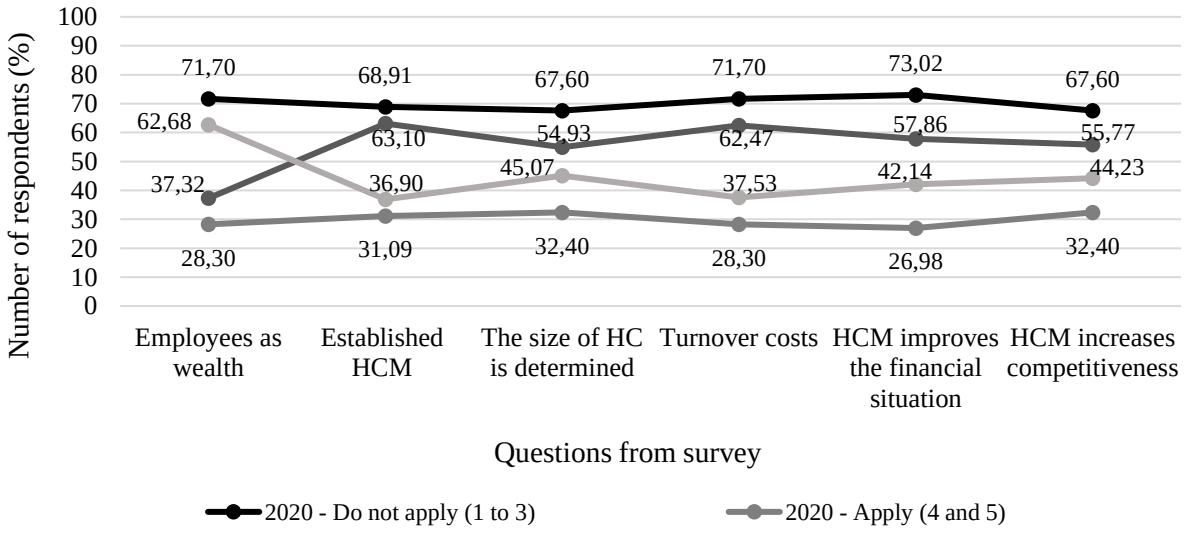


Figure 1. Comparison of actual application in 2020/2021 and 2021/2022
Source: own processing

The data in Figure 1 and Figure 2 are given in percentages. In both 2020/2021 and 2021/2022, the curves showing responses 1 to 3 are well above those showing respondents' positive responses. Even in 2020/2021, a minimum of 67.60% and a maximum of 73.02%, indicated a negative answer. A year later, the opinions of SMEs changed, and a negative answer (options 1 to 3) was indicated by a minimum of 37.32% (178 SMEs) and a maximum of 63.10%, representing 301 SMEs. Interestingly, in 2020/2021 when applying and not applying a given element of the HCM concept, the responses of SMEs ranged in the same only 5.42% interval. The year 2021/2022 showed that economic entities began to consider their employees more as an asset than just a cost, and the differences between individual answers also decreased. The biggest difference was noted in introducing the HCM concept and in the question regarding the evaluation of turnover costs.

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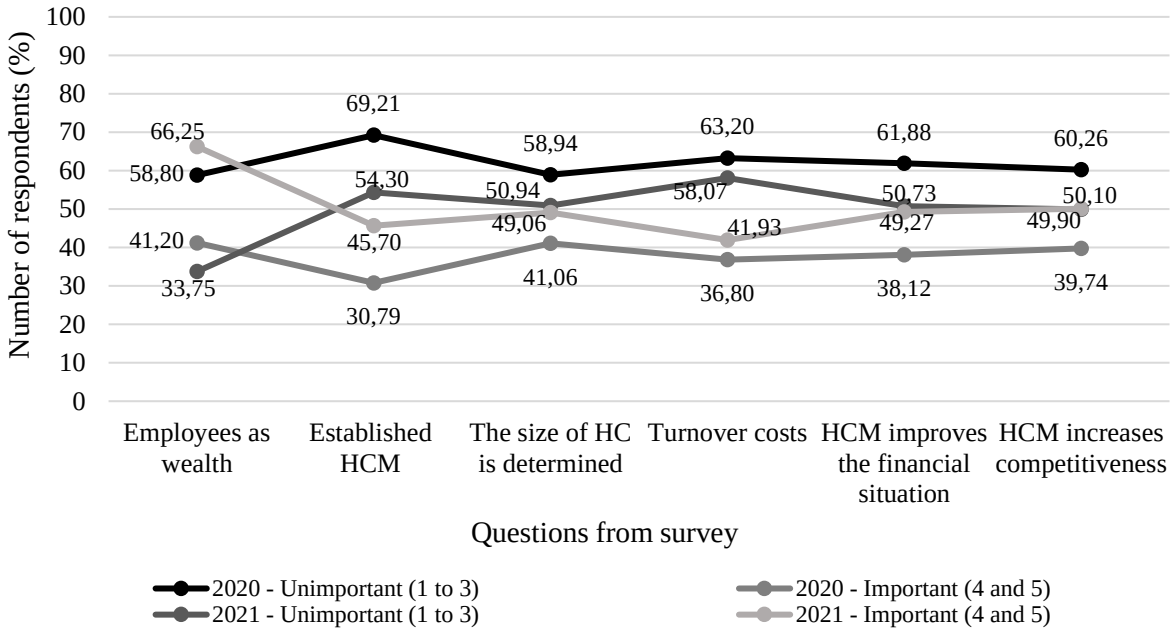


Figure 2. Comparison of the degree of importance in 2020/2021 and 2021/2022
Source: own processing

The most significant difference in the degree of importance for the future was in introducing the HCM concept and the question concerning the detection of turnover costs. Since these two questions had the most significant difference between positive (4 and 5) and negative (1 to 3) answers, the respondents did not understand the given questions, or they did not understand the mentioned concepts. We noticed an improvement in the situation in Slovak SMEs because when comparing the years 2020/2021 and 2021/2022, the number of positive answers increased (4 and 5). Based on the analysis of the HCM concept, we performed descriptive statistics on four out of six questions based on data from 2020/2021 (Table 5).

Table 5. Descriptive statistics of selected HCM questions in 2020/2021

Descriptive Statistics features	Size of HC	HCM increases competitiveness	HCM improves the financial situation	Fluctuation costs
Number (n)	682	682	682	682
Mean	2.83	2.83	2.72	2.61
95 % confidence interval – upper	2.92	2.93	2.81	2.71
95 % confidence interval - lower	2.73	2.73	2.62	2.51
Median	3.00	3.00	3.00	3.00
Mode	300	3.00	3.00	1.00
Standard Deviation	1.31	1.28	1.26	1.35
Variance	1.71	1.65	1.58	1.83
Kurtosis	-1.09	-1.06	-0.98	-1.17
Skewness	0.01	-0.02	0.09	0.23
Variaton range	4.00	4.00	4.00	4.00
Minimum value	1	1	1	1
Maximum value	5	5	5	5
Sum - Total	1 928.00	1 928.00	1 852.00	1 782.00

Source: own processing

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It is interesting that even though for the mentioned four questions related to HCM, at least 26.98% of SMEs stated that they implement the given activity, the most frequent answer was the value 3, even for the last one, it was 1, that is, that the owners and managers do not know whether the given activity they implement in the enterprise, or they do not implement it rather than implement it. The kurtosis values take on negative values in all cases, which means that the data distribution in the file is flatter, and there are more extreme values in the file. The coefficient of skewness mainly acquires positive values, which means that in three cases, it is a left-skewed distribution of values in a set with lower values. In two cases, the file had an almost symmetrical distribution of data. The average deviation from the arithmetic mean is between 1.51 and 1.71. For comparison, we also performed descriptive statistics in 2021/2022 (Table 6).

Table 6. Descriptive statistics of selected HCM questions in 2021/2022

Descriptive Statistics features	**HC as a wealth**	**HCM increases competitiveness**	**Size of HC**	**HCM improves the financial situation**	**Fluctuation costs**	**HCM concept**
Number (n)	477	477	477	477	477	477
Mean	3.65	3.16	3.14	3.11	2.96	2.92
95 % confidence interval – upper	3.76	3.28	3.26	3.23	3.08	3.04
95 % confidence interval - lower	3.54	3.04	3.02	3.00	2.84	2.80
Median	3.00	3.00	3.00	3.00	3.00	3.00
Mode	4.00	3.00	4.00	3.00	3.00	3.00
Standard Deviation	1.25	1.30	1.31	1.28	1.36	1.33
Variance	1.56	1.69	1.72	1.65	1.84	1.78
Kurtosis	-0.26	-0.86	-0.98	-0.89	-1.15	-1.12
Skewness	-0.80	-0.39	-0.33	-0.32	-0.09	-0.17
Variation range	4.00	4.00	4.00	4.00	4.00	4.00
Minimum value	1	1	1	1	1	1
Maximum value	5	5	5	5	5	5
Sum - Total	1 740.00	1 508.00	1 497.00	1 484.00	1 413.00	1 391.00

Source: own processing

Due to the impact of the COVID-19 disease, in 2021/2022 the number of SMEs implementing the given activities increased, even though the total number was lower than in 2020/2021. This is evidenced by the average indicator, which oscillates in the interval 3.10-3.65, while the previous year's values were 2.80-3.30. Similarly, the most frequently occurring value was the answer 4; they implement the activity at least partially. The deviation from the arithmetic mean is in the interval 1.56-1.78. The coefficient of spiciness and skewness acquire exclusively negative values, i.e., a flat distribution of data in the set skewed to the right, located further from the average, and there are several extreme (higher) values.

Table 7. Statistical testing of hypotheses

Signpost	**H1**	**H2**
Degrees of freedom (df)	4	4
Chi square test (χ^2)	273,97	39,37
Chi-square test table.	9,49	9,49
P-value	0,0000	0,0000
Significance level (α)	0,05	0,05
The result	**confirmed**	**confirmed**

Source: own processing

For a more thorough examination of the issue, we established two hypotheses, which we statistically verified thanks to the 2021/2022 questionnaire data and additional secondary sources (Table 7).

H1: The introduction and use of the HCM concept have a demonstrably positive effect on the financial situation of SMEs.

H2: The introduction and use of the HCM concept demonstrably increase the competitiveness of SMEs.

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We calculated the Kolmogorov-Smirnov test, which speaks about the normality of the data distribution in the analysed set, and the Levene test, which tests the agreement of the variances of the data in the set. Both tests came out at 0.000, a value lower than the established significance level (0.05). It follows that hypotheses cannot be tested with parametric tests but only with tests belonging to the group of non-parametric ones - e.g., the chi-square test.

Since the calculated chi-square test value for both hypotheses (H1, H2) was much higher than its tabular value, and the determined significance level was higher than the calculated p-value, both hypotheses (H1 and H2) were confirmed. A more negligible dependence was identified for H2 with a value of 0.28, i.e., a weak dependence. H1 had moderate dependence (Pearson's C = 0.60).

Therefore, based on the survey carried out on the conditions of Slovak SMEs, the introduction and use of the HCM concept has a demonstrably positive effect on the financial situation of SMEs (H1 confirmed). H2 also confirmed that introducing and using the HCM concept demonstrably increases the competitiveness of SMEs.

5. Discussion and conclusions

Human capital management is an approach where people in a company are viewed as an intangible asset that forms part of the company's value and not as a cost item. The unit resource of human capital in conjunction with units of output was previously addressed by Gallagher et al. (2022). Our ambition was to explain the essence of HCM and point out the activities carried out in connection with the implementation of HCM in the practice of SMEs in Slovakia in 2020/2021 and 2021/2022. We also investigated the impact on the company's results if companies implement HCM.

We found that if SMEs in Slovakia implement the HCM concept, it positively impacts the financial situation and the competitiveness of companies. These hypotheses were confirmed in 2020/2021 and also in 2021/2022. Considering the confirmation of the hypotheses, we are of the opinion that companies can significantly improve their financial situation (the costs of recruitment, selection, orientation and adaptation of employees will be reduced), which will contribute to higher efficiency (regular employees will not have to train newly hired employees, but will always devote their work) and finally to increase competitiveness (with a stable staff, the company can more quickly accept changes and move forward). Regardless of the country in which they are based, businesses can move forward, be inspired and implement the concept of human capital management thanks to our findings.

The study of Sahban et al. (2021) confirmed the positive impact of people orientation in the organization of SMEs on its results. Knowledge, abilities and skills of the entrepreneurs themselves, founders of enterprises, can contribute to the success of SMEs, which was confirmed in research works, for example, by El Shoubaki et al. (2020) and Zhang et al. (2023). Block et al. (2017) state that entrepreneurs' human capital contributes to SMEs' innovativeness. On the contrary, Huang et al. (2023), based on research conducted in China, found that in high-tech companies, there is a mismatch of human capital (human capital mismatch) and innovation performance, which can be eliminated, for example, by investments in HC. According to Safránková, Sikýr (2020), to cope with the challenges, SMEs should apply appropriate strategies, policies and procedures in human resources management to attract enough talented and motivated people and ensure the development of their potential towards increased performance.

In 2021/2022, compared to 2020/2021, due to COVID-19, interest in introducing HCM and its importance for the future of businesses increased in Slovak SMEs. Although our survey showed that the introduction of the HCM concept has a positive effect on the operation of the enterprise (statistical results from 2021/2022), SMEs in Slovakia, especially in 2020/2021, did not have this opinion and perceived their employees only as a production factor that is reflected in the company only in cost items. Due to the impact of the COVID-19 disease, the situation regarding the concept of HCM and employees in Slovakia improved between 2020/2021 and 2021/2022, which was also shown by the analysis of the data and their mutual comparison. While in 2020/2021, at least 32% of the subjects expressed themselves positively (answers 4 and 5) in the analyzed questions related to HCM, in 2021/2022, at least 45% of the subjects expressed themselves positively in the same number of

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questions (answers 4 and 5). We assume that this positive phenomenon was caused by the COVID-19 disease, during which employers (SMEs) began valuing their employees more and providing them with educational courses and training to a greater extent, which increased the value of their HC. Unfortunately, in most companies, employees are only considered a cost item in accounting. Their value in the form of an intangible asset is more likely to be realized by companies that implement investment activities or are focused on IT and marketing, where it takes a long time for an employee to learn. Also, developing and using various new applications like digitalization, augmented reality (AR), virtual reality (VR), or embedded 3D viewers help improve employees' skills (Papp, 2021; Toth et al., 2023).

For SMEs, investments (Malichová & Mičiak, 2019) and education are of great importance as critical investments in HC in the era of digitization and Industry 4.0 (Irtyshcheva et al., 2020; Maltseva et al., 2021). In connection with developments influenced by digitization, as well as the crisis caused by the Covid-19 pandemic and not small changes in the demands of employees on the working environment across all generations, new tools and management concepts are being developed in the field of human resources to maintain competitiveness (Stacho et al., 2022). Increasing qualifications, deepening knowledge and improving skills increase the attractiveness of employees both in the company and in the labour market. If an organization emphasizes education and career development, it can expect an increase in reciprocity, performance and a decrease in employee turnover (Ng et al., 2022). The perception of employees and their HC as wealth for the company can be part of the marketing strategy of companies (Ližbetinová et al., 2019) and part of the creation of the value of the company for interested groups (Kusnírová et al., 2023). Flexibility, personal development, and further education will be decisive in transforming various organizations, such as agricultural and forestry organizations (Hitka et al., 2023). Therefore, we see the possibility of continuing research in the field of education, which is part of the HCM concept. However, within HCM and social policy, businesses need to consider the findings of Giuliani et al. (2023), who found that companies that rely on financial performance have an incorrectly set social policy, i.e. HCM.

For the implementation of the HCM concept associated with the requirement to increase not only the performance but also the competitiveness of a specific enterprise, it is necessary to raise the awareness of managers and business owners about the HCM concept so that they can design and use metrics for HCM, adapt them to specific business conditions, and in the context of corporate strategy. Human resource managers themselves need to be educated in this area.

The limitation of our article is the implementation of a questionnaire survey in only one country (Slovakia). However, the questionnaire provides enough quantitative and qualitative data from various organizations. Another limitation of the article is the focus on small and medium-sized enterprises because it is a size category that only sometimes has defined departments; that is, few enterprises use human capital management.

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BUILDING AWARENESS OF THE ROLE OF KNOWLEDGE: RISKS OF KNOWLEDGE FOR PUBLIC SECURITY AND ORGANISATIONS*

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Abstract. Knowledge leads to wisdom and creates the 'intellectual excellence of organisation'. Building awareness of the role of knowledge is key in the effort to protect knowledge. It includes being aware of the benefits of knowledge and the risks that threaten and devalue it. The paper proposes a simple model of building knowledge awareness in organisations and presents a new classification of security knowledge risks. The empirical part presents a survey's results on a sample of N = 900 Czech and Polish respondents. With the use of Pearson's correlation coefficient, both of the formulated hypotheses were confirmed: (H1) The perception of knowledge benefits for employees as well as organisations and knowledge risks of Czech versus Polish respondents is correlated; (H2) The benefits of appropriate knowledge management, provided to the employees and the organisation, correlate mutually. The conclusion presents the measures for better use and protect knowledge.

Keywords: knowledge management; risks and threats; awareness; model; public security; security of organizations

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1. Introduction

In the third decade of the 3rd millennium, the amount and complexity of all knowledge generated by individuals and teams worldwide is growing at an incredible rate. Knowledge-based societies are being established, and the number of knowledge-based organisations is increasing (Nicolaescu et al., 2020; Ngah and Wong, 2020; Wang et

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al. 2021; Sart, 2023; Schenk, 2023; etc.). Knowledge takes on new forms, and new layers and ways of connecting them arise.

Often, knowledge in organisations is threatened and devalued by natural means and/or organisational processes, e.g., by the departure of key experts from the organisation (Bratianu, Nestian and Guta, 2022), knowledge gaps (Federico et al., 2023), knowledge obsolescence (Ramírez-Montoya, 2021); hiding (Bai, 2020), concealing (Wu et al., 2022) or non-sharing of knowledge with others (Xu, Huang and Huang 2023); forgetting or losing key senses and contents (Sumbal et al., 2018); and many others. In addition, knowledge risk is associated with any knowledge activity under the pressure of uncertainty (Bratianu, 2018). The unpleasant fact is that organisations also become the target of hackers and other attacks, with the primary goal of extracting, damaging or stealing important subjects (expert) and management knowledge (Čáp, Breu and Prošek, 2022; Carayannis and Grigoroudis, 2023). For this reason, protecting knowledge in knowledge-based organisations becomes a priority.

In addition to knowledge management in private organisations, which the literature deals with in abundance (e.g., do Céu Morais Cláudio and Santos 2023; Zhang et al. 2023; etc.), the literature pays relatively little attention to the study of knowledge in state and public security organisations. On the one hand, public administration and security organisations have generated a lot of unique knowledge and procedures by which they effectively fight against illegal activity and protect values, lives, key principles of safety and critical infrastructure (Dempsey et al. 2019). On the other hand, they also build managerial knowledge over the years, i.e., how to effectively manage the public and security sector (Hess et al. 2022; Bolade, 2023). This management knowledge, together with performance-active knowledge, represents the knowledge foundation of state security and, indirectly, of the management security and know-how of other organisations throughout the state.

Therefore, the paper's *first scientific aim* is to focus on knowledge and knowledge risk in organisations of various sectors and compare organisations of the public security sector with standard sectors. The *second aim* is to search for the benefits of knowledge and proper knowledge management from the individuals' and the organisation's point of view. The *third aim* is to conduct research in two European countries so that the results will gain an inter-sectoral and international perspective.

By fulfilling all partial aims and establishing two hypotheses, the *comprehensive intention of the paper* is to eliminate the existing gap in the literature and to enrich the current scientific base of management, knowledge management, and security management. An original contribution will be the proposal of a new classification of security/law knowledge risks, a simple model of building awareness of the knowledge's role in the organisation, results of international surveys, and ways to prevent knowledge risks and increase awareness of knowledge and its securitisation.

2. Theoretical background, own premises and hypotheses

In the knowledge-based economy, knowledge is an absolute wealth for organisations to efficiently meet their tasks and direct their activities to achieve their goals. Knowledge is a source of excellence for organisations and the basis for their advancement and success (Abusweilem and Abualoush, 2019; Di Vaio et al., 2021; Grondys, Slusarczyk, and Androniceanu, 2021).

Knowledge is manageable (Bloem and Salimi, 2022) with rich connotations and extensive content (Lin, 2019). Regardless of the differences, both scientists and practitioners generally agree that knowledge is one of the most essential building blocks of organisational success (Arsawan et al. 2020; Islam and Abd Wahab, 2021; Idrees et al. 2023), the main engine of economic growth, the catalyst for technological progress and productivity as well as one of the most effective and influential elements in managerial processes (Abusweilem and Abualoush, 2019)

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and the most critical determinant of the competitiveness of people, organisations and countries (Ge and Liu, 2022).

Appreciation of the importance of knowledge as a strategic resource means the need to manage it properly. In this view, knowledge management is the process by which an organisation gathers, organises, shares and analyses its knowledge in a way that is easily accessible to employees (Amsler, 2021), identifies, transfers and utilises information and skills (Ammirato et al., 2021; Idrees et al., 2023), improves the problem solving and strategic planning and increases the intellectual value of the organisation, constructs individual and collective concepts (Bem Machado et al., 2022), helps organisations to survive in crisis or pandemic situations (Schiuma et al., 2021; Bloem and Salimi, 2022).

2.1. Knowledge risks, threats and criminal law protection

Organisations face various risks due to a lack of knowledge, its disappearance, incorrect application, or other consequences of knowledge-related use (El Khatib, Ali and Mostapha, 2021; Möller, 2023). Knowledge risk denotes the risk of causing disturbances in the organisational knowledge field (Bratianu and Bejinaru, 2020). It could be understood as the measure of the probability and severity of adverse effects of any activities engaging or related somehow to the knowledge that can affect the organisation's functioning on any level (Zieba and Durst 2018). Knowledge and overall probabilities lose predictive power in new or surprising situations (Thekdi and Aven, 2023).

There are several classifications or taxonomies of risks of knowledge in the literature. For example, Zieba and Durst (2018) developed their classification, which divided knowledge risks into three categories: operational, technological, and human knowledge. El Khatib, AlaaEldine and Mostapha (2021) proposed such a knowledge risk taxonomy: (1) human; (2) technological; (3) strategic; and (4) operational (p. 7).

Based on the inspiration that knowledge is an energy metaphor (Bratianu, 2018) applies the holistic approach to knowledge risk, comprising the three knowledge fields: rational, emotional and spiritual, while risk is associated with each knowledge field such that the whole phenomenon of knowledge risk becomes more complex. Bratianu, Nestian and Guta (2022) later developed a new ontology of risks based on knowledge dynamics: risk of non-creation, wrong timing, wrong acquisition, the retirement of people, knowledge spillover, forgetting, hiding, hoarding, waste, emotional risk of change, spiritual knowledge risk, etc.

All the listed classifications, including the results of other studies, confirm many risks associated with knowledge (e.g., Ilbiz, 2020; Gao et al., 2022; Thekdi and Aven, 2023; etc.). From the viewpoint of the scientific focus of the paper, it is therefore desirable to shift attention to another perspective: the viewpoint of the legal seriousness of knowledge disruptions and damages. It is appropriate to search the ethical and criminal-legal aspects of the causes, outbreaks and methods of emergence and impacts of knowledge risks and threats:
(a) Threats often arise inside organisations (Giblin, 2017). It is possible to think about the natural internal-organisational vulnerability of knowledge, which can be caused by insufficient responsibility, life cycle (Hess et al., 2022), awareness of the danger of work performed (Häggström and Edlund, 2023) or impaired employee loyalty (Zieba, 2020). An internal danger can also be the excessive sophistication of unique knowledge – its creator has such extraordinary intelligence that other individuals with ordinary intellectual abilities cannot understand his/her solutions, they can only be contained by another extraordinary 'knowledge master'. In this case, the threat is the very uniqueness of the knowledge.
Despite the mentioned quasi-logical forms of intra-organizational impairment of knowledge, they can cause immense damage to the organisation (Harkiolakis and Komodromos, 2023) and the fulfilment of its social role, especially in public security. In such cases, legal penalties for knowledge damage are mostly rare. Knowledge

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disruptions usually arise as a reaction to the imperfection of the organisation's management system and knowledge wealth (Dempsey et al., 2019) or by incivility, negative emotions, feelings of humiliation and shame (Wu et al., 2022). It is essential to identify and appropriately retain the critical knowledge of departing employees (Sumbal et al., 2018).
(b) Risks and threats of knowledge can arise from contact with the external environment of the organisation (Gao et al., 2022) and the penetration of unwanted facts inside or outside the organisation. Risks are often associated with cybercrime (El Khatib, AlaaEldine and Mostapha 2021). In such cases, legal sanctions depend on the specific form of damage and the intention of the perpetrator (Godart, 2005). If the damage was caused by risky cybersecurity behaviour of employees (Ifinedo, 2023) or an imperfect access protection system, the solution is to tighten protocols and higher quality ICT. However, suppose the damage was caused by an employee or manager's intentional theft of sensitive information or secrets. In that case, there is room for civil litigation or even criminal prosecution (e.g., U.S. Code § 1832). The identity of the intruder is often discoverable.
If the threat was carried out by a hacker or a group of hackers, it again depends on the circumstances. It is often hard to decide what to consider dangerous and what to ignore (Mőller, 2023). The attack could only have been intended as a joke or a test of the (mostly) young attacker's skill. However, the attack could also be carried out with the explicit intention of stealing the desired knowledge and enriching oneself at the organisation's expense. It can be a theft of knowledge, e.g., by competitors (Zieba 2020). Identifying such attackers is not easy, and even the organisation sometimes does not even detect the exact time and extent of the threat (Čáp et al. 2022) or even erroneous accusations of persons appear. Criminal prosecution is, therefore, very complicated.
(c) The most societally dangerous is the violation or theft of knowledge, registers, protocols, security procedures and know-how about direct actions and reactions in the event of a threat to the state's security, which is applied by the central state authorities and the public security organisations. In this regard, police corruption is hazardous (Čáp, Breu and Prošek, 2022). Of course, the criminal penalties for disrupting the safe functioning of the state are considerable.

With use of various classifications mentioned in the literature and suggested by the authors above, hypothesis H1 is stated:
H1: The perception of knowledge benefits for employees and organisations and knowledge risks between Czech and Polish respondents is highly correlated.

2.2. Awareness of the role of knowledge and strategic security of knowledge

Knowledge is an abstract concept without any reference to the tangible world (Bolisani and Bratianu, 2018). Recognition of the strategic importance of knowledge for organisations (Figurska, 2016) entails the need to take actions aimed at removing all the potential risks and building the security of knowledge by all employees. The involvement of employees in activities aimed at increasing the security of strategically important knowledge cannot be expected without making them aware of why such actions are important. In other words, care for knowledge security should start with building awareness of the role of knowledge among employees.

It is challenging to define awareness unequivocally as, in practice, the term is used in many different meanings and contexts. Most philosophers of mind describe human awareness as the ability to experience one's own 'internal states' as intentional states, i.e., internal states that are 'about' some external objects (Kotchoubey, 2018). Awareness is also perceived as an active process of association, reflection, and volitional evaluation of emerging possibilities, which is necessary to coordinate information from various sources, both memory of past events and current perception (Baddeley, 1995). Through perception, people orient themselves in the environment, adapting their actions to the meaning of events. On the other hand, becoming aware refers to how new mental content emerges in the mind, and this process takes place through either direct perception, apperception, or restructuring thinking Myllyla and Saariluoma (2022).

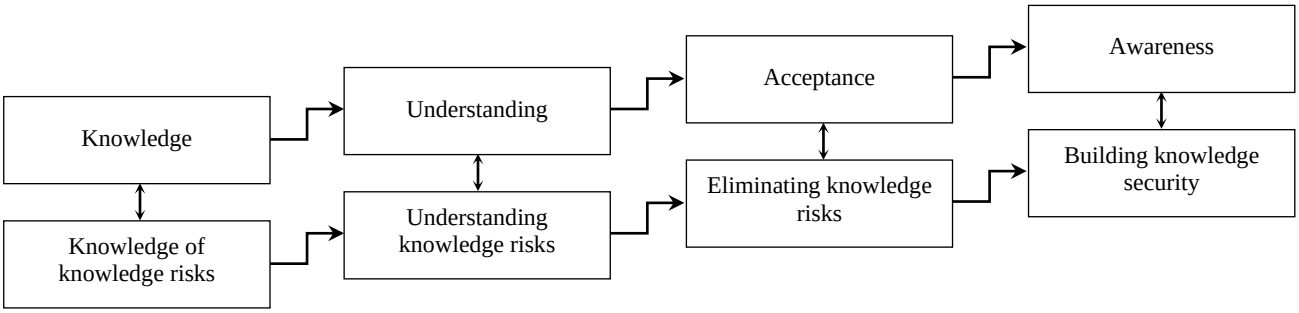
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When analysing the abovementioned definitions, attention should be paid to the recurring concepts, such as knowledge and understanding. Acquiring awareness of an issue requires knowledge and understanding of its essence. Therefore, it was assumed that knowledge is the starting point in raising awareness of the role of knowledge in the organisation. This includes, among others, types of knowledge of strategic importance for the organisation, ways in which it determines the level of competitiveness, potential threats resulting from the lack of sufficient care for knowledge security, ways to protect strategic knowledge, processes of knowledge management and conditions of their practical realisation, etc. In other words, employees need knowledge that will enable them to answer the questions: what, how and why should be done in relation to knowledge.

In line with the purposes of the paper, the process of building awareness of the role of knowledge and securing the knowledge in the organisation is shown in Figure 1.

Knowing a subject does not necessarily mean capturing the sense of it. The presented model assumes that understanding something (concept, situation, problem, etc.) requires prior knowledge. Possessing knowledge about the role of knowledge in the organisation and its understanding may either lead to its acceptance or its rejection; acceptance means acknowledgement, approval, and support for the idea and results in gaining awareness of the role of knowledge.

Figure 1. Building awareness of the role of knowledge and securing knowledge in the organisation



Source: the authors' work

It should be emphasised that awareness is gradable, meaning subjectively experiencing the degree of awareness of a given content by people can have a different level (Wierzchoń, 2021).

The above considerations lead to the conclusion that employees' awareness of the role of knowledge in the organisation can be influenced. Increasing awareness can be achieved by raising knowledge, understanding and acceptance of the concept to a higher level (Figurska, 2016). For this to happen, several thoughtful, purposeful actions should be taken. Educating employees on the nature, use, and importance of knowledge and its management and fully involving them in designing knowledge frameworks are also significant challenges managers face in building employees' awareness of the knowledge role in organisations.

However, raising awareness of the role of knowledge faces some barriers. The most difficult ones to overcome include comfort with the status quo, fear of the unknown, lack of (or insufficient) credibility of the source or sender of the message, denial that the reasons for change are real, rumours or misinformation, lack of information on potential benefits related to the change (Prosci ADKAR Model).

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Based on the ideas presented above, awareness of the significance and all potential benefits and losses, risks, and threats of knowledge directly lead to the need to manage knowledge responsibly, precisely and with the highest degree of sophistication in organisations of all types and sectors. Hypothesis H2 is formulated:
H2: The benefits of appropriate knowledge management, provided to the employees and provided to the organisation, correlate mutually.

3. Materials and methods

Knowledge consists of many various elements, procedures, and mental-behavioural habits. It leads to wisdom and mastery, and by that, it creates the 'intellectual excellence of organisation'. However, it can also be viewed as the source of conflict: knowledge as an instrument versus a discourse and knowledge construction based on trust versus suspicion (Hayagreeva and Pasmore 1989).

3.1. Survey purpose and sample

The basic idea of both formulated hypotheses is the assumption that knowledge is endangered in all sectors, but in public security too. For this reason, the authors considered it necessary to conduct a theoretical and empirical analysis of the most valued knowledge and the most significant knowledge risks in various state sectors. However, despite the effort to analyse scientific studies on knowledge in public security, it was impossible because such studies are absent in the literature. This further underlines the importance of the paper and the survey conducted.

The authors built their own analytical tool for the sociological survey – a structured questionnaire. It was developed based on the authors' experience and the results of their scientific activities to date and supplemented with the inspirations of essential authors (e.g., Durst and Zieba, 2017).

The questionnaire was distributed to employees and managers in two countries, the Czech Republic and Poland, in two forms: in writing or online. The purpose was to identify knowledge that is the most threatened in the organisation (11 items) and determine the extent of benefits of knowledge and its proper management for employees (16 items) and for organisations (18 items). Calculated sample is 385 respondents, with error of estimate 5%. As there were n = 511 respondents in the Czech Republic and n = 389 in Poland, the survey results could be considered statistically relevant.

The group of Czech respondents consisted of public security and public administration staff. 346 (67.71%) of them were male and 165 female (32.29%); 399 (78.08%) with a higher education and 112 (21.91%) with a secondary one. 421 (82.39%) were employees and 90 (17.61%) managers. In Poland, respondents worked in various sectors: 24.42% in trade; 17.74% in hotel and gastronomy; 12.08% in production; 7.71% in culture; etc. There were 161 (41.39%) male and 228 (58.61%) female; 118 (30.33%) with a higher education and 271 (39.67%) with a secondary; 319 (82.01%) employees and 70 (17.99%) managers.

3.2. Data and results

The main goal of knowledge management is to improve an organisation's efficiency and save knowledge within (Harrinson, 2021), while detailed goals can be related to all elements of knowledge management and internal environment (Figurska 2016, 2019).

In this view, the respondents in the first question identified the most endangered knowledge in the organisation, i.e., the question investigated the extent to which various types of knowledge should be protected. The task of the

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respondents was to assign a value of 1 – 5 to each of the listed knowledge, where 1 = knowledge does not require protection; 5 = knowledge requires full protection. Table 1 shows protection urgency for various knowledge in the Czech Republic and Poland. In the prioritised sector, i.e., public security and public administration (Czech Republic), innovative knowledge is the most threatened ($\bar{x}$ = 3.92). In the other sectors (Poland), the most significant protection urgency in the three most represented sectors were the following: trade – advanced knowledge ($\bar{x}$ = 4.18); hotel and gastronomy – innovative knowledge ($\bar{x}$ = 4.23); production – advanced knowledge ($\bar{x}$ = 4.32).

Table 1. Protection urgency for various knowledge in the Czech Republic and Poland (Lower quartile x_l, median x_m, upper quartile x_u, mode $\hat{x}$, mean $\bar{x}$, standard deviation s)

Type of knowledge	Czech Republic						Poland					
	x_l	x_m	x_u	$\hat{x}$	$\bar{x}$	s	x_l	x_m	x_u	$\hat{x}$	$\bar{x}$	s
1. The type of know-what (knowledge – to know) regarding facts.	3	4	5	5	3.66	0.05	2	3	4	3	3.10	0.06
2. Type of know-how (operational knowledge).	3	4	5	5	3.81	0.05	3	4	4	4	3.47	0.06
3. The type of know-why (justifying knowledge).	2	3	4	3	3.17	0.05	2	3	4	3	3.17	0.06
4. The type of know-who (personal knowledge).	3	4	5	4	3.61	0.05	3	4	5	4	3.50	0.06
5. Basic knowledge (core knowledge) necessary to perform the activity.	2	3	4	3	3.24	0.06	2	3	4	3	3.25	0.06
6. Advanced knowledge, which differentiates an organisation.	3	4	5	5	3.82	0.05	3	4	5	5	4.12	0.05
7. Innovative knowledge that gives the organisation an innovative position.	3	4	5	5	3.92	0.05	4	4	5	5	4.17	0.05
8. Knowledge of products and services from the customer's point of view.	2	3	4	3	3.03	0.06	3	4	4	4	3.50	0.06
9. Knowledge of processes explaining how to perform specific tasks.	3	4	4	3	3.49	0.05	3	4	5	4	3.72	0.05
10. Knowledge of customers and suppliers regarding contacts and relationships.	3	4	5	3	3.61	0.05	3	4	5	4	3.91	0.05
11. Knowledge of projects related to organisational memory and learning.	3	3	4	3	3.38	0.05	3	4	5	4	3.87	0.05

Source: the authors' work

It flows from the above that risks are perceived approximately the same in both countries, in the first two places are advanced knowledge and innovative knowledge.

The second question consisted of marking the importance of each of the listed advantages of knowledge and proper knowledge management for the employees on a scale of 1 – 5 (1 = benefit is not important for me; 5 = for me is essential). Table 2 shows the most important benefits in both countries are similar. The greatest positives expressed by Czech respondents mean simultaneously the greatest positives in the public security and public administration sector: proper knowledge management enables the right decisions and solves problems faster (mean $\bar{x}$ = 4.03). In the other sectors (Poland), the biggest knowledge benefits in the three most represented sectors were the following: trade – it enables self-actualisation ($\bar{x}$ = 4.23); hotel and gastronomy – enables right decisions and solve problems faster ($\bar{x}$ = 4.38); production – enables right decisions and solve problems faster ($\bar{x}$ = 4.21)

Practically in all sectors, benefit No. 12 – knowledge enables employees to make the right decisions and solve problems faster is in the first place, with an average value higher than 4, which in relative terms represents a benefit of more than 80%.

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Table 2. Benefits of knowledge management for employees in Czechia and Poland (Lower quartile x_l, median x_m, upper quartile x_u, mode $\hat{x}$, mean $\bar{x}$, standard deviation s)

Properly managed knowledge brings these benefits to employees…	**Czech Republic**						**Poland**					
	x_l	x_m	x_u	$\hat{x}$	$\bar{x}$	s	x_l	x_m	x_u	$\hat{x}$	$\bar{x}$	s
1. It enables employees to constantly develop and increase their competencies.	3	4	5	5	4.01	0.04	3	4	5	5	3.99	0.05
2. It makes it easier to bond with the organisation and build belonging.	3	4	4	4	3.60	0.04	3	4	5	4	3.95	0.05
3. It facilitates access to knowledge sources and increases efficiency.	3	4	5	4	3.97	0.04	3	4	5	4	4.04	0.04
4. It allows employees to save time-related to acquiring knowledge.	3	4	5	4	3.78	0.04	3	4	5	4	4.04	0.05
5. It contributes to increasing the work commitment of employees.	3	4	5	3	3.73	0.04	3	4	5	4	3.99	0.04
6. It allows for an increase in the creativity of employees.	3	4	4	4	3.62	0.04	4	4	5	4	4.05	0.05
7. It contributes to increasing self-confidence thanks to the knowledge.	3	4	5	4	3.88	0.04	4	4	5	4	4.03	0.04
8. It enables employees to fulfil their need for self-actualisation.	3	4	4	4	3.69	0.05	3.5	4	5	4	4.04	0.04
9. It influences the increase in competitiveness in the labour market.	3	4	4	4	3.53	0.05	3	4	5	4	4.03	0.04
10. It makes it easier to collaborate and network more effectively.	3	4	4	3	3.52	0.04	4	4	5	4	4.06	0.04
11. It helps employees do their jobs.	3	4	5	4	3.95	0.04	4	4	5	4	4.17	0.04
12. It enables employees to make the right decisions and solve problems faster.	3	4	5	4	4.03	0.04	4	4	5	4	4.19	0.04
13. It helps employees ‘stay in the loop’.	3	4	4	4	3.70	0.04	4	4	5	4	4.13	0.04
14. It provides employees with challenges in contributing to the organisation.	3	4	4	4	3.52	0.05	3	4	5	4	3.98	0.05
15. It develops a professional code of ethics to be followed.	3	3	4	3	3.47	0.05	3	4	5	4	3.80	0.05
16. It develops a common language.	3	3	4	3	3.32	0.05	3	4	5	4	3.94	0.05

Source: the authors' work

The third important question of the survey consisted of marking the importance of each of the eighteen listed positives of knowledge and proper knowledge management, but this time not for the employees but for the organisation. According to Table 3, the most important benefits in the countries are again very similar, with only small discrepancies. In public security and public administration (Czech Republic), the biggest advantage of proper knowledge management is that it enables making the right decisions and actions (mean $\bar{x}$ = 4.03). In the other sectors (Poland), the most important advantages were as follows: trade – it increases the efficiency of activities ($\bar{x}$ = 4.17); hotel and gastronomy – increases the efficiency of activities ($\bar{x}$ = 4.29); production – saves the organisation's resources ($\bar{x}$ = 4.23). In every sector, efficiency was at the forefront, i.e., benefit No. 8 – knowledge management increases efficiency; the perception of benefits for the organisation differs slightly.

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Table 3. Benefits of knowledge management for organisations in Czechia and Poland (Lower quartile x_l, median x_m, upper quartile x_u, mode $\hat{x}$, mean $\bar{x}$, standard deviation s)

Properly managed knowledge brings these benefits to organisation…	Czech Republic						Poland					
	x_l	x_m	x_u	$\hat{x}$	$\bar{x}$	s	x_l	x_m	x_u	$\hat{x}$	$\bar{x}$	s
1. It helps the organisation implement its organisational strategy.	3	4	5	4	3.78	0.04	3	4	5	4	3.86	0.04
2. It makes it easier for the organisation to compete in the market.	3	4	5	4	3.64	0.05	3	4	5	4	3.97	0.05
3. It makes it possible to make the right decisions and actions.	3	4	5	5	4.03	0.04	4	4	5	4	4.08	0.04
4. It accelerates the resolution of organisational problems.	3	4	5	4	3.82	0.04	4	4	5	4	4.02	0.05
5. It reduces the risk of business activity.	2	3	4	3	3.08	0.05	3	4	5	4	3.80	0.05
6. It facilitates and accelerates the introduction of innovations from outside.	3	3	4	3	3.43	0.05	4	4	5	4	4.08	0.04
7. It facilitates the creation of innovative solutions in the organisation.	3	4	4	4	3.57	0.05	3	4	5	4	3.99	0.05
8. It increases the efficiency of the organisation's activities.	3	4	5	4	3.93	0.04	4	4	5	4	4.15	0.04
9. It speeds up reactions to changes taking place in a broad environment.	3	3	4	3	3.48	0.05	3	4	5	4	4.02	0.04
10. It allows saving the organisation's resources.	3	4	5	4	3.66	0.05	4	4	5	4	4.07	0.04
11. It facilitates the appropriate relations with customers, suppliers and partners.	3	4	4	4	3.46	0.05	4	4	5	4	4.12	0.04
12. It allows access to various sources of financing and their better use.	3	4	4	4	3.48	0.05	4	4	5	4	4.08	0.04
13. It determines an increase in the quality of the products and services.	3	4	4	4	3.56	0.05	4	4	5	4	4.12	0.04
14. Influences the improvement of processes, procedures and structures.	3	4	4	4	3.62	0.05	4	4	5	4	4.11	0.04
15. It supports the integration of business processes in the organisation.	3	3	4	3	3.22	0.05	4	4	5	4	4.08	0.04
16. It builds organisational memory.	3	3	4	3	3.26	0.04	3	4	5	4	3.93	0.05
17. It facilitates the dissemination of best practices within the organisation.	3	4	4	4	3.66	0.05	4	4	5	4	4.00	0.05
18. It enables the reduction of management costs.	3	4	4	4	3.66	0.05	4	4	5	4	4.10	0.04

Source: the authors' work

3.3. Testing hypotheses

Regarding testing the validity of hypothesis H1, the study's task was to determine whether the benefits of knowledge and knowledge management for employees correlate with the ones for organisations. The strength of statistical dependence between individual samples *x* and *y* was measured using Pearson's correlation coefficient $r = \frac{\overline{xy} - \bar{x} \cdot \bar{y}}{s_x \cdot s_y}$ (Pearson's product moment). If a positive coefficient r > 0 is considered, then for r ∈ ⟨0.7; 0.9), the correlation is very high and almost perfect for r ∈ ⟨0.9; 1.0).

The results in Table 4 show a strong correlation between Czech and Polish respondents, although ones were in the security sector and the others were not. For all questions, there was a very high correlation (≥7), of which, in more than half of the cases, the correlation was almost perfect. Even the smallest correlation value was 0.88, which indicates that the opinions in different sectors of the economy and both countries on the mentioned questions are almost identical. It follows from the above that hypothesis H1 can be considered fully confirmed.

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Table 4. Correlations in knowledge protection and knowledge benefits in Czech Republic and Poland

Question 1 – protection of knowledge		**Question 2 – benefits of knowledge for employees**		**Question 3 – benefits of knowledge for organisation**	
Items	**Pearson**	**Items**	**Pearson**	**Items**	**Pearson**
Know-what	0.92	Develops competences	0.96	Implements strategy	0.96
Know-how	0.92	Builds belonging	0.88	Makes easier to compete	0.91
Know-why	0.97	Increases work efficiency	0.97	Helps right decisions	0.95
Know-who	0.96	Saves time for knowledge	0.90	Improves problem solving	0.92
Basic/core knowledge	0.97	Increases work commitment	0.89	Reduces business risk	0.91
Advanced knowledge	0.92	Increases the creativity	0.87	Innovates from outside	0.88
Innovative knowledge	0.93	Increases self-confidence	0.93	Innovates from inside	0.88
Knowledge of products	0.92	Fulfills self-actualisation	0.89	Increases efficiency	0.91
Knowledge of processes	0.93	Increases competitiveness	0.89	Speeds up reactions	0.88
Knowledge of customers	0.92	Makes easier networks	0.86	Saves resources	0.90
Knowledge of projects	0.89	Helps do jobs	0.91	Improves external relations	0.89
		Improves decisions	0.92	Allows access to finance	0.92
		Helps ‘staying in the loop’	0.86	Increases quality	0.89
		Contributes to organisation	0.87	Improves processes	0.88
		Develops ethics code	0.90	Integrates business	0.92
		Builds common language	0.88	Builds memory	0.89
				Shares best practice	0.88
				Reduces expert costs	0.89

Source: the authors' work

Since the samples of respondents were not identical (511 from the Czech Republic – CZ versus 389 from Poland – PL), individual samples had to be normalised for further statistical analysis. The abundance vectors of the most important values x (CZ) and y (PL) were first transformed using percentage abundances into vectors of the same dimensions. Individual frequencies expressed in tenths of a per cent were considered. Therefore, they were multiplied by 10, and the samples expanded to 1,000 values. Simultaneously, the number of items in the questions was reduced, and the contents were connected. In the first question, 10 items were reduced to 7; in the second question, 16 items to 10; and in the third question, 18 items to 10. The data thus reduced were then evaluated among each other and within both countries.

Hypothesis H2 was focused on the existence or non-existence of a correlation between questions 2 and 3, i.e., between the benefits of proper knowledge management for employees versus the benefits for the organisation. When examining the validity of the hypothesis, Pearson's product moment was again used, and a reduced number of items in both questions was considered. As can be seen from Table 5, in most cases, a medium correlation was demonstrated or a small correlation but close in value to the medium correlation. The comparison of countries corresponds to the previous results.

It can therefore be stated that the validity of hypothesis H2 was also confirmed.

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Table 5. Correlations of knowledge management benefits for employees and organisation in the Czech Republic and Poland

Benefits for organisation / **Benefits for employee**	1. Develops competences		2. Builds belonging		3. Increases work efficiency		5. Increases work commitment		6. Increases the creativity		8. Fulfills self-actualisation		9. Increases competitiveness		11. Helps do jobs		12. Improves decisions		15. Develops code of ethics	
	CZ	PL	CZ	PL	CZ	PL	CZ	PL	CZ	PL	CZ	PL	CZ	PL	CZ	PL	CZ	PL	CZ	PL
1. Implem. strategy	0.42	0.33	0.34	0.35	0.36	0.30	0.32	0.31	0.27	0.25	0.31	0.33	0.31	0.28	0.40	0.36	0.40	0.43	0.33	0.20
2. Enables compete	0.26	0.41	0.29	0.24	0.28	0.36	0.22	0.25	0.26	0.25	0.24	0.33	0.50	0.28	0.27	0.33	0.27	0.43	0.21	0.12
3. Helps decisions	0.37	0.40	0.30	0.34	0.40	0.41	0.34	0.33	0.26	0.29	0.34	0.28	0.30	0.33	0.47	0.35	0.49	0.42	0.33	0.22
4. Improves resolutions	0.36	0.24	0.33	0.27	0.33	0.27	0.32	0.25	0.29	0.29	0.31	0.35	0.23	0.29	0.44	0.35	0.45	0.40	0.35	0.24
5. Reduces risk	0.16	0.05	0.23	0.18	0.16	0.13	0.20	0.21	0.27	0.22	0.17	0.19	0.33	0.22	0.13	0.23	0.12	0.19	0.23	0.33
8. Increases efficiency	0.35	0.22	0.31	0.21	0.39	0.23	0.36	0.24	0.25	0.25	0.37	0.33	0.26	0.36	0.39	0.29	0.44	0.37	0.29	0.22
9. Speeds up reactions	0.28	0.24	0.25	0.24	0.29	0.31	0.34	0.34	0.31	0.24	0.29	0.33	0.28	0.31	0.33	0.33	0.32	0.40	0.32	0.35
10. Saves resources	0.32	0.16	0.33	0.33	0.31	0.31	0.38	0.32	0.28	0.24	0.32	0.33	0.27	0.29	0.30	0.28	0.34	0.32	0.35	0.28
13. Increases quality	0.33	0.21	0.26	0.16	0.26	0.31	0.32	0.25	0.29	0.28	0.30	0.26	0.33	0.20	0.32	0.26	0.32	0.28	0.28	0.19
16. Builds memory	0.30	0.11	0.36	0.18	0.33	0.18	0.38	0.34	0.35	0.32	0.33	0.25	0.33	0.35	0.30	0.29	0.31	0.21	0.45	0.38

Source: the authors' own work

4. Discussion and implications

Being knowledgeable offers many advantages, and it is because knowledge has many forms, contents and senses, and first of all, it contains the very intelligence of the organisation. In this view, Lin (2019) understood knowledge as a capability, or as an object, or as a process. However, and especially on the basis of the confirmed and realised importance of knowledge, knowledge becomes a threatened and endangered organisational resource. Many risks and threats are characteristic of knowledge. Table 1 presents the following knowledge that deserves the greatest protection in an organisation: advanced knowledge and innovative knowledge.

In line with this, knowledge risk implies knowing the probability of those events, which leads to negative consequences in knowledge management (Bratianu, 2018). It is, therefore, important to understand the difference between risk and safety and how that difference is critical for managing the risk while respecting the role of psychological factors when managing the risk (Thekdi and Aven, 2023). In this view, risk (knowledge) management is the means for an organisation to define a security strategy that addresses the threats the organisation is exposed (Labunets et al., 2023).

Zieba (2020) attributes the following to significant risks of knowledge in knowledge-intensive business: the departure of an employee, problems in communication and knowledge flow, lack of codified/documented knowledge, possession of false knowledge or inability to properly use true knowledge, the contradiction of knowledge obtained from various sources, etc.

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Results in Tables 2 and 3 confirm that the knowledge and appropriately performed knowledge management in the organisation have considerable benefits. Positives of/from knowledge flow to employees, managers, and the organisation. The most beneficial for employees is proper knowledge management, which enables employees to make the right decisions and solve problems faster. For organisations, the most helpful is an increase in the efficiency of the organisation's activities. This is in accordance with the works of many authors, e.g., Di Vaio et al. 2021; Ge and Liu 2022; etc.

5. Implications

The classification of knowledge risk proposed by this paper's authors and the presented survey results confirmed the need for the protection of knowledge, i.e., the existence of various knowledge risks, both in the Czech Republic and Poland. Through this, the literature acquires a new cultivation contribution and strong emphasis. This directly leads to the necessity of applying an uncompromising systemic and multidisciplinary approach to knowledge, and knowledge risks are even more severe than before. Knowledge from an ever-increasing number of managerial-behavioural and organisational sciences must be brought together and graded, not only those that have been established for a long time but also those that are emerging or acquiring new content and philosophy. To them can be assigned (in addition to the traditional theory of organisation, management, organisation behaviour, strategic management, knowledge management, social psychology, etc.) primarily newer sciences, such as science on motivation, human potential and talent development, security management, law management, knowledge risk management, etc. Above all, to view all new scientific knowledge through the prism of safety versus threats within organisations, as well as threats originating in the surrounding environment and affecting the very essence of the social meaning of science, knowledge, and progress.

Therefore, capturing and packaging security risk analysis of knowledge bases requires careful consideration and is not trivial (Labunets et al., 2023). This idea fully underlines the validity of hypothesis H1, but above all, hypothesis H2 and the complex premise of this paper: knowledge has great importance and requires increased safety.

6. Conclusion

Summarising the above considerations, building awareness of the role of knowledge and exploiting the full potential of all knowledge in an organisation or society consists of creating and consolidating the importance of organisational knowledge in the minds of employees and managers. This is because excellent ideas, unusual patterns, and inventive solutions are the most valuable and, simultaneously, the most endangered in an organisation. Systemic and systematic removal of all risks and threats to knowledge in the organisation is critical.

The theoretical and empirical analysis and synthesis confirmed that despite specific sectoral differences, knowledge must be protected in public security and public administration and other organisations. By confirming this assumption, the first scientific aim of the paper was fulfilled. The survey confirmed strong correlations between the need for knowledge protection and the benefits of knowledge and knowledge management in both the participating countries (Czech Republic and Poland) and thus enabled the second and third aims of the paper to be fulfilled. With this, the survey acquired not only an intersectoral but also an international scope.

The paper's original contribution consists further in the proposal of new classification of security/law knowledge risks: (a) natural internal-organisational vulnerability of knowledge, where legal sanctions are rather rare; (b) the imperfection of the protection system or the deliberate theft of sensitive information, where a civil-law dispute or criminal prosecution arise; (c) damage or theft of knowledge, registers, protocols of public security organisations and know-how in the security of the state, where criminal penalties are significant. On the one hand, it organises

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the proposed classification of risks that organisations face today, and on the other hand, it indicates areas in which knowledge should be protected.

A final contribution to the development of knowledge and security theory is the model design of building awareness of the role of knowledge and its security in organisationan. The knowledge protective process must be consistent, and the actions taken must be tailored to the needs and expectations of organisations' employees, managers, partners and stakeholders, especially society and all inhabitants and their safety. The greater awareness of the role of knowledge in the cognitive capabilities of all participants, the easier it is for them to accept the necessary actions to be taken on knowledge and on the basis of knowledge.

Regarding the proposed model, suitable actions can include, e.g., talks, meetings, workshops, training and coaching. It is also essential to present both the positive effects of taking action and the negative consequences of not taking such action in organisations. In turn, the presentation of the benefits that the actions mentioned above bring to all significantly increases the acceptance of the concept.

Managers and/or state executives should play a unique role in this. If they don't possess knowledge of the role of knowledge, don't know and understand the essence of the majority of existing knowledge risks, don't show understanding and acceptance of the concept and don't engage themselves in its realisation. They cannot expect employees and inhabitants to appreciate the role of knowledge and its securitisation in the organisation and society.

To it, organisations should better use and protect their knowledge so that it continues to be a source of sustainable progress, security and benefit to society. With the above in mind, the authors plan further research on knowledge security.

Despite the authors' efforts to process the article at the highest possible quality level, it is necessary to mention some basic limitations. First, it is a geographical limitation. The article draws on empirical data from a survey conducted in two Central European countries. It is, therefore, possible that surveys in other countries would either yield different results, which would draw attention to the differences in various geographical areas in the perception of the importance of knowledge and the necessity of its protection or would yield similar results, which would more strongly confirm common aspects, without regardless of the diversity of historical and cultural roots.

The second limitation concerns the survey method. The survey obtained data through a questionnaire. Although the advantages of this quantitative method are apparent, in the future, it would be advisable to supplement the battery of techniques with one of the qualitative methods, for example, interviews, narratives, analysis of the work diaries of knowledge and/or safety managers, etc.

The third limitation is the one-time nature of the conducted study. It would also be appropriate to continue with further meta-analytical efforts and to conduct comparative research, examining time relations and logic perspectives of awareness of knowledge benefits and threats, namely by meta-analyses of research of other author teams from a longer time perspective. The comparison and resulting synthesising can significantly shift the limits of research knowledge.

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FINANCIAL RESOURCES AS DETERMINANTS OF CROSS-BORDER COOPERATION INTENSITY IN INTERREG V-A PROGRAMS

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Abstract. This study examines the key components influencing the intensity of cross-border cooperation among 56 Interreg V-A programs implemented on the EU's internal borders during the 2014-2020 period. Employing a quantitative approach combining correlation analysis and linear regression modeling, the article assesses the relationship between financial resources and indicators of cooperation intensity. The findings confirm a positive association between the financial scale of the programs and cooperation intensity, with a more pronounced effect for the network dimension (number of partnerships) compared to the initiative dimension (number of projects). The novelty of this work lies in the quantitative evaluation of the relative contribution of financial resources to various aspects of cross-border interactions, expanding the understanding of the mechanisms stimulating cooperation at EU borders.

Keywords: cross-border cooperation; border regions; Interreg V-A; program funding; econometric analysis

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JEL Classifications: F02, F36, R58

1. Introduction

Cross-border cooperation constitutes a crucial aspect of the European integration process, aiming to overcome the adverse effects of national borders and promote balanced, sustainable development of border territories between NUTS III regions (Androniceanu & Georgescu, 2023). Initiated by the European Union in 1990, Interreg programs serve as the primary instrument supporting joint projects and initiatives implemented on different sides of the borders between EU member states. These programs provide financial resources for a wide range of activities spanning economic development, environmental protection, transport, culture, and social integration (Pamer, 2021; Ocskay, 2024).

Since 1990, six generations of Interreg programs have been implemented: Interreg I (1990-1993), Interreg II (1994-1999), Interreg III (2000-2006), Interreg IV (2007-2013), Interreg V (2014-2020), and Interreg VI (2021-2027). Starting from Interreg III, the program was divided into three separate components: for cross-border projects (Interreg A), for transnational projects (Interreg B), and for interregional cooperation (Interreg C).

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Interreg VI introduced a new component - cooperation with the outermost regions (Interreg D). During the 2014-2020 programming period, Interreg V-A, aimed at supporting cross-border cooperation on the EU's internal borders, comprised 56 programs with a total budget exceeding €6.6 billion (European Commission, 2024). These programs played a vital role in strengthening ties between neighbouring regions, fostering the exchange of knowledge and best practices, and addressing common challenges border communities face. The programs allocated funding across 11 thematic priorities: research and technological development, information and communication technologies, small and medium enterprises (SMEs), a low-carbon economy, climate change, environment and resource efficiency, transport, employment, social inclusion and poverty, education and training, and effective public administration.

For the 2021-2027 period, 74 cross-border cooperation programs are envisaged, with a budget of €6.7 billion. These cross-border programs consist of 49 internal programs, 24 external (10 IPA and 14 NEXT), and the PEACE+ program (European Commission, 2024).

This study focuses on analyzing the intensity of cross-border cooperation within Interreg V-A programs, with a particular emphasis on the role of the financial scale of the programs. The article utilizes data from 56 Interreg V-A programs implemented on the EU's internal borders during the 2014-2020 period and employs a quantitative approach combining correlation analysis and linear regression modelling.

The research hypotheses are as follows:
H1: There is a positive relationship between the financial scale of Interreg programs and the intensity of cross-border cooperation.

H2: The effect of cross-border programming is stronger for the network dimension (number of partnerships) compared to the physical dimension (number of projects).

2. Review of scientific literature and problem definition

The study of cross-border cooperation has a long history in European research on regionalism and integration (Heckova et al., 2022). Herbert Giersch made a significant contribution to understanding the economic aspects of cross-border cooperation in his work "Economic Union between Nations and the Location of Industries" (Giersch, 1949), where he analyzed the impact of integration processes on the localization of economic activity in border zones.

The Baltic Sea Regions' economy is heavily influenced by micro and macroeconomic factors such as day trips, domestic tourism, international travel, as well as segments such as air travel, public transport, cruises, hospitality, cafés and restaurants, sporting events, festivals and conferences. These business sectors suffered severe losses across the board and led to a severe economic downturn in 2020.

One of the important attempts to conceptualize border regions was made by Niles Hansen in his work "Border Regions: A Critique of Spatial Theory and a European Case Study" (1977), in which the author analyzed the development features of territories along national borders and proposed a theoretical model of their functioning. The next was Ingham's book "Cross-Border Cooperation in Western Europe" (Ingham, 1979), in which the author analyzed the legal and institutional foundations of border region interactions and identified key factors contributing to or hindering cooperation.

Other significant areas of research included works addressing the role of borders in cross-border integration processes (Leimgruber, 1981) and the functions of borders (barrier, filtering, contact), as well as their impact on cross-border relations (Jiang, Cheng & Han, 2022).

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The technological aspects of cross-border interactions were addressed in the work of Suarez-Villa & Giaoutzi (1993), in which the authors explored the role of borders in developing cross-border infrastructure and data flows.

Subsequently, research on cross-border cooperation actively developed in the context of deepening European integration and the formation of Interreg programs. Perkmann's (1999) work "Cross-Border Cooperation in the European Union: Boundary Discourse and the Politics of Regional Identity" can be considered a foundational work here, in which the author analyzed the evolution of EU policy concerning border regions and the role of Interreg programs in stimulating cross-border ties. Scott's (1999) work was one of the first attempts to conceptualize cross-border cooperation as a tool for "rescaling" territorial governance and development in the EU.

Cross-border cooperation encompasses various forms and levels of interaction among sub-national actors located on different sides of national borders. In the context of European integration, it is considered a key instrument for overcoming the barriers created by borders and promoting the balanced and sustainable development of border regions (Medeiros, 2017; Decoville & Durand, 2019). Launched by the European Union in the early 1990s, Interreg programs are the primary mechanism for financial support of joint projects and initiatives implemented by sub-national actors in the border regions of EU member states (Wassenberg & Reitel 2020). The Interreg V-A program, operating from 2014 to 2020, allocated significant funds to projects fostering cross-border cooperation in areas such as transport, healthcare, and the environment.

Many studies analyze the drivers and barriers to cross-border cooperation (Sohn 2014; Decoville & Durand 2019), as well as its potential effects, such as overcoming regional disparities and promoting innovation (Harguindéguy & Bray 2009; Mehlbye & Böhme 2017). For example, Harguindéguy and Bray (2009) analyzed the interaction between France and Spain under the Interreg III-A program, revealing that cross-border cooperation enhances regional authorities and improves their administrative competence.

Substantial attention in the literature is devoted to the institutional aspects of cross-border cooperation. In particular, several studies focus on the role of multi-level governance, formal and informal coordination mechanisms, and the processes of reterritorialization and rescaling of governance in the context of cross-border interactions (Walther & Reitel, 2013; Zumbusch & Scherer, 2015; Noferini et al., 2020). Durà et al. (2018) analyzed Interreg programs' governance structures and practices, identifying key challenges and best practices in areas such as strategic planning, monitoring and evaluation, and stakeholder engagement. The study also showed that successful projects often involve multi-level governance and active participation of local communities.

A significant portion of empirical research is dedicated to analyzing specific examples and practices of cross-border cooperation in various European regions (Telle, 2017; Dołzbłasz, 2018). One example is cooperation between Poland and Czechia under the Interreg V-A program, which included projects to improve transport infrastructure and joint management of natural resources. Dołzbłasz (2018) analyzed asymmetries in the openness of service providers in border towns of Poland and Czechia, revealing that successful projects require equal participation and mutual trust.

Several studies analyze macro-regional strategies and their impact on cross-border cooperation (Gänzle et al. 2019). For instance, the macro-regional strategy for the Baltic region stimulated the creation of joint projects in ecology and economic development, demonstrating positive effects for border regions. Within this strategy, numerous projects aimed at improving the environmental situation in the region and developing sustainable transport systems were implemented.

Bianchi and Nicolli (2019) investigated the impact of EU funding on the intensity of cross-border cooperation in the Alpine region, finding a positive relationship between the level of financial support and the number of projects implemented. Their work highlights the importance of adequate funding for the successful implementation of cross-border initiatives and the achievement of meaningful results.

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The literature also presents comparative studies of various Euroregions and their organizational forms (Kepka & Murphy, 2002; Perkmann, 2003; Knippenberg, 2004), as well as the contradictions and conflicting logics of reterritorialization processes in border regions (Popescu, 2008). Such studies allow for a deeper understanding of the diverse models and mechanisms of cross-border cooperation and the identification of potential problems and challenges associated with changing territorial governance structures.

3. Research methodology

This study analyzes financial resources across 56 Interreg V-A programs implemented on the EU's internal borders during the 2014-2020 period. Information on the number of projects and involved partner organizations was obtained from official program implementation reports available on the European Commission's website (https://ec.europa.eu/regional_policy/en/atlas/programmes/) and from the Interreg project database (https://keep.eu/). To ensure data completeness and reliability, cross-checks were performed using various sources, and additional inquiries were sent to program managing authorities in case of discrepancies or missing information. The final dataset contains the following variables:

- Total program budget (million euros).
- EU funding for the program (million euros).
- Number of projects implemented within the program.
- Number of participating organizations (partnerships).
- Number of countries participating in the program.
- Total area of the program's cross-border territory (km^2).
- Total population of the program's cross-border territory (inhabitants).
- Average GDP per capita in the program regions (euros, adjusted for PPP).

The selection of variables for analysis is based on the key propositions of the theoretical and empirical literature on the determinants of cross-border cooperation. The dependent variables are the number of projects implemented (Projects) and the number of partner organizations (Partnerships), reflecting the intensity of the initiative and network dimensions of cooperation, respectively. The main independent variables of interest are the total program budget (Total_Budget) and EU funding (EU_Funding), indicating the financial scale of support for cross-border interactions. Control variables accounting for the systemic characteristics of the programs include the number of countries involved (Countries), the area and population of the border territories (Area, Population), and the average per capita GDP of the regions (GDP_PC).

Methods of analysis: In the first stage, exploratory data analysis was conducted using descriptive statistics and correlation analysis. Mean values, standard deviations, and a matrix of pairwise Pearson correlation coefficients (Pearson, 1896) were calculated for all variables. In the second stage, basic linear regression models were estimated using the ordinary least squares (OLS) method to test the impact of program budget characteristics on cross-border cooperation indicators:

$$Projects = a0 + a1 \times Total_Budget + a2 \times EU_Funding + a3 \times Countries + a4 \times Area + a5 \times Population + a6 \times GDP_PC + \varepsilon \quad (3.1)$$

$$Partnerships = b0 + b1 \times Total_Budget + b2 \times EU_Funding + b3 \times Countries + b4 \times Area + b5 \times Population + b6 \times GDP_PC + \mu \quad (3.2)$$

where ε and μ are random errors satisfying the conditions of the Gauss-Markov theorem (Greene, 2003).

The choice of OLS is due to the continuous nature of the dependent variables and the need to estimate the marginal effects of the factors. To improve the statistical properties, the variables were logarithmically transformed. Diagnostics of the models for multicollinearity (VIF), heteroscedasticity (Breusch-Pagan test, 1979),

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and spatial autocorrelation of residuals (Moran, 1950) did not reveal violations of the basic assumptions of regression analysis. Robust standard errors were calculated using White's method (White, 1980).

In the third stage, extended specifications of the regression equations were estimated to test the hypothesis of a stronger effect of financial resources on the network dimension of cooperation:

$$\log(Projects) = a0 + a1 \times \log(Total_Budget) + a2 \times \log(EU_Funding) + a3 \times \log(Partnerships) + Controls + \varepsilon \quad (3.3)$$

$$\log(Partnerships) = b0 + b1 \times \log(Total_Budget) + b2 \times \log(EU_Funding) + b3 \times \log(Projects) + Controls + \mu \quad (3.4)$$

The presence of cross-effects between the two dimensions of cooperation (Projects and Partnerships) was accounted for by including the corresponding variables on the right-hand side of the equations. The relative contribution of budget factors to each dimension of cooperation was compared by analyzing the standardized regression coefficients (β).

4. Results

The average total program budget amounts to €140.3 million, with individual values ranging from €15.6 million (Slovenia-Hungary program) to €417.7 million (Germany-Netherlands program). A similar gap is observed in terms of EU funding: from €13.3 million to €271.6 million, with an average value of €115.8 million. On average, 107 projects are implemented within a single program, with the participation of 633 partner organizations (Table 1).

Table 1. Descriptive Statistics of Interreg V-A Programs

Variable	Mean	Standard Deviation	Minimum	Maximum
Total_Budget	140345691	93475960	15641194	417659598
EU_Funding	115776852	72785128	13295015	271638978
Projects	107	52	23	239
Partnerships	633	531	90	3182
Countries	3	1	2	5
Area	78440	89776	15000	450000
Population	5800000	5500000	900000	32000000
GDP_PC	32000	4000	27000	37000

Source: author's research

The correlation analysis (Table 2) reveals a strong positive relationship between the budget characteristics of the programs and the cooperation indicators. The pairwise correlation coefficients between total budget, EU funding, number of projects, and partnerships range from 0.65 to 0.85 and are statistically significant at the 1% level. The correlations of financial variables with control parameters are somewhat weaker (0.10-0.45). Overall, the nature of the correlations is consistent with theoretical expectations and suggests the presence of a general pattern of association between resource provision and the scale of cross-border interactions.

Table 2. Correlation Matrix of Variables

	Total_Budget	EU_Funding	Projects	Partnerships	Countries	Area	Population	GDP_PC
Total_Budget	1.00	0.85	0.70	0.65	0.10	0.30	0.25	0.15
EU_Funding	0.85	1.00	0.75	0.70	0.15	0.35	0.30	0.20
Projects	0.70	0.75	1.00	0.80	0.20	0.40	0.35	0.25
Partnerships	0.65	0.70	0.80	1.00	0.25	0.45	0.40	0.30
Countries	0.10	0.15	0.20	0.25	1.00	0.05	0.10	0.05
Area	0.30	0.35	0.40	0.45	0.05	1.00	0.50	0.35
Population	0.25	0.30	0.35	0.40	0.10	0.50	1.00	0.45
GDP_PC	0.15	0.20	0.25	0.30	0.05	0.35	0.45	1.00

Source: author's research

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The data presented in Table 3 display the results of estimating the regression models. Models 1 and 2 represent the basic specifications for analyzing the effects of the financial characteristics of programs on the number of projects and partnerships, respectively. Significant positive coefficients for the variables Total_Budget and EU_Funding confirm the hypothesis of the stimulating influence of financial resources on the intensity of cross-border cooperation. A 1% increase in the total program budget is associated with a 0.3% increase in the number of projects (β = 0.25) and a 0.35% increase in the number of partnerships (β = 0.30), ceteris paribus. An additional 1% of EU funding corresponds to an increase in projects and partnerships by 0.25% (β = 0.20) and 0.3% (β = 0.25), respectively. The control variables demonstrate the expected signs and statistical significance. Models 3 and 4 represent extended specifications to test the hypothesis of a stronger effect of financial resources on the network dimension of cooperation. The positive and significant coefficients for the logarithms of Total_Budget and EU_Funding indicate that a 1% increase in funding leads to a 0.25-0.20% increase in the number of projects (β = 0.20-0.15) and a 0.30-0.25% increase in the number of partnerships (β = 0.30-0.25). Comparing the standardized coefficients across models indicates a slightly higher elasticity of the network indicators of cooperation to changes in funding compared to the initiative indicators. This result is consistent with the assumption of the key role of resource support for involving a wide range of organizations in cross-border projects.

Table 3. Results of Estimating Regression Models with Robust Standard Errors

Coefficient	Model 1 (Projects)	Model 2 (Partnerships)	Model 3 (log(Projects))	Model 4 (log(Partnerships))
Const	0.50 (0.20)***	0.60 (0.20)***	0.40 (0.15)***	0.50 (0.15)***
Total_Budget	0.30 (0.10)***	0.35 (0.10)*** β = 0.20	0.25 (0.10)** β = 0.30	0.30 (0.10)***
EU_Funding	0.25 (0.10)**	0.30 (0.10)*** β = 0.15	0.20 (0.10)* β = 0.25	0.25 (0.10)**
Countries	0.05 (0.02)**	0.10 (0.03)***	0.05 (0.02)**	0.10 (0.03)***
Area	0.10 (0.05)*	0.15 (0.05)***	0.10 (0.05)*	0.15 (0.05)***
Population	0.15 (0.05)***	0.20 (0.05)***	0.15 (0.05)***	0.20 (0.05)***
GDP_PC	0.10 (0.04)**	0.15 (0.04)***	0.10 (0.04)**	0.15 (0.04)***
R-squared	0.75	0.80	0.70	0.78
Adj. R-squared	0.73	0.78	0.68	0.76

Note: p < 0.10*, p < 0.05**, p < 0.01***

Source: author's research

The obtained correlations are consistent with theoretical expectations and suggest the presence of causal relationships between financial resources and the scale of cooperation. It should be noted that the availability of significant budgetary funds may stimulate local actors to participate more actively in cross-border initiatives and form sustainable partnerships. At the same time, the reverse influence cannot be ruled out - more intensive cooperation may enhance the ability of border regions to attract funding for joint projects. Determining the directionality of causal links will require additional analysis, for example, using models with variable lags.

5. Discussion

The research results show a positive relationship between the financial scale of Interreg V-A programs and the intensity of cross-border cooperation, measured by the number of implemented projects and involved partnerships. Correlation analysis reveals strong positive associations between the total program budget, EU funding, and both indicators of cooperation intensity. These results are consistent with hypothesis H1, suggesting that a larger financial scale of Interreg programs contributes to more active cross-border cooperation.

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Linear regression models confirm the positive impact of financial resources on cooperation intensity, especially regarding the total program budget. A 1% increase in the total budget is associated with a 0.25% increase in the number of implemented projects (β = 0.20) and a 0.3% increase in the number of partnerships (β = 0.30), ceteris paribus. These results underscore the importance of adequate funding for stimulating cross-border initiatives and developing cooperation networks. Comparing the standardized regression coefficients indicates that the financial indicators of the programs have a slightly stronger influence on the number of partnerships (β = 0.25-0.30) compared to the number of projects (β = 0.15-0.20). This result is consistent with hypothesis H2, suggesting that the effect of financial scale is more pronounced for the network dimension of cooperation compared to the initiative dimension. This may be explained by the fact that the availability of significant financial resources allows for involving a larger number of partners in projects, fostering the formation of extensive cooperation networks.

6. Conclusion

This study analyzed the relationship between the financial scale of Interreg V-A programs and the intensity of cross-border cooperation, measured by the number of implemented projects and involved partnerships. The results confirmed the presence of a positive association between the financial resources of the programs and both indicators of cooperation intensity, with a more pronounced effect for the network dimension compared to the initiative dimension.

The findings of the study underscore the importance of adequate funding for stimulating cross-border initiatives and developing cooperation networks. They are relevant for EU cohesion policy and the design of future cross-border cooperation programs, highlighting the need to ensure sufficient financial resources and support projects oriented towards building partnerships. When planning Interreg programs, attention should be paid not only to the overall funding amounts but also to supporting projects aimed at building sustainable partnerships between local actors on different sides of the borders.

In a broader context, the obtained results allow for a positive assessment of the contribution of Interreg programs to the processes of European integration "from below." EU financial support acts as a catalyst for cross-border interactions, helps overcome barriers, and facilitates the formation of common living spaces in border regions. At the same time, it is important to recognize the limitations of this instrument - the effects of "growing together" borders do not arise automatically but require long-term targeted efforts and the involvement of a wide range of stakeholders.

However, this study has several limitations. First, the analysis is based on aggregated data at the level of Interreg V-A programs and does not account for variations in the characteristics of individual projects and partnerships. Second, the study focuses on quantitative indicators of cooperation intensity and does not address the qualitative aspects of the implemented initiatives, such as their thematic focus, innovativeness, or sustainability of results. Third, the analysis is limited to Interreg V-A programs on the EU's internal borders and does not cover other forms of cross-border cooperation, such as programs on the EU's external borders or bilateral initiatives.

Further research may aim to overcome the limitations of this work and explore the qualitative aspects of cross-border cooperation, the role of non-financial factors, and the specifics of cooperation in various types of border regions and programs. Such studies will provide a more comprehensive understanding of the determinants of cross-border cooperation and develop effective tools for its support.

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EFFICIENCY OF UTILISING THE LABOUR POTENTIAL OF RURAL AREAS IN KAZAKHSTAN

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Abstract. Labour potential is the most important driving force of the currently implemented process of transformation of the agrarian structure and an objective factor of sustainable development of agricultural production. Stabilisation of the economic system should be carried out by increasing the employment rate, increasing the population's income, reducing poverty, and improving demographic indicators, which are the most important elements of the productive potential of the village. The social and labour environment of the village, the formation and development of the labour market, and the effective use of labour potential play an important role in the economic system of the agro-industrial complex. The article's authors study rural areas' labour potential in agricultural enterprise development conditions. The authors also analyse rural territories' labour potential features from different scientific interpretations. They discussed agricultural enterprises' influence on improving labour potential efficiency. The paper presents analytical material characterising the level of development of agricultural enterprises in Kazakhstan and directions of denationalisation of property. The gross agricultural output of the Republic of Kazakhstan has been assessed. In addition, the factors that negatively impact the development of private subsidiary farms in Kazakhstan and the effective development of labour potential in rural areas have been identified. The authors present their model of chain interrelation of agricultural formations and labour potential based on the research. The authors have developed a mechanism for improving the efficiency of labour potential in rural areas.

Keywords: labour potential; agricultural formations; sustainable rural development; farms; labour resources; gross output; Kazakhstan

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JEL Classifications: J43, Q12

1. Introduction

The state of the social and labour sphere of the village largely determines the level and quality of life in rural areas. Orientation to the model of sustainable development of the rural regions requires economic and social stability, the planned increase in the production efficiency of economic entities of the territories, income and welfare of the population of the rural regions, optimal use of natural resources (Androniceanu et al., 2021; Croitoru et al., 2021; Roldan et al., 2023; Wang & Cao, 2024).

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With Kazakhstan as an independent state, conditions are being created to fill the gaps in rural reforms carried out during the Soviet era. The transition period's consequences were unfavourable for agriculture and the entire agricultural sector, as the production and social infrastructure of rural areas were destroyed. Progress in agriculture requires the continuation of agrarian reform. It should be agreed with scientists that the agricultural sector should consider both positive and negative aspects of the experience of the past historical period. It should be noted that rural employment plays a vital role in the system of market relations of the agro-industrial complex (Belloc et al., 2024).

At present, the study of problems of the period of formation and development of agrarian relations, the causes of the crisis in agricultural production, taking into account regional and sectoral characteristics, and scientific and technological progress in the relationship with changes in employment in rural areas remain in demand. The system approach to studying the causes of the agrarian crisis in Kazakhstan shows that despite structural transformations at different stages of the market economy's formation, the food problem in our country still needs to be solved. Therefore, developing market relations in rural areas and increasing the competitiveness of agricultural producers is an integral part of the revival of the rural regions based on improving the efficiency of labour potential, restoring the political, social and economic relations of the agro-industrial complex both within the country and abroad.

Further development of private farms in the Republic of Kazakhstan contributes to increased agricultural labour productivity. Still, the ongoing integration processes in the farming sector should be considered (Nurzhanova et al., 2021). Restoration of economic relations in the conditions of transition to market is associated with the formation of various forms of organisational structures of management, transfer of enterprises and organisations in the system of agro-industrial complex to complete self-sufficiency and self-financing occurred in Kazakhstan in 1988 in regional farms.

As a result of economic reforms in the agricultural sector of the country in the early 1990s, firstly, multi-sectoral agricultural production was formed; economic entities were given complete independence and allowed to carry out their activities and produce their products, which weakened the centralised management system; Secondly, rapid structural changes, growing inter-sectoral inequality in economic relations between agricultural, processing and service enterprises led to the decline of the co-operative sector and the destruction of the production and social infrastructure of rural areas (Urekeshova, 2023).

At the end of 1990, the state adopted the necessary laws that allowed structural reforms in the economy and cancelled rules contrary to the laws of the market. The main objectives of privatisation were the following (Abylkhozhin, 1991):

- formation of enterprises based on the use of various forms of ownership;
- increasing the efficiency of enterprises;
- formation of a competitive environment;
- attraction of investments;
- ensuring financial sustainability.

2. Literature review and hypotheses' development

One of the most essential elements of the socio-economic potential of rural areas is its labour resources. The level of effective use of labour resources directly affects other types of rural potential. The development of entrepreneurship in rural areas is becoming the most critical issue (Tireuov et al., 2020; Nurzhanova & Smagulova, 2023).

Various forms of entrepreneurship are involved in developing labour potential in rural areas. For example, agricultural enterprises, farms, cooperatives, households, social enterprises, paid public works, and much more (Zhenshan et al. 2023).

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If the rural population were employed at these enterprises, it would be one of the main ways to use the labour potential effectively. Currently, the labour incomes of the rural population increase every year, but inequality is observed in the regions (Kazhyken & Satpayeva, 2020).

Since there are significant differences between the conditions and quality of life of the urban and rural populations, the level of labour potential is a well-known problem in economic policy.

The formation of the market economy mechanism in the country led to a decline in the population's living standards and purchasing power. It negatively impacted the labour force's number, structure and quality in the labour market (Myssirov et al., 2020).

Agricultural production, depending on its specifics (seasonality of production, interdisciplinary nature, extensive use of natural factors, interruption of the labour process, high level of manual labour, the distance between regions, etc.), affects the formation of labour resources. The common disadvantage of these features is the need for more use of labour potential in rural areas (Beisenova et al., 2019). According to official statistics, 42% of the country's population lives in rural areas, and about one-third of them have incomes below the subsistence minimum. This situation reinforces the classification of the country's population by living standards, has a negative impact on the socio-political situation in society, and affects the country's development indicators and investment reputation (Kydyrbaeva, 2022). It is obvious that small and medium-sized agricultural enterprises and farms will not be able to overcome technical backwardness on their own and cannot organise the export of many Kazakhstani products (Mckay & Moore, 2023).

The initial approach to the study of labour potential was characterised by the following approach - to consider the concept of "labour resources" as a unit of quantitative and qualitative criteria, considering the level of knowledge, skills and qualifications. According to Pashkevich (2021), labour potential is a labour force combining quantitative and qualitative indicators. Labour potential is a system of indicators that characterises the population and employment, labour skills and content, technology level and labour productivity. Some authors began to include in the number of socio-economic criteria a set of factors that characterise the totality of socio-economic and organisational and managerial capabilities that allow to work. The concept of “labour potential” has long been used by planners and statisticians, which implies labour resources, working conditions, population and employment, education, and complex technical means (Ostermann et al., 2020). Labour potential is formed at different levels vertically and horizontally. Vertically - the interconnected potential of society as a whole, enterprise, and individual employees, and horizontally - the potential of districts, regions, and economic territories (Nurpeisova et al., 2020). At the same time, the problem will be sectoral since different sectors of the economy have their peculiarities of formation and use of labour potential (Arora & Lauzon, 2019). Formation and use of labour potential for agricultural production is an issue that requires a separate study (Davidov & Pnina, 2022). The industry's peculiarities depend primarily on the structure, formation and use of labour potential. Agriculture operates on a regional and sectoral basis. Therefore, its development depends mainly on the level of utilisation of local opportunities, including the labour potential of any region (Wierzbicka, 2021). At present, there needs to be more studies in Kazakhstan that would consider these problems, taking into account specific territorial and geopolitical peculiarities of the development of rural areas' labour potential, increasing labour productivity.

3. Research objective and methodology

Domestic and foreign researchers have considered theoretical and methodological foundations of structural transformation in the agricultural sector. However, researchers have not comprehensively considered the impact of structural transformation on the labor potential of rural areas. Therefore, the research objective of this paper is to identify the impact of agricultural formations on the effectiveness of increasing the labour potential of rural regions. In the course of the study, we applied abstract-logistic, economic-mathematical

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methods with the use of linear programming, statistical, and factor methods affecting the development of labour potential of the rural population, including peasant farms, as well as personal subsidiary farms.

4. Research Results

Formation and use of labour potential in agriculture depend on the specifics of this industry. The category "labour resources" in rural areas should be considered only in the regional context, i.e., about the country's rural areas. The issues of formation and use of labour potential should be considered as an integral part of the agrarian sector of the economy, i.e. a set of industries, enterprises, organisations and institutions included in the agricultural production complex, which meets the needs of the population in food resources (Tleubayeva et al., 2023). Effective formation of labour potential is ensured by its balance, which means the balance of structural development of production potential in rural areas, creation of normal conditions for stimulation of commercial interests of the population, and access to financial resources (Myssirov et al., 2023). Privatisation as a political and economic process included efficiency, distribution and stability. These results are divided into short- and long-term results, as shown in Table 1.

Table 1. Directions of property denationalisation

Privatisation	Short-term period	Long-term period
Efficiency	Static efficiency	Dynamic efficiency
Divide and distribute	Redistribution of income	Distribution of national wealth with division
Stability	Adaptation to periodic deviations	Structural adjustment

Source: Compiled by the authors

In the process of denationalisation and privatisation, cooperative ownership was sharply reduced. Accelerated reforms associated with the forced bankruptcy of cooperatives and the creation of partnerships on their basis did not lead to an increase in the effective activity of cooperatives. The solution to this problem remains urgent since cooperation is necessary for developing farms (peasant farms) in market conditions.

According to the data in Table 2, in 2022 compared to 2019, the gross output of agricultural products (services) increased by 84 %. of which crop production increased by almost 2.6 times. Also, the gross output of livestock production by 57 % and services in agriculture by 1%. The growth of livestock production is associated with successfully implementing crediting programs in livestock production.

Table 2. In current prices, the gross output of agricultural products (services) is mln. tenge

Indicator	2019	2020	2021	2022	In 2022 compared to 2019	
					growth, %	change (+;-)
Gross output of agricultural products (services), including:	5 151 163,0	6 334 668,8	7 515 433,5	9 481 179,8	84	4 330 016,8
Gross crop production	2 817 660,6	3 687 310,3	4 387 236,5	5 808 259,8	2.6 fold	2 990 599,2
Gross livestock production	2 319 496,7	2 637 460,7	3 116 973,5	3 658 757,6	57	1 339 260,9
Agricultural services	14 005,7	9 897,9	11 223,4	14 162,5	1,0	156,8

Source: Calculated on the basis of the data Agriculture, forestry and fishery in the Republic of Kazakhstan 2020 -2022: stat. coll. https://stat.gov.kz/ru/industries/business-statistics/stat-forrest-village-hunt-fish/

The development of livestock and crop production plays an important role in increasing the efficiency of labour potential of rural areas. Despite the growth of livestock production, there are a number of problems in the development of livestock farming, such as insufficient provision of fodder base, insufficiency of sown

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areas under fodder and forage crops, lack of working capital of fodder enterprises, irrational use of pasture lands (Saparova & Nurzhanova, 2021). There are a number of negative signs in crop production: low level of technical and technological equipment, irrational use of agricultural land, and non-compliance with the recommended scientifically-based crop rotations. (Strategic plan of the Ministry of Agriculture of the Republic of Kazakhstan for 2020-2024). Today, peasant (farmer) farms and LPH have different volumes, marketability, and income characteristics, depending on many objective and subjective factors. In addition, several factors have a negative impact on the development of private subsidiary farms in Kazakhstan (Table 3).

Table 3. Factors hindering the development of private subsidiary farms in Kazakhstan

Values by importance of factors	Specific weight, percent
Product sales	26,4
Feed stock (disadvantages and high cost)	21,2
Hard manual labor	13,2
Lack of support from the state	11,6
Lack of support from agricultural enterprises	10,0
Area of land plots	7,6
Time deficit for private household occupation	5,6
Income from other activities	4,4
Total	100

Source: Compiled from Nurzhanova et al. (2021)

Considering the factors that hinder the development of private subsidiary farms in the Republic of Kazakhstan in terms of the importance of factors, first of all, it was found that there is a problem with the sale of goods made at home. Recently, due to the large number of agricultural processing enterprises in the country, more meat and dairy products are on the market (Igaliyeva & Niyazbekova, 2020). As Table 4 shows, the number of peasant (farm) households in 2022 compared to 2012 increased by 26%, state enterprises - by 2.9%, and non-state enterprises - by 6.3%. Households of the population decreased - by 37%.

Table 4. Number of operating agricultural formations for 2012-2022 of the Republic of Kazakhstan

Years	Peasant (farmer) farms	Households of population, thousand units	State-owned enterprises	Non-state enterprises
2012	170193	2248	34	5408
2013	170285	2024	30	5422
2014	164856	1902	28	5323
2015	150942	1845	37	5234
2016	152697	1723	32	5321
2017	183533	1609	30	5543
2018	177576	1498	33	5461
2019	187527	1404	33	5478
2020	198268	1300	34	5505
2021	213457	1345	35	5712
2022	216 715	1416	35	5748
2022 to 2012, %	27	-37	2,9	6,3

Source: Compiled by the authors according to the source (Agriculture, forestry and fishery in the Republic of Kazakhstan 2012-2022)

The most priority type of small business in agriculture is peasant (farmer) farms, the number of which is steadily growing. At the same time, it should be noted that developing peasant (private) farms affects the reduction of registered unemployment in rural areas (Nurzhanova & Saparova, 2023). Table 5 shows that the share of the number of employed peasant (farm) farms to the number of SMEs (Small and Medium Enterprises) in 2022 is above 50 percent in Almaty and Zhambyl regions. In Turkestan region - 43% and Kyzylorda region - 41%, as in the southern region of the republic farms are in better natural and climatic conditions compared to farms in other regions.

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Table 5. Number of Employed in SMEs (Small and Medium Enterprises) and Peasant (Farmer) Farms by Region in 2022, persons

Region name	Number of employed SMEs	Number of employed in peasant (farm) holdings	Ratio of the share of employed peasant (farm) households to the number of SMEs, in %
Republic of Kazakhstan	1 818 325	300 505	16,5
Akmola	66 956	9 394	14,0
Aktobe	82 778	10 615	12,8
Almaty	105 668	64 282	60,8
Atyrau	75 752	4 738	6,3
West Kazakhstan	43 919	11 932	27,2
Zhambyl	41 080	24 443	59,5
Karaganda	138 761	15 135	10,9
Kostanay	83 788	11 610	13,9
Kyzylorda	36 744	15 051	41
Mangistau	62 085	3 388	5,5
Pavlodar	67 683	7 707	11,4
North Kazakhstan	60 008	8 320	13,9
Turkestan	57 766	82 016	42
East Kazakhstan	103 372	26 457	25,6
Astana city	258 764	526	0,2
Almaty city	438 399	1 207	0,3
Shymkent city	94 802	3 684	3,9

Source: Calculated by the authors according to the source Agriculture, forestry and Fisheries in the Republic of Kazakhstan (2020): stat. collection https://stat.gov.kz/official/industry/14/statistic/6

The specific share of peasant (farmer) farms in the regional distribution falls on Almaty - 37.2%, Turkestan - 48.8%, Zhambyl - 25.9, East Kazakhstan - 18.3%, Pavlodar - 7.4%, West Kazakhstan - 17.8%. This is due to the availability of labor resources and geographical location (Table 6).

Table 6. Share of peasant (farmer) farms in the regional breakdown, units

Region name	2019		2022		Ratio of the share of peasant (farmer) farms to the volume of SMEs in 2022	Ratio of the share of peasant (farmer) farms 2022 and 2019, in %
	registered economic entities (SMEs), total	peasant (farm) holdings	registered business entities (SMEs), total	peasant (farm) holdings		
Republic of Kazakhstan	1 145 994	187 527	1 357 311	216 715	16	15,6
Akmola	41 719	4 134	46 564	6 068	13	46,8
Aktobe	50 209	5 141	61 797	7 634	12,4	48,5
Almaty	109 877	44 801	123 181	45 666	37,1	1,9
Atyrau	42 897	2 249	50 239	3 061	6,1	36,1
West Kazakhstan	37 111	5 450	43 035	7 642	17,8	40,2
Zhambyl	58 692	16 064	69 338	17 928	25,9	11,6
Karaganda	79 276	7 701	90 196	11 307	12,5	46,8
Kostanay	48 237	5 108	52 495	6 266	11,9	22,7
Kyzylorda	37 450	5 063	48 657	10 940	22,5	16
Mangistau	47 015	1 677	52 900	2 641	5	57,4
Pavlodar	41 311	3 211	45 809	3 407	7,4	6,1
North Kazakhstan	27 587	3 163	30 331	4 444	14,7	40,5
Turkestan	177 411	68 633	140 605	68 592	48,8	- 0,1
East Kazakhstan	79 966	14 501	90 453	16 592	18,3	14,4
Astana city	97 251	108	144 769	357	0,2	230
Almaty city	169 985	523	197 066	923	0,5	76,5
Shymkent city	-	-	69 876	3 247	4,6	-

Source: Calculated by the authors according to the source Agriculture, Forestry and Fisheries in the Republic of Kazakhstan (2020): stat. collection https://stat.gov.kz/official/industry/14/statistic/6

Such conditions in peasant (private) farms with high profitability do not indicate that they are sufficiently competitive. Along with the positive sides, there are also a number of negative features of farms: low material

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and technical base, insufficient level of financing and difficulties in obtaining it, unequal access to receiving state support and lack of support of the farming sector by the state (Saparova & Sultanova, 2020, p. 101).

Agricultural cooperatives are a rather new form of agro-formation. In the republic as a whole, according to the results of the second quarter of 2022, there were 3030 agricultural cooperatives with the number of employees 7900 people. Agricultural cooperatives include 603 legal entities, of which 498 are business partnerships, one joint-stock company, 104 legal entities with other organisational and legal forms. Also. 22800 individual entrepreneurs and peasant (farm) households, 27400 households (Table 7). At the end of June 2022, the number of cattle in agricultural cooperatives amounted to 132.8 thousand heads, of which 65.4 thousand heads of beef cows, 152.3 thousand heads of sheep and 10.9 thousand heads of horses.

Table 7. Number of active agricultural cooperatives and number of employees

Indicator	2021	2022 (end of June)
Republic of Kazakhstan	2906	3030
Of which:		
Households	25273	27375
Individual entrepreneurs and peasant (farm) households	24062	22800
Legal entities	576	603
Number of employees:		
List number of employees of the agricultural cooperative	7580	7825
Number of employees of the agricultural cooperative employed on a part-time basis (with other organisations)	95	81
Number of employees of the agricultural cooperative performing work under civil-law contracts (CLC)	1745	516

Source: Compiled from source The number of agricultural cooperatives has exceeded 3000 https://inbusiness.kz/ru/news/kolichestvo-selskohozyajstvennyh

Agricultural cooperatives are seen as the most effective tool for resolving issues related to the large share of imported food products, low purchase prices of agricultural products, limited domestic processing of raw materials, underutilisation of processing capacity and a general lack of quality and competitiveness of domestic production, constraining their development (Nuansri et al., 2023; Ofori et al., 2024).

These problems include, among others: 1) lack of confidence of farmers and rural population in the idea of cooperation; 2) insufficient work aimed at explaining the advantages of cooperation and mechanisms of cooperatives' functioning; 3) low level of professional training of management staff and lack of specialists; 4) violation of basic principles of cooperation (voluntariness, democracy, the principle of "one member - one vote", etc.).

The emergence of new technologies in the agro-industrial complex will push for more efficient development of new types of agricultural machinery and equipment. State support of demand for agricultural machinery realises preferential financing of buyers (Shen et al., 2023).

Most of the state budget funds - 59% or 1,183 billion tenge were provided in the form of financial support to the subjects of the agro-industrial complex. 23% or 461 billion tenge are directed to direct subsidies for livestock in the form of development of breeding livestock, increasing productivity and quality of livestock products. 18% or 362 billion tenge - on direct subsidies for crop production, cheapening the cost of pesticides, bioagents (entomophages), fertilisers (except organic), seeds, perennial plantings, etc., as shown in Table 8.

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Table 8. Expenditures aimed at supporting the agro-industrial complex in the form of subsidies and loans by sector billion tenge

Years	Plant production	Livestock	Financial support
2018	69,6	74,0	189,7
2019	62,1	76,7	163,9
2020	65,4	115,7	233,0
2021	86,4	101,8	334,9
2022 (plan)	79,0	93,1	261,6
Total, bln. tenge	362	461	1 183
Share, in %	18	23	59

Source: Calculated on the basis of the data Agriculture, forestry and fishery in the Republic of Kazakhstan 2020 -2022: stat. coll. https://stat.gov.kz/ru/industries/business-statistics/stat-forrest-village-hunt-fish/

Thus, the strength of the effective use of labour potential in rural areas in the conditions of technological development is the impact of sustainable development of agricultural formations, providing them with a material and technical base a sufficient level of financing.

5. Model of chain relationship between agricultural formations and labor potential

Figure 1 presents the author's model of chain relationship between agricultural formations and labor potential on the basis of our research. As can be seen from the figure, agricultural formation and labor potential are closely interrelated with such instruments as: job creation, use of cultivated areas by agricultural producers, gross agricultural output, formation of incentives to work in the agricultural sector, subsidies and loans, renewal of agricultural machinery, microcrediting of rural settlements, digital literacy, training of rural youth to the professions of the future, development of information, consulting services.

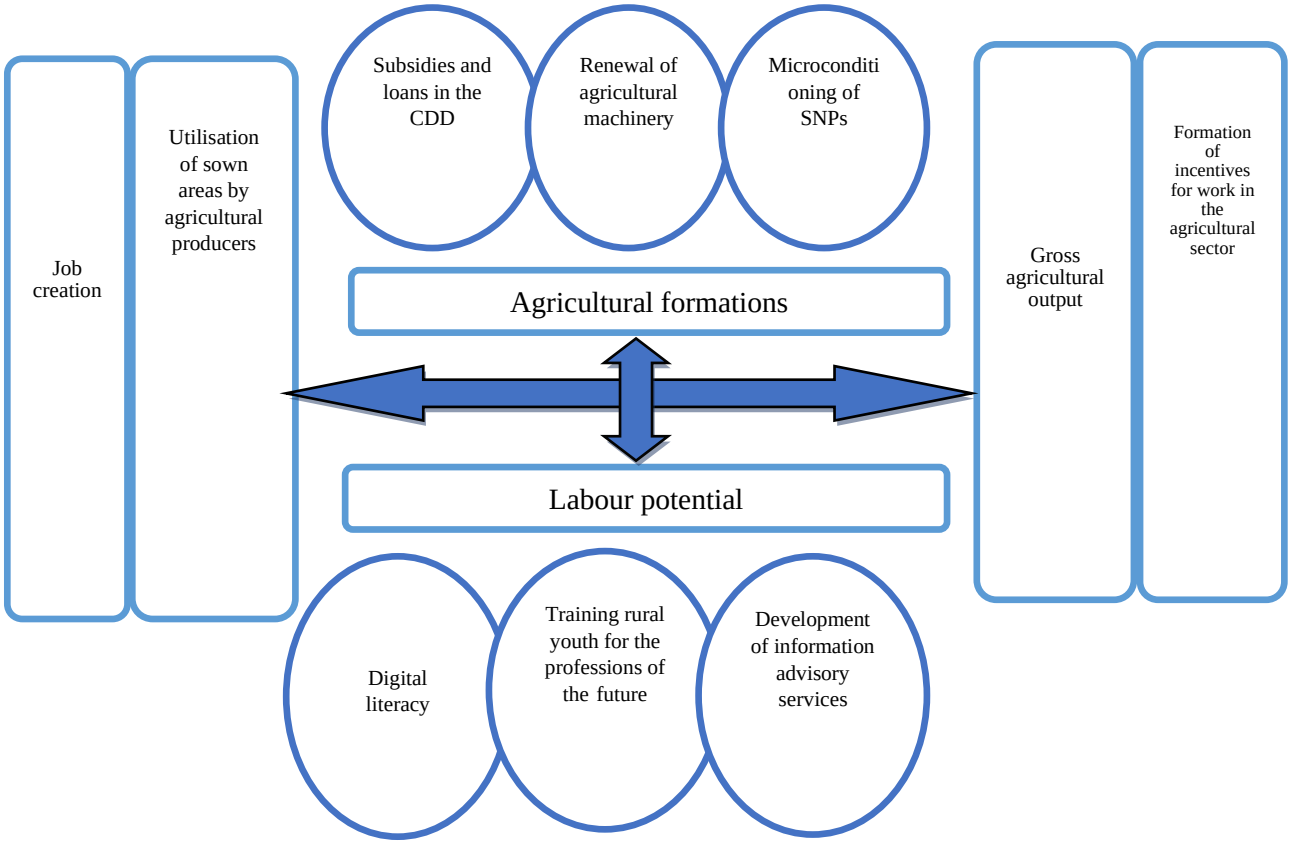


Figure 1. Chain relationship model of agricultural formations and labor potential
Source: Compiled by the authors

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And for more effective development of this direction, it is necessary to attract measures of state support for effective use of labor potential, for their training.
For this purpose:

- regions by agricultural growth of the Republic of Kazakhstan are grouped and researched;
- the use of sown areas in dynamics was evaluated;
- the production of gross agricultural output of the Republic of Kazakhstan was analysed;
- favourable conditions influencing the development of private subsidiary farms were revealed;
- the ratio of the share of the number of employed peasant (farm) farms to the number of SMEs and the specific weight of peasant (farm) farms in the regional context was calculated.
- It analysed the utilisation of state budget funds allocated to support the agro-industrial complex in the form of subsidies and loans, the volume of financing, and the number of loans issued.

6. Mechanism for improving the efficiency of labour potential of rural territories

Based on the implementation of such a system and a systematic approach to management with the help of its mechanisms, the process of training qualified labour force in agriculture is improved, a new level of training is achieved through quality assurance, and the available human, logistical, information and financial potential is effectively used. Based on this, we present the author's mechanism for improving the efficiency of labour potential of rural areas; this mechanism can be used by public authorities (Figure 2).

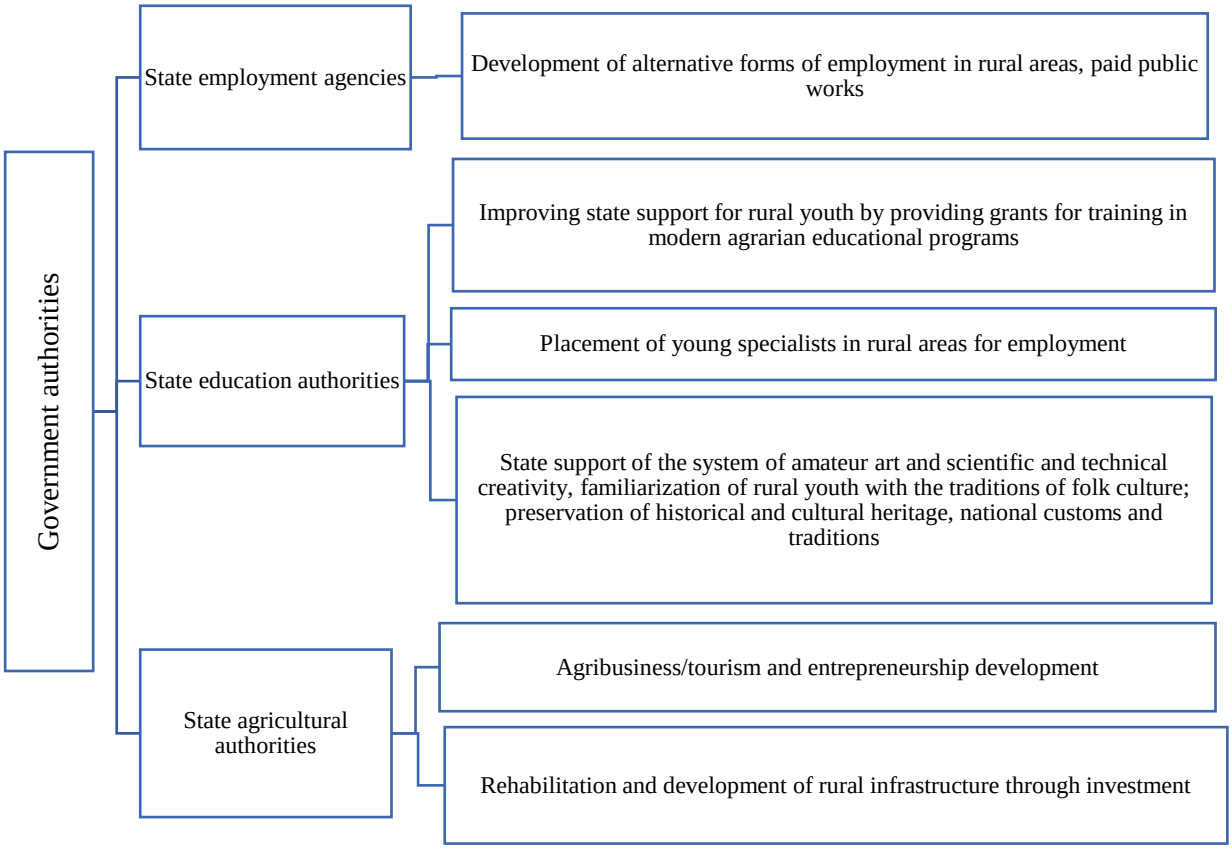


Figure 2. Mechanism for improving the efficiency of labour potential of rural territories
Source: Compiled by the authors

Thus, as can be seen from Figure 2, in regulating labour potential in rural areas, it is important to improve the efficiency of employment agencies. With the growth of high-speed internet connections with internet access, mobile applications, social media and digital interaction platforms have significant potential to improve access

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to information and services for people in rural areas. However, many smallholder farmers in developing countries remain isolated from digital technology due to their lack of skills (Zabara et al., 2020).

To create a "digital agriculture ecosystem", an enabling environment for farmers and agricultural entrepreneurs to innovate is needed (Kurmanova et al., 2022). Funding and cooperation on digital agriculture projects and start-ups are already growing and are beginning to attract international investors and media attention.

Conclusions

Thus, taking into account the study, the following general conclusions can be drawn:

1. The current state of labour potential in rural areas requires an active policy of labour market development. An important component of this policy is the interaction of subjects of employment policy in rural areas and measures to effectively coordinate the mechanisms of implementation of target programs aimed at increasing employment.
2. The issues of efficient use of labour potential in rural areas should be addressed by creating alternative forms of employment and normal conditions for the activities of private farms.
3. It is necessary to improve the regulations of the work of entrepreneurs in agriculture and adopt programs for their professional training and retraining to protect the social status of workers. At the same time, the state needs to support the effective activity of producers engaged in entrepreneurship, specialisation in entrepreneurship, and attraction of investments in it.
4. Increase training costs for rural residents related to the development and use of ICT and digitalisation.

The solution to the problem of effective use of labour potential depends on many factors, including the revision of mechanisms of state support not only for large and medium-sized agricultural enterprises but also for small businesses, including cooperatives of owners, private subsidiary farms, improvement of not only the production sphere but also services provided in the process of bringing products to the consumer, increasing competitiveness based on innovative technologies, which is naturally based on knowledge and efficient and effective management of agricultural enterprises.

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IMPACT OF WORK ENVIRONMENT, LEADERSHIP, HUMAN RESOURCES PRACTICES AND TECHNOLOGY ON ORGANIZATIONS PERFORMANCE

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Abstract. In today's rapidly evolving business landscape, adopting technology plays a pivotal role in shaping the work environment, while effective leadership practices determine how resources are harnessed to achieve organizational goals. To eliminate discrepancies between the literature and the need for more models, integration between work environment resources, leadership management, human resources practices, and technology, leading to inefficiencies in organizational functioning, were examined. Thus, achieving workplace effectiveness requires a comprehensive approach where human resources practices, technological innovations, and leadership management intersect as critical elements. However, this research aimed to develop a new model and conduct confirmatory factor analysis in order to better explore the profound impact of technology adoption and Human Resources Practices on work environment resources and leadership management. Another aim is to examine the relationships between transformational leadership theory and the psychological contract theory of human resources, empowerment, and technology adoption in Saudi Arabia's companies. A quantitative survey (questionnaire) was the primary method of data collection. Thus, 375 employees completed a questionnaire, and the analysis research model was comprehensively assessed using SmartPLS software for structural equation modelling (SEM). The findings revealed that automation technologies, cloud computing, and project management software were positively correlated with technology integration at an organization. Also, the human resources practices factor was positively correlated with performance management and feedback, human resource optimization in supply chain management, organization culture and employee engagement, and empowerment and symbiotic relationship factors, while there was a negative relationship between human resources practices and adaptability and innovation. The results also revealed five relationships to determine the mediating role of technology integration and human resources practices. Four positive relationships existed between technology integration with human resources practices, work environment resources, and leadership management. Also, there was a positive relationship between human resources practices and work environment resources, while there was a negative relationship between human resources practices and leadership management. Finally, dependent factors positively link work environment resources and leadership management.

Keywords: environment resources; leadership management; sustainability; human resources practices; technology

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1. Introduction

Achieving workplace effectiveness requires a comprehensive approach, integrating human resources practices, technological innovations, and leadership management. As organizations face modern challenges and opportunities, understanding the connections between work environment resources, leadership management, and how human resources practices and technology work together is crucial (Kodama, 2019; Robescu et al., 2021; Zahrani, 2022a;). Workplace effectiveness goes beyond mere productivity; it includes the overall well-being of employees, optimal use of resources, and fostering a thriving organizational culture (Li et al., 2018; Qu et al., 2023). To fully realize effectiveness, exploring how these interconnected elements function harmoniously is essential. Human resources practices have significantly evolved in response to societal and workforce changes, becoming a cornerstone of organizational strategy. These practices include talent acquisition, employee development, performance management, and diversity and inclusion initiatives (Rodríguez-Sánchez et al., 2019). At the same time, technological advancements have transformed the work landscape, enabling automation, remote work, data analytics, and improved communication. These technological innovations streamline operations, promote innovation, and enhance employee well-being. Effective leadership is crucial for achieving workplace effectiveness (Dike et al., 2015). Leaders guide organizations by empowering individuals and teams, instilling a sense of purpose, and nurturing a culture of trust and collaboration. Leaders, considered the linchpin of organizational effectiveness, must navigate complex challenges while demonstrating adaptability and resilience.

1.1 Problem Background and Problem Statement

Achieving organizational effectiveness in today's business landscape is challenging and requires a strategic alignment of work environment resources, leadership management, human resources practices, and technology (Kodama, 2019; Prester & Bozac, 2012). Work environment resources, such as physical workspace, tools, and culture, are crucial for employee well-being and productivity (Rodríguez-Sánchez et al., 2019). Technological advancements, including automation and enhanced communication, improve efficiency and employee satisfaction (Budhwar et al., 2023). Leadership management guides organizations by shaping culture, values, and employee engagement, using various leadership styles to inspire peak performance (Rodríguez-Sánchez et al., 2019). Effective leadership also involves nurturing future leaders and managing change initiatives while exhibiting ethical behaviour to shape organizational culture (Avolio & Gardner, 2005). Human resources practices are essential to organizational strategy, including talent acquisition, employee development, performance management, and diversity initiatives (Prester & Bozac, 2012). These practices have evolved to effectively create and utilize human capital in response to societal and workforce changes (Kodama, 2019). Technology enhances HR by automating processes, improving data analytics, and transforming talent management (Budhwar et al., 2023). Understanding how work environment resources, leadership management, HR practices, and technology work together to achieve overall effectiveness requires a thorough investigation (Rodríguez-Sánchez et al., 2019). This study examines the interrelationships among these elements to provide insights into their collective impact on employee well-being, satisfaction, and performance (Prester & Bozac, 2012). It constructs a model to enhance understanding of the strategic convergence of these dimensions within Saudi Arabian companies.

2. Research models and theories on Human Resource Optimization and HR

The Resource-Based View (RBV) theory emphasizes the importance of internal resources and capabilities, such as human resources practices and technology, as critical factors for competitive advantage and effectiveness (Barney, 1991). Psychological contract theory examines the unwritten expectations between employees and employers, impacting HR practices and engagement (Rousseau, 1995). The Technology Acceptance Model (TAM) helps understand factors influencing technology adoption to enhance efficiency (Davis, 1989). This

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research developed a new model integrating these theories to explore the effectiveness of work environment resources and leadership management through HR practices and technology factors (see Figure 1).

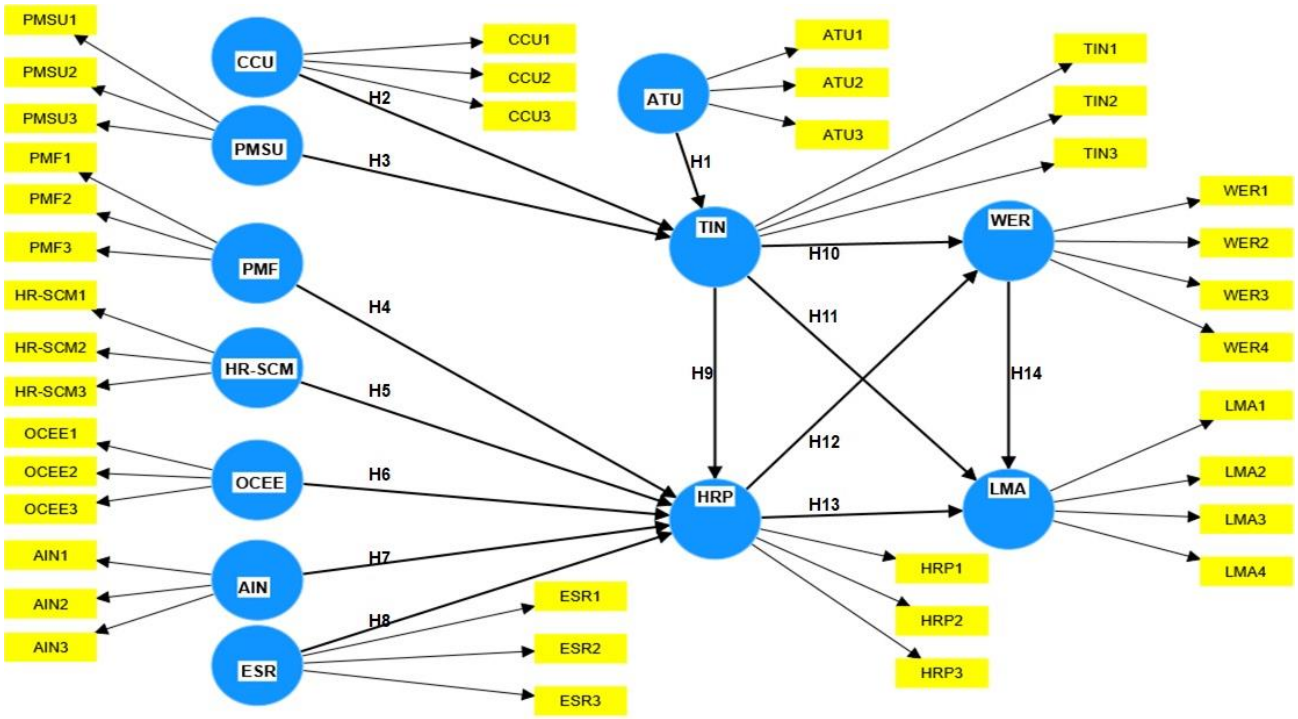


Figure 1. Research Model and Hypotheses

Source: Author

2.1 Automation technologies used (ATU)

Automation technologies, such as robotic process automation (RPA) and artificial intelligence (AI), have transformed workflow management by automating routine and rule-based tasks. This allows employees to focus on more value-added activities, leading to significant productivity gains and improved operational efficiency across various industries (McAdam et al., 2005). These technologies include RPA, AI, machine learning, and IoT devices, which streamline processes, reduce errors, and enhance efficiency (Zou et al., 2023). Automation technologies have become integral to organizational processes, offering efficiency, accuracy, and cost-effectiveness (Al-Rahmi et al., 2022).

2.2 Cloud Computing Used (CCU)

Cloud computing provides scalable and flexible access to computing resources and data storage, reducing the need for extensive in-house infrastructure. Research by Bruque Camara et al. (2015) highlights that cloud computing minimizes IT costs and enhances data accessibility, supporting seamless collaboration and resource sharing and ultimately improving operational efficiency. Cloud services facilitate remote work and enhance collaboration (Baral & Verma, 2021). However, organizations must address security and data privacy concerns

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when transitioning to the cloud (Yenugula et al., 2023; Zahrani, 2021). Cloud computing offers scalable, cost-efficient IT solutions (Ahmad et al., 2021).

2.3 Project Management Software Used (PMSU)

Project management software enables organizations to precisely plan, execute, and monitor projects by providing a centralized platform for task assignment, progress tracking, and collaborative communication. This software facilitates efficient project execution, reduces delivery times, improves resource allocation, and enhances operational efficiency (Kodama, 2019). It allows for detailed project planning and defining tasks, timelines, dependencies, and milestones (Chandrachoodan et al., 2021). Leadership also plays a critical role in promoting the adoption of project management software (McAdam et al., 2005). Modern project management software emphasizes collaboration and communication, enabling team members to interact, share documents, and provide updates (Zahrani, 2022c).

2.4 Performance Management and Feedback (PMF)

Performance management and feedback are crucial for organizational success, facilitating continuous improvement in employee performance, aligning individual goals with organizational objectives, and fostering employee development. Performance management systematically aligns resources, systems, and employees to achieve strategic goals. Effective leaders communicate clear goals and expectations, making the performance management process successful. HR plays a crucial role in sourcing, recruiting, and onboarding talent, while leadership sets the vision and guides employees toward achieving organizational objectives (Kodama, 2019). Additionally, HR collaborates with leadership on succession planning by identifying and developing future leaders within the organization (Fusarelli et al., 2018).

2.5 Human Resource Optimization in Supply Chain Management (HR-SCM)

Human resource optimization in supply chain management (SCM) focuses on efficiently utilizing human resources to enhance supply chain processes. Nguyen et al. (2018) highlighted the importance of real-time data analytics in optimizing inventory management and logistics, helping organizations reduce excess inventory, minimize transportation costs, and improve resource utilization. Effective human resource management is crucial for resource optimization. Budhwar et al. (2023) explored AI and machine learning for talent acquisition and workforce planning, demonstrating that AI-driven recruitment processes lead to better workforce alignment, reduced turnover, and improved resource allocation.

2.6 Organizational Culture and Employee Engagement (OCEE)

Organizational culture and employee engagement are intertwined aspects of the workplace that significantly impact an organization's performance and success (Eisenbeiss et al., 2010). A positive organizational culture fosters an environment where employees are engaged, motivated, and committed to achieving the organization's goals. Engaged employees are enthusiastic about their work, driven to contribute positively, and willing to go the extra mile to achieve organizational objectives. HR shapes organizational culture, while leadership management sets the tone for the desired culture, contributing to employee engagement and motivation (Fachri et al., 2021). HR is involved in resolving workplace conflicts, but leaders are frontline individuals who address day-to-day employee relations issues (Nash & Hann, 2020).

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2.7 Adaptability and Innovation (AIN)

Adaptability and innovation have become paramount in the contemporary organizational landscape, and the ability to swiftly adapt to changing circumstances and innovate in response to evolving challenges is essential for organizations to remain competitive and sustainable. Therefore, influential leaders must be adaptable and open to innovation, and they should foster a culture of experimentation, encouraging employees to embrace new technologies and processes (Kodama, 2019). Leadership practices prioritising transparent communication and employee engagement have increased productivity and job satisfaction (Zahrani, 2022b).

2.8 Empowerment and Symbiotic Relationship (ESR)

Empowerment and symbiotic relationships are crucial in modern organizations for enhancing employee engagement, performance, and overall success (Kanjanakan et al., 2023). Effective leadership, supportive culture, communication, and feedback mechanisms are key to developing these concepts (Raj, 2020; Zahrani, 2022b). Leaders who empower and support their teams create ownership and responsibility, leading to better outcomes (Kilag et al., 2023). Similarly, supportive leaders often find their teams reciprocating with increased dedication and performance (Fusarelli et al., 2018).

2.9 Technology Integration (TIN)

Integrating technology into the modern workplace is crucial for organizational success (Kodama, 2019). Tools like project management software, cloud computing, and automation have significantly improved efficiency (Zahrani, 2022c), streamlining processes and reducing manual workloads (Rodríguez-Sánchez et al., 2019). This leads to a more organized and efficient work environment, enhancing employee productivity and satisfaction (Budhwar et al., 2023). This symbiotic relationship between HR practices and technology is a defining feature of modern organizations and is expected to evolve further as technology advances (Rodriguez & Walters, 2017).

2.10 The Human Resources Practices (HRP)

Resource optimization is crucial in modern business management, especially in environments with resource scarcity and intense competition. Organizations focus on optimizing resources for efficiency and effectiveness. Human resources (HR) and leadership management are vital for effective organizational functioning, ensuring efficient workforce management and alignment of leadership practices with strategic goals (Zahrani, 2022c). HR practices are integral to organizational success, impacting employee performance, satisfaction, and effectiveness. As organizations evolve in response to changing work environments, understanding the latest concepts, theories, and empirical findings related to HR practices is essential (Kodama, 2019). HR practices include talent acquisition, performance management, training and development, compensation and benefits, diversity and inclusion, and employee engagement (Fachri et al., 2021).

2.11 Work Environment Resources (WER)

Work environment resources are crucial for employee well-being, productivity, and organizational effectiveness. Understanding concepts related to these resources is essential for creating supportive workplaces (Avolio & Gardner, 2005). These include physical resources, psychological safety, work-life balance, social support, and organizational culture (Kelly et al., 2014). The rise of remote work requires organizations to adapt their work environment resources. Initiatives to enhance employee health and productivity are increasingly implemented (Kelly et al., 2014).

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2.12 Leadership Management (LMA)

Leadership management is crucial for guiding organizations towards their objectives and ensuring employee motivation, contentment, and overall effectiveness. Leaders significantly influence an organization's culture and values, impacting employee engagement and satisfaction (Schein, 2010; Nica et al., 2022). It involves guiding, motivating, and directing individuals and teams within an organization to achieve its goals (Al-Rahmi et al., 2019; 2022). Leaders must exemplify ethical behavior in a business environment by emphasising ethical practices, as they significantly influence organizational culture. With organizations operating globally, leaders must develop cultural intelligence and tailor their leadership styles to different regions (Gip et al., 2023).

3. Research Methodology

This research explores factors affecting the effectiveness of work environment resources and leadership management concerning utilising human resources practices and technology within contemporary organizations. Thus, this study employs quantitative data collected through 375 structured questionnaires distributed manually to the Saudi Council of Engineers, Majmaah University, and Bank Al Jazira in April 2024. These surveys included closed-ended questions to gather numerical data for analysis in SPSS version 24 and SmartPLS version 4. Descriptive statistics, correlation analysis, and regression analysis were performed to examine the relationships and predictive power of the variables, and the study included factor analysis to identify underlying constructs and dimensions. The sample questionnaire was adapted to include basic demographic information, including the respondents' age, gender, and level of education, and questionnaire items measuring the components of the research model shown in Figure 1.

3.1 Measurement instrument and analysis

The measurement instrument utilized in this study consisted of survey questionnaires. Participants were asked to respond to a series of closed-ended questions, rating their responses on Likert scales ranging from "strongly disagree" (1) to "strongly agree" (5). The questionnaire was structured to evaluate the participant's perceptions and experiences regarding the interconnected 12 factors under investigation and the 14 hypotheses see Figure 1. The measurement scales for the factors were developed for this study based on widely used validity and reliability from other literature reviews and primary data; this is supported by Hair et al. (2020). Three questions for the automation technologies used (ATU) factor were adapted from (McAdam et al., 2005); Three questions for the cloud computing used (CCU) factor were adapted from (Loukis et al., 2017); Three questions for the project management software used (PMSU) factor were adapted from (Kodama, 2019); Three questions for the performance management and feedback (PMF) factor were adapted from (Folan & Browne, 2005); Three questions for the human resource optimization in supply chain management (HR-SCM) factor were adapted from (Parry et al., 2021); Three questions for the organization culture and employee engagement (OCEE) factor were adapted from (Eisenbeiss et al., 2010); Three questions for the adaptability and innovation (AIN) factor were adapted from (Prester & Bozac, 2012); Three questions for the empowerment and symbiotic relationship (ESR) factor were adapted from (Peng et al., 2016); Three questions for the technology integration (TIN) factor were adapted from (Kilag et al., 2023); Three questions for the human resources practices (HRP) factor were adapted from (Kodama, 2019); Four questions for the work environment resources (WER) factor were adapted from (Avolio & Gardner, 2005); and finally, Four questions for the leadership management (LMA) factor were adapted from (Schein, 2010).

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3.2 Data Analysis, Testing, and Validation

In this research, several analytical techniques were applied to derive meaningful insights from the data:

- Descriptive Statistics: Descriptive statistics were used to summarize the data, providing an overview of the central tendencies, variations, and distributions of the variables in demographic data (see Table 1).
- The measurement model helped researchers quantify and analyze these latent constructs by examining how they are measured through observable variables or indicators in the model fit and inner model (see Table 2).
- Factor Analysis: Factor analysis was conducted to identify the dataset's underlying constructs and dimensions. This technique helped in uncovering latent structures and patterns that may not be immediately evident from the survey responses but are shown by the test model on validity and reliability testing through two methods for assessing reliability were Cronbach's alpha coefficient (CA) and composite reliability (CR), Average Variance Extracted (AVE) see Table 3, and path coefficients, factor loadings, and R-square (see Figure 2).
- Correlation Analysis: Correlation analysis assessed the relationships between different variables. This technique helped in understanding the degree of association between the various factors by discriminant validity (see Table 4).
- Hypotheses Testing: Structural equation modelling (SEM) is a common statistical technique for estimating and assessing measurement models. Thus, in this research, SEM helped to determine the strength and significance of the relationships between the 14 hypotheses of the 12 factors and their observed indicators (see Figure 3 and Table 5).

4. Data Analysis and Results

Descriptive statistics serve as a fundamental tool for providing a concise and lucid overview of demographic data. These statistical measures are instrumental in comprehending and conveying the essential attributes of a sample, encompassing significant demographic variables such as age, gender, education level, and income (Pallant, 2020). Thus, in this research, descriptive statistics are pivotal in summarizing demographic data, offering researchers a concise portrayal of the characteristics and distribution of demographic variables within their sample. This enhances comprehension of the sample's composition and contributes to the interpretation of research findings (see Table 1).

Table 1. Descriptive statistics

Gender	Per cent	Valid Percent
Male	201	53.6
Female	174	46.4
Total	375	100.0
Age	Per cent	Valid Percent
18-21	243	64.8
22-25	77	20.5
26-29	16	4.3
30-33	16	4.3
>34	23	6.1
Total	375	100.0
Level of Education	Per cent	Valid Per cent
High school level and above	62	16.5
Diploma level and above	58	15.5
Graduate level and above	255	68.0
Total	375	100.0
Companies	Per cent	Valid Percent
Saudi Council of Engineers	162	43.2

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Majmaah University	165	44.0
Bank AlJazira	48	12.8
Total	375	100.0

Source: Author

4.1 Measurement model fit and inner model

In structural equation modelling (SEM), the measurement model, model fit assessment, and inner model are critical components that help researchers understand and evaluate the relationships between latent constructs and observed variables in their research models (Hair et al., 2020). Model fit assessment is crucial in SEM, ensuring the measurement model accurately represents the observed data. It involves various fit indices, which provide information about how well the proposed model aligns with the actual data. Some commonly used fit indices include the standardized root mean square residual (SRMR), degree of freedom-adjusted unweighted least squares (d_ULS), chi-square (χ^2), and normed fit index (NFI). Moreover, the inner model, or the structural model, comes after the measurement model. It examines the relationships between the latent constructs themselves (not their indicators). In other words, it explores how different latent constructs relate to each other in the proposed model (Hair et al., 2020; see Table 2).

Table 2. Model Fit and Inner Model - List

Model Fit		
Model Fit	Saturated model	Estimated model
SRMR	0.063	0.109
d_ULS	2.934	8.782
d_G	1.153	1.391
Chi-square	2553.436	2758.784
NFI	0.952	0.932
Inner Model - List		
Inner Model - List		VIF
AIN -> HRP		2.326
ATU -> TIN		1.661
CCU -> TIN		1.972
ESR -> HRP		1.985
HR-SCM -> HRP		2.288
HRP -> LMA		2.389
HRP -> WER		1.844
OCEE -> HRP		1.834
PMF -> HRP		2.839
PMSU -> TIN		1.604
TIN -> HRP		2.228
TIN -> LMA		2.352
TIN -> WER		1.844
WER -> LMA		2.766

Source: Author

4.2 Measurement Model and Factor Analysis

In this research, factor analysis is a statistical technique used to explore the underlying structure of a set of variables and identify latent factors that may explain patterns of correlations among observed variables (Hair et al., 2020). Also, validity and reliability refer to Cronbach's alpha (CA), which is a measure of internal consistency reliability, which assesses the extent to which items in a scale or construct are correlated with each other; composite reliability (CR), another measure of reliability in SEM that evaluates the internal consistency of a latent variable; and AVE, which assesses the extent to which the variance shared among items within a construct

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exceeds the variance due to measurement error (Fornell & Larcker, 1981; Dijkstra & Henseler, 2015), see Table 3.

Table 3. Measurement Model and Factor Analysis

Factors	Code	Factor loadings	CA	CR	AVE	R-square
Automation Technologies Used	ATU1	0.855	0.810	0.887	0.723	0.000
	ATU2	0.864				
	ATU3	0.832				
Cloud Computing Used	CCU1	0.831	0.708	0.837	0.632	0.000
	CCU2	0.783				
	CCU3	0.769				
Project Management Software Used	PMSU1	0.903	0.890	0.932	0.819	0.000
	PMSU2	0.920				
	PMSU3	0.893				
Performance Management and Feedback	PMF1	0.905	0.891	0.932	0.822	0.000
	PMF2	0.933				
	PMF3	0.880				
Human Resource Optimization in Supply Chain Management	HR-SCM1	0.899	0.872	0.922	0.797	0.000
	HR-SCM2	0.902				
	HR-SCM3	0.877				
Organizational Culture and Employee Engagement	OCEE1	0.862	0.863	0.916	0.783	0.000
	OCEE2	0.906				
	OCEE3	0.886				
Adaptability and Innovation	AIN1	0.921	0.894	0.934	0.826	0.000
	AIN2	0.891				
	AIN3	0.914				
Empowerment and Symbiotic Relationship	ESR1	0.876	0.814	0.890	0.729	0.000
	ESR2	0.855				
	ESR3	0.831				
Technology Integration	TIN1	0.852	0.834	0.900	0.750	0.414
	TIN2	0.856				
	TIN3	0.890				
Human Resources Practices	HRP1	0.833	0.749	0.854	0.661	0.609
	HRP2	0.813				
	HRP3	0.793				
Work Environment Resources	WER1	0.782	0.806	0.873	0.632	0.639
	WER2	0.799				
	WER3	0.776				
	WER4	0.822				
Leadership Management	LMA1	0.768	0.784	0.860	0.607	0.525
	LMA2	0.729				
	LMA3	0.792				
	LMA4	0.824				

Source: Author

4.3 Correlation analysis and discriminant validity

Correlation analysis and discriminant validity are fundamental elements of structural equation modelling (SEM), playing a pivotal role in assessing the relationships between variables and confirming the distinctiveness of constructs (Hair et al., 2020). Consequently, in this study, discriminant validity was necessary within the SEM framework, ensuring that latent constructs remained separate and did not capture the same underlying concept, as indicated in Table 4.

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Table 4. Discriminant validity

	AIN	ATU	CCU	ESR	HR-SCM	HRP	LMA	OCEE	PMF	PMSU	TIN	WER
AIN	0.889											
ATU	0.501											
CCU	0.577	0.802										
ESR	0.625	0.528	0.667									
HR-SCM	0.607	0.519	0.733	0.606								
HRP	0.636	0.720	0.800	0.708	0.816							
LMA	0.703	0.580	0.694	0.817	0.638	0.736						
OCEE	0.739	0.407	0.418	0.562	0.408	0.414	0.675					
PMF	0.630	0.610	0.823	0.725	0.828	0.825	0.747	0.483				
PMSU	0.586	0.566	0.747	0.631	0.599	0.631	0.596	0.466	0.697			
TIN	0.686	0.605	0.710	0.760	0.646	0.811	0.839	0.575	0.743	0.648		
WER	0.727	0.670	0.812	0.777	0.840	0.913	0.822	0.558	0.875	0.719	0.875	0.912

Source: Author

Path coefficients are crucial components of structural equation models (SEMs) in this research that measure the strength and direction of relationships between latent variables or constructs (Hair et al., 2020). Thus, in this research model, 14 path coefficients, often denoted as β, are used to quantify the relationships between latent 12 variables (also known as constructs) and their observed indicators in structural equation modelling hypotheses.

Moreover, factor loadings represent the relationship between observed variables and the latent factors they are hypothesized to measure in a confirmatory factor analysis (CFA) model, and R-square (R2) in SEM is a measure of the proportion of variance in an endogenous (dependent) variable that is explained by its exogenous (independent) variables (Hair et al., 2020), see Figure 2.

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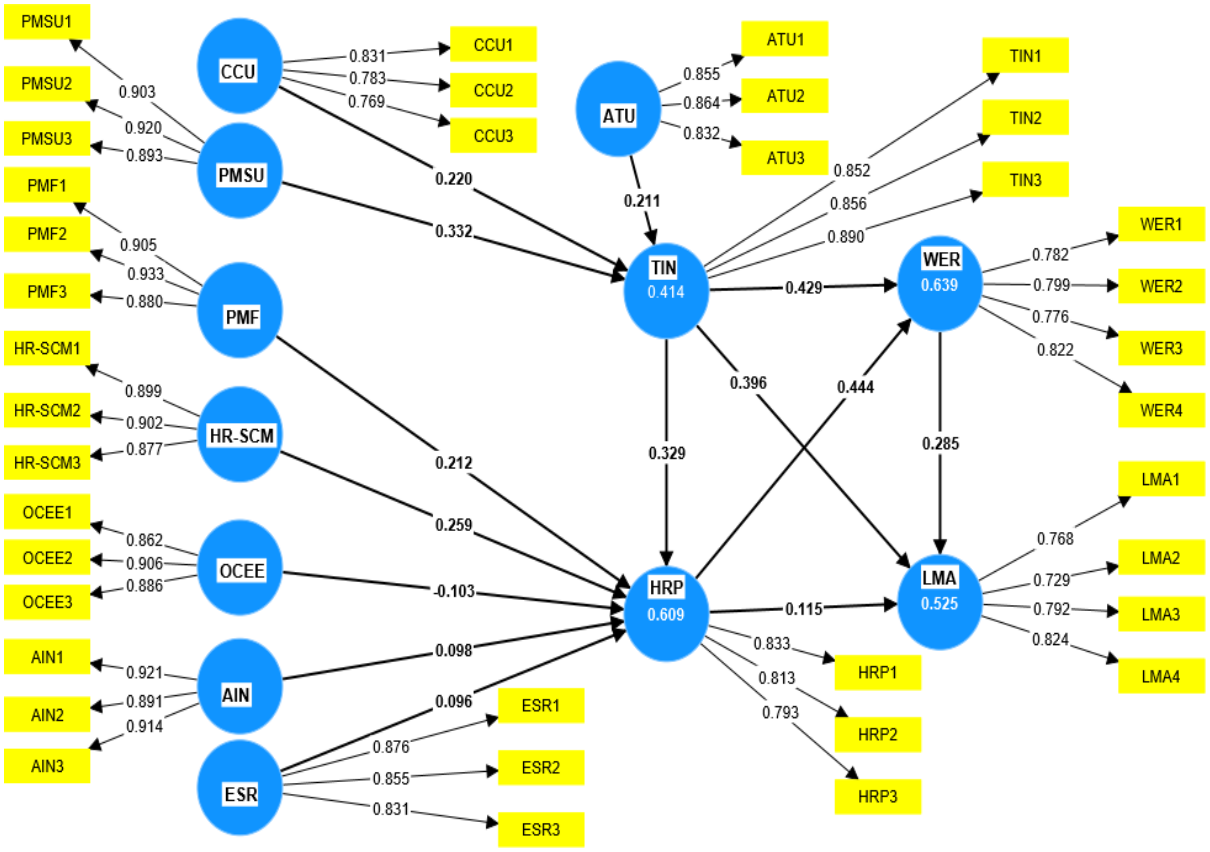


Figure 2. Research Model and Path coefficients, Loadings and R-square

Source: Author

4.4 Hypotheses testing using SEM

Hypothesis testing using structural equation modelling (SEM) is a robust method for evaluating relationships between variables in research. SEM combines measurement and structural models to test hypotheses, assessing relationships between variables and the impact of one variable on another. It allows researchers to analyze the model's fit to the data, calculate path coefficients, and determine the significance and direction of relationships. Path coefficients represent the strength and direction of relationships between variables, and their significance is assessed to determine if proposed relationships are statistically supported. This approach provides a comprehensive understanding of structural relationships within a theoretical framework (Hair et al., 2020), see Table 5.

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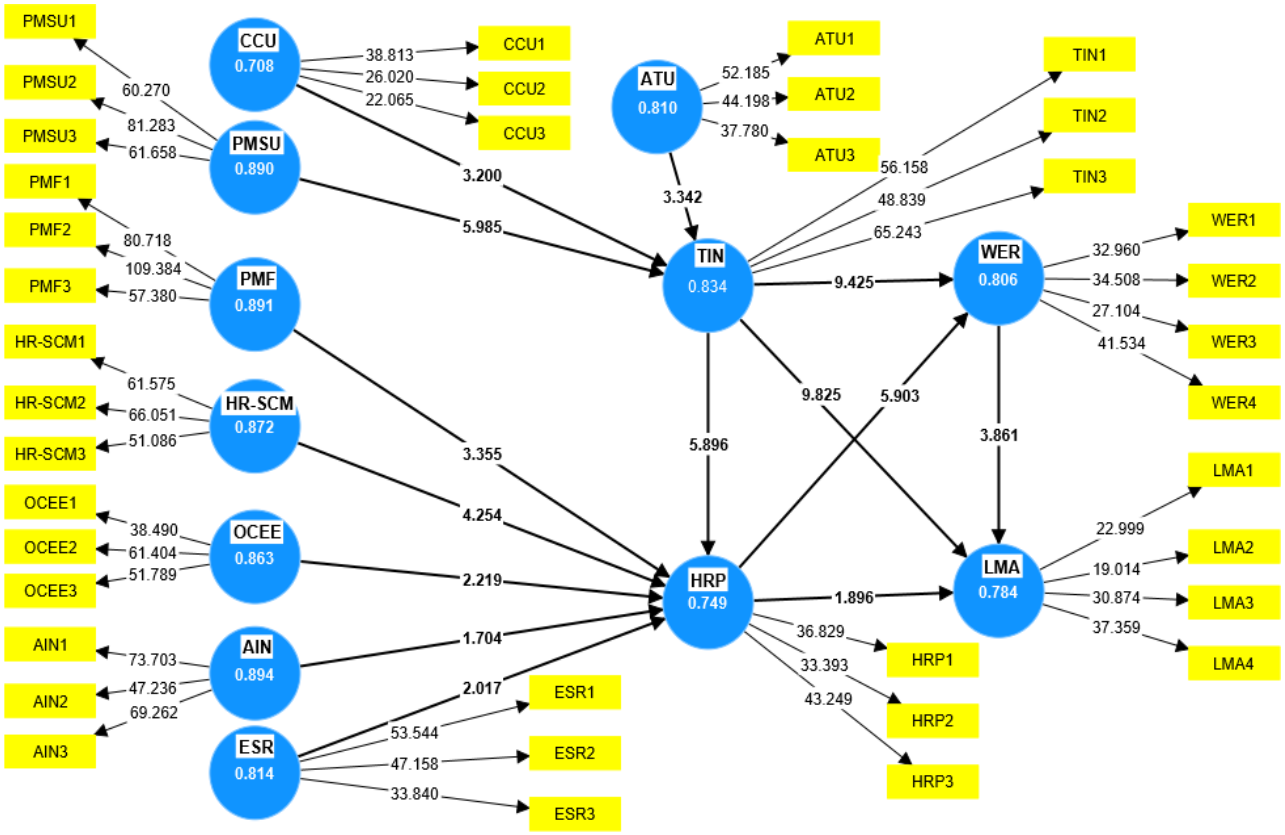


Figure 3. Research Model and Hypothesis testing using SEM

Source: Author

Table 5. Hypothesis Testing Research Model Using SEM

Hypotheses		Mean	STDEV	Path coefficients	T statistics	P values
H1	ATU -> TIN	0.212	0.063	0.211	3.342	0.001
H2	CCU -> TIN	0.220	0.069	0.22	3.200	0.001
H3	PMSU -> TIN	0.332	0.055	0.332	5.985	0.000
H4	PMF -> HRP	0.211	0.063	0.212	3.355	0.001
H5	HR-SCM -> HRP	0.261	0.061	0.259	4.254	0.000
H6	OCEE -> HRP	0.103	0.047	-0.103	2.219	0.027
H7	AIN -> HRP	0.098	0.057	0.098	1.704	0.089
H8	ESR -> HRP	0.098	0.048	0.096	2.017	0.044
H9	TIN -> HRP	0.329	0.056	0.329	5.896	0.000
H10	TIN -> WER	0.429	0.045	0.429	9.425	0.000
H11	TIN -> LMA	0.397	0.067	0.396	5.903	0.000
H12	HRP -> WER	0.443	0.045	0.444	9.825	0.000
H13	HRP -> LMA	0.115	0.060	0.115	1.896	0.058
H14	WER -> LMA	0.285	0.074	0.285	3.861	0.000
Sample mean-M		Standard deviation STDEV		Path coefficients	T statistics	P values

Source: Author

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5. Discussion and Implementation

Implementing automation technologies requires organizations to assess their compatibility with existing infrastructure to ensure seamless integration and maximize benefits (Budhwar et al., 2023). This integration involves incorporating automation tools into current workflows and systems. While automation offers significant advantages, it also presents challenges like job displacement, data security risks, and ethical guidelines in AI deployment, all of which must be addressed for responsible and sustainable automation. Cloud computing provides computing services over the internet, including storage, processing power, and applications, offering scalable and on-demand access to technological resources (Yenugula et al., 2023). Cloud services enable organizations to scale infrastructure based on demand, leading to cost savings and operational efficiency (Ullah et al., 2020). Moreover, cloud computing enhances collaboration among geographically dispersed teams by providing centralized and accessible data storage and collaboration tools (Zahrani, 2021). Similar to automation, the integration of cloud computing is positively associated with technology integration within organizations, and it is often part of broader digital transformation initiatives to maintain competitiveness (Ahmad et al., 2021).

Project management software offers a centralized platform for planning, executing, and monitoring projects, enhancing communication and coordination among team members (Arefazar et al., 2022). It enables the creation of structured project frameworks, defining tasks, timelines, and dependencies, and facilitates efficient resource allocation based on skills and availability (Ika & Pinto, 2022). The software fosters improved collaboration among team members, particularly in virtual or remote work setups, by providing a centralized location for project documents, real-time communication, and collaborative decision-making. Performance management and feedback processes are crucial for employee development, organizational performance, and strategic goal achievement (Atmaja et al., 2023). Leaders should involve employees in goal-setting and provide opportunities for input, fostering ownership and commitment (Arefazar et al., 2022). Positive feedback acknowledges achievements and motivates employees, while constructive feedback identifies improvement areas and enhances skills. This systematic process of setting expectations, assessing performance, and providing feedback contributes to employee effectiveness and organizational success. These findings align with research indicating a positive relationship between the use of project management software and technology integration within organizations and a positive relationship between performance management and feedback processes and human resources practices.

Human resource optimization in supply chain management (SCM) enhances efficiency, responsiveness, and overall performance (Alam, 2022). This optimization involves aligning and maximizing workforce capabilities to ensure smooth material, information, and service flow (Ma et al., 2023). Continuous training and development programs are essential to keep employees updated on industry trends, technologies, and best practices (Kosanoglu & Kus, 2021). Integrating technology tools like SCM software and analytics enhances human resource capabilities and strategic planning, streamlining processes and enabling data-driven insights (Aroba et al., 2023; Mater et al., 2024; Alserhan et al., 2023; Althunibat et al., 2021; Abbas et al., 2021). This aligns with research indicating a positive relationship between human resource optimization in SCM and human resources practices.

Organizational culture and employee engagement are crucial for performance and success (Makhmut et al., 2023). Organizational culture encompasses shared values, beliefs, and practices that shape employee behaviour (Alam, 2022). A positive and inclusive culture fosters belonging, collaboration, and alignment with the organization's mission and values. Leaders prioritising transparency, inclusivity, and ethical conduct contribute to a positive culture (Aroba et al., 2023). Programs encouraging employee involvement in decision-making enhance ownership and engagement, aligning with human resources practices. Adaptability and innovation are essential for success in today's dynamic business environment (Sabuhari et al., 2023). Organizations establish learning and development initiatives, including training, workshops, and mentorship, to enhance employee skills and knowledge (Makhmut et al., 2023). Embracing adaptability helps organizations navigate challenges and seize opportunities, while innovation enhances competitiveness, efficiency, and stakeholder satisfaction. These findings align with research

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showing a positive relationship between organizational culture and employee engagement with human resources practices. However, a negative relationship exists between adaptability and innovation in organizations with human resources practices.

Empowerment and symbiotic relationships in organizations involve delegating authority and providing autonomy to individuals or teams, enabling them to make decisions and take ownership (Budhai & Lewis, 2023). This mutual benefit between entities, such as teams, departments, or employees, and the organization is facilitated by training programs focusing on skill development and providing necessary tools (Han et al., 2023). Leadership development programs can cultivate transformational leaders who empower their teams, contributing to symbiotic relationships. Technology integration strategically incorporates technologies into organizational processes to enhance efficiency and collaboration; research shows a positive relationship between empowerment and symbiotic relationships with human resources practices. Effective technology integration fosters innovation by providing tools for creativity, problem-solving, and adaptability (AlAjmi, 2022). Technologies like video conferencing and instant messaging improve team communication and collaboration, even in dispersed settings (Hung et al., 2023). Organizations should develop a technology strategy aligned with their goals. Research indicates a positive relationship between technology integration, human resources practices, work environment resources, and leadership management.

Human resources practices encompass strategies, policies, and processes to manage and optimize the workforce, covering recruitment, talent development, performance management, and employee relations. These practices also address diversity and inclusion, recognizing the value of diverse perspectives and creating an inclusive workplace (Aboramadan et al., 2020). Integrating technology into human resources involves using HRIS for data management, analytics, and automating administrative tasks (Al-Aali, 2021). Organizations develop comprehensive HR strategies aligned with objectives, addressing short-term and long-term workforce needs and potential skills gaps (Irshad et al., 2021). Work environment resources include physical, cultural, and technological elements contributing to employee well-being, productivity, and satisfaction (Badrianto & Ekhsan, 2020). A positive organizational culture promoting collaboration, inclusivity, and shared values impacts employee relationships, communication, and job satisfaction (Mihalache & Mihalache, 2022). Implementing ergonomic principles in workspace design, such as adjustable furniture and proper lighting, enhances employee well-being and reduces physical strain (Hung et al., 2023). Research shows a positive relationship between human resources practices and work environment resources, while a negative relationship exists between human resources practices and leadership management.

Finally, effective leadership is crucial for motivating employees, fostering a positive work culture, and promoting engagement. Thus, leaders who inspire and provide a clear vision increase employee morale (Buhagiar & Anand, 2023). Therefore, effective leadership involves successfully navigating and managing organizational change and creating a culture that embraces change and continuous improvement (Nabella et al., 2022). Leaders should exemplify ethical behaviour, set a standard for the entire organization, and implement ethical leadership practices to build trust, integrity, and a solid organizational culture (Buhagiar & Anand, 2023). This is consistent with the results of this research, as it was found that there is a positive relationship between organisational leadership management and human resources practices.

In summary, these twelve hypotheses emphasize the importance of various factors, including technology adoption, human resources practices, organizational culture, leadership, and more, in positively influencing organizational performance and success. Understanding and validating these relationships can guide organizations in optimizing their practices and resources to achieve better outcomes. However, there were two hypotheses that had a negative relationship: the first was the relationship between adaptability and innovation with human resources practices, and the second was the relationship between human resources practices and leadership management. Justifying these two hypotheses, a negative relationship between adaptability and innovation in an

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organization with human resources practices and a negative relationship between human resources practices and leadership management can be challenging, as these factors are often designed to work together harmoniously to enhance organizational effectiveness. Negative relationships between adaptability, innovation, human resources practices, and leadership management would typically be the result of specific, unusual circumstances.
Organisations often strive to align these elements positively to promote growth and effectiveness. The negative relationships mentioned here are exceptions and require unique contextual situations to be relevant. Here are the scientific contributions:

- Empirical Validation of Effectiveness: This research contributes to the scientific community by empirically validating the effectiveness of work environment resources and leadership management within human resources practices and technology utilization. It provides concrete evidence of the impact of these factors on organizational success, shedding light on their practical importance.
- Interdisciplinary Integration: The study integrates multiple disciplines, including human resources management, leadership studies, and technology management. This multidisciplinary approach enriches the scientific understanding of the complex relationships between work environment resources, leadership, human resources practices, and technology, offering a holistic perspective.
- Quantitative Analysis of Technology: By examining the role of technology in the context of work environment and leadership, the research offers quantitative insights into the influence of technological advancements on organizational outcomes. It contributes to the growing knowledge on technology's role in shaping work environments and leadership practices.
- Human Resources Practices: The research highlights the significance of driven human resources practices, contributing to the scientific exploration of evidence-based decision-making in HR. It underscores the importance of leveraging technology and analytics to optimize HR strategies and align them with broader organizational goals.

Therefore, these contributions collectively enrich the scientific understanding of how work environment resources, leadership, human resources practices, and technology impact organizational effectiveness. Here are the theoretical contributions:

- Work Environment Resources Framework: The study contributes to the theoretical understanding of work environment resources by providing a framework incorporating leadership management, human resources practices, and technology utilization. It advances existing theories by emphasizing the interconnectedness of these factors in creating an effective work environment.
- Leadership Management Theory: The research enriches leadership management theory by emphasizing the importance of leadership in optimizing the use of work environment resources and technology. It contributes to leadership theories by highlighting the role of leaders in creating an environment conducive to productivity and well-being.
- Technology Integration in HR Theory: The study expands theories related to technology integration in human resources. It underscores the need for organizations to harness technology for HR practices and align these technologies with leadership and work environment resources for organizational effectiveness.
- HR Decision-Making Theory: The research contributes to the theoretical foundation of HR decision-making. It underscores the importance of collecting and analyzing data to inform HR practices and supports the evolution of HR management theories towards more evidence-based approaches.

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6. Conclusion, Limitations, and Future Research

This research highlights the importance of work environment resources and leadership management in shaping organizational success. It emphasizes the relationship between a supportive work environment, effective leadership, human resources practices, and technology adoption and their impact on employee well-being, performance, and organizational outcomes. The study developed a new research model based on transformational leadership theory and psychological contract theory, highlighting the importance of technology and effective leadership in creating efficient, productive, innovative, and engaging work environments. Integrating technology tools such as project management software, cloud computing, and automation is crucial for improving workplace efficiency and organizational success in today's business landscape. The study found that 12 hypotheses were accepted, indicating the significance of fostering resource-rich work environments, proficient leadership, strategic human resources practices, and technology integration. However, the research has limitations, including potential bias from specific industries, company size, and organizational culture, which could affect the generalizability of the results. The cross-sectional design also limits establishing causality, suggesting the need for longitudinal research. Future studies should explore how changes in work environment resources and leadership practices affect human resources practices and technology adoption over time, considering diverse cultural contexts and potential mediating and moderating variables. Additionally, research should continue to examine how emerging technologies impact organizational outcomes across various sectors.

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BANKS' VISION STATEMENTS: PECULIARITIES AND MISSING LINKS

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Abstract. This study aims to cross-examine the vision statements of banks by comparing Islamic banks (IBs) and Conventional banks (CBs) in the Middle East. The top 100 IBs and top 100 CBs were selected for this study based on their rankings. The vision statements for each bank were collected from official websites. The datasets were accessible through a Mendeley data repository. Data were analyzed using content and descriptive statistics. This exploratory research provides many significant findings for academia and professional bankers involved in strategy formulation. First, this study provides a comparative account of vision statements for both types of banks. IBs and CBs did not have significant differences in their descriptive statistics, especially vocabulary density, frequently used keywords, frequently used characteristics, and average number of words in each vision statement, except for a few. Most banks (approximately 80% including both IBs and CBs) have a range of 1-30 words for each vision statement. Six out of ten keywords are common in both IBs and CBs, i.e., 'Bank', 'Financial', 'Services', 'Islamic', 'Choice', and 'Leading'. The keyword 'uniqueness' was the least frequently used characteristic (36%). Analyses of major themes in data reflect that both groups share the common themes of 'bank' and 'financial' in their vision statements. On the other hand, distinctive elements in the keywords include 'Customer' in CBs and 'Islam' in IBs. Secondly, a few of the current study's findings are new to the literature. For example, previous studies have suggested that visions are futuristic, but the current study could not find meaningful 'futuristic' vision statements in banks (both IBs and CBs). Finally, this study provides recommendations for academia and senior bankers. Both IBs and CBs are suggested to make risk enablement part of their visions, and both must include technology or, more specifically, financial technology (FinTech) or at least technology enablement in their visions. They must be able to impress young customers through technology enablement and utilization. IBs need to work on their vision statements and create a sense of differentiation from CBs in the region. More vision-only studies are required to explore the 'anatomy' of vision statements in different countries, cultures, and, more importantly, in different types of banks. Developing essential components of vision statements in the modern world is a good research agenda. A more detailed and robust framework is required to analyze vision statements more efficiently.

Keywords: Banks; Islamic Banks; Vision Statement; Strategy; Technology

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Additional disciplines

1. Introduction

Conventional banks (CB) are called the fabric of society and perform multi-faced operations in every part of the world. CBs are seen as the engine of every economy as the Bank of England for England (O'Brien & Palma, 2023), the pride of the country as the Grameen Bank for Bangladesh (Alam, 2023), excellent user experience (UX) as the Citibanamex, for Mexico (Ojha et al., 2024); global digital bonds as the HSBC Global (Lee et al., 2024). One common thing in all these examples is their struggle to achieve excellence as they envisioned earlier. On the other hand, Islamic banks (IB) are the most recent addition to the banking industry and are probably the

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most profitable (Sobol et al., 2023) and more competitive (Azad et al., 2023). IBs emphasize distinguishing their products, services, and processes from those of traditional interest-based banking systems (Parsa, 2022). Differentiation can act as a unique selling proposition (USP) for IBs and be a fundamental element in their branding (Thomas, 2020). The aspirations of banks (both IBs and CBs) are usually reflected in their vision statements. Therefore, studying banks and their intentions through the lens of vision statements provides an interesting opportunity to explore.

This research gap suggests that comparative studies on IBs and CBs in terms of vision statements are almost nonexistent. The current research aims to fill this research gap by cross-examining the vision statements of both types of banks (IBs and CBs), clarifying the differences between them, and finally classifying the characteristics and components of vision statements to provide generalizable answers to the following research questions:

1. What is the average length of a vision statement for each bank? IB? CB?
2. What keywords are most commonly used in banks' vision statements? IBs? CBs?
3. Which characteristics of vision statements are most commonly adopted by the major banks? IBs? CBs?
4. What major word themes or word clouds can be observed in banks' vision statements? IBs? CBs?

2. Literature Review

During the last five decades, vision statements have emerged as the core need of any organization to stay competitive and thrive (Kaiser et al., 2022). A vision statement is meant to give direction to an organization and communicate where it is going and what it wants to achieve. The leadership team typically creates these to help the organization foster a shared understanding of its aspirations and objectives (Baildon & Arabi, 2023). These are usually accompanied by a mission statement, core values, and goals that are central to the organization's work. These statements are considered an integral part of strategic management, as they describe an organization's goals (Kaiser et al., 2022) and an essential element for business success (Aftab et al., 2023). These statements can serve as a guiding principle for the company and provide a defined growth direction and goal (Fitzsimmons et al., 2022). By developing a vision, an organization can instil the aspirations for the future organization. Ideally, corporate decision-making is in line with the company's vision.

Vision statements are overwhelmingly accepted as an integral part of the strategic management process for different types of organizations and influence most aspects of strategy and performance. Vision statements have consistently been shown to be the most highly-rated management tool senior managers use (Fiset & Robinson, 2020). In contrast to those who claim that vision statements are archaic documents typically displayed as wall hangings, vision statements are claimed to be helpful in daily work (operations performance) and are empirically supported (Brorström et al., 2022). Typically, vision statements are presented as annexed mission statements (Runi, 2023; Joshi et al., 2023), with very few as 'Vision only' (Baildon & Arabi, 2023). The literature provides a few differences between vision and mission statements (see Table 1).

Table 1. Vision & Mission Statements

Vision	Mission Statement	References
Focuses on the future	Concentrates on the present	Fitzsimmons, Qin, & Heffron, (2022); Fiset, & Robinson, (2020)
Source of inspiration and motivation	Defines customer and critical process.	
The desired future position of the company.	Desired level of performance.	
Externally focused	Internally focused	
Having 10 characteristics and components is not yet realized.	Having universally accepted 10 components and five characteristics	

Source: Author's Contribution

Vision statements also help leaders to create and communicate effective organizational roadmaps (Men, Yue & Liu, 2020). These are described as visions as 'mental models' or 'conceptual representations' of the organisation's future (Kaiser et al., 2022). Vision has several definitions but mostly describes the future of the organization's future and emphasizes the need to align goals and strategies to achieve the desired future (González, 2022; Feleaga, Ionescu & Bunea, 2023).

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A vision statement (or simply vision) usually conveys the idea of an organization's 'goals'. Many researchers have argued that vision is more than a goal. Table 2 presents the differences between vision and goals.

Table 2. Vision Statements & Goals

Vision	Goals	References
Long-term ideas of what an organization wants to achieve.	Are specific and measurable objectives that help achieve the vision.	Allouch, et al., (2021); Fuertes, et al., (2020); Dzwigol, (2020).
Provide direction and motivation.	Provide clarity and focus.	
Without a specific deadline.	Deadlines for completion.	
Long-term and foresight.	Short-term and specific.	

Source: Author's Contribution

Some studies claim that the absence of clear vision is inversely related to organizational performance and effectiveness (Mattisson, 2021), which reflects on operations performance for all activities around the organization. Several theorists have proved a direct relationship between the vision statement and organizational performance. They suggest that vision should be action-oriented and innovative and have the best fit for other organizational communication elements like mission and values (Mittal et al., 2021). Vision has also been seen as a critical aspect of strategic change, and forward-thinking organizations describe vision as a proactive response to the changing environmental needs of the environment (Soomro et al., 2021).

Banks, like other industrial sectors, are subject to significant changes and transformations resulting from various factors, including demographic shifts, technological advancements, globalization, and the country's or region's socio-political-economic environment (Mazurek et al., 2020). Furthermore, banks are also advised to deal with rivalry of competitors and changes among internal and external stakeholders who have the opportunity to influence and, to some extent, reshape academic performance (Arifin, 2021). Competitiveness, therefore, puts banks under tremendous pressure to ensure that their activities and services to their target audience are accurate and relevant and simultaneously develop competitive vision statements and strategies to achieve them. (Arifin, 2021). Furthermore, regulators have also emphasized interest in banks' vision statements and their influence on their strategic and operational plans of action (Ahmed & Jafri, 2024). More importantly, these regulators also provide concrete guidelines for creating a vision for effective and efficient measures in strategic decision-making within their institutions (Nurhaida et al., 2023).

During the last decade, many trends have engulfed the global banking industry. The most apparent trend is the 'technology enablement' in the form of FinTech (Vives, 2017). These trends have impacted the banking industry and its stakeholders, including employees and customers. Therefore, the bank's strategic management team must acknowledge this trend in its strategic orientation. The second buzzword surrounding the banking industry is 'sustainability', and many studies have linked it with a bank's strategy (Kantabutra, 2020; Bedoya-Dorado et al., 2022; Marfo et al., 2024) or bank's performance (Dawood et al., 2020).

Many dimensions of comparison between IBs and BC have been presented in past studies (Parsa, 2022). Those comparisons are ongoing and attract both academicians and professionals as researchers, writers, critics, or even readers. However, these studies are based on the outputs or impacts of IBs and CBs, and the root cause for differentiation is still missing. A growing number of IBs have shown great importance in differentiating their products, services, and processes from those of conventional banking systems. This differentiation might work as their USP (unique selling proposition) and help them build their brand. A research gap indicates that no study has compared IBs and CBs in terms of intention and vision statements. The current research aims to cross-examine banks' vision statements, both IBs and CBs.

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3. Methodology

This section discusses the methods and methodologies used in this research. It begins with the justification of the population and sampling for the study. It furthers the illustration of the methodology by providing a brief extraction of vision statements and the content analysis technique employed in this study to analyze the data.

For this study, two types of banks were selected: Islamic (IBs) and Conventional (CBs).
The top 200 CBs were selected for this study based on their international rankings (Money Gate, 2022). Similarly, the top 100 IBs were chosen according to their rankings (Asian Banker, 2022). All IBs were removed from the list of CBs, and the remaining 100 CBs were selected. Therefore, there was no overlap between the two lists, and the final list included 100 IBs and 100 CBs. Both datasets are available from Mendeley data (Al Falah, 2023a; Al Falah, 2023b).

The vision statement of each selected bank was collected from their official websites. This method of gathering critical information through official websites has been widely practised in previous studies (Al Falah & Siddiqui, 2021; Ahmad, 2021; Sat, 2021; Toker Gökçe, 2021; Mazurek et al., 2020; Siddiqui, 2021).

This study used content analysis or text analysis, which is defined as any technique for concluding by objectively and systematically identifying certain characteristics of a message (Abd Rahman et al., 2020; Kleinheksel, et al., 2020). This allows the collection of both qualitative and quantitative oral, printed, and electronic data (Lindgren et al., 2020). In other words, this is a summary and quantitative analysis of news based on the scientific method (including attention to objectivity, inter-subjectivity, a priori design, reliability, and hypothesis testing) and the types of variables that can be measured is not limited to or the context in which the message is created or presented (Narin, 2021). The literature often uses content analysis to analyze vision statements, especially for universities (Adebanke et al., 2022; Ahman, 2020). Previous studies have used content analysis as a significant research/analytical tool for analyzing vision statements for various types of organizations, including business schools (Siddiqui, 2021; Ahmad & Siddiqui, 2021), top global brands (Ahmad & Al-Shaikh, 2021; Siddiqui, 2021).

The framework used to analyze vision statements is based on ten possible characteristics of vision statements specified by (Al Falah & Siddiqui, 2021): clear, realistic, easy to explain, easy to communicate, easy to memorize, focused, challenging, short, decision-making guidance, and unique. A set of keywords was prepared to gauge each characteristic of the vision statements for all banks. Table 3 presents the characteristics of the vision statements with possible explanations and keywords. Finally, the datasets of the vision statements were prepared for analysis.

Table 3. Characteristics of Vision Statements - Measurement for Banks

Characteristics	Explanation	Measuring bases
Clear	Achieve clarity of purpose among all stakeholders having different expectations and perspectives.	Easy to perceive, understand, or interpret. No jargon, no technical terms No words open to interpretation. Sentences are short and to the point Use of precise, uncluttered language. Write it in the present tense.
Realistic	Set an accurate expectation for all stakeholders toward bank performance.	The sensible and practical idea of what can be achieved.
Easy to be explained	A single sentence needs to be written from a customer's perspective to explain it to customers quickly.	Not highly intellectual or cultured No technical terms No calculations
Easy to communicate	Posing no difficulty, requiring little effort to pronounce and remember.	No technical terms No calculations Use a single word to explain the complete philosophy.
Easy to memorize	Should be short, preferably one sentence so that it could be remembered easily.	Easy to memorize Maximum 20 words Maximum 12 letters in a word.

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Shorter	Smaller text with some enforcement of arbitrary limits on its length.	Maximum 20 words Maximum 12 letters in a word. Maximum 1-word string. Maximum two sentences.
Decision-Making	Provide guidance helpful in making decisions like brand, growth, survival	Provide guidance helpful in making decisions like brand, growth, survival
Challenging	Testing one's abilities is demanding.	It is something that, if achieved - would represent a sense of pride and fulfilment.
Focused	Focused on the future and emphasize the goals of the company overall.	Provide direction to achieve a particular aim. Must be able to link it to the mission statement and goals. Make it specific to your business.
Unique	Being the only one of its kind, unlike anything else	Must reflect the unique selling proposition of the bank.

Adopted from Al Falah & Siddiqui (2021).

4. Results of Analysis

This section provides data analysis and discussions on the descriptive statistics related to the four research questions. First, using descriptive statistics, differences between IBs and CBs are presented. Second, it compares the number of words in both groups and highlights the ideal length of bank vision statements. Third, it presents a comparative account of frequently used keywords. Fourth, it compares the characteristics of vision statements between IBs and CBs and presents a comparative account of major themes observed in vision statements.

RQ1: What is each bank's average length of a vision statement? IB? CB?

A total of 200 vision statements (IBs = 100 and CBs = 100) were collected and analyzed. Table 4 presents the descriptive results comparing IBs and CBs. Although the banks selected for this study belong to 23 different countries (IBs = 22 and CBs = 9), they share some common keywords in their vision statements. The total number of words and average number of words for the two types of banks were not significantly different.

While developing vision statements, organizations often wonder how many keywords would be appropriate. A trend was observed for both IBs and CBs in terms of the number of words in vision statements (Figure 1). There was an 80:20 split in the number of words in the vision statements. Eighty per cent of banks (both IBs and CBs) have vision statements ranging from 1-30 words for each vision statement. Only 20% of banks (IBs and CBs) have more than 30 words of vision statements. Overall, the average number of words was 21.8 for IBs and 20.8 for CBs (see Table 4).

Table 4. Descriptive Results for Vision Statement – Islamic/Conventional Banks

Criteria	Islamic Banks	Conventional Banks
Minimum number of words	5	3
Maximum word count	129	76
Average number of words	21.8	20.8
Total word count	2180	2110

Source: Author's Contribution

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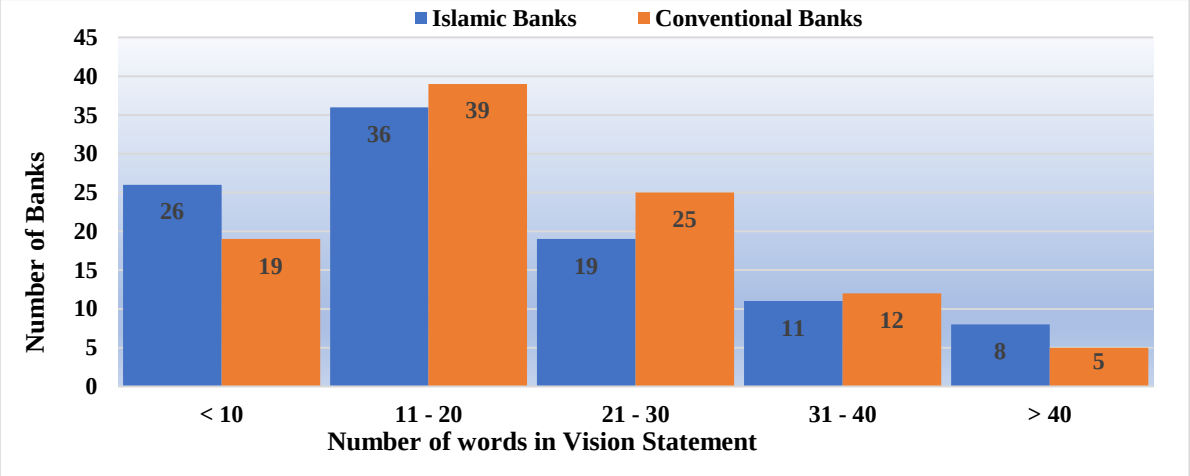


Figure 1. Vision Statement - Number of Banks / Number of Words
Source: Author's Contribution

Vocabulary density analysis of the data was performed using the Voyant Tools. Vocabulary density is the ratio of the total number of words to the number of unique words in a document (Ahmad, 2021; Siddiqui, 2021a). Therefore, a higher vocabulary density value close to 1 indicates a simple text with fewer unique words. On the other hand, a lower density value represents a complex text with more unique words. The vocabulary density of the data in this study appeared to be on the lower end with a value of 0.25 for IBs and 0.27 for CBs, indicating that both types of banks have an insignificant difference in their average number of words. The number of unique words and vocabulary density of vision statements were also not significantly different between CBs and IBs. Table 6 shows the number of unique words and the vocabulary density.

Table 6. Vocabulary Density in Vision Statement – Islamic/Conventional Banks

Criteria	Islamic Banks	Conventional Banks
Unique words	533	565
Vocabulary Density	0.25	0.27

Source: Author's Contribution

RQ2: What keywords are most commonly used in banks' vision statements? IBs? CBs?

An analysis of the frequently used keywords in vision statements was performed using SPSS. The analysis revealed that the top IBs and CBs frequently used ten keywords in their vision statements, as indicated in Tables 7 and 8. Six out of ten keywords are common in both IBs and CBs, i.e., 'Bank', 'Financial', 'Services', 'Choice', 'Leading', and 'Islamic' CBs have two unique keywords in their vision statements, i.e., 'Customers' and 'Innovation'. IBs have 'Sharia-compliance' and 'Investment' as unique, frequently used keywords in their vision statements. The keyword 'Islamic' appeared in both IBs and CBs, with a significant difference in their frequency (IBs =51%; CBs = 14%). This is because IBs associate themselves with the keyword 'Islamic' (51%). In comparison, CBs also use the term 'Islamic' in their vision statements (14%), as target customers would overlap in both types of banks and/or CBs are located in the Middle East. Approximately 90% of the population in the Middle East is Muslim, and Islamic banking is close to their beliefs and values, in addition to their financial needs. Therefore, 'Islamic' would be attractive to both IBs and CBs.

Table 7. Frequently used common keywords in Vision Statements – Islamic/Conventional Banks

Keywords	Islamic Banks	Conventional Banks
Bank	85	79
Financial	38	35
Services	25	34
Islamic	51	14
Choice	16	13
Leading	16	13

Source: Author's Contribution

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Table 8. Frequently used different keywords in Vision Statements – Islamic/Conventional Banks

Keywords	Islamic Banks	Conventional Banks
Sharia-compliance	27	-
Investment	15	-
Customers	-	27
Innovation	-	16

Source: Author's Contribution

RQ3: Which characteristics of vision statements are most commonly adopted by the major banks? IBs? CBs?

An analysis of frequently used characteristics in vision statements was performed using SPSS and the results are listed in Table 9. The analysis revealed that IBs and CBs had insignificantly different frequencies for their characteristics, as indicated in Table 9. The keyword 'Unique' was the least frequently occurred characteristic of the vision statements. This is mainly due to the population's narrow line of business, banking and scope of work in the Middle East as limited geographic areas for the selected banks. Under these two issues, it would be challenging to maintain uniqueness in visions.

Table 9. Characteristics of Vision Statements – Islamic/Conventional Banks

Characteristics	Islamic Banks	Conventional Banks
Clear	88	94
Realistic	87	91
Easy to be explained	87	91
Easy to communicate	86	91
Focused	81	89
Challenging	75	83
Easy to memorize	75	78
Decision-Making guidance	62	69
Shorter	58	55
Unique	31	42

Source: Author's Contribution

RQ4: What major word themes or word clouds can be observed in banks' vision statements? IBs? CBs?

Major themes in vision statements were extracted using Voyant Tools. Many earlier studies have used this technique to analyze different strategic documentation (Cortés Sánchez, 2018). Figure 2 presents a comparative account of the major themes observed in vision statements. The only major theme difference observed between IB and CB is the major theme pillar. Both groups share the common theme of 'bank' and 'financial' while distinctive elements include 'Customer' in CBs and 'Islam' among IBs.

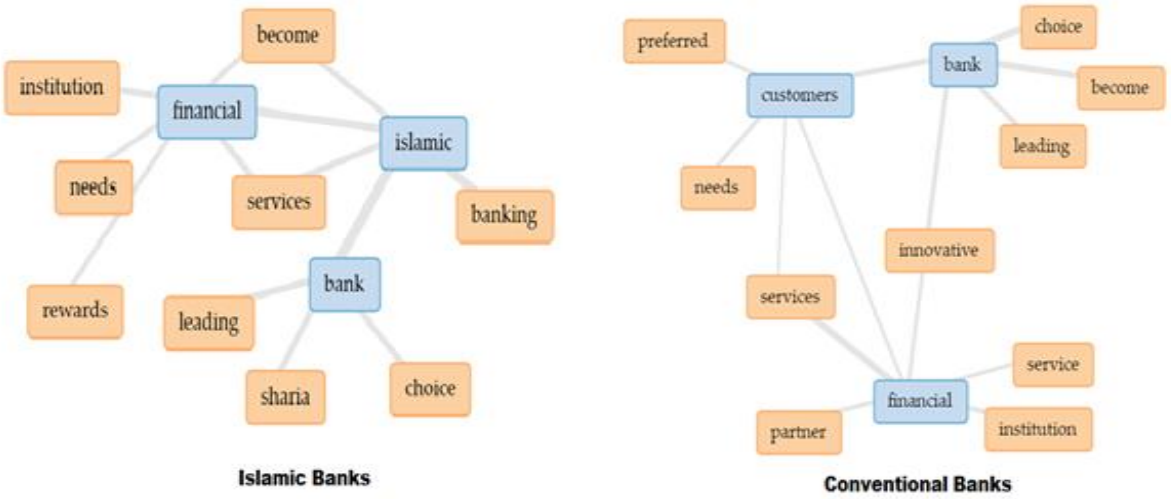


Figure 2. Major themes in Vision Statements – Islamic/Conventional Banks
Source: Author's Contribution

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Voyant Tools were also used to draw Cirrus for both the IBs and CBs. 'Cirrus is a word cloud that displays the frequency of words appearing in a corpus. Words occurring more frequently appear larger'.



Figure 3. Major cirrus in Vision Statements – Islamic/Conventional Banks
Source: Author's Contribution

Figure 3 presents the major cirrus in the Vision Statements for IBs and CBs. These cirrus and word clouds present three essential findings. Firstly, both IBs and CBs look similar in their word clouds. Second, the most prominent and observable difference is the presence of the word 'shariah' in IBs. Finally, the word 'Islamic' is present in both IBs and CBs but IBs have more prominence.

5. Conclusions

Several conclusions were drawn from this study. First, the results of the current study support and validate the findings of earlier research. For example, vision is the source of inspiration and motivation, externally focused, providing direction and motivation without any specific deadlines, and has 10 characteristics. Second, IBs and CBs do not differ significantly in their descriptive statistics, especially the average number of words in each vision statement, vocabulary density, frequently used keywords, and frequently used characteristics. Third, most banks (both IBs and CBs) have vision statements with a range of 1-30 words for each vision statement (80%). Fourth, six out of ten keywords are common in both IBs and CBs, i.e., 'Bank', 'Financial ','Services', 'Islamic', 'Choice', and 'Leading'. Fifth, 'uniqueness' was the least frequently used characteristic (36%). Sixth, analysis of major themes in data reflects that both groups share the common themes of 'bank' and 'financial' in their vision statements. Seventh, distinctive elements in the keywords include 'Customer' in CBs and 'Islam' in IBs. Seventh, all of the banks (both IBs and CBs) have yet to express concern about the most pressing elements of the modern banking industry, for example, technology, sustainability and risk management. Finally, a few of the current study's findings are new to the literature. For example, previous studies have suggested that vision is futuristic, but the current study could not find meaningful 'futuristic' vision statements in banks (both IBs and CBs).

6. Managerial Implications

This article provides a critical discussion of the debate on bank vision statements. After researching the vision statements of almost 200 IBs and CBs, a disconnect was found between the current banking in the region and technological changes in the global banking industry. No bank has expressed concern about the most pressing elements of the modern banking industry, including (a) technology and (b) risk management. After the 2008 financial crisis, banks typically showed some level of interest in risk management, crisis management, safety, survival, and security measures. As new risks emerge (Feleaga, Ionescu & Bunea, 2023), banks that focus on

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developing new products/services based on customer risk management and helping customers solve their problems rather than selling their banking services will outperform their peers. IBs and CBs are suggested to make the risk enablement part of their vision.

In addition, CBs have two unique keywords in their vision statements: 'Customers' and 'Innovation'. IBs have 'Sharia-compliance' and 'Investment' as unique, frequently used keywords in their vision statements. This provides unique selling propositions for IBs that can also be used in marketing communication materials.

The findings also indicate that vision statements reduce vocabulary density. This is because the industry is highly specialized, and the target market is narrowly concentrated. This places banks in a very tough position if they want to stand out. Senior bank managers have come to infuse their banks with individuality, beginning with the vision statements. Banks must understand their role in changing the world and reflect this in their strategic statements. Similar to CB, IB has a more extensive customer base. IB focuses on 'Islamic', more specifically 'Sharia compliant', as their Unique Selling Proposition (USP), but unfortunately, IB lowers the priority of clients in their vision statements. Unlike other financial institutions, a bank's most expensive assets may have been its customer base. It has been noted earlier that IBs put more emphasis on 'Sharia-compliant' or 'Islamic' in their vision statements and ignore the importance of customers in their visions. Now is the time for IBs to make their vision statements more customer-centric. It is a regular practice for all commercial and non-profit organizations to review and update their vision statements. This engages the different perspectives of all relevant stakeholders. Banks are no exception to this practice.

In this study, 200 vision statements were analyzed, and all vision statements were found to be in accordance with the global best practices of banks and global companies. Most banks studied in this research had all the elements outlined in earlier studies except for two elements, i.e., uniqueness and futuristic. Uniqueness was found at a low frequency in survey results. This is due to the limited line of business and scope of work in the banking industry and the heavy reliance on 'Islamic values' in IBs. The lack of futurism is a challenge for IBs and CBs.

Modern banking is based on technology, and the future of banking has technology in its pivotal role. Banking technology has several facets. The global banking industry is on the brink of transformation, including digital transformation; however, both IBs and CBs in our sample are silent on this issue. Instead, IBs and CBs should be committed to playing key roles in digital transformation. Both IB and CB missed these themes in their vision statements and ignored digitalization or technology enablement as part of their visions. It could include various features of digitization, such as Immediate Payment Service (IMPS), real-time gross settlement (RTGS), national electronic fund transfer (NEFT), online banking, and telebanking. Now, IBs and CBs need to link their services with new developments in this area, such as mobile apps, e-wallets, block-chain cross-application integration, etc. Likewise, in this technological age, where every business is oriented toward technology, the banking industry has, in many ways, become a technological hub, and the banking industry is looking for digital transformation as a critical indicator. Unluckily, 'technology' has not been included as a key part of IB's and CB's vision statements. Some researchers still believe that technology is a part of mission statements and should be discussed with mission statements.

Moreover, banks have invested heavily in FinTech (financial technology), benefiting from profits, customer access, and market penetration. Therefore, IBs and CBs must both include technology or, more specifically, financial technology (FinTech) or at least technology enablement in their visions. They must be able to impress young customers through technology utilization. Additionally, banks must be able to link themselves with the new trends in modern banking, as the application of technology in banking could be seen as paperless, branchless, smart banking. All IBs and CBs lack direction in banking technology, while vision statements must articulate a link between modern banking trends and the bank's vision.

Finally, extending the idea that 'vision must be futuristic', it was noted that 'care for the future' emerged as the weakest part of the vision statement. In the last five years, the world has made significant strides. This requires all banks to express their concerns about the prospects of their stakeholders in their vision statements.

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7. Need for Future Research

Last but not least, I have a few recommendations for future research. Typically, vision statements are presented as annexed mission statements. Studies targeting 'Vision only' are few; therefore, more vision-only studies are warranted to explore the 'anatomy' of vision statements in different countries, cultures, and, more importantly, in various types of organizations.

Comparatively, mission statements have universally accepted 10 components, but earlier studies on vision statements did not offer any specific components of vision statements. Developing essential components of vision statements in the modern world is a good research agenda.

Additionally, a comprehensive framework for analyzing vision statements is still in its infancy. This research attempts to provide keywords to measure vision statements, but a more detailed, robust framework is needed to analyze vision statements more efficiently.

8. Originality of the study

The novelty of this study lies in two points. First, this study harmonizes academic research with practitioner work for developing and managing vision statements for banks in a single yardstick. Second, using the developed standard, this study offers a fresh insight into the vision statements of banks with insights from 100 IBs and 100 CBs worldwide.

9. Limitations

This study has several limitations, including using content analysis as the primary analytical technique, which previous studies have criticized for being overly subjective. Additionally, the findings were formed based on information gathered from publicly accessible official websites of relevant banks. Using secondary data subjective content analysis techniques is not a plausible approach by some quantitative researchers.

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USE OF MANAGEMENT GAMES WITHIN THE EDUCATION PROCESS OF FUTURE MANAGERS AT UNIVERSITIES IN SLOVAKIA AND CZECH REPUBLIC

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Abstract. In the current turbulent business environment, the role of management is increasingly demanding, and therefore the demands for future managers in companies are increasing. A decisive role in the preparation of a manager for the performance of his work is primarily played by his education. The education of future managers is carried out primarily at universities designated for this purpose. Following the change in the role of management and the requirements placed on the performance of managerial practice, it is also necessary to change the approach to education and the form in which the future manager is educated. The key to success is, above all, the connection of theory and practice, active involvement of participants in the educational process, simulation of corporate reality, solving real cases in a risk-free environment and understanding the fundamental processes in the company and managerial work as such. All this is made possible by active education methods, specifically management games. Unfortunately, even though management games are globally considered modern, active education methods, they have many benefits and are constantly gaining importance. Still, few researchers in Slovakia and the Czech Republic are dedicated to this issue and research into their use, application and development within education. Following on from the above, this article, therefore, deals with the use of managerial games in the education and training of future managers, specifically at universities in Slovakia and the Czech Republic. The subject of the analysis is the identification of all affected universities where management games could be used, followed by the study of all publicly available information regarding this issue at the affected universities and the implementation of an extensive questionnaire survey at these universities. The results are summarised and compared in the context of other studies and the claims of other researchers focusing on this issue. The result of the article is primarily a mapping of the issue being addressed and pointing out current problems, challenges, and obstacles in using managerial games while educating future managers at universities.

Keywords: management games; education process; active methods of education; universities; Slovakia; Czech Republic

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JEL Classifications: I25, M21, M53

1. Introduction

A typical feature of the current business environment is the constant rapid changes and, therefore, the high dynamics of this environment. The changes concern, e.g., the legislative conditions of a given country, the market in general, business support, scientific and technical progress or innovation, ICT, globalisation, cooperative management and creating of cooperation relationships, etc. As a consequence of these changes, the demands on business management are increasing, and the role of managers is becoming more demanding. They face various problems, obstacles and challenges that they have to solve. As managers often misunderstand the role of cooperation, the way of their security, and the importance and benefits of cooperative management, and they do not use the cooperation potential of a company to the maximum extent, another challenge may be for

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them to realise the full potential of their company for innovation, however, for this it is necessary to manage these activities effectively and to be able to quickly and flexibly respond to developments in the market (Lendel et al., 2016; Peterková et al., 2022; Haurovi & Chilunjika, 2024), and others. But how do we prepare future managers for this role? It is necessary to start with the education of future university managers. Their education must be both theoretical and practical. Traditional education methods are proving inadequate for educating the managers of the future generation. Linking theory and practice, active involvement, trying out different situations, solving real problems in the form of simulations and linking knowledge from various areas are the keys to success in educating future managers. All this is made possible by management games, one of the most essential active education methods. They are growing in popularity worldwide. The trend is to use them in the education of future university managers or to train the management skills of current company managers. Even though the education of future managers should be based primarily on an active approach to education and active methods such as management games, many universities and faculties still apply mainly traditional methods of education, even though many researchers have demonstrated the positives and benefits associated with these methods. What is the current situation in universities in Slovakia and the Czech Republic? Are active methods of education, and especially management games, used in the education of future managers? How do universities develop and approach this issue? Do they understand its importance?

2. Theoretical background

According to Vodenicharova (2022), the development of individuals is mainly carried out with the help of education because education as a process helps to acquire knowledge and activities, which the individual processes into knowledge, skills and habits. Education can be defined as an ongoing process during which there is constant adaptation and change in behaviour, skills, knowledge, and people's motivation, primarily with the help of various methods. In addition, its primary role is also to form individuals' personalities, opinions, and interests. Education can also be viewed as a permanent lifelong process in which an individual acquires new knowledge, experiences, insights, ideas and attitudes, whether within a specialised field or a general overview (Valladares et al., 2023).

Education can, among other things, be used to acquire new communication skills, to ensure the development of creativity or to improve cooperation, more precisely defined, to develop collaboration. Ultimately, it is the process of expanding any knowledge, skills and experience that purposefully enhances proficiency in a particular industry. This classical understanding describes the educational process only as an activity to acquire new knowledge. However, education and training are complex processes that involve many sub-activities and touch on several areas. Petlak (2007) mentions three essential areas this process affects: Learning Area, Training Area and Psychomotor Area.

If we want the education process to be effective, we also need to choose the proper method of education. The education process has changed and shaped over time, as seen in the following Table 1.

Table 1. Evolution of the education process

Education 1.0 Oral knowledge	**Education 2.0 Written knowledge**	**Education 3.0 The discovery of letterpress**	**Education 4.0 Academic education**	**Education 5.0 Digital education**	**Education 6.0 Social Brain Education**
50 000 BC	10 000 BC	1 377	1 635	1 955	Discovery of a new level of education
Collective learning	Discovery and spread of agriculture	South Korea	Public schools in the USA	Excellent spread of the digital world	A growing amount of information
Valuable communication	Enough energy to survive	First printed book released	1 744	Internet, fast availability of information	Decline of traditional methods of education
Faster spread of information	3 200 BC Mesopotamia	Modern science discovery	Compulsory school attendance for kids aged 6-12	Fast and inexpensive spread of information	Usage of active methods of education

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Ability to learn from experience	Creation of the alphabet still used today	Mathematics, chemistry, astronomy, physics, biology etc.	1 760	Start of e-learning	High demands of today
	Active usage of writing		Industrial revolution	Social pressure	Mutual influence and connection between people
	Better connection between people			Great amount of information	New dimension of education – Social Brain

Source: Compass, 2024

Currently, there are two types of educational approaches: traditional and active. More detailed characteristics of these approaches and their specific education and learning methods are given in the following Table 2.

Table 2. Characteristics of a traditional and active approach to education

Learning methods	Traditional	Active
Characteristics	The prevailing approach at universities nowadays	Based chiefly on solving problem situations
	A teacher has the leading role of giving information to students	The primary role is to stimulate and enhance students' creative and critical thinking
		It can be considered as 'the bridge', connecting theory to practice, from the individual knowledge about management to the very development of managerial skills
Specific methods	Verbal method in the form of explaining, describing, a lecture or reading comprehension	Case studies – to search for the cause of the analysed situation, its consequences and possible outcomes. Based on real situations, case studies help students develop their skills and apply theory to the solving process.
	Illustrative methods in the form of demonstration, observation or work with images	Management games – to help students develop managerial skills and try out the simulation of actual management practice
	Practical methods in the form of experiments, workshops, and school projects	

Source: Blažek, 2014

Active forms of learning have emerged as a response to corporate practice and differ from traditional forms of learning in several ways. While conventional forms of learning assume that students are in the position of listeners and receive theoretical knowledge from teachers or lecturers, active forms of learning involve the active involvement of students in the learning process. This approach improves critical thinking and leads to a better understanding of facts and ideas. These include, for example, problem-based learning, team-based learning, workshops or brainstorming sessions, role-playing, programme-based learning, collaborative learning, e-learning, etc. Active forms of learning also include management simulation games, which are their most important tool (Vljayalakshmi, 2019).

The term 'management games' is very general in the world; therefore, there are myriads of different definitions. When defining the issue of management games, attention is paid to authors who perceive management and simulation games as a means to increase the effectiveness of the educational process of future managers. Management games are a remarkable tool that can be used nowadays to train, test, monitor knowledge, and assess the overall behaviour of employees. Schrier et al. (2023) argue that these games represent the right way, making verifying and gaining additional knowledge possible.

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Depending on the relationship of the players in the simulation model, management games can be divided into competitive games – in these games, players or teams compete against each other, and non-competitive games – the adversary is the simulation model itself. Games can also be divided into several categories, such as Board games (e.g., Monopoly), Computer (e.g., various turn-based strategies, building games), Team-based learning games (e.g., in the form of team building) and Simulations of real processes using technology and computers.

Each management game has its characteristics that distinguish it from others. Forssén-Nyberg and Hakamäki (1998) characterise the basic features of management games as follows: they must reflect reality, active social communication exists between live participants, and the aim is to assess reality, self-evaluation, and reflection.

The basis of any simulation game is, first of all, the scenario, which defines its main essence, the content focus and last but not least, the initial conditions. However, management games must consist of sustainable development of practical solutions and enable students' creativity in decision-making (Biercewicz et al., 2022). The authors also stated that computer games are considered the best form of training for management and business students.

Regarding historical development, management games have undergone several significant changes and improvements up to the present day. Faria et al. (2009) stated the historical development of management games, which dates from 1932, when Mary Birshstein developed her first management simulation – the existence of direct predecessors of the management simulation game in Europe, to the first widely known management game "Top management decision simulation" in 1956, until to today's games, which focus on specific issues Pászto & Pánek, 2020).

Their overall sophistication is all about using information technology and keeping up with today's ever-changing times. The overall application of these management games extends to research and many areas of human life.

There are countless management games in the world today; examples of well-known management games include Manahra (2024), Promis (2024), Stratis (2024), Global Marketplace (2024), Softip (2024), Global Management Challenge (2024) and many more. These games are mainly differentiated regarding industry, areas, difficulty, and accessibility.

With the help of management games, students are allowed to apply the acquired knowledge in practice and to find out to what extent they can use the acquired knowledge, given the problem situations that may arise in their future profession. Simulation games complement traditional forms of education with a dynamic, reactive and risk-free learning environment. They seek to fill the gap between student's knowledge after completing the relevant studies, and the skills companies require to perform a particular job. Simulation games also benefit the lecturers and teachers themselves. Nowadays, it isn't effortless to keep the attention of students. Simulation games can motivate students primarily based on their gamification. In this regard, the so-called creation of a more entertaining school curriculum includes several benefits affecting both parties.

Using managerial games in the educational process can be beneficial for teachers, as well. Teachers' attitudes towards business and entrepreneurship should be positive in order to educate future managers. Universities are advised to encourage teachers to develop their professional competencies in management (Joensuu-Salo et al., 2023).

According to Anastasiadis et al. (2018), an approach to learning based on digital games is a very good educational tool that has demonstrable benefits. It can increase students' well-being and self-confidence, help them improve their soft skills, develop their critical thinking, decision-making and problem-solving skills, and maintain a healthy mental and psychological balance.

Simulation games used in education can be divided into six categories, depending on their functionality and objectives. The first category of games is the so-called memory games, which aim to make the player remember the relevant information. The second category consists of decision games. These games challenge players to interpret data, compare a set of options, predict their consequences, and select the correct answers, given an

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optimal strategy or specific objectives. The third category is the game of consequences, which focuses on causal phenomena. The fourth category consists of strategy games that test players through various puzzles or challenges aimed at solving in a specific way. The fifth category consists of exploration games that involve the principle of branching. The game evolves from the decisions of individual players. The last category is made up of simulation games that incorporate the principle of interaction, consequences and strategic decisions.

According to Tumpa et al. (2024), computer-based managerial games could be used mainly in higher education, especially when learning aspects of project management. Key elements of such games are learning how to involve stakeholders, managing instability in the team or the organisation itself, checking the project goals or improving future managers' decision-making. Peterkova et al. (2022) also recommend using digital simulation games that were not initially developed as an educational tool but can provide benefits. Such games can be used in a challenging way and offer a new point of view on the whole process of education.

The main advantages of management games and simulations in education can be considered as exposure to situations like those in a real company, a range of experiences, strong motivation to compete, teamwork, connection with a robust real-life story, learning by experiencing the consequences of one's actions and thus repeating different strategies to discover different outcomes, 'I do and I understand': assessing the usefulness of web-based management simulations to develop critical thinking skills, providing staff with an understanding of the bigger strategic picture (Nica et al., 2023).

Moreover, according to López et al. (2021), gamification at universities may bring more positives than negatives. The most significant advantage is its positive impact on the whole education as a process or stronger motivation of students to be involved. The authors recommend using severe games, which students consider a practical and fun training activity.

In addition to the advantages, management games have various disadvantages, which can be defined as follows (Hellström et al., 2023):

- Lack of ability to capture reality in detail,
- the limited nature of the game conditions,
- preparation is often costly and time consuming, hence the pressure to develop complex management simulation games,
- in the case of computer simulation, enough computers need to be provided,
- The performers may not perceive the management game as a reality or may not take it seriously and thus may consequently lose the motivation for it.

The advantages mentioned above and the benefits of active learning methods are indisputable. These methods are becoming increasingly prominent, and their importance is growing. The global market for games and simulations is constantly increasing, and this exponential growth is expected to continue soon. The growing use of computer and mobile technologies is behind this assumption.

According to Jääskä & Aaltonen (2022), the potential benefits of game-based learning are well understood, but less research examines the challenges, disadvantages, and barriers to applying it.

Blažek (2014), however, pointed out that education in higher education was dominated by teaching focused on the use of traditional methods. He does not consider this way of teaching appropriate in the management field. According to him, focusing on active teaching methods is better because students can better use and develop their management skills more effectively. This is mainly because they can help students link theory with practice, encourage creative thinking, or solve problems. Traditional forms of education are, in most respects, already outdated. Nowadays, in the education and training of managers, space for their self-determination and self-creation is encouraged. Self-efficacy, opinions and ability to collaborate are positively valued. All this includes active forms of learning and simulated creativity techniques, which are gradually becoming a growing trend. According to Peterková et al. (2022), using managerial games at universities may positively affect the educational process since these games help management and business students get and verify their knowledge.

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Efforts to support the inclusion of active methods in the educational process can also be observed in the framework of various calls and projects by the state. Evidence of this can be, for example, the national project of the Slovak Republic called 'Universities as engines of development of knowledge society', which is focused on trends in education in the 21st century. The main task of this project is primarily to focus on the development of the competencies of individual students. It is about the development of 5 objectives, such as the development of analytical skills (applying methods to support students' creativity), the formation of interpersonal skills (practice in companies), how to realise intentions (solving model projects), the possibility of how to process knowledge and information (involving students in the logic system of manufacturing enterprises), how to develop skills and how to make changes with the help of learning (help in solving projects for enterprises). It can be seen in the very description of this project that the main aim is to help individual students through active learning rather than traditional learning. Slovakia currently has a National Programme for the Development of Education and Training, which it wants to achieve by the end of 2027. Through this programme, individual model school curricula (active forms of learning) can be developed to help students further their development (Ministry of Education, Research, Development and Youth of the Slovak Republic, 2020 a,b). Some model educational programmes already exist so far. Still, they are only for nursery schools to prepare children for life in society (Ministry of Education, Research, Development and Youth of the Slovak Republic, 2020 a,b).

3. Research objective and methodology

This article aims to map the current state of the use of management games in the education process of future managers at universities in Slovakia and the Czech Republic. These two countries were chosen mainly because they were connected in the past and tend to compare or rival each other constantly. Among other things, they have a similar language, behaviour, customs and processes.

In order to map in detail the current state of the use of management games in the education of future managers, the first phase of the research was to identify universities in Slovakia and the Czech Republic that focus on economics and management.

With the help of the portalvs.sk and vysokeskoly.Cz websites and universities (faculties) focusing on economics and management were selected based on their listed study programmes and subjects. Subsequently, these selected courses were examined through information sheets to find mention of the use of active learning methods, especially management games and simulations. Similarly, other university activities were also reviewed to see if they participated in competitions, management games, etc.

A major drawback can be seen in the lack of accessibility of the information sheets of their courses by the individually selected universities. In case these information sheets are accessible only to students or lecturers, the possibility of contacting a particular university using an e-mail address or contacting student groups studying in a specific university via social networks is used.

The output of the first phase of the research is an overview – a list of universities, faculties, study programmes, subjects or courses and the methods or specific games used, based on the analysis of available information.

In the second phase of the research, a questionnaire survey is subsequently conducted to analyse in detail the current state of the use of management games in the process of education at universities in Slovakia and the Czech Republic. The questionnaire was compiled into an electronic form to contain the most straightforward and most easily understandable questions for the respondent. In total, it includes 15 questions. The questions are aimed at ascertaining the facts regarding the use/non-use of management games at universities, reasons for use/non-use, specific games/simulations, time of use, invested financial resources, identification of advantages/disadvantages associated with the use of games, deepening of the issue, etc.

The internet survey was used mainly because it is very time-consuming to collect the answers using traditional distribution, given that the universities are located in Slovakia and the Czech Republic. A great advantage can

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be seen in this online questionnaire, as the data is automatically stored in a database, thus eliminating the overall administration associated with paper-based data collection.

The core set includes all universities located in Slovakia and the Czech Republic. It is a collection of universities regardless of whether they are public, private or state universities. There are a total of 70 universities in the Slovak Republic (105) and a total of 84 universities in the Czech Republic (208). The total sample, in this case, is 154 universities. These universities were searched using the website's portals. sk and vysokeskoly.cz.

The final sample must be formed based on predetermined criteria, such as the university's focus on the field of economics and management, or the use of management games in the educational process. Suppose a university has courses focused on economics and management or has introduced management games in its education. In that case, it is included in the selected universities that are subsequently contacted. There are 15 universities in the Czech Republic and 19 universities in Slovakia. The analysis established the relationship between these universities and the survey topic carried out earlier (first phase of the research – developed list of universities).

The questionnaire survey was carried out in 2020-2021 in 19 selected universities in Slovakia and in 15 selected universities in the Czech Republic.

The return rate for each questionnaire is a total of 29 completed questionnaires. 5 of the selected universities did not complete the questionnaire due to providing an incorrect email address on the website, which was reflected in a bounced message or a lack of interest in responding to the sent email. Specifically, these are 2 selected universities from the Czech Republic and 3 selected universities from Slovakia.

The results of the data show that the return rate of questionnaires within Slovakia is 16 completed questionnaires but with a 90% confidence interval and a maximum 10% margin of error. Within the Czech Republic, the return rate is 13 completed questionnaires, but also with a 90% confidence interval and a maximum 10% margin of error. The difference between the contacted sample of respondents and the final return of questionnaires is only one less respondent. The Raosoft web application (2024) calculates the sample size for the survey. The responses thus obtained were compiled into a clear database in MS Excel and MS Word. The resultant scores are presented in the form of graphs for a better overview.

4. Analysis and Results

4.1. Analysis of publicly available information on the use of management games in the educational process at selected universities in Slovakia and the Czech Republic

Based on the selected criteria and the procedure described in the Methodology section of this article, available information on the use of management games or similar active learning methods at relevant universities, faculties, institutes or departments was analysed.

It is evident from the information obtained that the difference in the use of management games or similar active teaching methods in teaching individual subjects at universities in Slovakia and the Czech Republic is not so great. Currently, management games in education have been introduced in 11 universities out of 19 in Slovakia and 12 universities out of 16 in the Czech Republic. These universities use management games mainly in teaching courses.

In Slovakia, these are mainly subjects such as Simulation Models, Game Theory, Managerial Simulations, Innovative Business Models, Theory and Tools of Modelling and Simulation, Managerial Games, Creative Methods in Management and Managerial Games, Game Theory and Business Simulation.

In the Czech Republic, these are courses such as Planning and Project Management, Management Simulator I, Managerial Simulations of Business Processes, Simulating Financial Models, Strategic Games and Simulations, Modelling and Simulation of Complex Systems, Managerial Game, Creation of Business Models, Controlling, Project Management, Management Simulation Games, Strategic Marketing (simulation game The Global

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Market Place) or Financial Investing. On the positive side, universities are not afraid to introduce management games into other subjects as part of their education. It is a great way to link theory with practice.

Several Slovak universities, such as the University of Management or the Slovak Technical University, offer various courses focused on the development of presentation skills or the opportunity to use the acquired skills in a simulated environment. In both cases, management games are used.

In the Czech Republic, in addition to universities such as Mendel University, the Polytechnic University or the University of West Bohemia use the management game from UNISIM in their education, they also participate in various competitions offered by UNISIM. Other universities, such as the Czech University of Agriculture, use the Farmasim management game in their education and the FactorOrEasy software. At the University of South Bohemia in České Budějovice, online computer-based management simulators have been continuously developed since 2009; these are simulators such as 'Supermarkéty', 'Cestovka', 'Cesta & Cieľ'. Tomáš Bat'a University organises various management simulation games, for example, Beer Distribution Game. It uses the JA Titan simulation game in teaching. Charles University, specifically the Faculty of Philosophy, has created an educational simulation in Czechoslovakia 38-89. The University of Technology uses a management game called Simulation Game for Managers – Soft Skills.

Positives can be seen in the fact that individual universities not only in Slovakia, but also in the Czech Republic use in the framework of education not only existing management games from various companies, which are engaged in its design and development, but also self-designed and developed.

Many of the selected universities in Slovakia use management games, but compared to the Czech Republic, they are still in small numbers.

Given that the publicly available information obtained on using individual management games at the selected universities represented an older edition or the year of publication was not disclosed, it cannot be assumed that it is valid at present. These facts, as well as others, need to be verified and ascertained through further analysis of the use of management games in the process of educating future managers at these selected universities. Hence, a questionnaire survey was carried out.

4.2. Implementation of the questionnaire survey

The questionnaire shows that management games are used at selected Czech Republic universities rather than in Slovakia. Out of 16 universities in Slovakia, only 5 universities use managerial games in teaching, whereas in the Czech Republic, out of 13 universities, 12 universities use them.

According to the results of the questionnaire, the main reason for not using management games in teaching at universities in Slovakia is the fact that teachers do not know how to use them at their university and also that they do not consider them effective or do not have enough financial resources to introduce and use them.

There are other reasons given by respondents, these are:

- Fear of time/labour for teachers,
- inadequate teacher training in the subject,
- given that it is an elective subject, students find it too demanding.

Only one Czech university stated it could not imagine using them in education. However, it did not elaborate further on its answer. This is probably because they cannot imagine their use financially and organisationally, even though management games can be a great tool to learn something new and prepare for the real reality, which the student can try out beforehand.

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Also, universities that use active methods in the learning process, specifically management games, have reported that they have seen several positives, such as increased student creativity, efficiency in problem-solving, better logical thinking and effective decision making.

Universities are influenced by various factors when deciding whether to purchase or create their own management game, such as the quality of the game, the complexity of the game's focus, the price, the length of use or development of the game, etc. Figure 1 shows the most critical factors universities consider when choosing a management game. The quality of the game, the complexity of the focus and the price are the main priorities in the selection process.

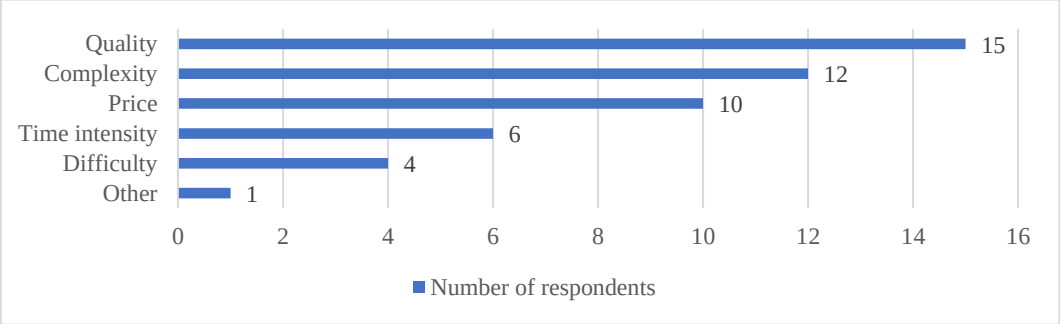


Figure 1. Factors influencing the implementation of management games in universities

As mentioned above, a total of 17 universities in Slovakia and the Czech Republic use management games in their teaching. An interesting finding is a fact that 9 of them use self-developed management games and, 7 use existing ones, 1 university uses both its own and existing games. Universities are interested in creating and developing their games, and this trend may be a reaction to the current availability of games, the area of use, the quality and above all, the price.

Analysed universities are currently using the following games:

- Beer Distribution Game,
- UNISIM,
- Global Management Challenge,
- Greatail International,
- 'SuperMarkéta',
- 'Cestovka',
- Insolvency simulations,
- SimBiz,
- MarketPlace,
- LUDUS,
- Manahra,
- Promis,
- FacOrEasy,
- Act as A.
- Simulations of production capacity budgets and optimal utilisation budgets of own and external human resources.

It is a positive finding that universities are using quite a large number of different management games, especially their own. As many as 7 universities have used management games in their learning process for over 10 years. Only 2 universities indicated that they have been using management games for 1-3 years (see Figure 2). From the length of use of management games at these universities, it can be inferred that individual universities consider management games to be very important and effective.

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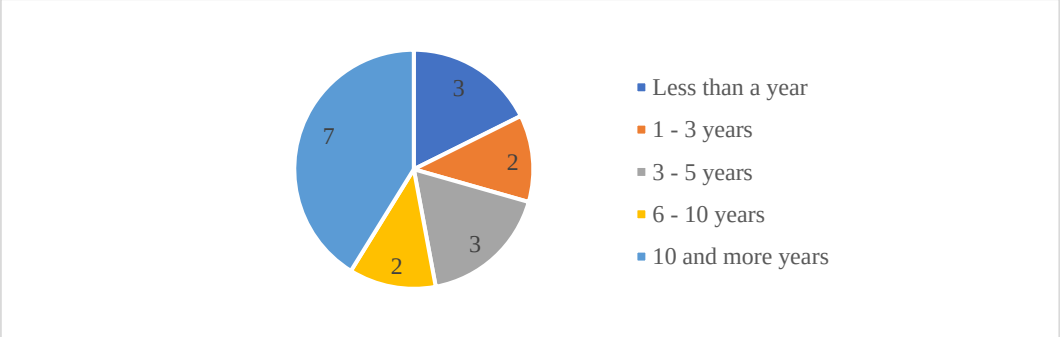


Figure 2. The usage of management games in Czech and Slovak universities

The cost of acquiring and using an existing management game or creating and maintaining your own one can be significant. The questionnaire, therefore, included a question related to the amount of annual costs associated with acquiring and using or developing and maintaining games. Unfortunately, not all universities that use management games as part of their education answered this question. It can be assumed that this question was sensitive for them to answer. Of the 17 universities that use management games within the education process, 8 universities stated that they invest up to €500 annually in management games, 3 universities stated that they invest up to €2,000 and only 1 university stated that they invest more than €2,000. It is a great finding that these universities care about their students' education and contribute even more money to education.

As many as 14 universities use management games as part of the course curriculum, 4 universities use these games as part of a separate course focused on management games, and only 1 university uses management games in the form of competitions. Management games are used in these universities as part of the educational process (to increase its effectiveness) to support teaching in various subjects, such as:

- Management 1,
- Business management system,
- Project Management,
- Basic Management Course,
- Enterprise Management,
- Business Skills,
- Strategic Management in Business and Tourism,
- Law in Business 2,
- Management games and simulations.
- Simulation of economic processes,
- Strategic Marketing,
- Decision Theory,
- Strategic Management,
- Fundamentals of managerial decision-making,
- Controlling,
- Management simulation games,

It follows from the above that management games or games in general can be introduced into a variety of courses, not just those focused on management games or management.

A positive finding is that all universities that use management games realise their importance in the educational process and its benefits—up to 15 of them stated that they want to deepen this issue at their university.
Four universities want to establish cooperation with specialised institutions dealing with management games in the future, 3 universities want to participate in competitions based on management games and only 1 university wants to deepen the issue by introducing a subject or introducing management games. In addition, 8 universities are planning to expand the subject in the following way:

- Use in more subjects, as this has not been the case so far,
- automation of the simulation game, as so far, the evaluation of the games has been done manually,
- the creation of a teaching tool,
- linking simulations (management games) more closely to teaching, i.e. linking theoretical knowledge to simulation,
- development of other, own management games, organisation of competitions between universities.

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5. Discussion

From the analyses, Slovakia still needs to be developed using management games like the Czech Republic. Lendelova et al. (2019) reached the same conclusion in their previous research. Universities in Slovakia gave several reasons for not using these games. These reasons are that they need to consider their introduction effective or cannot imagine their introduction into education. Trávniček (2008) has already stated in the book entitled Managerial Games at the University of Economics in Bratislava that: 'Managerial games are time-consuming, there is a lack of textbook materials and manuals in the Slovak language. An important condition for their implementation is also a quality methodological training of new teachers." It is possible to agree with this statement because in the research on this question, other answers, such as fear of time demands, finding it complex or inadequate requirements for teacher education in the subject matter, were included.

Not using these management games can be considered a big negative because universities that use this issue in education have seen many benefits, such as increased student creativity, problem-solving, better logical thinking or effective decision making.

Based on this information, this education method can put the university and its students at the forefront, prepare them for the future, and help them succeed, thus ensuring the university's reputation. It is essential that universities themselves, which do not use these games in education, realise this fact because theory alone does not prepare students for their real profession. It is the combination of traditional and active methods of education that will ensure success.

Currently, companies list demanding requirements for future employees in their job offers, which often need to be met by graduates. Their requirements are mainly experience, knowledge or problem-solving. In an interview, they frequently ask questions such as, 'How would you handle this situation...?' Many graduates do not know how to answer them. What is the reason? The main reason may be a lack of practice or the use of active methods in education. These active methods can be an excellent tool for universities to prepare students for their future positions. Management games contain different model situations with different focuses. These model situations can prepare students for unexpected situations in a real business. In this case, students might be fine answering the abovementioned question.

Many factors, such as time, cost and quality of the game itself, have influenced the number of universities that have introduced this active method in their education of future managers. Most universities have been using management games for more than 10 years as part of their education process and invest up to a maximum of €500 per year. Only one university stated that it invests more than €2000 per year in this active method. It is a positive finding that these universities really care about their students' education and contribute a more significant amount of money to education. Compared to the earlier research conducted by Lendelova at al. in 2019, where more than 80% of the surveyed universities stated that they invest up to €500 per year in management games, the situation has not changed significantly.

Currently, only 9 universities out of 29 are using self-created management games. These games are mainly used to teach various subjects. These findings do not compile with the results of a previous study conducted by Lendel et al. (2019), where more than 60% of the universities surveyed reported using their own developed management games, and more than 30% used existing management games. The selected universities are aware of the importance of the use of management games, which is reflected in the fact that they plan to deepen it in various ways, such as establishing cooperation with specialised institutions dealing with management games, participating in competitions based on management games, introducing another subject with a focus on the issue, or even creating their own management game. It is also a significant finding that these universities are planning to get involved in issue-based competitions, as this is a great way to learn how to deal with knowledge that can be linked to time and compare strengths with other teams.

Based on an evaluation of the current situation, universities are trying to increase the use of this active learning method, especially in the Czech Republic. Management games are indeed a great educational tool, which, although more expensive, can help students in their education and prepare them for their future managerial

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fasting. The room for improvement in the educational process of future managers can be seen in their introduction, especially in universities in Slovakia, because many universities in the Czech Republic already use these games in the educational process. Also, most of them have stated that they are a great tool that benefits students.

Conclusions

Educating future managers has never been as challenging in the past as it is now. Every successful business must have educated, motivated employees in today's turbulent business environment. This fact forces businesses to carefully select new employees for management positions and invest in their growth and education. For a business, this means that it can expect efficiency and sufficient performance from its employees, which ultimately leads to achieving and fulfilling the company's goals. The competitive advantage for businesses is not just machines, technology, know-how, and innovation but their people. Human capital represents the most precious resource of an enterprise. It is, therefore, essential for the enterprise that this capital meets the high demands and criteria placed on it and, at the same time, that the enterprise develops and promotes it. Therefore, the education of future university managers must be at a high level to meet the requirements of current corporate practice.

Management games have been successfully used as an effective, active, and modern form of education abroad for years, whether at universities or directly in companies. Abroad, management games are a highly recognised form of education, and management games must become more widely known in our country for the issue of management games to be deepened and for more literature and publications to contribute to this.

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THE ROLE OF SUPPLIER-CUSTOMER RELATIONSHIPS IN THE VALUE CHAIN IN TIMES OF CRISIS*

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Abstract. The main aim of this article is to identify the evolution of the importance of supplier-customer relations in the period of crisis and the factors influencing the change of this importance. The research question was answered by testing a total of 6 hypotheses, which focused on comparing the degree of influence of factors such as firm size, industry, and profitability on the growth in the importance of supplier-customer relationships in the COVID-19 period. Boxplot and histogram were used to ensure the normality of data. The results suggest that the significance of supplier-customer relationships increased during the crisis period (COVID-19). The firm's profitability influences the growth in the importance of supplier-customer relationships before the pandemic, industry (the growth in importance is more pronounced in industrial firms) and overall sector (the growth in importance is stronger in the secondary sector than in the tertiary sector). In contrast, the association between firm size and the growth in the importance of supplier-customer relationships is not confirmed. Limitations of the study: the research results apply only to enterprises in the Czech Republic, and it is of a short-term focus (i.e., it cannot be said with certainty whether the increase in the importance of supplier-customer relationships is permanent or a short-term fluctuation). Thus, the results of the impact of individual factors may vary over longer time horizons.

Keywords: supply chain; value management; crisis management

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1. Introduction

Proper value chain management is necessary for business processes that create value in products or services. A company aims to optimize its value chain as much as possible, thus securing a competitive advantage over other competitors. The generation of competitive advantage is conditional on several measures within the company's control, but several unforeseeable events are beyond its control. A pandemic is an example of the external influence of unforeseen events that fall within the group of asymmetric risks. The impact of a pandemic in the corporate sphere in the context of behavioural changes can be classified, according to many studies, as the behaviour of actors in a crisis. An essential part of the value chain is the supplier-customer relationship, which can affect a wide range of processes in a company. Modern approaches focus on a higher degree of customer

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integration in the development process, which allows for a more detailed product parameterization that conditions the increased value perceived by the customer. Given the societal demand in both the corporate and academic communities, research on supplier-customer relationship management can be expected to grow in the coming years. The main objective of this paper was defined as the identification of the trend of the importance of supplier-customer relationships in enterprises in the Czech Republic. Sub-objectives were set to reflect the article's structure to fulfil the objective properly. First, it is necessary to identify current scientific knowledge on the importance of buyer-supplier relationships (BSR). This is followed by establishing the baseline change in perceptions of the significance of BSR during the pandemic through a questionnaire survey. The final step will be to determine the underlying factors influencing the change in the importance of BSR in enterprises and to establish the association between the selected factors and the change in the significance of BSR.

2. Theoretical background

A company's value chain is a system composed of different sub-systems, each with processes, inputs and outputs that provide value (Simatupang, Ginardy and Handayati, 2018). Part of the value chain is properly setting up all the business processes to create value for a given product (Linkov et al., 2020). In their research, Fahimnia et al. (2018) describe the processes through which each product or service must go and where it gets its value. Research by McWilliam et al. (2019) shows that value is not tangible but results from stakeholder interaction and the system's overall functioning. Research most often analyzes the value chain to maximize competitive advantage (Choi, 2019), but we can also see approaches where shareholder value is maximized (Mukhtar and Azhar, 2020). Other studies link the value chain to the supply chain (SC) and describe how supply-demand determines operational relationships throughout the production cycle (Nauhria et al., 2018; Adobor, 2019). The supply chain concept is based on a resource-based business. Sivula, Shamsuzzoha and Helo (2021) describe how a business can achieve a sustainable advantage by using inimitable and irreplaceable resources. Resources are identified as tangible or intangible assets that help a firm gain and sustain market advantage (Gölgeci and Kuivalainen, 2020; Sodhi and Tang, 2021). Research by Nguyen et al. (2018) highlights capability development challenges within the supply chain. The authors further confirm that for a firm to survive in a market environment, differentiation in the handling of its resources is necessary. Other literature presents that sharing knowledge, information, and assets with partners positively affects supply chain capability development (Pettit, Croxton and Fiksel, 2019). Wieland and Durach (2021) state in their work that creating mutual trust is a prerequisite for establishing complex collaboration between partner firms.

For this reason, trust can be considered as one of the capabilities within the supply chain that can bring certain benefits to the involved companies (Del Giudice et al., 2021). Closely related to the supply chain is the research of Lizbetinova et al. (2017), where the authors discuss the motivation of logistics employees. In recent years, supplier-customer relationships have become a popular topic in both academic and corporate spheres (Santana, Moraes and Hermes, 2021). Research shows that the importance of buyer-supplier partnerships in the supply chain is continuously growing (Wieteska, 2020), but it can also be a source of serious risks that can result in significant financial losses (Kubickova et al., 2021). Supplier-customer relationships are also a hot topic in the global economy, where it is often very difficult to eliminate or manage the risks to which a company is exposed (Lehtimaki and Komulainen, 2021). The implementation of supplier-customer relationship management is being addressed by small, medium, and large enterprises (Monnagaaratwe and Mathu, 2022). However, research shows small businesses often do not realise the importance of supplier-customer relationships and generally lag in them (Moro et al., 2018; Grenzfurtner and Gronalt, 2021). At the same time, it can be observed that enterprises often do not sufficiently appreciate how improving supplier-customer relationships affects business processes. Indeed, all of these can ultimately contribute to improved service quality, reduced costs, or higher business performance (Mathu, 2019). Other research points out that the development of technology and the growth of Internet commerce positively impact the management of supplier-customer relationships (Corallo et al., 2021; Ustyuzhanina, Dementiev and Evsukov, 2021). The global constraints brought about by the COVID-19 pandemic sharply reduced consumer demand, halted production, disrupted international supply chains and caused the global economy to fall into recession (Al-Hadi and Al-Abri, 2022). The biggest problem for the corporate sector was the demand reduction, which meant weaker businesses could not repay their obligations to

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creditors (Sarkis, 2020). The research by Danielak (2021) also addressed supply chain issues, which focused on the risks associated with supply chains during pandemic times.

Research by Bertello, Bogers, and De Bernardi (2021) describes the COVID-19 pandemic as a significant challenge characterized by nonlinear dynamics, unpredictability, and the ability to cross jurisdictional boundaries. Other research has shown that the pandemic directly impacted business-to-business relationships (Greco et al., 2022; Konecny, Kostiuk and Ruschak, 2022). The COVID-19 pandemic marked a noticeable increase in the use of digital technologies; this fact resulted in partial dematerialization and greater personalization of products (Almeida, Duarte Santos and Augusto Monteiro, 2020; Sagapova, Dusek and Pártlová, 2022). Businesses in global markets increasingly include co-innovation processes where suppliers are involved in the development of products or services (Oinonen et al., 2018; Chu, Tian, and Wang, 2019). Another phenomenon nowadays is the involvement of customers in different stages of the production process or innovation (Qiu and Yang, 2018; Mishra, Singh and Subramanian, 2022). Researchers agree that looking for partners with sufficient resources and capabilities is necessary to improve innovation outcomes (Vahlne and Bhatti, 2019). In a relationship with a company, the customer is often seen as a partner because the collaboration of these two parties allows the identification and determination of the customer's specific problem or need (Lehtimaki and Komulainen, 2021). This assertion is supported by the research of Bhatti, Larimo, and Servais (2020), who put forward that understanding customer needs is key to the right direction of innovation. This implies that the future direction should focus even more on supplier-customer co-development, where the customer participates in the development of new products or services that better capture customer needs (Kim, 2022; Yuki and Takashima, 2020).

Several studies on the importance of BSR and SCM can be found in the literature. For example, (Scarpin et al., 2022) see the impact of pandemics on the emergence of the bullwhip effect (BWE) and the ripple effect (RE) in supply chains. The study identifies which financial and non-financial variables (factors) influenced the emergence of BWE and RE. The empirical research was conducted in a supply chain setting. The data collection process involved two steps: analysis of BWE and RE between individual buyers, suppliers, and global airlines, and subsequent measurement of the impact of BWE and RE in the BSR.

The study (Owusu Kwateng et al., 2022) aims to investigate the relationship between the level of communication and knowledge management on supply chain performance. The research was conducted through a questionnaire survey with employees. The following methods were used for data analysis: descriptive and inferential statistics, structural equation modelling (SEM), Cronbach's alpha.

Supply chain agility is considered one of the critical characteristics of potential SC success (Khan et al., 2022). Meanwhile, empirical research focuses on the impact of agility on export performance. It looks for export-oriented factors (e.g., competition, international business orientation, export strategy) that encourage the development of agility. For this study, primary data was collected through a five-point Likert scale questionnaire. For example, PLS-SEM (Partial least square-structural equation modelling) was used for data analysis.

One of the topical issues is sustainability in the context of BSR and SCM. For example, research by (Pereira et al., 2020) addresses how sustainability initiatives are affected by the COVID-19 pandemic in export-oriented suppliers from emerging economies. Data collection took the form of three rounds of semi-structured interviews. A "snowball" technique was used to define the research sample to access the participants. In doing so, sustainability initiatives emerged from the empirical findings and were selected only when mentioned at least three times among the cases. Each initiative examined was highlighted by respondents as central to SC sustainability.

The study (Bag et al., 2022) focuses on social sustainability in SC during a pandemic. The survey had 2 parts. The first survey captured buyers' perspectives using a questionnaire survey. The second survey focused on capturing suppliers' perspectives using a questionnaire survey. This study applied descriptive statistics and a t-test using SPSS 21.0 software and regression analysis.

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Sustainable resource management in micro and small industrial enterprises is the object of research (Czainska et al., 2021). The research questions include, for example, which activities in the "sustainable resource management" field are carried out by micro and small enterprises in the rubber products industry in Poland. The empirical (qualitative and quantitative) research was conducted between March and May 2021 using computer-assisted telephone interviewing (CATI).

Sharma et al. (2022) focused on analyzing the factors for improving a sustainable supply chain (SSC) during the pandemic and factors important for SSC management. This study used the Multi-Criteria Decision-Making (MCDM) - Stepwise Weight Assessment Ratio Analysis (SWARA) method. Data was collected from SC experts from different organizations of FMCG industry. The data was collected through a structured questionnaire with the experts.

The potential impact of cognitive capital on SCRES (Supply Chain Resilience) capabilities is discussed in (Daghar et al., 2022). The study was mainly based on 40 semi-structured interviews in a multinational manufacturing company. The data analysis was based on an open coding procedure followed by axial and selective coding processes that revealed various key elements of cognitive capital. The result of empirical research is the case studies.

An interesting question is the relationship between internal and collaborative supplier complexity and the number of disruptions experienced by the buyer, which is addressed in (Wissuwa et al., 2022). The research was conducted as a questionnaire survey in the German manufacturing industry. A Likert scale was used to generate responses to each questionnaire question; the research was conducted in dyads in a triadic context. Three variables that could influence the independent and dependent variables were controlled: age of the supplier firm, position of the supply chain and size of the supplier firm. Data processing in the form of count regression was performed using robust standard errors.

Another important trend related to the topic of this paper is the quality of information within the DOV and its impact on supply chain performance. For example, (Hu, 2022) explores the impact of digital technology on DOV during a pandemic among PPE manufacturers. The research was conducted through 14 semi-structured interviews with company managers. Primary data from the interviews were supplemented with secondary data (expert reports and news articles), and company reports from the survey. Based on the interviews, case studies were compiled within each company.

A similar focus is provided by (Shahbaz et al., 2018), which focuses on determining whether certain factors (e.g., information sharing, collaborative decision-making, electronic data exchange) positively impact the operational performance of SOEs. Information sharing, shared decision-making, and electronic data exchange are the independent variables, and operational performance is the dependent variable. The samples of this study are members of manufacturing companies, including production, assembly, distributors, retailers, and suppliers. The data was collected using questionnaires. The data was analyzed using SPSS version 23. In addition, the reliability of the data was verified using Cronbach's alpha.

Armayah et al. (2019) analyse the impact of supply chain collaboration (information quality, information sharing, alignment of incentives and joint decision-making) on the competitiveness of SMEs. Data were collected using questionnaires, interviews, and observation techniques. Validity testing was conducted through item analysis using the Pearson Product Moment Correlation method. Reliability testing was conducted using the Alpha Cronbach (α) value. The methods of analysis used in this study are (1) Descriptive analysis and (2) SEM analysis (structural equation model). The research data were processed using SPSS and AMOS software.

This paper (Bani Hani, 2022) focuses on different supply chain management practices (SCMP) (Information Technology or IT, CRM, Information Quality), Information Quality (IQ) and their impact on supply chain performance (SCP). The empirical research was conducted through a questionnaire survey of companies in

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Saudi Arabia. The methods and tools used for data processing were Cronbach's Alpha with an acceptance level of 0.60, CR-composite reliability Shapiro-Wilk test and others.

Based on the research conducted, several factors affect the performance of the supply chain. Furthermore, it can be summarized that the COVID period as one of the consequences had an increase in the importance of SCM. From the available literature sources, research in SCM is a topical issue, and it is necessary to investigate the factors leading to the change in their importance.
From the developed literature search reflecting the current social demand for the issue of the influence and impact of COVID-19 on companies, the authors set the following research questions:

- RQ1: Has the COVID-19 pandemic caused the rise in importance of BSR?
- RQ2: What factors influenced the change in the significance of BSR?

3. Research objective and methodology

A double analysis using the VoS Viewer program will examine the topicality of the issue. First, a two-parameter search on Web of Science will be performed to obtain the basis for creating a bibliographic map. The result of the bibliographic analysis will be a bubble map where the size of the bubbles indicates the number of occurrences, and the distance between each bubble indicates the degree of co-occurrence. All bubbles are divided into relevant clusters that are related to the keyword theme (van Eck and Waltman, 2010). After completing the bibliographic analysis, a double analysis of the 3 keywords will be performed. A regression analysis based on a 3-degree polynomial will be used to determine the transcription of the function, which will be enriched with a measure of the accuracy of this transcription using the correlation coefficient r (Likens et al., 2019; Zhang et al., 2022). The correlation coefficient will be determined using Excel following the following formula, where: the x and y values represent the average of matrices 1 and 2:

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \ \sum(y - \bar{y})^2}}$$

Methods of data collection
To achieve the objectives of the paper, two research questions were set and primary quantitative research was conducted in Czech companies to answer them. A total of 395 enterprises participated in the study; however, after cleaning, the research was conducted on a set of 351 enterprises. The respondents held a managerial position in the enterprise. The questionnaire survey was carried out in the period 2021-2022. The parameters related to the RQ were selected as the size of the enterprise (micro, small, medium, large), HV before and during the COVID-19 pandemic (loss, stagnation, profit) and the business sector (NACE sector - industry, mining, services, other). Other parameters observed were the importance of supplier-customer relationships before and during the pandemic (ranging from 0-1.00). The following hypotheses were defined to answer the set research questions:

- H0: The pandemic has not caused an increase in the importance of supplier-customer relationships in the value chain,
- H1: The pandemic has caused an increase in the importance of supplier-customer relationships in the value chain,
- H2: The change in the importance of supplier-customer relationships is related to selected factors (size of the enterprise, profitability of the enterprise, scale (scope), industry (differentiation by NACE), and business sector.

The second hypothesis was divided into five sub-hypotheses:

- H21: The size of the enterprise influenced the change in the importance of the BSR,
- H22: The profitability of the firm (HV before the pandemic) influenced the change in the importance of BSR,
- H23: The scale/size of the enterprise influenced the change (growth) in the importance of BSR,
- H24: The business sector (according to NACE differentiation) had an impact on the change in the importance of the BSR,

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- H25: The business sector (primary, secondary, tertiary) impacted the change in the importance of the BSR.

Data processing methods

The data processing will take place in two stages. During the first stage, H0 and H1 testing will be carried out. The testing will compare the growth in the importance of purchasing (supplier-customer relationships) before and during the COVID-19 pandemic. To test these hypotheses, 3 sets (A1, A2, A3) will be randomly created, and it can be argued that all firms in the sets had less than 100% importance in supplier-customer relationships before COVID-19. The A1 sample comprises firms where a positive change (growth) in the importance of supplier relationships has been defined. For the A2 sample, enterprises for which a negative change (decrease) in the importance of supplier-customer relationships was observed were randomly selected. The last sample is A3, which consists of enterprises where no change in the importance of supplier-customer relationships was defined. The evaluations of the results of the H0 and H1 tests are presented in the following Table 1.

Testing results	**H0**	**H1**
A1 > A2, A1 > A3:	Rejected	Confirmed
A1 < A2, A1 > A3:	Not confirmed/partially rejected	Not confirmed/partially rejected
A1 > A2, A1 < A3:	Not confirmed/partially rejected	Not confirmed/partially rejected
A1 < A2, A1 < A3:	Confirmed	Rejected

Table 1. Dataset of tests performed
Source: own processing

In the second stage, hypothesis H2 will be tested. The growth in the importance of supplier-customer relationships will be examined from several perspectives: size, profitability, scale (scope), differentiation by NACE, and sector. Method of testing: we compare the importance of supplier-customer relationships before and during the pandemic according to selected factors. The description of the files and instruments in testing each hypothesis were presented in the following methodological diagram Research Structure (Figure 1).

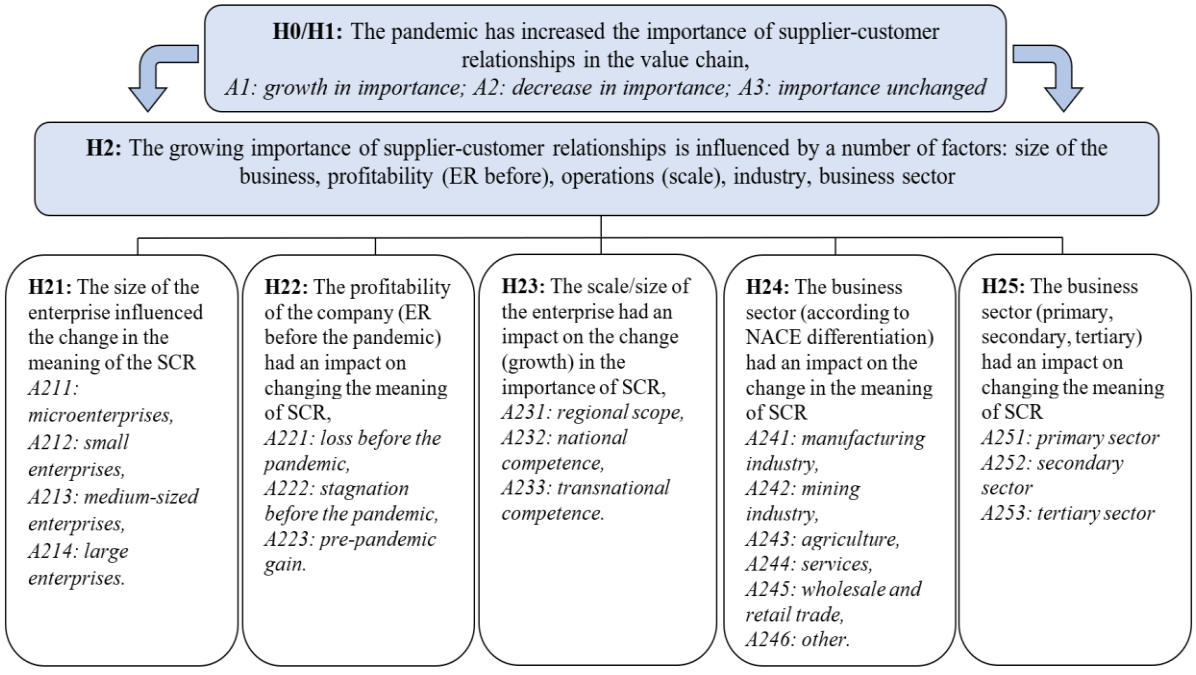


Figure 1. Structure of the research methodology
Source: own processing

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4. Results and discussion

A dual analysis using VoS Viewer was used to identify the current state of supply and value chain research. First, a search for Supply Chain and Covid-19 and Value Chain and Covid-19 (Management, Business or Economics category) was conducted on Web of Science. For the first search, the result was 1008 publications; for the second search, it was 610 publications. The search was followed by an export of information on all articles, which was used to create two bibliographic maps. The Supply Chain and COVID-19 map contained 303 keywords and was sorted into 7 clusters according to the relevant category. The Value Chain and COVID-19 bibliographic analysis contains 209 keywords in 8 clusters. This paper will use the top 5 clusters from each search. The keyword analysis yielded that both search topics are highly relevant and need further research (Figure 2, Table 2).

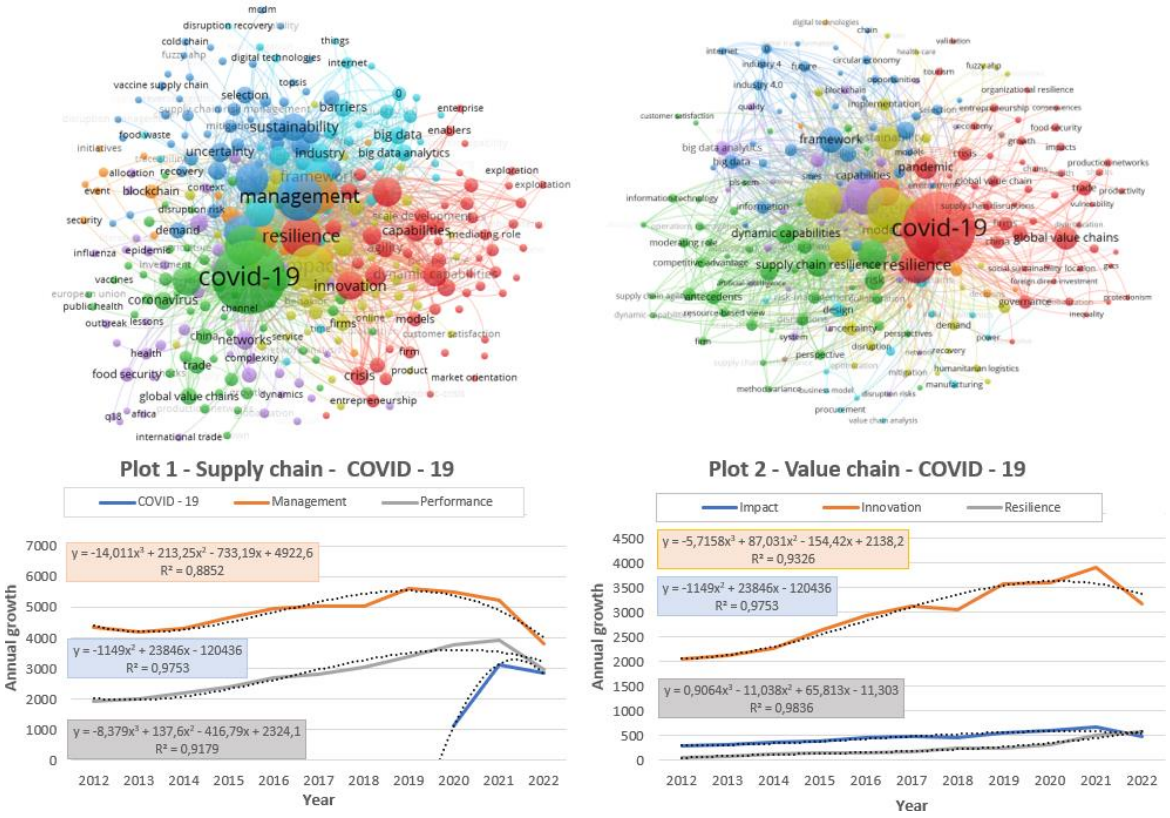


Figure 2. Graphic visualization from bibliographic analysis
Source: own processing

PICTURE 1	COLOUR	ITEMS	CLUSTER STRENGHT	FIELD
CLUSTER 1	Red	58	19,14 %	Resilience
CLUSTER 2	Green	53	17,49 %	Covid 19
CLUSTER 3	Blue	50	16,50 %	Management
CLUSTER 4	Yellow	48	15,84 %	Impact
CLUSTER 5	Purple	42	13,86 %	Framework
PICTURE 2	**COLOUR**	**ITEMS**	**CLUSTER STRENGHT**	**FIELD**
CLUSTER 1	Red	55	26,31 %	Covid 19
CLUSTER 2	Green	44	21,05 %	Supply chain
CLUSTER 3	Blue	38	18,18 %	Framework
CLUSTER 4	Yellow	27	12,91 %	Implementation
CLUSTER 5	Purple	23	11 %	Data

Table 2. Cluster table
Source: own processing

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After completing the bibliographic analysis, 3 keywords were identified from each search that were closely related to the article's topic. If a keyword was repeated in both studies, the following keyword was used. The words identified from the first search were Covid 19 (518 occurrences), Management (205 occurrences) and Performance (164 occurrences). The second search yielded the words Impact (112 occurrences), Resilience (100 occurrences) and Innovation (64 occurrences). Once all keywords were identified, a second analysis was created to track the annual growth of publications with the keywords. This analysis is enriched with a transcription function and a measure of the accuracy of future trends. The analysis shows that the most used keyword is **Management,** and the least used is **Resilience** (Table 3).

Table 3. Search table

Author Keywords	WoS Categories	Results
Management	Management or Business or Economics	72 121
Innovation	Management or Business or Economics	44 618
Performance	Management or Business or Economics	42 350
Covid - 19	Management or Business or Economics	7 111
Impact	Management or Business or Economics	6 611
Resilience	Management or Business or Economics	2 815

Source: own processing

Hypothesis testing yielded several results. The first stage tested H0 and H1 and investigated changes in the importance of BSR over the course of COVID-19, across size and sectoral differentials. We observe micro enterprises, SME enterprises and finally, large enterprises according to size differentiation. We further visualize the sectoral differentiation where we differentiate the enterprises into primary, secondary and tertiary sectors (Figure 3).

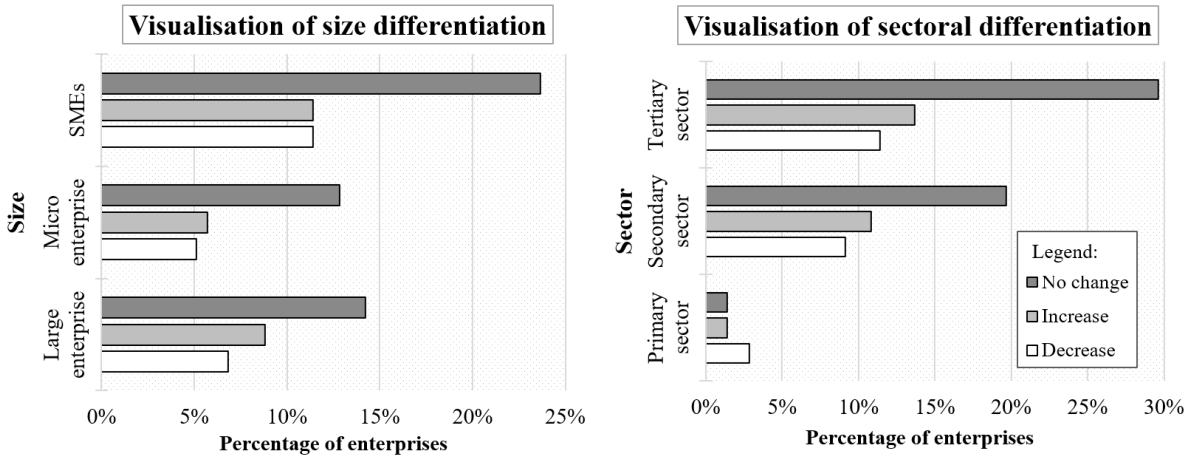


Figure 3. Result of sectoral and size differentiation of enterprises of the tested sample
Source: authors

The results show that the most dominant enterprises were those for which we identified a neutral importance of BSR during the COVID-19 pandemic. Regarding size differentiation, most enterprises were SMEs, followed by large enterprises and closely followed by micro-enterprises. Then, enterprises with an increase in the index of change in the importance of BSR dominated, again SMEs, followed by large enterprises and finally, micro-enterprises. Similarly, there was a decrease in the indicator of change in the importance of the BSR; we measured in SMEs, then large enterprises and micro enterprises. The indicator with no change in sectoral differentiation has its most frequent representation of the tertiary and then the secondary sector. We identified an increase in the importance of BSR again in the tertiary and secondary sectors. The decrease in change in importance was again greatest in the tertiary, then secondary and finally primary sector. Following this finding, our research was conducted to directly identify the mathematical and statistical differences between the

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meanings of BSR change across the observed differentiations, specifically, the sectoral differentiation focusing on the service and industrial sectors (Figure 4).

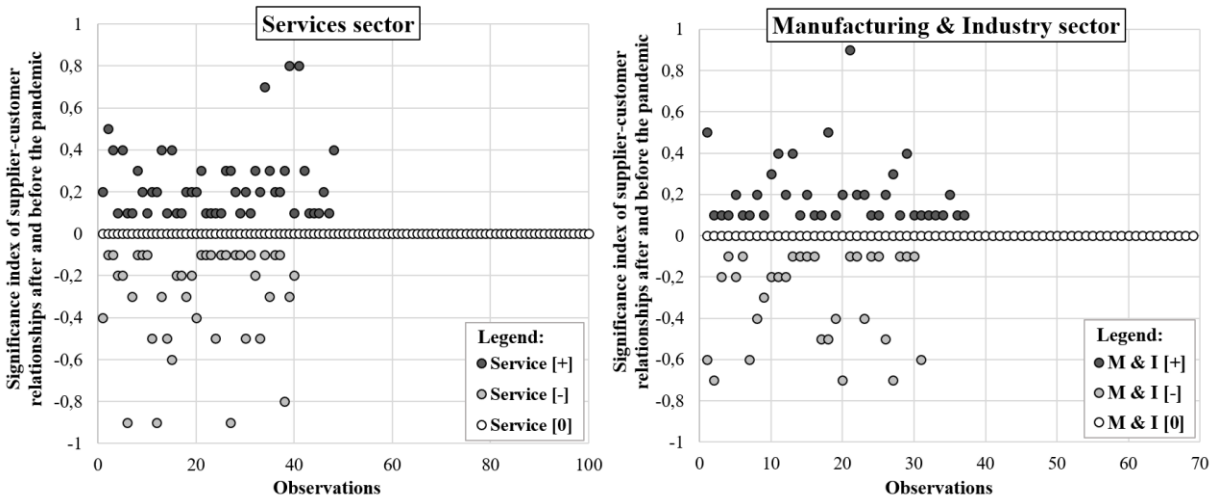


Figure 4. Manufacturing & industry and services sectors compared to the change significance index
Source: own processing

The results show that the unchanged change in BSR is strongly dominant across sectoral differentiation. In comparing the sectors we have studied, the manufacturing and industry sectors fare much better than the trade sector, as the measured nuances of change during the services pandemic resonated. We also indicated a larger standard deviation of the data here and, most importantly, we calculated a more significant proportion of outliers. In the positive vein of change in the BSR, the manufacturing and industry sector had a mean value of 0.27, whereas the service sector had a mean value of 0.25. In the negation of perceived importance, the service sector takes -0.37 while the manufacturing and industry sector takes -0.35. Hypothesis 1 was confirmed, and therefore, H0 was rejected. Thus, it can be concluded that due to the pandemic, there was an increase in the perceived importance of BSR in Czech enterprises. The implemented normality test confirms the validity of this conclusion. The second stage of the research focused on determining the factors that contributed to the growth in the perceived importance of BSRs during the COVID-19 pandemic. The results of testing hypotheses H21, H22, H23, H24, H25 are presented in the following Table 4.

Table 4. Result from ANOVA test

One-criteria ANOVA test					
Model I.	*Impact of a change in BSR significance*				
	Df	**Sum Sq**	**Mean Sq**	**F value**	**Pr (>F)**
H21: Size differentiation	4	0,96	0,2389	0,351	0,843
H22: Profitability	5	2,7	0,5397	0,796	0,553
H23: Territorial scope	3	2,05	0,6850	1,013	0,387
H24: NACE differentiation	9	8,84	0,9826	1,468	**0,018.**
H25: Sectors	3	6,18	2,0586	3,092	**0,027.**
Residuals	390	265,52	0,6808		

*[Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1]*

Source: own processing

Using one-factor ANOVA testing, hypotheses H24 and H25 were confirmed. On the other hand, hypotheses H21, H22, H23 were rejected. The association between NACE differentiation and change in BSR significance was confirmed. The results suggest that in industrial enterprises, the increase in the importance of the BSR due to the crisis is more noticeable than in service enterprises or retail and wholesale trade. Another confirmed

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relationship is the link between the business sector and the change in the importance of SMEs during the crisis. Secondary sector enterprises were more likely to increase the importance of BSRs than primary and tertiary sector enterprises. The relationship between the size of the enterprise and the change in the importance of BSRs was not confirmed. Thus, the growing importance of SMEs is a recent trend for enterprises of all sizes. There is no link between the size of the enterprise and the change in the importance of SMEs during the crisis. The enterprises' scale (scope) did not influence the evolution (growth) of the significance of BSR. Based on the data examined, another relationship that was not confirmed was the association between profitability (HV before the COVID-19 pandemic) and the evolution of the importance of BSRs. That is, growth in the importance of BSRs is not related to the short-term economic efficiency of a particular enterprise.

The results of the literature search indicate a growing interest in supplier-supplier relationships. Research conducted by Bertello, Bogers, and De Bernardi (2021) finds a link between crisis periods and the increasing importance of supply chain and supply chain linkages.

The results of the primary research can be summarized as follows: there is a direct link between the outbreak of a pandemic and the growth of the importance of BSRs in the companies studied. Therefore, during other crises, the importance of BSR will also grow. This result is consistent with the research results of Chu, Tian and Wang (2019). The overall increase in importance is evident for the entire set of firms without sectoral differentiation. The profitability of the enterprise (HV before) did not affect the growth of the importance of BSRs during the pandemic; regardless of HV, enterprises perceived the growth of BSRs during the crisis period. Thus, based on the existing data, BSR belongs to the set of essential aspects of a successful business and, according to the evidence from practice, is one of the areas of achieving resilience in turbulent periods. Industry and sector impact the growing importance of supplier-customer relationships during pandemics. For industrial enterprises, the increase in the importance of SSCs during a pandemic is more evident than for service enterprises. Similar findings can be applied to sectors, i.e., the secondary sector shows a more remarkable growth in the importance of BSR than the tertiary sector. Thus, in the case of negative externalities (e.g. pandemics), BSR becomes more critical in material-oriented flows. In the research carried out, the relationship between the size of the enterprise and the change in the importance of the BSR was not confirmed. Therefore, the size of the enterprise did not affect the importance of the BSR. The growth of the importance of BSR during the crisis period is equally evident in micro, small, medium, and large enterprises. Scale (operation) did not affect the growth of the importance of CSR in the crisis period. This finding can be interpreted by saying that national, local (regional) and multinational companies took the same approach to assessing the importance of BSR during the crisis. Overall, the results of this thesis suggest that BSR, as part of the meso-environment, is perceived by companies as one of the key areas for achieving sustainable resilience in times of external turbulent negative influences. The literature search results provided a contrarian view of the research question related to the importance of BSR in the context of a pandemic. The primary research results confirm the study's findings (Bani Hani, 2022) regarding the growing importance of BSR and SCM. The results of the empirical research provide a comprehensive view of specific firm characteristics and their impact on the changing importance of SCMs. Thus, the research builds on the results of, for example, the research on the link between the analysis of the factors of SSC (sustainable supply chain) improvement during a pandemic and the factors necessary for SCM (Sharma et al., 2022) or the impact of digitalization on SCM performance (Hu, 2022). Overall, the paper provides a comprehensive view of the potential areas/characteristics that make an enterprise more responsive to external influences by changing the importance of SSC.

Conclusions

The growing interest in BSRs as part of the GHR concept is evident in academia and business. The main objective of this paper was to identify the trend of the importance of supplier-customer relationships in enterprises in the Czech Republic. This objective was fulfilled through primary quantitative research in Czech enterprises. The growing interest in BSR during the pandemic period was confirmed. Based on the study, factors that have contributed to more significant growth in the importance of BSR include the industry and business sectors. Recommendations for the target segment are linked to analysing individual BSRs and using tools to consolidate them, especially in times of crisis. A first-level BSR is essential in building a flexible and

robust supply chain. Industrial and secondary sector enterprises should continue to work hard to strengthen the BSR to achieve resilience in times of crisis. The findings have some limitations, primarily since our research focuses on short-term changes, so it is still being determined if the context will hold in the long term. The paper's own results set out several directions for future research. One interesting question is the effect of the growth in the importance of the BSR on the growth of the profitability of the firm (economic resilience in times of crisis). Another exciting direction is to establish the link between the digitalisation of BSRs and value chain efficiency.

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EXPLORING DYNAMIC CAPABILITIES AND GREEN INNOVATIONS IN BORN SUSTAINABLE FIRMS*

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Abstract. Born sustainable firms aim to regenerate the environment and drive positive societal changes since their establishment. Therefore, they need to leverage dynamic capabilities and their micro-foundations to reach their strategic aims. This paper investigates how dynamic capabilities—and their micro-foundations—influence the transition of such firms towards carbon neutrality. It assumes a holistic approach, analyzing the contribution of the firm's ecosystem to the development of its dynamic capabilities. Finally, the role of green innovations on the path toward carbon neutrality is evaluated. The adopted research method is based on a single longitudinal case study concerning a small organic wine-born sustainable firm implementing a sustainable and circular business model. Our findings clearly show that a firm's dynamic capabilities—belonging to the sensing, seizing, and reconfiguring clusters—play a critical role even in the case of micro and small companies, which are rarely investigated in the extant literature. However, due to the traditional resource poverty characterizing such companies, dynamic capabilities must be rooted in micro-foundations developed through interactions with partners within the firm's ecosystem. At the same time, developed capabilities allow the company to create and exploit a set of green innovations, which, in turn, push forward the net zero goal.

Keywords: dynamic capabilities; born sustainable firm; ecosystem; green innovation; wine sector; sustainability

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1. Introduction

Over recent decades, crafting environmentally sustainable strategies has emerged as crucial for compliance with the 2030 Agenda for Sustainable Development and the global climate target of reaching net zero emissions set by the Paris Agreement (Bombelli et al., 2019). To tackle sustainability challenges, firms must transcend conventional business practices and pioneer innovative methods to achieve carbon neutrality (Hoffman, 2005). Within the realm of sustainability-focused businesses, born sustainable firms (BSFs) represent a distinct category from other enterprises. Knoppen and Knight (2022) define them as firms "which were established with explicit strategic intent to operate in a sustainable manner from the outset. BSFs seek to contribute directly to regenerating the environment and driving positive societal changes" (p. 1790). According to the authors, such firms do not pursue the traditional competitive advantage but rather a more specific "sustainability advantage." To achieve such a sustainability advantage, BSFs must develop dynamic capabilities (DCs) (Teece et al., 1997). These are conceptualized as the firm's ability to integrate, build, and reconfigure internal and external competencies to cope with rapid changes in the dynamic business environment. Moreover, DCs are defined as the capacity to 'orchestrate' successful innovation and value capture over time. However, it must be considered that BSFs are traditionally micro, small, and medium enterprises (M&SMEs) (Knoppen & Knight, 2022). Therefore, they diverge from larger counterparts in three crucial ways: a) they often face 'resource poverty'; b) they typically maintain simple organizational structures, with owner-founders playing a pivotal role as relationship and network managers; and c) they frequently operate without external shareholder accountability. Therefore, the development of DCs within such companies deserves special attention.

The DC framework has been previously applied in both strategic management (e.g., Zahra et al., 2006) and corporate sustainability studies (e.g., Kabongo & Boiral, 2017). However, Daddi et al. (2018) point out that the DC framework is scarcely investigated in the context of sustainability management. Moreover, Wu et al. (2012) highlighted that "how firms develop and apply dynamic capabilities to address the distinctive challenges involved in corporate change toward sustainability is yet to be fully explored" (p. 233). Finally, Amui et al. (2017) call for further research to better appreciate how DCs affect sustainable innovations.

It is also worth noting that DCs are rooted in micro-foundations that competitors cannot imitate (Teece, 2007). These micro-foundations are related to the adjustment and recombination of existing DCs, through which management, supported by organizational processes, senses and devises a business model to seize new opportunities and determine the best configuration for the organization (Teece, 2018). Khan et al. (2020) point out that the development of DCs' micro-foundations has been scarcely investigated in the extant literature, especially in firms implementing sustainability strategies.

The development of DCs involves a pivotal role played by the firm's "ecosystem." While this term has been employed in the field of strategy for a long time (Moore, 1993; Iansiti & Levien, 2004), its applicability has greatly expanded over the last decade. Teece (2007) defines it as "the community of organizations, institutions, and individuals that impact the enterprise and the enterprise's customers and suppliers" (p. 1325). According to some scholars, sustainability-oriented strategies (such as those aiming to develop a path towards carbon neutrality) require interaction with diverse stakeholders (Kortus & Gutmann, 2023). This is even more important in the case of "innovation ecosystems" (Jacobides et al., 2018), which may support the development of "green innovations" along the path toward net zero, as shown by De Marchi (2012).

Such innovations are defined as "measures by relevant actors (firms, private households…), which: (i) develop new ideas, behaviours, products, and processes, apply or introduce them, and; (ii) contribute to a reduction of environmental burdens or to ecologically specified sustainability targets" (Rennings, 2000, p. 322). While traditional innovations encompass creating novel products, materials, processes, services, and organizational structures to secure a competitive edge, green innovations strive to foster novel concepts, goods, services, processes, or management frameworks tailored to address environmental challenges (Rennings, 2000). Therefore, they support BSFs in developing a sustainability advantage (Knoppen & Knight, 2022).

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Our paper aims to shed more light on the DC framework by exploring how their micro-foundations impact the path towards the net zero goal, specifically focusing on BSFs. In so doing, we investigate the impact of ecosystems on the development of the firm's DCs, which, in turn, allow the company to create green innovations. To sum up, we raise the following research questions:

1. RQ1: What kind of DCs' micro-foundations characterize firms implementing sustainability strategies towards the net zero goal?
2. RQ2: What is the role of the ecosystem in developing DCs?
3. RQ3: What types of green innovations are developed based on developed DCs?

The paper is structured as follows. Section 2 provides an overview of the available literature on DC to develop an integrated theoretical framework to support the evolutionary path towards the net zero goal. Section 3 describes the research method, which consists of a longitudinal single case study of an Italian wine-making BSF implementing a sustainable business model and organic production. The main findings are presented in Section 4 and discussed in Section 5. Limitations and suggestions for future research avenues are discussed in the final section.

2. Theoretical background

The existing literature on dynamic capabilities (DCs) occupies a significant place among the various theories in management studies. The first scholars to highlight the relevance of DCs were Teece et al. (1997), who defined them as "the ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (p. 516). The DC approach has advanced as an extension of the resource-based view of the firm, embracing the dynamic and evolutionary dimensions of firms' resources and capabilities as they move towards the next stage of organizational growth or encounter new obstacles. The DC perspective delves into how organizations navigate rapidly changing environments by creating new resources and adjusting or renewing their resource composition (Teece et al., 1997).

In 2007, Teece further explained DCs by identifying three enterprise-level capacities: 1) sensing and shaping threats and opportunities; 2) seizing opportunities; and 3) maintaining competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring tangible and intangible firm assets. Sensing involves recognizing and evaluating opportunities for sustainability, exploring different facets of the ecosystem, understanding customer needs, analyzing competitors, exploring technological advancements, interacting with suppliers, and evaluating markets. Seizing entails harnessing internal and external resources and capabilities to capitalize on opportunities and extract value from them. As Teece (2007) argued, from the viewpoint of DC, a firm's capacity to create and execute innovations is integrated within a network of interconnected actions aimed at producing, obtaining, and integrating a diverse array of resources and skills. Finally, reconfiguring involves ongoing revitalization and coordination of resources to align the company's resource portfolio with changes in the business landscape. These reconfiguring capabilities empower a company to maintain its evolutionary flexibility and mitigate any rigidity that may develop over time due to accumulating resources and established routines (Teece, 2007).

For each of the three enterprise-level capacities, Teece (2007) identifies a set of micro-foundations. Based on this framework, Khan et al. (2020) analyzed start-ups and recently established firms implementing a circular economy approach, identifying 11 specific micro-foundations interconnected with the three "clusters of DCs" proposed by Teece (2007). This set of micro-foundations can serve as a reference for any firm's sustainability strategy.

A further contribution offered by Teece et al. (1997) regards the source of DCs; in this respect, external competencies and their integration within the company emerge as fundamental issues. Mousavi et al. (2018) point out that firms develop solutions to environmental problems (e.g., through green innovations, as defined by Rennings (2000) by developing knowledge links with a wide range of external actors within their ecosystem. Several scholars underscore the critical role of external knowledge and information sources in fostering innovation towards sustainability (e.g., Bocken et al., 2014). Some authors also pointed out that the greater the

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variety of partners a company collaborates with, the higher the likelihood of effectively innovating for sustainability (Dangelico et al., 2017; De Marchi, 2012). Due to their "resource poverty" (Knoppen & Knight, 2022), such collaborations are even more relevant for M&SMEs, including BSFs (Knoppen & Knight, 2022).

Based on the earlier discussion, the proposed integrated framework for the analysis of BSFs' sustainable strategies towards net zero is summarized in Figure 1.

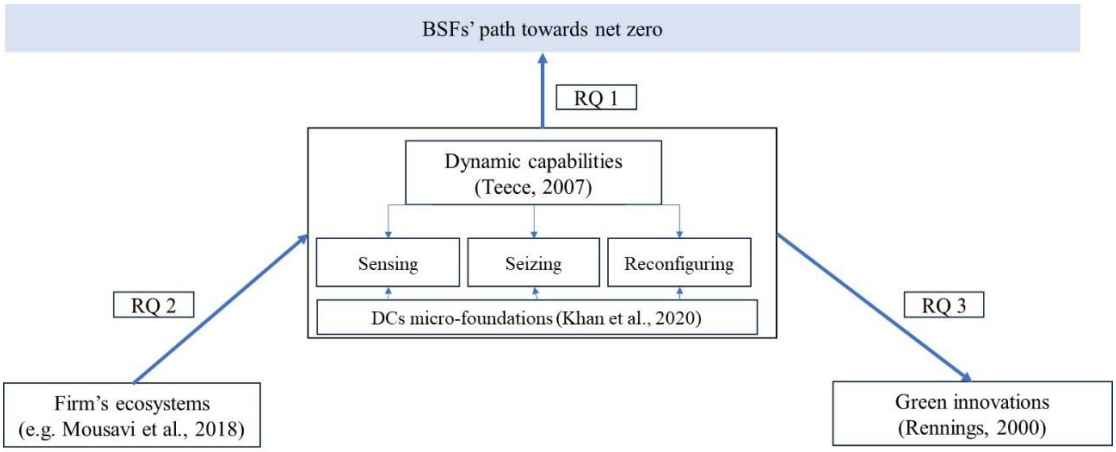


Figure 1. The proposed integrated framework
Source: Our elaboration

3. Methodology

As stated earlier, this paper adopts an integrated framework based on the dynamic capabilities (DC) approach (Teece, 2007; Teece et al., 1997). Specifically, it aims to investigate the nature and micro-foundations of the capabilities (Teece, 2007) adopted by born sustainable firms implementing strategies toward the net zero goal. It is assumed that a company can cultivate a range of capabilities, including interactions with its ecosystem, to facilitate the development of green innovations. The focus on ecosystems is emphasized by Knoppen and Knight (2022) as a crucial perspective in analyzing BSFs' development.

Due to the novelty of the topic, a qualitative research method was chosen. Qualitative research based on a case study can generate a detailed and multifaceted understanding of a complex issue within its real-life context (Schwandt & Gates, 2018). To achieve this objective, a longitudinal case study was selected (Jensen & Rodgers, 2001). This approach aligns with Knoppen and Knight (2022), who suggest adopting a longitudinal approach due to the importance of the time horizon for sustainable advantage. For instance, BSFs may encounter challenging financial periods, compelling them to prioritize financial outcomes while deferring their intended environmental impact. Additionally, Yin (2003) stated that the longitudinal approach is a rationale for using a single case study to develop a research project. Therefore, a longitudinal single case study was selected through a purposive sampling approach to investigate the previously defined research questions. Scholars have pointed out that a case study selected through predefined criteria would increase the study's reliability (Etikan et al., 2016).

The case selection was based on the following criteria where the firm should:

1. belong to an industry characterized by a high level of engagement in sustainability. Santini et al. (2013) pointed out that sustainability plays a key role in the wine industry, as demonstrated by the increasing interest of academia, policymakers, and practitioners. Some companies have implemented sustainability strategies based on green innovations. Bandinelli et al. (2020) identified 20 different sustainable practices within the wine industry;
2. be a micro or small enterprise, due to their "resource poverty" (Knoppen & Knight, 2022), which obliges them to develop relational advantages in collaboration with partners in their ecosystem.

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3. directly manage the entire wine production process, from vine cultivation to winemaking and bottling. Ferrer et al. (2022) state such characteristics are necessary to define the business model as highly sustainable in the wine sector.
4. The company should be classified as a BSF, having implemented a sustainable and circular business model since its establishment.

Based on these criteria, a small winemaking company located in central Italy emerged as an interesting case study. It was established by an entrepreneur with a strong commitment to sustainability. His business idea was to develop a new wine firm according to a sustainable business model (Geissdoerfer et al., 2020). This entrepreneurial aim originated from both his family heritage and his involvement in several environmental initiatives. His relatives owned a large vineyard in northern Italy, and he participated in grape harvests and wine production from childhood. This experience led him to pursue a Master's degree in agronomy. Given his environmental orientation, he also took courses on sustainability in agriculture and agroecology during his university period. He decided to establish a new company in the same province as his university. After carefully selecting land suitable for organic agricultural techniques, he established the company in 2002 and started constructing an eco-sustainable underground wine cellar, completed in 2005. In 2006, the firm's first organic product was launched. The company achieved carbon neutrality, producing minimal GHG emissions offset by carbon removals resulting from sustainable land management in the vineyards (Chiriacò et al., 2019). Moreover, the company developed several collaborations with universities and research centres and implemented some green innovations (Mura et al., 2023; 2024). Finally, it adopted both LCA and LCC measurement tools (Chiriacò et al., 2019; Mura et al., 2023; 2024).

Based on this evidence, the company may be classified as a BSF. It was previously investigated using a life cycle thinking approach related only to some of its sustainable initiatives (Chiriacò et al., 2019; Mura et al., 2023; 2024). However, no prior study has assumed a longitudinal and global perspective, considering all the firm's sustainability-oriented initiatives since its establishment. Moreover, previous analyses did not aim to investigate the DCs micro-foundations and their relationships with the firm's ecosystem and green innovations. In this regard, it is worth noting that previously available studies serve as useful secondary sources for data triangulation, a fundamental element of research focused on BSFs (Knoppen & Knight, 2022).

The authors contacted the company, and the research aims were presented to the entrepreneur, who agreed to collaborate and make his network of relationships available with actors in the firm's ecosystem. Based on this availability, the authors selected a set of key informants (see Table 1). Semi-structured interviews with the selected key informants were held via MS Teams, audio-recorded with permission, and lasted about 60 minutes. These interviews were conducted between November 2023 and March 2024.

Table 1. Primary sources for data collection

Primary data collection	Entrepreneur
(Semi-structured interviews)	Employee in charge of communication activities with company visitors Sustainability expert at a research centre collaborating with the selected company
	University professor acting as Principal investigator in two applied research projects involving the selected firm
	Firm's business customer (restaurant) involved in a reverse logistics project

Source: Authors' elaboration

All interviews were transcribed and manually coded to ensure rigorous qualitative data analysis, then sent to the interviewees for confirmation of the content. If further information needs emerged during the data analysis, the key informants were contacted again. Finally, a draft of the paper was sent to the company entrepreneur to provide an opportunity to comment, review the results, and give final approval.

Consistent with other studies (e.g., Khan et al., 2020), we triangulated the interview data to minimize interviewer bias and other issues typically present in qualitative research. Additionally, secondary data from the firm were analyzed, using not only previously available studies but also archival sources such as firm reports, press

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releases (including interviews with the entrepreneur), final reports of applied research projects, and the firm's website.

Data analysis was supported by a coding activity conducted through a data-driven open-coding approach (Gibbs, 2007). Collected data were separately analyzed by each author to define the different phases of the DCs development along the path toward net zero. For each phase, authors autonomously conducted the coding activity to identify: a) which of the micro-foundations proposed by Khan et al. (2020) in relation to companies implementing circular economy strategic approaches were involved; b) the corresponding cluster of DCs (sensing, seizing, and reconfiguring) (Teece, 2007); c) the actors within the firm's ecosystem and their contribution to DC development; d) the set of green innovations (if any) developed in each phase. Such innovations were then classified according to the Oslo Manual (OECD/Eurostat, 2018).

After comparing the coding activity outputs, no relevant differences emerged. Findings collected and classified according to the described research methodology are presented and discussed in Section 4.

4. Results

During the first phase, the firm developed an initial collaboration with the local university, where the entrepreneur was enrolled. The company served as a case study for a practical application of Life Cycle Assessment (LCA) during a Master's course. Specifically, the environmental impact in terms of greenhouse gas (GHG) emissions was assessed using a 0.75L bottle as the functional unit (FU). Despite the occasional nature and specific focus of the collaboration, it proved highly beneficial for the company. The 'sustainability expert' involved in the LCA application during the Master's course noted: "*The application of the LCA was useful for the firm to define a first-ever overview of its impact in terms of greenhouse gas emissions. This was the first time the company had calculated the emissions generated.*" The valuable results obtained through the LCA approach were later coupled in 2022 with those emerging from the Life Cycle Costing (LCC) based on the same FU. These findings led the entrepreneur to implement several sustainability strategies.

According to the proposed analytical framework, the primary ecosystem actor is the local university, represented by the director of the Master's program, who will be the principal investigator of future research projects involving the company and other professors the entrepreneur met during his academic experience. The assessment of environmental impacts through the LCA method revealed that the main source of GHG emissions was from the wine packaging. This prompted the entrepreneur to seek new solutions in this area, resulting in three green marketing innovations: a) a lighter glass bottle for 95% of the total production (2011); b) a fabric label for aged wines (2012); and c) a recycled cardboard box for all product lines (2013). Due to the inability to use the lighter glass bottle for aged wines, a specific green organizational innovation was implemented based on a reverse logistics approach. Business customers, particularly those in the hotel, restaurant, café (Ho.Re.Ca.) sector, were asked to return empty glass bottles, fabric labels, and shellac to the wine firm. This project increased Ho.Re.Ca. customers' engagement despite some operational challenges. One customer noted: "*The only negative aspect of this initiative is the space needed to store the empty bottles, which then need to be returned. For us, it is not a problem because we have a large available area. However, for others with smaller warehouses, this could discourage participation*." Despite the wide participation of the company's business customers, the project remains at the logistics level and has not been leveraged for storytelling to Ho.Re.Ca. end customers, who are only informed about the organic nature of wine production and the company's local roots.

Based on the previously described coding activity, three of the micro-foundations proposed by Khan et al. (2020)—'experiential learning,' 'strategic planning,' and 'best practice adaptation'—emerged. These belong to each of the three clusters proposed by Teece (2007): sensing, seizing, and reconfiguring. Table 2 summarizes all the analytical findings related to Phase 1.

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Table 2. Phase 1 description

Phase	Phase Description	Ecosystem's Involved Actors	Phase Outputs			Classification according to Khan et al., 2020	
			Sustainability Assessment Tool	Other Outputs		Micro-foundations	Clusters of Dynamic Capabilities
				Description	Green Innovations Classification		
1	Informal collaboration with the University	University (Master's programme) Bottles suppliers Local supplier of textile fabric labels Suppliers of recycled cardboard boxes B2B Customers (Ho.Re.Ca.)	LCA (product unit)			(Using LCA to assess potential environmental impacts of products) - Experiential learning	Sensing
				Adoption of lightweight bottles (2011)	Marketing (packaging)	(Finding strategic partners) - Strategic planning	Seizing
				Adoption of fabric label (2012)	Marketing (packaging)	(Finding strategic partners) - Strategic planning (Collaborating with suppliers to acquire recyclable materials) - Collaboration	Seizing
				Adoption of a recycled cardboard box	Marketing (packaging)	(Finding strategic partners) - Strategic planning	Seizing
			LCC (reverse logistics)	Reverse logistics	Organizational	(Finding strategic partners) - Strategic Planning	Seizing
						(Implementing new business practices) - Best practices adaptation	Reconfiguring

Source: Authors' elaboration

The second phase involves consolidating the relationship between the firm and the university through a more structured collaboration, which included other research centers. Prompted by an external stimulus from the university, the company participated in its first public call for funding industrial research projects in the agricultural sector. Although the initial attempt was unsuccessful, a subsequent application the following year was successful. The approved project aimed to reduce the farm's environmental impact (achieving zero impact) and to produce a new product line of high-quality eco wines, furthering the firm's sustainability strategy. The project focused on three main areas: agronomic, technological, and ecological.

Referring to the proposed framework, the firm's ecosystem expanded due to the activation of additional relationships with new research institutions introduced by the local university. Notably, the university, represented by the same professor managing the Master's degree, not only initiated the new collaboration but also acted as a gatekeeper.

In terms of outputs, six green innovations were stimulated by the results obtained through the collaboration – one at the product level and five at the process level. The process innovations are:

1. Use of self-produced organic compost – derived from the firm's organic pomace and other plant residues – for soil improvement purposes (2011) (agronomic project area);
2. Implementation of a microsensors system within the cellar to reduce energy consumption (technological area);

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3. Creation of a cell for conditioning and dehydrating grapes, where ozone treatments were also tested. The cell was built with local materials (chestnut wood and cork) to reduce environmental impact and was equipped with dehumidification and refrigeration systems for further energy efficiency (technological area);
4. Adoption of ozone in the dehydration phase, grape washing phase, and container cleaning. This process innovation reduced the use of chlorine and sulfur (technological area);
5. Creation of an integrated water management system, involving the collection of all water resources used in the company – cellar wastewater and rainwater collected from roofs – and a plan for their reuse (ecological area).

Regarding product green innovation, an eco-wine line characterized by no added sulfites was launched, thanks to the use of ozone for grape washing (2012 and 2022).

A special role in this project was played by the LCA (Life Cycle Assessment) method. The entrepreneurs highlighted: "*The three paths were all under the same sustainability umbrella, and the LCA acted as the common denominator for the entire project. The idea was to evaluate the firm's impact before and after the development of these technologies. The goal was to certify the company's sustainability through all the innovations implemented.*" Specifically, the LCA method was applied not only to the 0.75L glass bottle as the functional unit (FU) but also to the unit of cultivated land, i.e., 1 ha of vineyard. This approach allowed for more comprehensive GHG (greenhouse gas) accountability, as assessing GHG per unit of land provides a more detailed estimation of the firm's contribution to climate change. Various studies (Chiriacò et al., 2022) demonstrate that the carbon footprint assessed by product units for agricultural products is not always fair, as it is primarily related to yields. Intensive management with high agricultural inputs per hectare generates higher GHG emissions in absolute terms per unit of land, which can be overshadowed by higher productivity when the carbon footprint is assessed per unit of product. The newly introduced carbon footprint per unit of land better reflects the actual agricultural contribution to climate change, driven by land-atmosphere GHG fluxes, independently of the number of bottles produced. The sustainability expert researcher stated: "*With this project, we went further and, for the first time – or at least we were among the first – applied LCA by land unit. We considered the entire territorial unit occupied by the company and how it is managed*." Finally, the integrated approach – considering both the agricultural phase and the wine production phase – was evaluated (2022) using the LCC (Life Cycle Costing) approach. Table 3 summarizes the findings related to Phase 2.

The third phase is still characterized by exogenous stimuli promoted by a spin-off of the same local university. More specifically, it was proposed to integrate the LCA results developed in the previous phase with those derived from the use of the so-called "eddy covariance technique" (Baldocchi, 2003). The new integrated method allowed for the inclusion in the LCA of not only the anthropogenic GHG emissions attributable to the production process but also the overall biogenic GHG fluxes resulting from the agricultural management of the vineyard. This revealed that the farm was already carbon neutral in the field phase since the sustainable practices applied in the vineyard turn the system into a net carbon sink (i.e., -0.27 Mg CO2-eq per ha per year), capable of completely offsetting the anthropogenic emissions associated with vineyard management (i.e., 0.24 Mg CO2-eq per ha per year) (Chiriacò et al., 2019).

Table 3. Phase 2 description

Phase	Phase description	Ecosystem's Involved Actors	Phase Outputs			Classification according to Khan et al., 2020	
			Sustainability assessment tool	Other Outputs		Micro-foundations	Clusters of Dynamic Capabilities
				Description	Green innovations classification		
2	Structured Collaboration with University	University Research Centres	LCA (Integration of product unit with unit of land)			Experiential Learning - Collaboration	

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				Launch of 3 new wines without added sulphites (2012 and 2022)	Product	Undertaken activities to increase the stock knowledge - Knowledge Creation (Collaboration with universities and research centres) - Collaboration (Formulating a strategy for sustainability) - Strategic Planning	
			LCC (Production phases)	Organic Compost (2011)	Process	Undertaken activities to increase the stock knowledge - Knowledge Creation (Collaboration with universities and research centres) - Collaboration (Implementing new business practices) - Best practices adaptation	Sensing Seizing Reconfiguring
				Micro-sensorization (2012)	Process	Undertaken activities to increase the stock knowledge - Knowledge Creation (Collaboration with universities and research centres) - Collaboration (Technological modifications in existing machinery and infrastructure) - Technological Upgradation	
				Grape pomace drying room (2012)	Process	Undertaken activities to increase the stock knowledge - Knowledge Creation (Technological modifications in existing machinery and Infrastructure) - Technological Upgradation	
				Ozone Utilization (2012)	Process	Undertaken activities to increase the stock knowledge - Knowledge Creation (Implementing new business practices) - Best Practices Adaptation	
				Phytodepuration and biolake (2013/2014)	Process	Undertaken activities to increase the stock knowledge - Knowledge Creation (Implementing New Business Practices) - Best Practices Adaptation	

Source: Authors' elaboration

Referring to the proposed analytical framework, the firm's ecosystem is further enlarged to include the spin-off; however, the university's gatekeeper role is confirmed. Given the specific contents of this new collaboration (integration of sustainable measurement tools), no green innovations were developed. Finally, the two micro-foundations involved in this phase ('experiential learning' and 'collaboration') belong to the sensing and seizing cluster (Table 4).

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Table 4. Phase 3 description

Phase	Phase description	Ecosystem's involved actors	Phase Outputs			Classification according to Khan et al., 2020	
			Sustainability Assessment tool	Other outputs		Micro-foundations	Clusters of Dynamic Capabilities
				Description	Green Innovations Classification		
3	Collaboration with spin-off	University spin-off	LCA (integration among product unit, unit of land, and Eddy Covariance tool)			(Using LCA to assess environmental impacts) - Experiential learning (Collaborating with partners) - Collaboration	Sensing Seizing

Source: Author's elaboration

The fourth phase builds on the results described in Phase 3, motivating the firm to further collaborate with its scientific partners. Specifically, LCA results revealed a critical issue with the open-air production of organic compost: the emission of methane, which has a global warming potential 21 times greater than carbon dioxide (IPCC, 2022). Consequently, a new research project proposal was developed to address this issue, submitted for a public call in 2012. The primary aim of this project was to capture methane emissions from open-air compost fermentation and utilize them to meet the firm's energy needs. To support this recovery effort, the use of a closed, movable agricultural wagon was proposed for the compost fermentation phase. Methane emissions generated during this process would be used as biogas to supply the firm's gas boiler. Additionally, the organic residues from the fermentation process would be used to cultivate organic mushrooms for the local market. Finally, the remaining organic compost would be applied in the vineyard as a soil improver, mulch, and for anti-erosion purposes (Cirigliano et al., 2017).

Unfortunately, the research project found that the emitted methane was not pure enough to be used in the existing gas boiler. Consequently, the company decided to use the movable wagon solely for the production of organic compost, replacing the previous outdoor composting method. This change preserved a larger amount of the organic components, enhancing the quality of the compost. To produce higher-quality biogas, the wagon—initially a modification of an existing one—would have needed a complete redesign to ensure a more hermetic seal; however, budget constraints prevented this further step. Additionally, the mushroom business proved to be unprofitable and was discontinued in 2017. Therefore, during this phase, only the (partial) green innovation of the movable wagon was developed, which can be classified as a process innovation.

Regarding the firm's ecosystem, in addition to the established collaboration with the local university and its network of research centres, a critical role was played by the entrepreneur's involvement in the presentation of a book on the "blue economy." He noted, "*It was through the studies contained in the Blue Economy that I conceived the project to close the cycle. All company waste must be reused to become a resource: recover fermentation methane as biogas, use the substrate sterilized by fermentation along with coffee grounds sterilized by the coffee steam machine, and grow edible mushrooms to sell in the market*."

Finally, the relationships activated in this phase can be categorized under the 'collaboration' and 'technological upgradation' micro-foundations belonging to the seizing and reconfiguring clusters (Table 5).

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Table 5. Phase 4 description

Phase	Phase description	Ecosystem's involved actors	Phase outputs			Classification according to Khan et al., 2020	
			Sustainability Assessment tool	Other outputs		Micro-foundations	Clusters of Dynamic Capabilities
				Description	Green Innovations classification		
4	Structured collaboration with universities and other ecosystem partners (institutional and business)	University research centres Engineering business company	LCA (integration among product unit, unit of land)			(Collaboration with universities and research centres) - Collaboration	Seizing
				Compost fermentation wagon/bin (2016)	Process innovation	Undertaken activities to increase the stock knowledge - Knowledge creation (Collaboration with universities and research centres) - Collaboration (Collaboration with suppliers) - Collaboration (Technological modifications in existing machinery and infrastructure) - Technological upgradation	Sensing Seizing Reconfiguring

Source: Author's elaboration

The fifth and final phase concerns green innovations developed independently by the focal firm, without specific relationships with actors embedded in its ecosystem. However, these green innovations are supported by the dynamic capabilities (DC) previously developed through the interactions described in earlier phases. In other words, they are an indirect result of the firm's embeddedness in the ecosystem.

During the last phase (2017-2023), two green innovations were developed. The first concerns an additional element of the packaging for the eco wines in the product line of wines without added sulfites (developed as a result of Phase 3). Specifically, in 2017, a label produced using a mix of paper and cotton was adopted; this label can be easily removed and recycled as paper waste.

In contrast, the second green innovation pertains to the creation of a new service line, the so-called "Eco Wine Experience." This offers visitors the opportunity to tour the firm's vineyards and cellar and learn about the sustainability strategies being pursued. This activity serves as both a communication tool and an autonomous business unit related to experiential tourism, attracting customers who may not be primarily interested in wine sales. In this regard, the entrepreneur noted, "The Eco Wine Experience is becoming the most relevant activity within the firm. For us, it also represents a tool to disseminate the firm's sustainability values." Notably, these tours have been adopted by several universities, including the local one promoting the collaborations described in previous phases, as a training activity for students in agriculture-related degrees. To support this new business

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activity, a new company was established to manage the catering service for participants of the "Eco Wine Experience" tours.
Table 6 summarizes the findings related to Phase 5.

Table 6. Phase 5 description

Phase	Phase description	Ecosystem's involved Actors	Phase outputs			Classification according to Khan et al., 2020	
			Sustainability Assessment Tool	Other outputs		Micro-foundations	Clusters of Dynamic Capabilities
				Description	Green Innovations classification		
5	Autonomously developed green innovations			Adoption of a differentiable label of mixed cotton paper for wine product line (2017)	Marketing (packaging level innovation)	Collaboration with suppliers to acquire recyclable materials - Collaboration. (Finding strategic partners) - Strategic planning	Seizing
				Supply of 100% sustainable power		(Collaborating with suppliers to acquire sustainable inputs) - Collaboration	
				Eco Wine experience Spin-off establishment	Product innovation (new service)	(Addition of a specialized unit) - Organizational restructuring	Reconfiguring

Source: Authors' elaboration

5. Discussion and conclusions

Our findings underscore the importance of the firm's ecosystem in implementing sustainability strategies, particularly for BSFs. Within such an ecosystem, a diverse array of actors was identified based on the competencies needed in the analyzed phases (e.g., applied research activities in Phases 2 and 4, sustainable packaging supply in Phases 1 and 5). This aligns with previous studies highlighting the significance of the firm's external relationships within its ecosystem (Kortus & Gutmann, 2023), particularly in developing green innovations (De Marchi, 2012). Among these actors, the university plays a pivotal role. Specifically, the local university contributes at multiple levels: a) education and training, fostering the entrepreneur's agronomic background and enhancing sustainability awareness (further developed through participation in environmental organizations); b) exposure to new knowledge, such as adopting LCA techniques; c) promoting participation in public-financed applied research projects; d) developing customized technical and technological solutions. The collaboration between the firm and the university is mutually beneficial, evidenced by the opportunity for university students and its spin-off to conduct on-ground experiments at the firm.

Despite the small size of the BSF, it succeeded in developing and implementing 15 green innovations. According to the OECD/EUROSTAT (2018) framework, seven of these innovations can be classified as process innovations, four as marketing (all related to packaging improvements), three as product innovations, and one as an organizational innovation. The organizational innovation pertains to adopting reverse logistics for the Ho.Re.Ca. channel. Ferrara and De Feo (2020) showed that, at least in Italy, reusing glass bottles is feasible only for customers within 100 km. This is consistent with data from the case study.

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Regarding organizational innovations, special emphasis is placed on the sustainability training activities mentioned earlier. Product innovations also deserve attention, particularly those involving new wine product lines) and the Eco Wine Experience tours.

This wide range of green innovations was initially facilitated by participation in public calls offering financial aid for applied research projects. Here, the gatekeeper role of the local university emerges as a crucial enabling factor. However, developing green innovations is not without challenges, such as the inability to use impure methane produced during the compost fermentation process due to the lack of suitable small boilers. Additional financial resources were needed to further develop methane recovery for the firm's energy supply, but the firm's small size and limited budget prevented this. This finding aligns with Knoppen and Knight (2022), who noted that BSFs might face challenging financial periods, forcing them to prioritize financial outcomes over environmental impact, resulting in "light green" rather than "deep green" projects for survival.

Referring to the micro-foundations proposed by Khan et al. (2020) for companies implementing circular economy strategies, the findings showed that 10 out of 11 were present in the five analyzed phases. The only missing micro-foundation is related to 'Business model and governance', which includes redesigning business models or restructuring governance structures. For the focus company, a sustainable business model was adopted since its establishment, and the governance structure remained unchanged. It is noteworthy that multiple micro-foundations were found within the same phase, especially in Phases 1, 2, and 4, where collaboration with the local university occurred. Correspondingly, these phases involve the three clusters of DC proposed by Teece (2007): sensing, seizing, and reconfiguring.

In conclusion, collaboration with external partners embedded in the firm's ecosystem enables the development of green innovations through the development of DC. These innovations can be developed based on micro-foundations within a single cluster. However, involving all three DC clusters significantly enhances the quantity and quality of green innovations, as seen in Phases 1 and 2.

Finally, the adoption of sustainability assessment tools deserves special mention. Initially promoted by informal collaboration with the university (Phase 1), these tools led to early green innovations (e.g., adopting a lighter glass bottle). Subsequently, the firm incrementally adopted measurement tools, integrating LCA approaches based on product units (GHG per bottle) and land units (GHG per hectare) in Phase 2. An integrated approach using LCC and LCA was later adopted to evaluate the impact of green innovations in Phases 1 and 2. Unfortunately, the social impacts of the firm's sustainability strategies are not yet evaluated using life cycle-specific tools. The Eco Wine Experience tours are noteworthy for promoting sustainability awareness among visitors. The entrepreneur emphasized the importance of internal training to cultivate a sustainability-oriented culture among employees, stating, "*It [sustainability culture] is a pivotal point that I always specify to various trainees, students, or future workers on probation [… therefore,] it is a condition sine qua non to work within the firm, from seasonal grape pickers to full-time employees and external consultants*." This culture's real diffusion within the company is confirmed by the employee in charge of communication activities for Eco Wine Experience participants, who stated, "*Sustainability for the firm is the track that accompanies the production process. It's the driver of production choices; obviously, it has to be consistent with the need to consider also the firm's economic performance*."

The novelty of this contribution addresses several issues. Firstly, the paper offers a longitudinal analysis of the strategic path towards net zero implemented by M&SMEs. More specifically, the focus is on the case of a BSF, which was established to achieve a "sustainability advantage" rather than a traditional "competitive advantage." Secondly, to the best of our knowledge, this is the first attempt to investigate the interdependencies between DCs' micro-foundations and green innovations. Finally, the paper adopts a holistic approach, considering the relationship between the sampled BSF and its ecosystem.

To achieve the research objectives, a single longitudinal case study was conducted on a BSF established in 2003 in the wine sector in Central Italy. The company achieved net zero for agricultural activities in 2014 and implemented several green innovations, significantly reducing GHG emissions related to downstream activities

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(wine production, bottling and packaging, and distribution). The benefits of the green innovations were measured using both LCA and LCC techniques. The local university, as a key actor in the firm's ecosystem, played a critical role in developing these green innovations.

From the collected data and the conducted analysis, several implications emerged for both scholars and practitioners. In terms of academic contribution, following Daddi et al. (2018), the DC framework was explored within the context of sustainability management. The case study was analyzed to verify the presence of the micro-foundations proposed by Khan et al. (2020), connected to the three DC clusters proposed by Teece (2007). These DC micro-foundations underpinned the green innovations developed by the BSF. Combining these theoretical approaches represents a significant advancement in business sustainability research, a field increasingly attracting scholars, particularly concerning BSFs (Knoppen & Knight, 2022). The paper also contributes to the DC debate, as the evolutionary mechanism of DC has not been systematically investigated (Zhang et al., 2020), requiring further discussion among scholars (Arndt et al., 2022). Our findings confirm that developing organizational capabilities allows M&SMEs to overcome constraints related to their small size and young age (Annunziata et al., 2018). Additionally, the paper provides empirical evidence for the debate on sustainability measurement tools (Kambanou & Sakao, 2020), offering a longitudinal perspective that monitors their incremental and integrated adoption (Mura et al., 2023).

When considering the practical implications of this paper, several advices emerge for practitioners and policymakers. Firstly, BSFs managers and entrepreneurs should carefully select the actors belonging to their ecosystem in order to create new DCs. This, in turn, promotes the development of green innovations, allowing the M&SMEs to advance toward net zero. Within the firm's ecosystem actors, local universities can provide valuable support through their three missions: lecturing, applied research, and the third mission (Abbate et al., 2021). Universities can also facilitate firms' participation in public calls for research project funding, which is crucial for M&SMEs that often lack the capacity to monitor these calls and apply for grants. Our findings also underscore the benefits of incrementally and jointly adopting environmental (e.g., LCA) and economic (e.g., LCC) sustainability measurement tools (Smith & Lal, 2022). Furthermore, public calls for financial support are essential for BSFs in adopting sustainability strategies, including developing and implementing green innovations (Benito-Hernández et al., 2023).

This paper has some research limitations. First of all, being based on a single longitudinal case study, generalizing the findings requires caution. Therefore, the study should be replicated in different geographical and industry contexts to account for unique factors. Additionally, the impact of sustainability orientation in the entrepreneur's business model and strategy, especially for BSFs, should not be underestimated. The investigated case study, where the entrepreneur embraced sustainability from the outset, represents an exceptional scenario. Future research should also examine small companies pursuing net zero strategies with varying degrees of sustainability orientation.

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POINT OF SALE AND CASHLESS POLICY IN SELECTED MARKET

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Abstract. The study examines the impact of Point of Sale (POS) business on implementing the cashless policy in the Nigerian economy. The Technology Acceptance Model theory served as the theoretical foundation for this investigation. The work adopts quantitative and qualitative approaches to gather data that aligns with the study's objective. 100 questionnaires were distributed among Point of Sale (POS) operators and users of the services in the Federal Capital Territory, Abuja, Nigeria. 100 respondents (first-degree holders and university students, aged 18-55) were purposively selected to have the necessary knowledge about the subject matter. Questions asked: How do POS transactions impact Nigeria's economy? What are the challenges faced by point-of-sale businesses in Nigeria? The survey period is from 10th October 2023 to 10th May 2024. The study found that the point-of-sale business has significantly impacted the Nigerian economy. It has contributed to financial inclusion, employment generation and consequent economic growth. However, among the factors identified as challenges to POS business and cashless policy in Nigeria are exorbitant transaction charges, lack of adequate infrastructure required to run POS, irregular network connectivity, which erodes the users' trust, and security of network communications. The study provides some plausible recommendations, such as improving the infrastructure and reducing charges, among others.

Keywords: point of sale; cashless policy; business; Nigeria; market

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1. Introduction

The 21st century has led to many changes in the social environment, affecting not only information processing and communication but also the area of commerce. The communications that support commerce have changed dramatically, with many countries moving towards open and interconnected electronic solutions. However, the presence of a high-speed and efficient transaction infrastructure does not mean an automatic and unconditional solution to related problems (problems of security of financial assets and information; problems of choosing security procedures and methods to prevent expected risks - confidentiality, data integrity, access control, identification, verification, and authorisation; problems cash and consumer habits, etc.).

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An electronic transaction typically involves three parties: the seller, the buyer, and the person who technically and financially facilitates the transaction. Therefore, ensuring the interests of all these interconnected counterparties is necessary. In some aspects, these interests coincide, and in some, they differ. For example, all parties are interested in ensuring the security, speed, and simplicity of the transaction - the seller strives to provide the buyer with the opportunity to make impulse purchases without encountering problems with the payment system; the buyer is interested in this to save time and ensure psychological stability; a financial organisation is interested in increasing the number of transactions. In turn, on the issue of transaction costs, interests may differ: the seller wants to have low transaction costs to increase its competitiveness; the buyer wants to have low transaction costs to save his financial resources; however, for a financial institution that processes electronic payments, the size of the commission is essential, which is part of the cost of transactions. Financial institutions may be trying to increase their profits by increasing the use of the means of payment they offer, but this approach will not be used if the means of payment are monopolised. This certainly cannot satisfy consumers, especially if the product price is meager and the transaction cost may be higher than the transaction cost.

It should be noted here that the initial hopes for the extremely rapid development of electronic transactions in all regions of the world were not entirely realised. Experience not only in Africa but also in the European Union has shown that the number of electronic transactions is growing much more slowly than expected, as consumers must have the time and willingness to adapt to changes in the traditional way of conducting transactions and must also see apparent benefits. From a comparison perspective, emerging economies such as Nigeria are exploring various solutions in the financial market that might be locally relevant and thus provide a faster and more likely adoption. This has been evident in some European Union countries at the emergent economy stage before, e.g. the case of e-banking adoption in Latvia (Kaže et al., 2007) less than a few decades ago. Recognising the requirements and assessing the organisational capabilities of each partner are necessary steps in setting up business processes. The main factors that can overcome this problem are reducing transaction costs for payment processing, increasing merchant outlets that enable electronic transactions, reducing technology costs, and ensuring transaction security.

Since the economically developed countries of North America, the European Union, Japan, South Korea, and Australia have already gone through several stages in solving these problems, in the context of this study, countries where these processes are at earlier stages are of particular interest. This article focuses on Nigeria. Nigeria's adoption of a cashless policy was to moderate the cost of cash management, reduce lending rates, encourage the use of electronic payment, and encourage individuals and organisations to convert paper money to bank deposits. Additionally, the objective is to modernize the payment methods, promote and enhance the payment system, and simultaneously reduce the illegal activities linked to carrying large amounts of physical currency (Adanma, 2022). The payment system in Nigeria has primarily relied on cash transactions throughout the years. Supporting the statement, Ali-Momoh (2023) elucidated that cash is the predominant form of payment in Nigeria, with a significant portion of the population lacking access to banking services. A significant proportion of the population stores cash in their residences, rendering them susceptible to security threats. The electronic payment methods implemented in Nigeria include Automated Teller Machine (ATM), web transactions, electronic financial products (such as credit and debit cards) and POS systems. E-payment systems offer a more comprehensive audit trail compared to transactions involving physical cash, resulting in a decrease in the amount of currency in circulation (Afolabi et al., 2019).

This paper examines explicitly the point of sale (POS) business and the implementation of the cashless policy in Nigeria. Nigeria's Point of Sale (POS) industry has grown substantially recently. A point of sale (POS) system encompasses the physical equipment and computer programs employed to handle sales transactions and oversee inventory management in retail establishments. It allows firms to streamline operations and boost efficiency while offering better customer service. This paper aims to present an in-depth examination of the POS business in Nigeria, as well as its impact and challenges. By reviewing relevant literature and studies, we will learn about the notion of POS and its implications on the Nigerian cashless policy and economic growth.

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2. Theoretical background

The evolution of technology and its application for electronic transactions opens new opportunities, new horizons for business, and new problems. At the current stage of the development of electronic transactions, the issue of mutual trust between the buyer and seller and the idea of providing security, which helps to establish trust, comes to the fore. Since a purchase creates a transaction description that includes the names of the recipient and the person paying the amount of money, the date and time of the transaction, and the amount of the payment, any payment solution must provide transparency and flexibility.

This area is not limited to issues of security and confidentiality - forms of payment depend on confidence in the security and reliability of the system and control of a particular transaction. The security aspect deals with protecting the buyer from fraud and financial loss, and the privacy aspect deals with protecting personal data and the seller's obligation not to share any data collected during the transaction with third parties.

Of course, risk management is also necessary - consumer behaviour is usually motivated not by real risk but by perceived risk because consumers suffer even from perceived risks (regardless of whether they are real or not). The reluctance of some consumers to conduct electronic transactions and not use cash means that there are risks that the consumer perceives. This may be a financial risk (possibility of monetary loss, likelihood of theft of credit card information); the risk that the confidentiality of personal data (collection by the seller of personal information and information related to purchasing habits - without the knowledge and permission of the consumer); operational risk (hardware or software problems, human error or malicious attack); legal risk (misinterpretation of the meaning of the law or legal uncertainty may expose the payment system or payment participants to financial risks and possible losses).

The structure of risk in a simplified form can be described by three elements: threat, vulnerability and consequence. Therefore, risk analysis requires the identification of means, identification and assessment of threats, assessment of vulnerabilities, and assessment of risks. A business needs to forecast its security investments, considering the possibility that an event will result in a loss (this could include not only direct financial losses but also, for example, loss of reputation and loss of customers). Table 1 summarises the main problems of electronic transactions and refusal to use cash, which are the focus of modern research:

Table 1. Point of sale and cashless policy: the main problems

Problem	Description	Researcher
Efficiency problem	Actions that are required from the parties involved (physical effort, time spent, speed of transaction execution).	Akhisar et al. (2015); Madugba et al. (2021); Nwankwo & Agbo (2021); Haurovi & Chilunjika (2024)
The problem of security	E-commerce systems must be protected from threats such as fraud from internal or external sources, information theft, and sabotage. Security (including IT security) is a fundamental strategic asset. Transaction security consists of (at a minimum) the confidentiality, integrity, and availability of the relevant data.	Khan et al. (2018); Krivins (2019); Javaria et al. (2020); Grondys et al. (2021)
Legal Problems	For a payment system to be effective, it is vital that its legal environment provides finality and irreversibility. settlements and payments. Transaction applications must consider tax, intellectual property, copyright, contract law, and enforcement issues. In addition, it is necessary to consider the specifics of criminal law, the responsibility of business leaders, ensuring public procurement, combating bribery, preventing possible corruption and monopoly, etc.	Kipane et al., (2023); Krivins et al. (2023); Remeikiene, et al. (2022); Krivins (2014); Teivāns-Treinovskis et al. (2022); Vilks et al. (2024)
The problem of consumer interests	Consumers are moving from classic solutions to new relationships with businesses, making customer service the most crucial issue in the global marketplace. The electronic environment poses new challenges for consumers, and new strategies that will help increase consumer confidence are needed. Consumers tend to reject novel electronic finance solutions due to habits of using legacy ones or concerns of trust and security.	Kaže et al. (2007); Masoud & AbuTaqa (2017); Nnamani & Makwe (2019)

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The Relationship marketing problem	Relationships with clients, their successful development, and management as factors of business success can become one of electronic processes' competitive advantages. The result is assessed by assessing the degree to which consumer expectations are met. Consumer human values and socio-cultural context significantly affect their choices and preferences for specific services and digital service solutions.	Okoye et al. (2021); Ali-Momoh (2023); Adanma (2022); Chedrawi et al. (2019); Kaže et al. (2022); Bhukya & Paul (2023)
The problem of quality of solutions	The quality of modern electronic solutions is assessed based on the corresponding consumer perceptions - consumers evaluate specific parameters to make a judgment about quality. This is mainly determined by the ability to solve customer problems and respond to complaints effectively.	Kavitha (2017); Ojo (2021); Osazevbaru & Yomere (2015); Uwaisu et al. (2023)
The problem of information accuracy	All information necessary to conduct and complete the transaction must be clearly and unambiguously provided. No aspect of the problem should be misleading.	Adeoti & Omidiora (2019); Davis (1989); Gilbert & Tochukwu (2023); Kimiagari & Baei (2021)

Source: authors' created

Having analysed scientific articles that address similar issues, we discovered a gap: articles mainly focus on general theoretical problems of POS, which could be correlated with global trends, or articles of a similar direction focus on well-developed markets in North America, Europe, etc. Articles that relate specifically to Nigeria examine individual problems in the banking sector, cashless payments or e-commerce. Thus, our article can fill the gap - the lack of articles that would consider the problem of POS in Nigeria, firstly - comprehensively, and secondly, using data from direct research - surveys of local residents.

3. Research methodology

The study applied qualitative research due to its usefulness in providing insights, uncovering trends in opinion, and its usefulness in delving deeper into a phenomenon. Data for this research were collected mainly from secondary sources. The secondary data were sourced from articles and publications of previously acknowledged works of scholars such as journals, textbooks, media, and the internet on POS business and the cashless policy in Nigeria. Therefore, a conclusion emerged from content analysis.

The study is based on Fred Davis's (1989) Technology Acceptance Model theory. The Technology Acceptance Model (TAM) posits that an individual's intention to adopt a technology is influenced by two fundamental beliefs: perceived utility (PU) as well as perceived ease of use (PEOU). TAM2 expanded upon the concepts of TAM by incorporating new factors that influence the perceived usefulness and intention to use TAM's constructs. This model facilitates the comprehension of how the impacts of these factors vary as user experience with the envisioned system increases over time. Consumer behaviour might play a major role in technology adoption as well if policies facilitate a natural choice of propositions matching locally relevant and predominated values and, hence, attitudes. Contrary to that, attempts to enforce untrusted and less relevant technologies might face challenges of rejection as attitudes and behaviours are dependent on personal values and situations, which are associated with the skills of individuals, including financial literacy (Kaže et al., 2022).

This approach can certainly be applied to our study. This will allow us to understand in more detail the level of POS technology acceptance which, in turn, affects both economic growth and operational efficiency of Nigerian enterprises.

4. Results and discussion

According to 70% of the respondents, the payment system in Nigeria was improved with the implementation of the cashless policy, which was established by the Central Bank of Nigeria (CBN) in 2012. This improvement was achieved through the adoption of POS terminals for financial transactions. Since the inception of the program, banks have been providing an increasing number of operational POS terminals to mobile money merchants. This discovery aligns with the claim made by Okoye et al. (2021), who noted that the introduction

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of the cashless policy has led to increased awareness and acceptability of POS transactions in society. Most Nigerians, who were in dire need of employment opportunities and a stable income, explored this possibility.

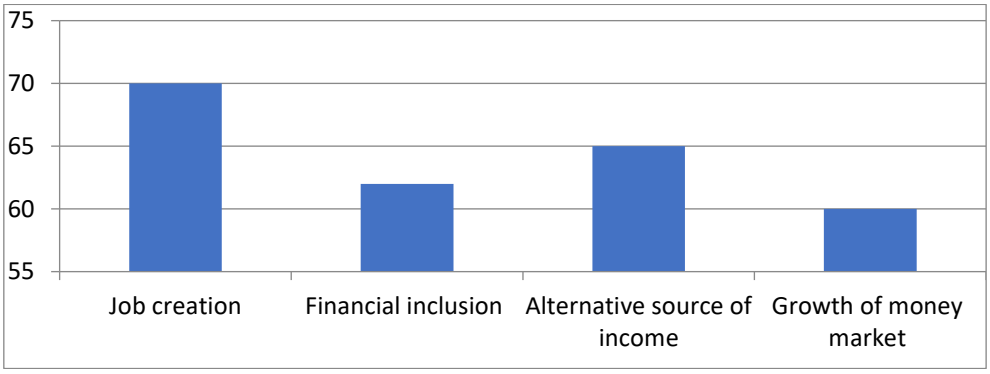


Figure 1. Impact of POS Transactions on the Nigerian Economy

Source: authors created based on Field survey, 2024

Despite Nigeria's debilitated economy and high unemployment rate, the imperative to endure has resulted in a remarkable surge in the number of money dealers or point-of-sale (POS) enterprises functioning in the country. This is due to the perception that this chance holds the possibility for substantial profitability and employment prospects. Worth around 663 billion Nigerian Naira, marking a rise compared to the prior years. From 2015 to 2022, the percentage of POS payments climbed considerably. Between 2017 and 2022, the percentage of POS terminals in Nigeria expanded dramatically. In 2017, there were over 155 thousand terminals, whereas as of April 2022, this total reached around 1.1 million. Over recent years, Nigeria's value and total number of POS payments underwent an impressive rise (Gilbert & Tochukwu, 2023).

65% of the respondents also revealed that the introduction of POS created an opportunity for an alternative revenue stream for small businesses by delivering complementary services to the end users. As per the agents' survey conducted by Enhancing Financial Innovation and Access (EFINA) in 2020, agent banking such as POS businesses, not only facilitates simpler and safer access to financial services but also offers micro, small, and medium-sized enterprises (MSMEs) with additional revenue streams while fostering financial inclusion and literacy (Gilbert & Tochukwu, 2023). Thousands of individuals in the nation are employed by small-scale businesses, including agency banking, which is also generating employment due to the high number of people becoming bank agents (Social Voices, 2021).

According to records, in Nigeria, throughout the first three months of 2018, banks registered 17,193 POS machines for use during cashless transactions. The Nigeria Inter-Bank Settlement Scheme (NIBSS) provided statistics indicating that as of 2018, there were 164,607 operational point-of-sale terminals in Nigeria. According to data from the Nigeria Inter-Bank Settlement System, the number of point-of-sale transactions increased by 50% from 2019 to 2020, from 438.6 million to 655.7 million. According to Statista, a Nigerian database provider, there were 266,039 bank agents in Nigeria as of 2019 compared to 38, 416 agents in 2018 (Gilbert & Tochukwu, 2023).

62% of respondents said that it is difficult for residents in many Nigerian regions to obtain financial services since the nation has a small number of financial institutions. A 2019 study from the National Financial Inclusion Strategy states that as of 2019, there were 7,564 bank branches and cash centres, including microfinance institutions, serving an estimated 201 million people. But agency banking, a model that enables banks to collaborate with outside retail networks, provides financial services to clients in underbanked or unbanked areas on behalf of mobile money providers and/or licensed deposit-taking financial institutions through an intermediary (an agent) (Ojo, 2021). Furthermore, the 2019 National Financial Inclusion Strategy highlights that the main obstacles to financial inclusion are the great distances between communities and formal banking institutions, eligibility requirements, low financial literacy, poverty, and high service costs. It also notes that

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agency banking is a major force behind efforts to boost financial inclusiveness in Nigeria (Ojo, 2021; Uwaisu et al., 2023). People and company owners can conduct transactions whenever it is convenient for them if they reside in developing and undeveloped areas without access to banks. Small business owners and dealers can deposit their everyday profits without worry, and customers who require money for a variety of purposes will be happy to travel to a location where they can receive prompt service. Due to the increasing need, the total number of agents of the bank has increased dramatically over time and continues to do so. About 440 million point-of-sale transactions were recorded in Nigeria in 2019, as reported by Nairametric, and the cause is clear (Gilbert & Tochukwu, 2023).

In the past few decades, the utilization of POS terminals and e-payment systems has significantly increased due to the growing adoption of online banking and shopping (Madugba et al., 2021). POS systems reduce the need for cheque and money transactions by handling e-payments in a safe and efficient way as technology advances (Nwankwo & Agbo, 2021). It has been determined that the banking sector may improve customer happiness and loyalty, grow its market share, and save operating and admin costs by implementing point-of-sale (POS) systems. Customers prefer POS stations for transactions, including utility payments, cashouts, and transfers due to advantages such as speed, courteous operators, affordable rates, and easy placement.

When POS machines are used for financial transactions, long lines at ATMs and overcrowding in banking halls are also reduced, which improves client satisfaction in the banking industry (Nnamani & Makwe, 2019; Uwaisu et al, 2023). The banking industry in many countries has benefited greatly from implementing Point of Sale (POS) systems. These advantages include shorter checkout lines, better hygiene, a reduced danger of bearing enormous sums of cash, greater volume of sales, easy to collect cash (Kimiagari & Baei, 2021), greater comfort, better service options, and less expensive banking services (Williams et al., 2018). In Nigeria, the banking sector benefits greatly from using point-of-sale (POS) terminals for both banks and clients. Consumers no longer need to go to a branch in person because they may do their financial transactions online and from any place (Chedrawi et al., 2019). Customers can now conduct banking operations whenever they choose without being constrained by branch operations (Awoniyi, 2022). In short, POS adoption impacts the Nigerian banking system by giving clients a self-service alternative that removes time and location restrictions and increases ease of use (Kavitha, 2017).

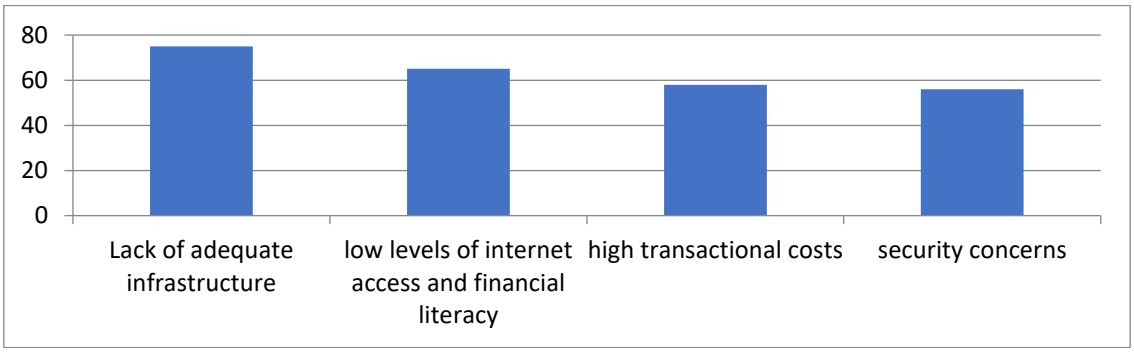


Figure 2. Main Challenges of Point-of-Sale Business in Nigeria

Source: authors created based on Field survey, 2024

Despite the advantages that point-of-sale (POS) technology offers the Nigerian banking system, including its affordability and payment simplicity (Akhisar et al., 2015), there are a number of obstacles that prevent its widespread use. According to Nwakoby et al. (2020), these difficulties include insufficient facilities, low levels of web usage and financial education (Fakunle & Ajani, 2021), expensive transaction charges, and security issues. According to a study by Ekele and Ukpata (2020), network interruptions, passcode insecurity, and confidential information safeguarding are some of the main problems that affect the use of POS terminals. The study also examined the effects of digital banking on the operational efficiency of commercial banks in Nigeria.

According to some research, bank customers' reluctance to use POS terminals is largely due to security concerns (Khan, Olanrewaju & Anwar, 2018 & Sudharsan, 2019). Other research, however, has shown that security does

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not provide a major obstacle to the uptake and application of POS systems. Furthermore, clients may be dissuaded from using POS terminals by the heavy transaction charges that banks impose on them (Osazevbaru & Yomere, 2015). The banking populace may be resistant to adopting POS terminals due to the high costs and levies involved, especially among those without bank accounts (Osazevbaru & Yomere, 2015). However, according to Okeke, Nwatu, and Ezeh (2017), network crashes, false authorisation, and data transaction intrusions can all jeopardise point-of-sale safety.

According to data gathered from NIBSS, as of the third quarter of 2019, criminals in the banking sector had succeeded in carrying out 8,920 attempted frauds totalling N597 million across a variety of transaction platforms. An analysis of the channels reveals that during the period, N40.964 million went unaccounted for in 40.988 million fraudulent attempts by means of point of sale; N79.497 million disappeared in 80.499 million fraudulent attempts over the counter; N136.542 million disappeared in 142.278 million manoeuvres at ATM fraud; and N144.440 million was vanished in 158.087 million steps at fraud by means of mobile banking (Gilbert & Tochukwu, 2012).

Although POS adoption offers advantages including enhanced productivity and interpersonal interaction, high-quality products, and a competitive edge, it may also influence job security for banking industry personnel (Ololade & Ogbeide, 2017). Specific job skills have become outdated because of the banking sector's increased emphasis on technology improvements, such as the use of online banking channels like POS, which has raised turnover among employees and uncertainty about employment (Gilbert & Tochukwu, 2023). Because of the paucity of new naira notes, the cost of obtaining money at POS machines in Nigeria has increased significantly and is currently profit-oriented. People with fewer financial resources may find it challenging to rationalise the costly nature of POS technology, particularly when contrasted to conventional banking services' price tag (Gilbert & Tochukwu, 2023).

The high cost of using POS terminals may make it more difficult to advance the cause of a cashless economy and lessen the advantages of POS technology in terms of increased accessibility, ease of use, and security (Gilbert & Tochukwu, 2023). In a nutshell, while trying to spur broader use of the technology and support the development of a cashless economy, the expensive nature of employing POS terminals in Nigeria continues to be a barrier that must be dealt with.

5. Conclusions

This study concentrated on how the POS industry affects Nigeria's economy's adoption of the cashless policy. A cashless economy policy minimises the number of business activities involving cash. The initiative aims to dissuade people in Nigeria from conducting cash transactions. Nonetheless, Nigeria's use of digital banking has significantly impacted the advancement of the payment system. One of the electronic payment methods used in Nigeria to advance the cashless policy is POS. However, based on the experience of the European Union, where POS development has gone through many stages in earlier periods than in Nigeria, a gradual reduction in transaction costs can be predicted.

We expect that the total value of transaction costs will be reduced for several reasons: 1) savings on staff salaries - the development of POS will inevitably lead to more active use of self-service cash registers and payment processing will require less and less personnel who will communicate with customers; 2) automation of processes - since there are no stages of processing documents and entering data into the system, this will gradually reduce procedural costs - the personnel that was traditionally required to process documents and provide communication channels within the company will be replaced by an automatic registration system (this applies not only to the place of trade , but also to the company directly providing the transaction amount); 3) increasing the accuracy of transactions - with the automatic electronic method of entering the name of the product and the price of the product, registration errors are minimized, in turn, reducing errors means reducing the time and money spent on correcting them; 4) increased competition - the previous three factors of reducing transaction costs could not influence the final price of the transaction if this process was monopolized by one player or group of players who are in a monopolistic conspiracy. Only free competition - a common means of payment supported by many independent organisations - can provide an efficient market for financial services.

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In addition, competition between financial services organisations may enable more effective transaction risk management.

Further research, including a comparison study of other economies that had undergone the emerging economy stage, as well as a follow-up quantitative study of the adoption of cashless policies, including the attitudes of the local population, might provide valuable insights to facilitate the transition to the new electronic commerce solutions. It is recommended that local authorities carry out such a study with the assistance of independent academic researchers.

The widespread transition from the former traditional form of payments to electronic commerce transactions raises many unresolved issues and allows buyers, sellers and financial institutions to benefit from new opportunities. The future of commercial transactions is primarily electronic, so the current priority is secure, fast and cost-effective consumer access to electronic payment systems. This fact is directly related to the issues of training specialists and personnel not only in entrepreneurship and electronic technologies.

Payment systems must not only satisfy technical, economic and social needs but also comply with institutional and legal requirements, not conflict with government regulations and laws, and must comply with the environmental obligations of a particular country. Thus, the issue of POS terminals is a complex, multidisciplinary problem, including business aspects, economic and financial dimensions, legal elements, technical solutions, issues of information and communication technologies, education and sociology, marketing and management. This systematic approach emphasises the need for cooperation between man, science and technology to eliminate problematic situations.

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ACCESSES TO WATER, ELECTRICITY AND SUSTAINABLE DEVELOPMENT: EVIDENCE FROM THE AMAZONIAN STATE OF PARÀ*

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Abstract. According to the UN's Sustainable Development Agenda, to effectively achieve sustainable development, strategies for building economic growth should also address social needs, including access to essential services. Sustainable integrated management of water resources for both primary use and energy production is crucial, especially in territories such as the Amazonian State of Pará, where a primary good like fresh water is also the main source of electricity. However, the territorial transformations occurring in Pará over installing new hydroelectric plants have jeopardised local development. This was mainly caused by the top-down approach underlying national strategic projects that have paid little attention to local needs, thus paving the way for detrimental conditions for implementing the UN's 2030 Agenda. This paper aims to analyse the relationship between a municipality's level of development and quality of life and the most relevant key determinants of sustainable development in Pará. To this end, we consider a spatial regression analysis, with particular attention devoted to the role of access to both energy and water. The presence of significant spillover effects implies that providing public services on a geographically broad basis could induce self-reinforcing benefits.

Keywords: access to water; access to electricity; Amazônia Legal; sustainability; spatial regression analysis

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1. Introduction

The interdependence between energy consumption and economic growth has been extensively examined in the literature (Ozturk, 2010; Payne, 2010a; Payne, 2010b). For instance, Apergis and Payne (2012) find a bidirectional causality between energy consumption and growth, with both renewable and non-renewable energy consumption having a positive impact on real GDP in the long run and little difference in the elasticity estimates between the two energy sources. However, it is well known that "*GDP is not an expression of human development but only of economic growth*" (Sen, 1990). In this sense, the energy consumption-growth nexus does not necessarily provide insightful hints about the relationship between energy consumption and human

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development, significantly linked to the difference between consumption and access to services within a society. Per capita electricity consumption, for instance, aggregates the consumption of end users with that of the production system and does not provide information on users' access to energy services, thus hiding potential inequalities and enclaves (Magnani and Vaona, 2016).

In fact, according to the UN's Sustainable Development Goals – SDGs (United Nations, 2015) to effectively achieve sustainable development, strategies for building economic growth should also address a number of social needs like access to water and energy, as well as education, health, inequality, food availability, housing and job opportunities, while at the same time tackling climate change and environmental protection. Recall that all UN Member States adopted the 17 Sustainable Development Goals in 2015 as part of the 2030 Agenda for Sustainable Development; aims of the Goals include ending poverty, protecting the planet and improving the lives and prospects of all individuals. It is important to stress that all the Goals are interconnected, and sustainable development can be achieved in the long run only by considering them all. Goal 7, for instance, relates to making energy more sustainable and widely available; in this sense, energy production, which is a driver of economic growth (Ohler and Fetters, 2014), can also become a driver of sustainable development only if it is produced using sources that are sustainable for both environment and the humanity and if it is supported by the right infrastructure to facilitate access to it (Brand-Correa and Steinberger, 2017).

Interestingly, similar conclusions about the importance of an integrated management of development drivers are reached also within the *Water, Energy and Food Security Nexus* framework (Bonn2011 Nexus Conference, 2011), whose foundation is the interdependency between water, energy and food security and the underlying natural resources, *i.e.*, water, soil, land and related ecosystems. Global trends such as population growth and increasing economic prosperity could result in shortages of resources and failure to recognise the influence of one sector on another (decisions on the type of energy generation, for instance, can notably influence water demand) can prevent economic development, lead to social and geopolitical tensions, and damage the environment irreversibly.

Notice that a sustainable integrated management of water resources and energy production is crucial, especially in territories such as the Brazilian Amazon where a primary good like water is also the main source of electricity. Alternative uses of water may affect water quality and rivers' flow, impacting relevant fields like health (through the availability of clean water) or education (because of the use of rivers for mobility). Although hydropower is often considered a renewable technology, many doubts arise about its actual sustainability, especially for major projects not accompanied by coherent, supportive socio-environmental policies (Fearnside, 2016; Manyari and de Carvalho, 2007).

The present work focuses specifically on the Brazilian Amazon and, as a case study, considers the Federal State of Pará, the most significant hydroelectricity producer in the area. Notice that Brazil uses more renewable sources than the rest of the world. Its energy mix is 44,8% from renewable origin, while hydroelectric power accounts for 57% of the electricity matrix (EPE, 2021; ANEEL, 2019). The enormous endowment of water (and therefore energy potential) has fuelled economic growth, so Brazil became a major contributor to the global GDP (OECD, 2021). However, Brazil does not perform equally well from the point of view of human development, remaining far beyond the average of developed countries (UNDP, 2020). It is interesting to notice that this gap between growth and development also occurs within the Federal States such as Pará that are great energy producers, thus suggesting that production does not necessarily drag access and that energy production cannot be regarded as a sensible indicator of development (Conigliani et al., 2023; UNDP, IPEA, FJP, 2013). Thus, there is a need to further investigate the relationship between human development and access to water and electricity, which is the main objective of the present paper, while controlling for other relevant dimensions among those indicated by the UN's Sustainable Development Goals.

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The paper is organised as follows. Section 2 will detail the characteristics of the case study and the rationale behind its choice in the context of what has been discussed so far on energy access, hydropower production and human development. Section 3 illustrates the variables that will be included in our analysis, taking into account the different dimensions of the UN's Sustainable Development Goals and the characteristics of the region we are considering, making some dimensions more relevant than others. Section 4 motivates the choice of the spatial regression model for investigating the relationship between human development and the different predictors in the Federal State of Pará. Finally, the results of the econometric analysis are discussed in Section 5, while Section 6 presents some conclusions and policy implications.

2. Regional background

Brazil's energy strategy has been influenced by its endowment of water resources well before any declaration of climate commitment. This led to hydropower specialisation and negligible diversification of the energy and electricity matrixes (Kileber and Parente, 2015). In fact, according to the energy ladder theory, countries are usually induced to progressively switch from polluting and exhaustible energy sources to clean and renewable ones; only in a more advanced development phase they should provide for energy diversification to meet the increasing energy demand and ensure countries' energy security (Kileber and Parente, 2015). Brazilian energy and electricity mix development have been following quite a different path due to the initial availability of renewable sources. After World War II, in particular, Brazil started installing hydroelectric power plants throughout the country, and from the 1970s onwards, the demand for energy increased due to both demographic growth and industrial development. This scenario drew attention to the Federal State of Pará, among the largest in the Brazilian Amazon (*Amazônia Legal*) and between two large catchments.

The abundance of water resources in Pará led to a significant national initiative, the *Grande Carajás Program* (da Costa and Filho, 1987) and to the installation of the Tucuruí UHE (UHE is the Brazilian Portuguese acronym for "Hydroelectric Plant"), the biggest power plant in Brazil at the time of opening in the mid-1980s, and to date still one of the largest. The project's objective was to increase the country's installed capacity and, at the same time, to enhance the urban development of a predominantly rural area (Rocha, 2008). In fact, almost 57% of the Brazilian electricity matrix is still supplied by hydroelectric power, and nearly 19% of this share is provided through Pará (EPE, 2021). Instead, from the point of view of the development of the region, the installation of the Tucuruí UHE led to mixed results. On the one hand, since the mid-1980s, the trend of economic growth in Pará has accelerated faster than the Country trend (IBGE, 2020). On the other hand, the Tucuruí UHE project led to water use conflicts, and most of the power generated by it has been supplying energy for multinational aluminium plants rather than reaching the households of those who live in the surrounding area through an efficient distribution infrastructure (Pinto, 2012).

Indeed, the Tucuruí UHE's environmental and social costs have been substantial, as has been the case for other hydroelectric infrastructures in the area (Scherer and de Oliveira, 2006). Environmental costs include forest loss, greenhouse gas emissions, hindrances to fish migration, and radical changes in aquatic ecosystems (Fearnside, 2001). Social costs include displacement of the population in the submergence area, collapse of the fishery that traditionally had supported the population downstream of the dam, health effects including malaria and mercury contamination, displacement and disruption of indigenous groups (Fearnside, 1999; Magalhães, 1990). It is estimated that over 32.000 people had to be dislocated from the submergence area of Tucuruí UHE and adjacent locations, in addition to the indigenous population; they consisted mainly of small producers whose subsistence activities were connected to riverine life and came essentially from family-based agriculture (Fearnside, 1999). Notice that some families were relocated in small lots with no access to water and electricity, far from roads or means of transportation; for others the compensation was a small amount of cash rather than land, or no compensation at all due to lack of land legal titles. It is also estimated that in 1985, one year after opening the plant, about 1500 families remained homeless (Fearnside, 1999). Note that the grave social tensions that derived

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from the lack of a real relocation plan were exacerbated by the attraction of the population drawn to the region because of the dam building, i.e., short/medium-run employment opportunities (Fearnside, 1999; Magalhães, 1990). In the long run, this process of territorial transformation, which paid little attention to decent housing with guaranteed access to essential services, appears to have paved the way for detrimental conditions for implementing the UN 2030 Agenda in Pará.

It is important to note that to investigate the relationship between human development and access to essential services such as water and electricity, which is the main objective of the present paper, we consider the whole State of Pará and not just the Tucuruí area. The first reason for this is that the impact of a power station can reach many neighbouring municipalities; this is an important point that, in fact, has also guided the choice of the (spatial) econometric model for the empirical analysis of Section 4. The second reason is that Tucuruí UHE is not the only national project realised in Pará (in accordance with the rationale of the *Grande Carajás Program*); in fact, other dams have been built in various locations in Amazonia to provide power to cities that Tucuruí could have supplied if the output of Tucuruí had not been allocated beforehand to the aluminium smelters (Fearnside, 2001). Ultimately, Tucuruí UHE is a model of centralised governance, which is not always positive for local realities but has been consolidated in Brazil since the Tucuruí UHE experience (Farias and Vilenha, 2021).

3. Data

The purpose of the present work is to analyse the role of selected key determinants of sustainable development in shaping the level of human development achieved by the Federal State of Pará municipalities, with particular attention devoted to access to basic services such as water and electricity. The different variables involved in the analysis are defined in Table 1 and were selected by considering both the setting of the UN's Sustainable Development Agenda and the socio-economic background of the case study, as detailed in Sections 1 and 2.

The data source is the *Atlas of Human Development in Brazil* (UNDP, IPEA, FJP, 2013), which is an open-source platform intended for gathering and processing data acquired by the Brazilian Institute of Geography and Statistics (IBGE) through the census surveys in 1991, 2000 and 2010 (on July 2023 IBGE released the first results of the Census 2022). The creation of the platform and its related database, which has been available for consultation since 2013, has been supported by the United Nations Development Programme (UNDP), also relying on the participation of the João Pinheiro Foundation (FJP) and the Brazilian Institute of Applied Economic Research (IPEA). The municipality disaggregation of the data within the *Atlas* allows for detailed socio-economic analyses supporting regional and local policies, which often suffer from a lack of data. In particular, the *Atlas* sets up dimensions of human development that are aligned with the Sustainable Development Goals. It provides a measurement of human development at the municipal level, the Municipal Human Development Index (MHDI), for each of the 5.570 Brazilian municipalities (UNDP, IPEA, FJP, 2013).

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Table 1. Description of the variables involved in the analysis.

Variable		**Methodology**	**Reference to 2030 Agenda**
MHDI	Municipal Human Development Index	The geometric mean of three sub-indices representing the Income dimension (based on the municipal income per capita), the Health dimension (based on life expectancy at birth), and the Education dimension (based on the educational level of the adult population and of young people), with equal weights.	Crosscutting
Access to electricity	Percentage of the population living in households with electricity	Ratio of the population living in permanent private households with electric lighting to the total population living in permanent private households multiplied by 100. It considers the illumination coming or not from a general network, with or without energy meter.	SDG 7
Access to water	Percentage of the population living in households with bathrooms and running water	Ratio of the population living in permanent private households with water channeled to one or more rooms to the total population living in permanent private households multiplied by 100. Water may be provided by the general network, from a well, directly from the source or from reservoirs supplied by rainwater or by tank trucks for water.	SDG 6
Household density	Percentage of the population living in households with a density of more than 2 persons per dormitory	Ratio of the population living in permanent private households with a density greater than 2 to the total population living in permanent private households multiplied by 100. The density of the household is given by the ratio of the total number of dwellers in the household to the total number of rooms used as a dormitory.	SDG11
Exp years of education	Expectation of years of study at age of 18	Average number of years of study that a generation of children entering school must complete at age 18 if current standards are maintained throughout their school life.	SDG 3
Illiteracy	Illiteracy rate of the population aged 11 years and over	Ratio of people aged 11 years or over who cannot read or write a straightforward ticket to the total number of people in the same age group multiplied by 100. It is computed as the mean (weighted for population) of the illiteracy rates in four age groups (11-14;15-17;18-24; over 25).	SDG 4
Inequality	Gini index	Measures the degree of inequality in the distribution of individuals by household income per capita. It varies from 0 (no inequality) to 1 (maximum inequality). The universe of individuals is limited to those living in permanent private households.	SDG 10

Notice that the methodology used by UNDP to build the MHDI differs from that used for building the Human Development Index – HDI (UNDP, 1990) at the country level. Although it considers the same three dimensions, namely income, health and education, it adapts the global methodology to the Brazilian local socio-economic context and the availability of data. To evaluate education, in particular, the MHDI uses schooling of the adult population (i.e., the percentage of adults that concluded primary school) and school flow of young people (*i.e.* the percentage of young people that, depending on their age group, is attending or has completed primary school or secondary school), while the global HDI uses the average years of schooling and the expected years of schooling.

As underlined in the previous sections, the interest in analysing the determinants of human development in the Federal State of Pará relies on the fact that, despite the enormous endowment of water (and therefore of electricity) and despite the trend of economic growth that has been observed since the mid-1980s, from the point of view of human development Pará is still well below the Country standard. In fact, it went from being one of the 20 Brazilian states (out of 26 states plus the Federal District) with very low human development in 1991 (MHDI = 0.413), to being one of the 14 states with medium human development in 2010 (MHDI = 0.646), with all the remaining states having either high or very high human development. In 2017 Pará was still one of the four Brazilian federative units which did not manage to improve their human development index and were still classified as having a medium one (with MHDI = 0.698) (http://www.atlasbrasil.org.br/ranking). Interestingly, as

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shown by Figure 1, this poor performance of Pará from the point of view of MHDI has been consistently due to the education dimension, and in recent years also to income.

Note that the MHDI will be the response variable of our models in Section 4. In accordance with the discussion of Sections 1 and 2 about the abundance of water resources in the area and the hydropower production, the two main predictors that we selected among the key determinants of sustainable development provided by the 2030 Agenda are access to water and electricity. The evolution in time of these variables, as well as the comparison between the State of Pará and Brazil from the point of view of the different variables involved in the analysis, is shown in Table 2 and, despite a considerable improvement over time, emphasises the dramatic situation of Pará with respect to both facilities.

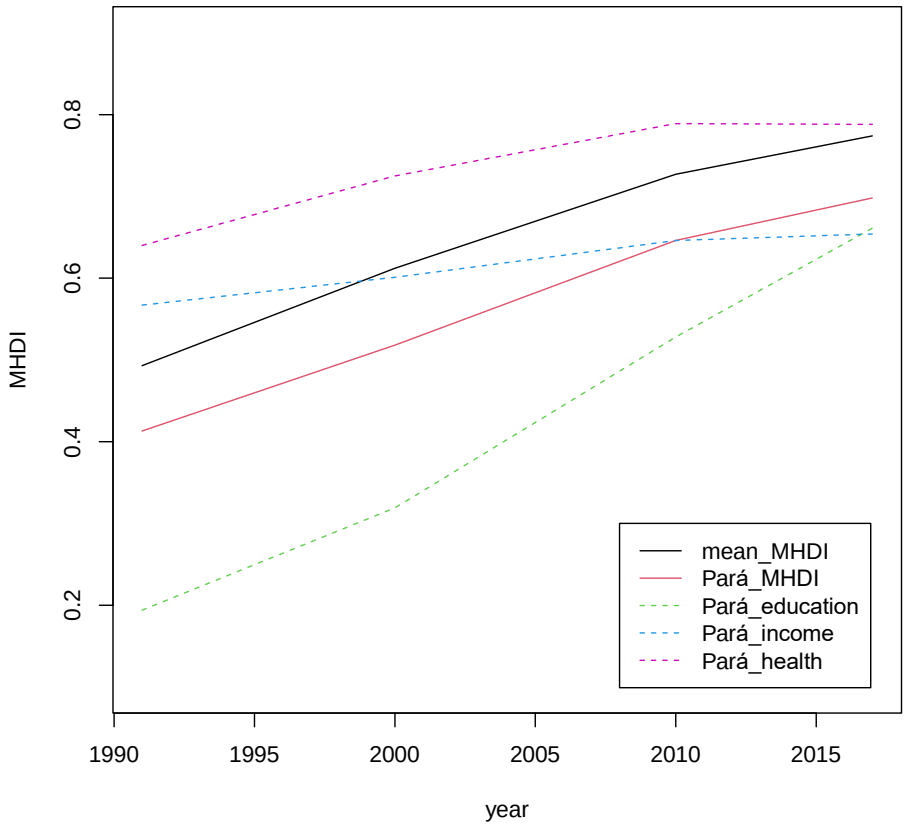


Figure 1. Federal State of Pará: MHDI and its constituents over time. Personal elaboration from UNDP, IPEA, FJP (2013).

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Table 2. Federal State of Pará vs Brazil (mean values).

	1991		2000		2010	
	Pará	**Brazil**	**Pará**	**Brazil**	**Pará**	**Brazil**
Access to water	31.97	66.97	36.93	76.72	57.50	87.16
Access to electricity	63.99	84.84	76.73	93.46	91.89	98.58
Household density	71.37	50.08	61.04	39.13	49.40	27.83
Inequality	0.62	0.63	0.65	0.64	0.62	0.60
Exp years of education	6.48	8.18	6.80	8.76	8.49	9.54
Illiteracy rate – 11-14 years old	25.04	16.08	11.49	6.26	6.32	3.24
Illiteracy rate – 15-17 years old	15.85	12.42	7.16	4.85	3.55	2.20
Illiteracy rate – 18-24 years old	15.95	11.97	8.84	6.26	4.13	2.61
Illiteracy rate – 25 years old or older	29.14	23.45	21.29	16.75	14.98	11.82

Source: Personal elaboration from UNDP, IPEA, FJP (2013).

The next two predictors are both related to education, and their introduction into the analysis was justified by the crucial role of the education dimension for building the MHDI shown in Figure 1. They are the expected number of years of education at the age of 18 for children entering the school system and the illiteracy rate of the population aged 11 years and over. Notice that both variables pick up different aspects related to education with respect to those which enters the calculation of MHDI. Again, as emphasised from Table 2, Pará is doing worse than Brazil from the point of view of both expected years of education and illiteracy for all age ranges, consistently in time.

The last two predictors included in our analysis are the percentage of the population living in households with a density of more than 2 person per dormitory and the Gini inequality index. In fact, it is important to recall that both aspects, one related to housing and urbanisation and the other one to income inequality, have been and still are critical issues for the whole country (de Freita Barbosa, 2012). Housing, in particular, in Brazil is one of the main urban problems in contemporary times, and it is significantly linked to the urbanisation process that took place in the country (Monteiro and Veras, 2017). Interestingly, Brazilian urbanisation is a recent phenomenon, with rates that started increasing in the 1940s, reaching 84.36% by 2010. This strong urbanisation was due to both the growth of the Brazilian population (resulting from high birth rates and declining mortality) and an intense rural-urban migratory flow (resulting from the expansion of industrialisation in the cities, which attracted workers from the countryside, and from the modernisation of agriculture, which implied increased productivity). Industry, however, could not absorb all this contingent of workers, and the increase in the supply of urban services did not occur at the same rate as the growth of cities. The combination of these factors then led to the expansion of precarious, self-built housing settlements with no basic services and infrastructures, mainly in the more peripheral areas of the cities (Maricato, 2011). According to IPEA, the housing deficit in Brazil in 2012 was 5.24 million households. Although this problem has been affecting the whole country, Table 2 shows that it has been particularly dramatic in the State of Pará, both from the point of view of access to basic services such as water and electricity and to the percentage of the population living in domiciles with density greater than 2.

Notably, inequality is strongly related to the housing problem in Brazil. In fact, after being known as one of the most unequal countries in the world for decades (Chancel et al., 2022), with the northeast region having the worst situation, at the beginning of the new millennium, inequality started decreasing and fell consistently until 2014, when it began growing again, with labour earnings being at the core of both trends (Neri, 2018). Interestingly, Table 2 shows that income inequality is probably the variable among those included in the analysis that less distinguishes Pará from the whole country.

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4. A spatial regression analysis

Recent Brazilian socioeconomic studies using data related to spatial units, such as municipalities or minimum comparable areas, are progressively embracing the spatial approach to econometric analysis (Lins et al., 2015; Reis, 2014; Barufi et al., 2012; Amaral et al., 2010; Magalhães et al., 2005). This is due to the fact that when the data exhibit spatial autocorrelation, i.e., correlation among response values due to the relative location proximity of the units, not taking it into account in formulating a regression model can lead to inconsistent and inefficient estimates (Elhorst, 2014; Baltagi, 2008).

Notice that different interaction effects can explain why an observation at a specific location may depend on observations at other locations (Elhorst, 2014). The first are endogenous interaction effects, where the response of a particular unit depends on the response of neighbouring units. The second are exogenous interaction effects, where the response of a particular unit depends on explanatory variables of neighbouring units. The third are interactions among the error terms, that represent for instance a situation where the determinants of the response omitted from the model are spatially autocorrelated. Also, notice that all these spatial interaction effects can be introduced in a spatial econometric model by means of a spatial weights' matrix, that is, by a negative and usually symmetric matrix *W* that describes the spatial configuration of the units in the sample.

Following Elhorst (2014), the General Nesting Spatial model (GNS), which include all possible interaction effects, can be written as:

$$Y = \rho WY + a\iota_N + X\beta + WX\theta + u$$
$$u = \lambda Wu + \bar{\text{I}}\mu \qquad (1)$$

where *WY* represents the endogenous interaction effect and ρ is the corresponding spatial autoregressive coefficient, *WX* represents the exogenous interaction effect and θ is the corresponding vector of parameters, *Wu* represents the interaction effect among the error terms and λ is the corresponding spatial error parameter, and ε is a well-behaved error term.

It is important to note however that the GNS model is usually over-parametrised, so that most empirical studies resort to simpler models that can be obtained from it by imposing restrictions on one or more of its parameters. In particular, among the models that include only two spatial interaction effects, we find the *Spatial Autoregressive Combined Model* (SAC), which assumes no exogenous interactions, the *Spatial Durbin Model* (SDM), which assumes no interaction effects among the error terms, the *Spatial Durbin Error Model* (SDEM), that assumes no endogenous interactions. Instead, among the simpler models, we find the *Spatial Lag of X model* (SLX), that only includes exogenous interaction, the *Spatial Autoregressive Model* (SAR), that only includes endogenous interactions, and the *Spatial Error Model* (SEM), that only includes interaction effects among the error terms (LeSage and Pace, 2009; Anselin, 1988; Elhorst, 2014).

Choosing the appropriate spatial regression model is indeed a critical step in conducting an effective analysis. Interestingly, one feature of the SAR, SAC and SDM, that include endogenous interactions, is that the spillover effects that they produce are global, in the sense that a change of a predictor in a particular location potentially impacts the response in all the locations, including those that according to *W* are not connected to it. In our setting this seems difficult to justify (Halleck Vega and Elhorst, 2015; Elhorst, 2017). Another limitation of the SAR and the SAC is that they impose restrictions on the magnitude of spatial spillovers, since the ratio between the indirect and the direct effect that they produce is the same for every explanatory variable, which is not very likely in many practical applications (Elhorst, 2014). Thus, the starting point of our analysis will be a SDEM, that includes exogenous spatial interactions and interaction effects among the error terms, that can eventually be simplified into

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one of the simpler models that it nests (namely the SLX and the SEM) if the spatial error parameter λ or the θ parameters corresponding to the exogenous interaction effects turn out to be not significant.

For our purpose, we consider data from three census years (1991, 2000, and 2010) and control for a possible time trend. Notice that as our sample is exhaustive, i.e., it consists of 143 units representing all the municipalities of the state of Pará, we find it appropriate to focus on fixed effects (FE) models rather than random effects (RE) ones, which assume that the units are representative of a larger population (Elhorst, 2014). The analysis is based on a 1st-order binary contiguity matrix, i.e., on a spatial weights matrix whose elements are equal to 1 if the corresponding municipalities have common borders (and therefore can be regarded as neighbours) and is equal to 0 otherwise. In what follows we will explore the behaviour of both a row-normalised spatial weights matrix and of a spatial weights' matrix normalised as in Ord (1975), that retains symmetry. Notice that the need to take into account the spatial configuration of the data in our case is confirmed by the Pesaran's CD(p) test for local cross-sectional dependence, i.e., dependence between neighbours, computed on the residuals of a fixed effects model with no spatial interaction effects, which rejects the null hypothesis of no cross-sectional dependence with a p-value < 2.2e-16 (Millo and Carmeci, 2011; Pesaran, 2021; Bivand et al., 2021).

Note that all our FE models have been estimated with the R package **splm** (Millo and Piras, 2012) with data stacked first by time period and then by cross-section. For purposes of comparison, we applied both maximum likelihood estimators, through the **spml** function, and the generalised moment estimators, through the **spgm** function; interestingly, the latter is designed to handle spatial models for panel data of short time dimension, as in the present case (Millo and Piras, 2012), but does not allow estimating the covariance of the spatial error parameter and testing its significance. Despite this difference, most of the parameter estimates obtained with the two methods are identical up to the fifth decimal; for this reason, in what follows, we will only show the results obtained with the **spml** function. Moreover, in acknowledging the fact that the standard technique for eliminating individual fixed effects, i.e., time-demeaning the variables, induces artificial serial correlation in the residuals that disappears as the number of time points diverges, but in short panels leads to biased estimates of the errors' variance (Millo and Piras, 2012), in **spml** we apply the orthonormal transformation of Lee and Yu (2010). It is also important to recall that with a large number of observations and a small number of time points, the incidental parameter problem may occur; however, this might lead to inconsistent estimates of the individual fixed effects but not of the model parameters (Millo and Piras, 2012).

5. Results

Table 3 shows the results obtained with the SDEM corresponding to a row-normalised spatial weights matrix and to a spatial weights matrix normalised as in Ord (1975); in both cases, as it is usual with the SDEM, the direct effects are represented by the β parameters and the spillover effects by the θ parameters of equation (1).

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Table 3. Fixed effects SDEM: direct and spillover marginal effects corresponding to different normalised spatial weights matrices

	Row-normalised W		**Ord-normalised W**	
	Direct effects (β)	**Spillover effects (θ)**	**Direct effects (β)**	**Spillover effects (θ)**
Access to water $_{it}$	0.000721***	0.000643*	0.000724***	0.000575*
Access to electricity $_{it}$	0.000390**	0.000013	0.000364**	0.000058
Household density $_{it}$	-0.000776***	0.000160	-0.000795***	0.000347
Exp years of education $_{it}$	0.008051***	-0.002314	0.007458***	-0.006318
Illiteracy $_{it}$	-0.001932***	0.000103	-0.002020***	0.000347
Inequality $_{it}$	0.057778**	0.036031	0.061362**	0.038385
Dummy_Year_2000	0.070855***		0.075991***	
Dummy_Year_2010	0.144945***		0.164006***	
λ	0.352254***		0.376219***	
AIC	-752.1834		-755.4245	

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Various points arise from the analysis of the results of the fixed effects SDEM from Table 3. First, the two spatial weights matrices lead to very similar results, with the Ord-normalised one being preferred in terms of the AIC of the model. In both cases the spatial error parameter λ is significant, the only significant spillover effect is that corresponding to access to water, and there is a positive time trend, so that controlling for everything else, human development has been increasing over time. Moreover, the results confirm the positive relationship between human development and access to water (with total effects equal to 0.0014 and 0.0013 under the row-normalised *W* and the Ord-normalised *W* respectively) and access to electricity (with direct effects equal to 0.0004 under both spatial weights matrices), as well as the expected number of years of education (with direct effects equal to 0.0080 and to 0.0075 respectively). Notice that the significance and the positive sign of the spillover effect corresponding to access to water can be interpreted as evidence that the provision of water and sanitation on a geographically broad basis could induce self-reinforcing benefits. A similar finding in terms of the advantages deriving from appropriate regional policies can be found, for instance, in Barufi et al. (2012). The results of Table 3 also confirm the expected negative relationship between human development and the percentage of the population living in households with a density of more than 2 person per dormitory (with direct effect equal to -0.0008 under both spatial weights matrices), as well as illiteracy (with direct effects equal to -0.0019 and to -0.0020 respectively).

It is interesting to note that similar findings in terms of significance of accesses and education can be found in Barufi et al. (2012), that estimate a fixed effects SDEM to study the relationship between infant mortality rate (used as an inverse measure of human development) and different socio-economic and living conditions variables in Brazil between 1980 and 2000. One point on which our results differ from those in Barufi et al. (2012), and that is worth a few more considerations, concerns the relationship between human development and inequality, that in their case is negative while is positive in the results of Table 3.

In fact, there is a substantial literature assessing that inequalities in income distribution have an inverse U-shaped relationship with economic growth, so that the inequality increases in the initial phase of economic development and decreases in more advanced phases (Kuznets, 1955; Kuznets, 1963; Robinson, 1976; Barro, 2000). With reference to Brazil, the existence of this relationship has been verified for instance by Daudelin and Samy (2011) and da Silva Jr et al. (2016), while another part of the literature is critical of the Kuznets approach (Acemoglu and Robinson, 2002; Deininger and Squire, 1998). Our estimate of the inequality coefficient, that is positive and significant under both models, seems to support the Kuznets approach. However, in some sense also the negative relationship found in Barufi et al. (2012) is compatible with the Kuznets approach, as they take into account the whole country, that includes also areas with higher levels of both human and economic development.

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6. Conclusions

Notice that although attention to access has not always been the focus of local policies in the study area, an increase in access to both water and electricity has been observed over time within the municipalities of Pará. It is also noticeable that this slow but consistent improvement has taken place also with respect to other dimensions, first and foremost education, as well as to the municipal human development index.

In the present work, the tie between accesses and development has been investigated by means of a fixed effect spatial regression model that found a significant and positive relationship. The results of our analysis confirm that integrated water and energy management strategies to ensure access are crucial for the national electricity sector to be able to drive also local development. In particular, the increase in MHDI observed in Pará over the two decades under consideration can be ascribed to improving living conditions mainly due to access and education. These results also suggest that a further increase of access to water and energy could be a valid driver to obtain higher levels of development, especially given the abundance of water resources present in the area (Lipscomb et al. 2013; Iorio et al., 2018; Monni et al., 2018; Iorio et al., 2019; de Souza et al., 2016). The detected spillover effects associated with water and sanitation indicate that providing these services on a geographically broad basis could induce self-reinforcing benefits.

Interestingly, as the starting point of the present work was the effect of hydropower on local development, it is worth concluding our analysis by recalling the taxonomy proposed by Magnani and Vaona (2016), who draw attention to the *energy justice* problem, which is threefold in terms of distribution, procedure and reconnaissance (Conigliani et al., 2023). In fact, according to Fearnside (1999), all three types of injustice occurred in the process of building the Tucuruí power plant. The displacement of people due to the diversion of the rivers or the inadequate allowances allocated to compensate losses in traditional economic activities, for instance, has led to a problem of *distribution justice*. The fact that indigenous reserves or protected areas have been directly or indirectly affected by unilateral decisions that were neither shared nor discussed with all possible stakeholders, on the other hand, has led to an issue of *procedural justice*. Finally, the lack of rural electrification in the area surrounding the power plant has led to an issue of *recognition justice* (van Els et al., 2012).

It follows that policies aiming at increasing sustainable development in this area should be oriented towards restoring energy justice, bearing in mind that allocating a valuable asset such as water for energy purposes can have a very high opportunity cost, especially in the presence of huge infrastructures. Measures such as providing compensations commensurate with the actual social and environmental changes or limiting the increase in the cost of energy for end users, for instance, may be useful to re-establish *distribution justice* (ABRADEE, 2018). Similarly, the enlargement of the low-voltage electrical network, i.e., the one linked to domestic consumption, could re-establish *recognition justice*, making rural electrification an effective driver of development (ONS, 2020). Finally, from the point of view of *procedural justice*, adopting a participatory process rather than a top-down approach could enhance both the economic and human development of areas like Pará. Hence, the pivotal role of education in human development processes arises from both our results and those of Barufi et al. (2012). As pointed out, for instance, by James (2017), education is crucial not just for human capital accumulation but also for boosting the participatory approach within a *capacity-building* framework.

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PUBLIC ADMINISTRATION AND PUBLIC SERVICES ANALYSIS AND DEVELOPMENT TRENDS: A REVIEW

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Abstract. Public administration in the political system is part of the executive branch and is responsible for implementing policy and achieving the goals set by the government. Public services are the "tangible" results of public administration, and the activity of municipal authorities manifested as the provision of certain benefits to their clients – the public. The theoretical review aims to provide insights into the definition of public administration and services and the reforms carried out in this area in Latvia and Eastern European countries. Issues related to public administration and public service quality are described; trends in the development of public administration and their research in Europe and worldwide are provided. The insights allow us to foresee peculiarities of development and challenges this sector can encounter in various countries, including Latvia.

Keywords: public administration, public services, development trends; reforms; quality of public services; Latvia

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JEL Classifications: H8, H83

Additional disciplines: quality management

1. Introduction

The existence of society is only possible with public administration. Therefore, its implementation is on the agenda in all countries. The main task of public administration is to implement the laws and regulations issued by the parliament (in the case of Latvia, the Saeima) and the government, as well as to plan and prepare the government's decisions and future political plans. Public administration under the management of the Cabinet of Ministers (CM) performs the administrative functions of the executive power (functions of public administration), which consist of specific administrative tasks and liability for the performance of such tasks (LR Saeima, 2002). Public administration is the administrative apparatus of executive power and a set of institutions that covers the national, regional, and local levels. It is also where the development and implementation of public policies and the definition and provision of public services occur. The objective of public administration is to implement the public's wishes rationally, effectively and legally. Public administration uses institutions and organizations at various levels, transforming the collective will of society into policies and public services (LR Saeima, 2002). In

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legislation, development and policy planning documents, and public communication in Latvia, the term "state administration" is used in various ways. It is used broadly as a synonym for "public administration, " encompassing the executive branch's administration and its institutions, including independent institutions, planning regions, and municipalities. It is also used narrowly to denote the state apparatus institutions and very narrowly to include only the state institutions subordinate to the Cabinet of Ministers, referred to as direct state administration (also known as the central government apparatus or central level). The scope of understanding of the term is further expanded by the fact that part of the society sometimes interprets public administration to mean the entire public sector – all institutions financed from tax revenues and other public funds or that use public property, also including other public authorities (e.g., the LR Saeima, the Cabinet of Ministers, courts) and state capital companies.

Public administration institutions in Latvia are divided into institutions of direct administration and institutions of indirect administration. Direct public administration consists of the institutions and officials of the Republic of Latvia, the initial public entity. In contrast, indirect administration includes institutions and officials of derived public entities, such as municipalities, state-founded universities, and public foundations (LR Saeima, 2002). At the same time, the term “public administration” usually refers to the executive power, which comprises the Cabinet of Ministers and its subordinate institutions, as well as the so-called independent institutions. Government institutions and state organizations are public entities operating at the national level to ensure public welfare, enforce the law, and provide the functions of the state.

Government institutions and state organizations are responsible for enforcing laws and regulations. They develop and implement rules that govern various areas, such as health, education, transportation, and the environment. These organizations are of public significance; they operate with public funds and are liable for serving the public interest. They must be transparent and accountable for the money spent and activities. Government institutions and state organizations are funded by the state budget, which, in turn, is replenished by tax contributions from residents and businesses. These organizations employ state employees, state officials, teachers, doctors, police officers, and other specialists to perform their functions. They provide various public services such as healthcare, educational, social, and legal protection. These organizations participate in developing and implementing policies to address societal issues and achieve national goals. Government institutions operate within the framework of democracy. In these institutions, politicians are elected to represent the interests and decisions of the citizens. Government institutions and state organizations ensure national security and protection, including the military force, the police, and the legal system.

Public administration within the political system is part of the executive branch and is responsible for implementing policy and achieving the goals set by the government. Public administration can also be defined as the process by which state policies and legal norms are transformed into specific decisions appropriate for each case. The term "public sector" generally refers to, on the one hand, the civil service, which consists of public administration and various institutions throughout the country (at regional and local levels), and on the other hand, public entities that are wholly or partially owned by the state or regional public institutions, and municipalities. The concept of the public sector is usually understood in its broadest sense, i.e. encompassing all public administration and its services.

The theoretical overview aims to provide insight into the definition of public administration and services and the reforms undertaken in this area in Latvia and Eastern European countries. The paper describes public administration and public services issues to promote an understanding of the challenges the sector encounters.

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2. Services and Public Services

The wide range and diversity of services result in a lack of a unified approach to interpreting "service" in scientific literature. Several researchers have provided their understanding of this concept.

According to the interpretation by ISO (the International Organization for Standardization), a service is the result of direct interaction between the supplier and the consumer and of the internal activities of the supplier to meet the consumer's needs (International Organization for Standardization, 2015). This interaction can be implemented in the form of tangible products (material services) but can also be realized as a favourable impact on the person providing the service (intangible services) (Katelo, Kokina & Rasčevskis, 2022).

A service can be the interaction between the supplier and the consumer and the supplier's internal activities to meet the consumer's needs (International Organization for Standardization, 2015). Additionally, a service can be explained as any benefit or activity that one party can offer to another, which is intangible and cannot be obtained as one's property.

Furthermore, a service can be interpreted as an order executed within the scope of an individual's economic or professional activity, either for compensation or without it, or as fulfilling a contract with a consumer. The latter can include leasing an item, creating a new item, improving or modifying an existing item or its properties, performing a task, or achieving an intangible result. A service is a particular product characterized by the following key features, which must be considered when developing a quality management system in the service industry.

There are several types of classification of services. *Services can be classified based on the degree of involvement of tangible assets.* According to this factor, services are divided into intangible and partially tangible services. Considering the specifics of immaterial services, the service is provided solely as a result of the actions of the service provider or producer. Examples of such services include education and insurance services. Partially tangible services are services provided using tangible goods. Examples include retail, fast food, mobile communication services, and public utilities. The service is provided due to the service provider's actions, while the consumer becomes the owner of the material product. *Services can also be classified based on the level of contact between the consumer and the producer*.

Direct services are provided solely due to the service provider's actions, which occur through direct contact between the employee and the customer. This is where the continuous production and consumption of services are most evident. Mixed services involve meeting the customer's needs in "two stages", including direct contact between the producer and the customer and the producer's actions in the customer's absence. *Services can be classified based on the frequency of their provision*: one-time service, rare, systematic, regular, or daily services. *Services are also categorized based on the number of customers*: individual, group, and corporate services (Katelo, 2022). *Services can be classified according to several characteristics*: form of ownership, market type, and service provider. The criteria and types of service classification are summarized in Table 1.

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Table 1. Criteria and types of service classification

Criteria of Service Classification	Types of Service
Degree of involvement of tangible assets	Intangible services Partially tangible services
Level of contact between the consumer and the producer	Direct services Mixed services
Frequency of service 0rovision	One-time services Rare services Systematic services Regular services Daily services
Number of customers	Individual services Group services Corporative services
Form of ownership	State or public services Services provided by private entities Services of mixed-property companies
Type of market where services are provided	Trade services for production resources Commodity trading services Real estate trading services Financial and securities trading services Currency trading services Labour recruitment services Information services, etc.

Source: designed by the author

In Latvia, the Nice Classification (WIPO, 1979) is used: it is an international classification of commodities and services used to classify and search trademarks and service marks. It includes eleven classes of services. The catalogue of public services is available on the state administration service portal Latvija.lv, which serves as a unified access point for services provided by the Latvian state and municipal institutions. The service catalogue there accumulates information on services provided to the population by the state and municipal institutions (LR Cabinet of Ministers, 2017).

The main *types of public services* include services of general economic interest (road maintenance, street lighting), governance (individual) services that include administrative services (registration, certified statements, permits, taxes, social benefits), and physical services (social care, education, healthcare), as well as economic services (management of residential buildings). The public sector includes state and municipal institutions and their commercial companies, companies with 50% or more of state or municipal capital, foundations, associations, funds, and their commercial companies.

Public administration operates within a legal framework defined by external regulatory acts (Katelo, 2022). The types of public services are shown in the figure below (see Figure 1).

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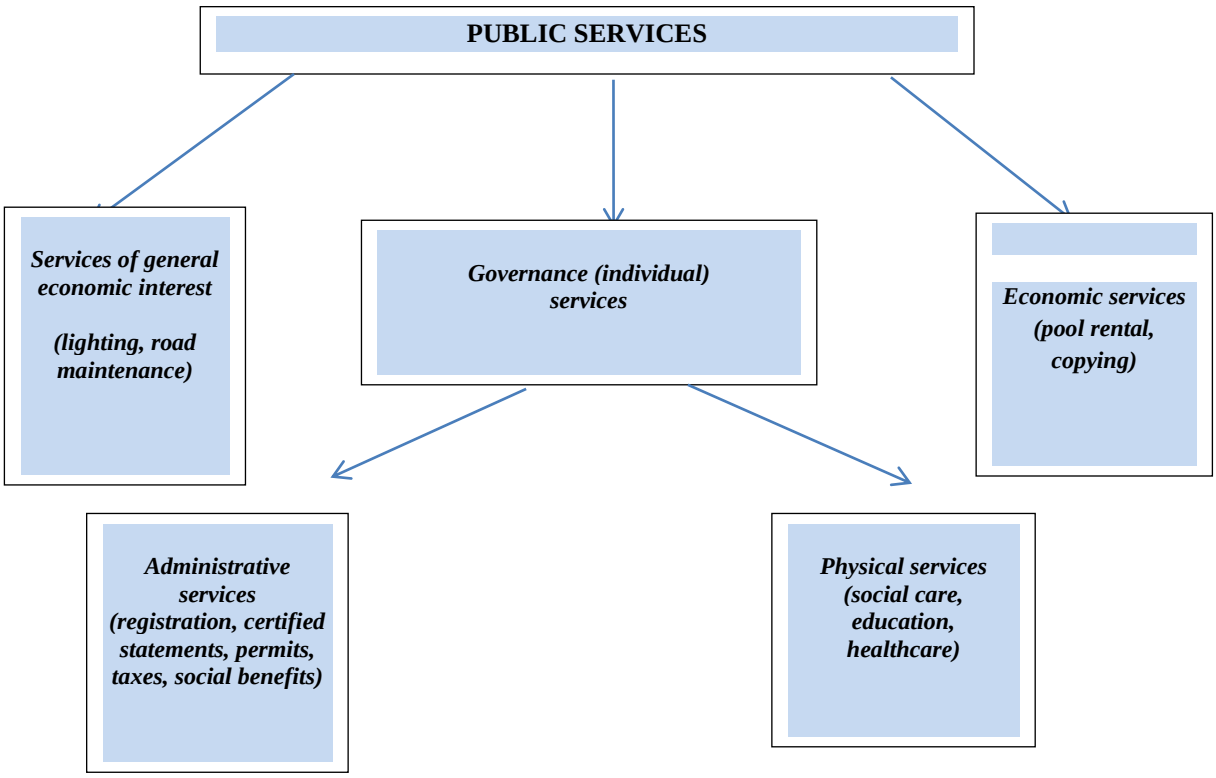


Figure 1. Types of public services
Source: created by the author based on a review of the literature

Administrative services are public (i.e., state and municipal) services provided by public administration institutions and municipalities. The author agrees with the characteristics of administrative services identified by Koliushko et al. (2009):
1. Administrative services are provided upon the request of a natural or legal person.
2. The provision of administrative services is associated with ensuring legally significant conditions for the exercise of the subjective rights of a particular person.
3. Public administration institutions and municipalities provide administrative services through their authority.
4. The right to provide a particular administrative service to an individual and the institution's authority is determined by law.
5. The result of the activities of public administration institutions is an administrative act – a decision or legally significant action that satisfies the individual's request. (Koliushko et al., 2009).

The researcher above proposes the following classification of administrative services:
1. Based on the level of authority determination for the provision of administrative services and the type of legal procedures for the order of their provision:
- administrative services with centralized regulation (laws, acts of the Cabinet of Ministers);
- administrative services with local regulation (acts of municipal institutions);
- administrative services with "mixed regulation (both centralized and local regulation).

2. Based on the payment criteria:
- fee-based services;
- free services.

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3. Based on the content of public services for the provision of administrative services:
- registration;
- issuance of permits (licenses);
- certification;
- inspection;
- determination of status.

4. Based on the thematic issues addressed:
- business (economic) services;
- social services;
- tax administration services;
- Land office services;
- construction and public utility services, etc. (Koliushko et al., 2009).

The classification of administrative services is summarized in Table 2.

Table 2. Classification of administrative services

Criteria for the classification of administrative services	Types of administrative services
1. Based on the level of authority determination for the provision of administrative services and the type of legal procedures for the order of their provision.	- administrative services with centralized regulation (determined by laws and acts of the Cabinet of Ministers); - administrative services with local regulation (determined in the acts of municipal institutions); - administrative services with "mixed regulation (in case of both centralized and local regulation).
2. Based on the payment criterion	- fee-based services; - free services.
3. Based on the content of public services for the provision of administrative services	- registration; - issuance of permits (licenses); - certification; - inspection; - determination of status, etc.
4. Based on the thematic issues addressed	- business (economic) services; - social services; - tax administration services; - Land office services; - construction and public utility services, etc.

Source: designed by the author using a review of the literature

The above-presented classification may be applied to the conditions of Latvia (Katelo, 2022).

3. Public administration and quality of public services

In the European context, discussion about the trends of public administration development is often linked to the ideas of the new "European Administrative Space (EAS)" – a concept commonly treated as a gradual convergence of administrative structures, processes, and values towards a standard European model.

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The development of public administration is related to the level of development of the country as a whole and, of course, to the old and new trends in the development of public administration. Along with implementing public administration reforms, great importance is attributed to the quality of public services (Katelo, 2022).

The issues related to the quality of public services have been analyzed through decades by many researchers (Kondrotaite, 2012; Mazur et al., 2018; Christensen, Laegreid & Rovik, 2020; Androniceanu, 2021; Singh & Slack, 2022; Androniceanu & Georgescu, 2023).

The research on the quality of public services in *Lithuanian municipalities* by Kondrotaite (2012) concludes that in terms of quality in the context of public services, the most critical aspect is consumer satisfaction with the services provided. However, Lithuania has not yet used a "client-oriented" model of public service management. According to the author of the research, the process of ensuring the quality of public services should be divided into two parts: 1) quality assessment, which includes process analysis, summarizing the results of that analysis, and feedback; 2) the implementation of the results of process analysis in the reform of education, healthcare, and social care systems (Katelo, Kokina & Rasčevskis, 2021).

The study on Poland's state governance's development and status quo was conducted by Mazur, Możdżeņ and Oramus (2018). The research was elaborated for the European Commission with technical assistance from the European Institute of Public Administration (EIPA), the Hertie School of Governance, and Ramboll Management Consulting (Katelo, Kokina, & Rasčevskis, 2021). The report highlights the following most essential areas for improvement:

1. Enhancing public trust in the civil service and improving its image. Increasing the society's awareness of the benefits of the civil service and its role by focusing on citizen needs and using modern communication methods.
2. Quality of management and human resources in the civil service. It is essential to update the systems and management standards offices use to ensure greater flexibility in human resource management through a long-term strategy.
3. Remuneration levels and appointment limits in the civil service. Relatively low wages combined with appointment limits create the risk of causing highly trained staff to leave and make it harder to attract new specialists. In recent years, this has manifested in declining employment and increased staff turnover in the civil service.

In very recent research, Romanian researchers David et al. (2024) claim that the future public administration quality will depend on the adaptivity of public administration managers and employees to changes caused by digitalization processes.

In the context of the public sector in Turkey, quality management is identified not only as an approach and system for improving the quality of public services but also as a tool for addressing problems within the Turkish public administration (Katelo, Kokina, & Rasčevskis, 2021). The results of surveys conducted in two ministries indicate that employees in both ministries have a positive attitude towards quality management. Most respondents agree on the necessity and usefulness of quality management in Turkey's public sector. Most respondents also agree with the definition of quality management as an approach aimed at citizen satisfaction by continuously improving services and processes.

Pareek and Sole (2022) analyzed the development and quality of public administration in India, including the Citizen's Charter formulation and implementation, social audit, e-Governance programme, and Public Service Guarantee Act.

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Ntshangase and Msosa (2022) and Shava and Vyas-Doorgapersad (2023) tackled the quality of public services provided by municipalities of South Africa. Some authors express harsh criticism and call the quality of services especially unsatisfactory. Mamokhere (2023) names public services so bad that they trigger protests from their users; Tsheola, Sebola and Mamabolo (2023) see the reasons for the low quality of services in a scandalous governance crisis and societal leadership vacuum. Haurovi and Chilunjika (2023) describe unethical behaviour in the South African police service. Zikhali, Lungwengwe and Komisane (2023) stress the importance of value-based leadership on local economic development. Therefore, the public administration must develop tools for evaluating service quality and setting priorities (Katelo, Kokina & Rasčeskis, 2021).

Christensen, Laegreid and Rovik (2020) have compiled several new research programs and theories of public administration. The authors mention interdisciplinary studies, such as life sciences or environmental studies. They also highlight research on public administration accountability and reputation management. Another potential trend of research is opened up by data analysis on the evaluation of public services by both the public and public administration participants. These data are obtained from various social studies and compared with the perceptions of officials and politicians.

In recent years, the digitalization of public services has been the focus of researchers and practitioners. Radivojevic et al. (2024) stress importance of intelligent public administration. Brzozowska-Rup, Nowakowska and Zdradzisz (2024) stress the importance of the impact of cloud computing on the quality of public administration. Androniceanu (2023) and Bakhmat et al. (2024) point to challenges to public administration caused by the advancement of artificial intelligence.

The trends in the development of public administration and their research in Europe and globally directly impact the development of this sector in Latvia).

4. Public administration system development peculiarities in Latvia

At the end of 2022, there were 149 direct administration institutions in Latvia (LR Ministru kabinets, 2020). In total, these institutions employed 43,512 people, with the most significant portion, or 12,280 people, being used in the Ministry of the Interior (State Police, State Fire and Rescue Service, State Border Guard, etc.) (LR Ministru kabinets, 2023). In the Ministry of Justice sector (Court Administration, Prison Administration, etc.) at the end of 2022, there were 5,631 employees; in the industry of the Ministry of Welfare – 5,024; in the Ministry of Health – 4,536; in the Ministry of Finance – 4,467; in the sector of the Ministry of Agriculture – 2,387; in independent institutions – 2,035; in the Ministry of Culture – 1,838; in the Ministry of Defence sector – 1,342; in the Ministry of Economics – 1,144; in the Ministry of Environmental Protection and Regional Development – 954; in the Ministry of Education and Science – 875; in the Ministry of Foreign Affairs – 566; in the Ministry of Transport – 283; and in the Cabinet of Ministers – 150 people. At the same time, it should be taken into account that the number of institutions of direct administration is variable – the Cabinet of Ministers makes decisions on the establishment, reorganization, or liquidation of institutions of direct administration (for example, a new institution, the Ministry of Climate and Energy, was included in the register of institutions of direct administration at the beginning of 2023) (LR Ministru kabinets, 2023). Reforms in the state administration in Latvia began after the restoration of independence on May 4, 1990, with the adoption of numerous laws. From the mid-1990s until the approval of the Public Administration Reform Plan (LR Ministru kabinets, 2017), several significant stages of reform were implemented in the development of public administration policy. The development of public administration has also been influenced by the state's economic crisis that necessitated structural reforms in 2009.

The list of key policy documents regulating the public administration reforms since 1995 and their objectives is provided below:

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1. The Concept of the Latvian Public Administration Reform (1995) aimed to develop a state administration system envisaged in the Constitution to effectively and fairly fulfil the functions entrusted by the society (LR Ministru kabinets, 1995).
2. State Administration Development Strategy until 2000 (adopted in 1998) – to ensure systematic and consistent implementation of measures aimed at improving the operation of public administration by promoting the development of the state development strategy, sectoral formulation, and resource allocation according to the priorities set by the government (LR Ministru kabinets, 1998).
3. Public Administration Reform Strategy from 2001 to 2006 and Action Plan for Strategy Implementation (2001) – to establish a government-approved basis for medium-term (until 2006) development of the public administration, as well as to coordinate individual initiatives in the field of public administration, aligning them with political goals for the development of the state (LR Ministru kabinets, 2001).
4. Guidelines for the Development of Public Administration Policy 2008–2013 (2008) aimed to ensure a legal, effective, and high-quality public administration that ensures that the services it provides meet the needs of the society (LR Ministru kabinets, 2008).
5. Action Plan for the Optimization of Public Administration System and Civil Service (2009) – aimed at developing small, professional, and citizen-oriented public administration working for the benefit of society (LR Ministru kabinets, 2009).
6. Concept of the Development of Human Resources in Public Administration (2013) – professional, motivated, and honest employees in public administration (LR Ministru kabinets, 2013).
7. Guidelines for the Development of Public Administration 2014–2020 (2014) – effective, accessible, innovative, professional, and results-oriented public administration (LR Ministru kabinets, 2014).
8. Public Administration Reform Plan for 2020–2017 – effective, responsible, and flexible state administration (LR Ministru kabinets, 2017).

When evaluating the indicators of public administration efficiency in Estonia, Latvia, Lithuania, Slovenia, and Finland, it can be concluded that since 1996, the World Bank's measurements demonstrate that Latvia has not experienced significant upward trends or notable improvements compared to other countries. Finland, frequently mentioned in the State Audit Office reports (LR Valsts kontrole, 2022), is a noteworthy example of enhancing national welfare.

The slow progress in Latvia is also evidenced by the State Audit Office's report regarding the public administration reform plan. Evaluating the implementation of the Public Administration Reform Plan, approved by the government in 2017, which aimed to build "an effective, accountable, and flexible state administration", "the audit findings allow us to conclude that the governance of the Reform Plan was carried out according to the laws and regulations in general but it has not been effective". Furthermore, using the term "reform" raised great expectations for qualitative changes throughout the public administration, but these have not occurred (LR Valsts Kontrole, 2022). Audit findings allow us to conclude that the governance of the Reform Plan was carried out according to the laws and regulations in general, but it has yet to be effective.

The Sustainable Development Strategy of Latvia until 2030 outlines six fundamental directions or priorities for national development: investments in human capital, a change of paradigm in education, an innovative and eco-efficient economy, nature as a future capital, spatial development perspective, innovative government and public participation, and the development of the culture space. The implementation of most of these strategic goals, from both the aspect of the policies and the element of sectoral development, falls under the supervision of the public administration (LR Saeima, 2010).

As public understanding of the role of the state and municipalities in society's life changes, there is an increasing demand for higher quality services provided by the state and municipalities. To ensure that public administration

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can adapt to these requirements and not hinder the overall development, a series of public administration reforms must be implemented at the national (state), regional, and local levels. Effective public administration, based on the efficient use of state and municipal resources, is a significant factor in enhancing Latvia's competitiveness in Europe and the whole world. The development of public administration reforms in Latvia is focused on ensuring a rational distribution of state and municipal functions, a clearly defined system of responsibility and accountability for the state institutions and municipalities, its effective coordination, a professional civil service, an efficient public financial management system, and predictable operations of the state institutions.

To enhance the development of public administration reforms, in May 2023, the Cabinet of Ministers of the Republic of Latvia adopted the Public Administration Modernisation Plan 2023-2027 (LR Ministru kabinets, 2023). Public Administration Modernisation Plan 2023-2027 is a medium-term planning document that determines the trends for the development of direct public administration in Latvia until 2027. The Modernisation Plan has been developed to continue, deepen, and expand the reforms initiated in the "Public Administration Reform Plan 2020". At the same time, the future trends discussed in the Modernisation Plan are determined by new global challenges (including the post-Covid-19 situation, the war in Ukraine, and the energy crisis), as well as the low level of trust of Latvian citizens in public administration (LR Ministru kabinets, 2023).

The goal of the Modernisation Plan complies with the action direction "Rule of Law and Governance" set out in the National Development Plan 2027 (NDP2027). It aims for the state administration to become more professional – more open, modern, and capable of achieving better and faster results (Cross-Sectoral Coordination Center, 2020). The measures included in the Modernisation Plan are subordinated to the fulfilment of the objective outlined in NDP2027, which envisions the implementation of intelligent, efficient, and open governance that prioritizes human needs, implements evidence-based solutions, and promotes coordinated cross-sectoral cooperation by using new methods and digital opportunities, ensuring meaningful public participation (Cross-Sectoral Coordination Center, 2020). The National Development Plan for 2021-2027 (NDP 2027) is Latvia's primary medium-term development planning document (Cross-Sectoral Coordination Center, 2020). It has been developed in compliance with the Sustainable Development Strategy of Latvia until 2030 (Latvija, 2030) (LR Saeima, 2010) and the United Nations Sustainable Development Goals (United Nations, 2015), aiming to improve the quality of life for every Latvian citizen and the society as a whole over the next seven years.

Implementing the National Development Plan for 2021-2027 is planned to achieve fundamental changes and growth in four main directions: equal rights – ensuring the implementation of fundamental rights of Latvian citizens through the state-provided services; quality of life, which features the enhancement of overall well-being and growth of opportunities for every Latvian citizen; knowledge society, which is a common trend that fosters changes in education, science, civic awareness, media, and the economy; responsible state as a response to current and future challenges posed by climate and demographic trends (Cross-Sectoral Coordination Center, 2020).

Concluding insights

Public administration is defined as an administrative apparatus and a set of institutions of the executive branch, encompassing national, regional, and local levels, where the development and implementation of public policy and the definition and provision of public services occur.

Administrative services are public services (of the state and municipalities) provided by public administration institutions and municipalities. The operation of any service is oriented towards satisfying the customer's needs. Research into needs is also necessary to understand the service area's mechanism.

The public sector comprises government and municipal institutions and their corporates, commercial entities with 50% or more of state or municipal capital, foundations, associations, funds, and their corporates. In the public sector, an essential criterion of effectiveness is the symbiosis between such efficiency criteria as economy and quality of public services, where a certain degree of savings is achieved while maintaining the quality of service at an adequate level. The quality of European public administration institutions directly impacts the economic environment and plays a crucial role in promoting productivity, competitiveness, economic cooperation, growth, and employment.

The improvement of the organization of on-site service delivery will contribute to achieving the goal of improving the public service system – creating and organizing delivery of services that meet the needs of residents, entrepreneurs, and other service recipients, at the same time reducing administrative burden, improving the business environment, ensuring the availability of services in regions, and promoting more efficient public administration.

Evaluating the efficiency indicators in public administration in Estonia, Latvia, Lithuania, Slovenia, and Finland, it must be concluded that Latvia has yet to show significant improvement or advancement compared to other countries.

The quality of public administration is the key to its economic performance and the well-being of its citizens. An efficient and productive public administration serves the needs of its citizens. Government institutions and their leaders need to adapt to changing circumstances, especially during times of crisis and change.

The development of public administration is related to the level of development of the country as a whole and, of course, to the old and new trends in the development of public administration. The future challenges of public administration will be related to service quality benchmarking and digitalization processes.

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INCLUSIVE EMPLOYMENT: BARRIERS AND WAYS TO OVERCOME THEM

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Abstract. Inclusive employment is a comprehensive system of measures to ensure equal access to employment for all social groups, including persons with disabilities. Inclusive employment involves developing and implementing policies and practices aimed at creating accessible and supportive work environments, adapting workplaces and providing the necessary resources and training to facilitate the inclusion of workers with disabilities in the workplace. This study aims to conduct a comprehensive analysis of the state of the inclusive labour market and identify the key barriers faced by persons with disabilities in the employment process. Particular attention is paid to employers' perceptions of the problem and the identification of factors that require priority attention from government and business. To achieve this goal, the study used methods of expert survey of employers, as well as the method of in-depth interviews with persons with disabilities. The article focuses on the problems faced by people with disabilities when looking for a job and employers' attitudes towards hiring such employees. The research involved expert interviews with representatives of various companies and in-depth interviews with persons with disabilities. The results of the study show that the main barriers to employment are discriminatory attitudes of employers, lack of information about the opportunities and rights of persons with disabilities, and problems with workplace adaptation. The authors offer a number of recommendations to improve the situation, including developing support and training programmes and information campaigns for employers.

Keywords: employment of persons with disabilities; barriers to employment of persons with disabilities; social vulnerability; social inclusion; inclusive employment; social entrepreneurship

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1. Introduction

According to the World Health Organisation, there are more than 1 billion people worldwide (15% of the world's population) living with some form of disability. Disability is usually defined as a biopsychosocial phenomenon that depends on the interaction between the individual and the environment. From this perspective, special attention is paid to promoting individual participation, especially in employment.

The issue of social inclusion is currently very acute in many countries around the world. Research in this area identifies the barriers and challenges faced by persons with disabilities and provides recommendations to ensure their increased participation in society. Many countries are introducing new legislation and developing public policies on inclusive employment and the rights of persons with disabilities. Scientific research can

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help assess the effectiveness of government interventions, suggest ways to improve them, and help identify best practices to ensure that persons with disabilities have access to quality education and training, which affects their chances of successful employment.

In the Republic of Kazakhstan, equal treatment of persons with disabilities remains unsatisfactory. This is particularly relevant in the field of labour and is related to the lack of state supervision of compliance with legal principles by individuals in the workplace (Adibayev & Susi, 2023).

Employment policy and addressing unemployment problems, including among socially vulnerable segments of the population, is a priority area of Kazakhstan's social policy. According to the Convention on the Rights of Persons with Disabilities, they have the right to work equally with others. The problem of unemployment among socially vulnerable categories of the population has economic consequences that negatively affect both the economy and the well-being of the citizens of the Republic. However, to assess the policy's effectiveness in relation to socially vulnerable groups of the population, it is necessary to understand how many citizens from among the socially vulnerable in the context of categories are represented in this or that region of the country. Unfortunately, there is no information on some categories of social vulnerability in the context of regions and the country as a whole.

The relevance of the research topic is determined by the need to create conditions for employment of socially vulnerable populations, development of their labour potential and social integration into society. It is necessary to understand that employment and direct work with socially vulnerable people have their peculiarities. In this regard, the team of authors proposes to consider the problems of socially vulnerable populations not through the prism of their vulnerability but through the prism of the labour market and their functional use in enterprises.

Thus, research on the employment of socially vulnerable people, including persons with disabilities, has a vital role to play in the struggle for a more just and inclusive society, as well as in the creation of policies and programmes that can help this vulnerable group.

2. Literature review

The literature search was conducted using Google Scholar, Scopus, and Web of Science databases during the study period.

Increasing the employment of people with disabilities is based on changing people's attitudes and behaviours to be more inclusive of people with disabilities at work (Mahasnehet et al., 2023). The academic literature on the employment of people with disabilities describes various factors that hinder this process, among them attitudinal, socio-economic, and organizational factors. Behavioural barriers and lack of reasonable accommodation, excessive workload are barriers to which people with disabilities respond (Levitt et al., 2023)

The employment of people with disabilities faces numerous barriers that hinder their professional activity. These barriers include employers' fears of additional formalities, costs associated with reduced productivity, limited mobility, job adaptations and provision of preventive care (Śledzińska et al., 2022).

Discriminatory attitudes of employers, lack of education and skills, and non-compliance with government regulations are also significant barriers (Ebuenyi et al., 2018). Lack of disability awareness, concerns about costs, and fear of legal liability are reported to be significant barriers to hiring workers with disabilities (Kaye et al., 2011).

Negative societal attitudes and low levels of education and skills among people with disabilities are identified as major barriers to employment (Pinilla-Roncancio & Caicedo, 2022). According to some scholars (Ballo & Alecu, 2023), the presence of higher education among persons with disabilities and their parents is associated with the likelihood of obtaining stable employment.

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The lack of disability registers where employers can find suitable candidates with the necessary skills is identified as a significant barrier (Paušić et al., 2021).

Discrimination, especially against women, has been identified as a major barrier to employment of people with disabilities (Naami, 2015).

In addition, misconceptions, myths and prejudices about disability continue to limit understanding and acceptance in the workplace (Moghazy & Sheriff, 2017). Research shows that people with disabilities face challenges such as discrimination, inaccessibility, lack of training and lack of employment skills (Blackmore et al., 2022). Barriers to employment for people with developmental disabilities are multifactorial, requiring stakeholder engagement and collaboration to develop policy solutions (Khayatzadeh-Mahani et al., 2019).

Employers' attitudes towards hiring people with disabilities, the demand for work, and the attitudes of people with disabilities themselves are cited as barriers to employment (Anuaruddin et al., 2018). Employers consider personal hygiene a significant barrier to employment for people with developmental disabilities (Gushanas & Thompson, 2018), and people with disabilities report lower quality of work compared to people without disabilities (Shahidi et al., 2023), which also illustrates the challenges.

In some post-Soviet countries, negative stereotypes and prejudices of employers and their lack of awareness are behavioural barriers to an inclusive labour market on the part of employers (Yusupov & Abdukhalilov, 2022).

Another barrier is that managers avoid hiring people with cognitive disabilities due to misconceptions about the obstacles they pose (Eftring & Kjellstrand, 2022). In conclusion, employment of people with disabilities is hindered by a complex interplay of factors, including societal attitudes, lack of awareness, discrimination, and misconceptions. Addressing these barriers requires a multi-stakeholder approach, policy change, education and information campaigns to promote inclusion and equal opportunities in the workplace.

The study (Olsen, 2022) noted that employers perceive the reluctance of people with disabilities to disclose information about their characteristics as a barrier to hiring people from this category. At the same time, according to the people with disabilities interviewed in the study, previous experience of interacting with employers strongly influences their willingness to disclose information about themselves, as they believe this makes them less likely to be employed.

People with intellectual disabilities are also vulnerable in the labour market, even more so than people with physical disabilities. The study found that people with intellectual disability have positive attitudes towards employment, and there is gender inequality in the employment situation of people with intellectual disability in the Nordic countries. The authors point out that support for such people in the workplace is critical and that the level of employment depends on the education these people have previously received (Garrels & Sigstad, 2021).

One of the challenges of employing people with disabilities is their socialization into segregated school and workplace systems, where they do not have the opportunity to acquire the skills and qualifications needed to enter the labour market (Jochmaring & York, 2023).

In some countries (e.g., Latin America), unemployment rates for people with disabilities are much higher than the same rate for normotypic people. Given the barriers to formal employment in the labour market, informal employment is increasing due to the lack of policies that should guarantee the inclusion of persons with disabilities in the formal labour market (Pinilla-Roncancio & Gallardo, 2023).

Social enterprises play a significant role in promoting the employment of persons with disabilities, whose development should be supported through the application of public support instruments, such as subsidizing the wages of employees with disabilities and supporting long-term investments in such social enterprises (Lall & Park, 2022; Kruse et al., 2021; Licite-Kurbe & Sevcuna, 2023; Bonfanti et al., 2023).

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An example of a social enterprise employing persons from socially vulnerable categories in Kazakhstan is the company ‘GreenTAL', whose primary mission is to train and further employment of people with disabilities, former prisoners, single mothers, mothers raising children with disabilities, etc. (Okutayeva & Askerov, 2021).

In some countries, the possibility of employment for people with intellectual disabilities is provided by micro-enterprises created by such people. Still, their development is constrained by limited funding and staffing problems. However, the activity of such enterprises has a synergistic effect on all stakeholders: income generation, employment opportunities for people with intellectual disabilities, and reduction of benefit payments (Hutchinson et al., 2022).

3. Research Methods

The research aims to study the state of the inclusive labour market in the Republic of Kazakhstan and analyze the barriers to employment of people from social categories.

To achieve the research objective and identify barriers and ways to overcome them in inclusive employment, two qualitative research methods were applied: expert interviews with employers and in-depth interviews with persons with disabilities.

As part of expert interviews with employers, 9 semi-structured interviews were conducted with employers representing different sectors of the economy. Experts were selected based on their experience and direct involvement in the processes of employment and adaptation of persons with disabilities in the workplace. The interviews covered questions about perceptions of barriers to employment of persons with disabilities, existing inclusion practices and policies, and suggestions for improving inclusive workplace environments.

The in-depth interview method with people with disabilities was used to gain a detailed understanding of personal experiences and perceptions of barriers faced by people with disabilities in employment. Eighteen respondents with different disabilities participated in the study. The interview questions aimed to identify challenges related to job search, the employment process and workplace adaptation and to gather suggestions for improving an inclusive work environment. Participants with hearing impairments were given paper questionnaires, and participants with visual and mental impairments were asked the survey questions orally. The interview questions were in two languages, Russian and Kazakh, at the respondents' choice. Respondents who were not located in Astana were interviewed online using Zoom software.

Informed consent was obtained from study participants by providing detailed information about the aims of the research study and the expected risks and benefits of participation. All interviews were recorded with the participants' consent and transcribed for subsequent analysis. The data was analyzed using a thematic analysis approach that identified key themes and patterns related to barriers and ways of overcoming them in the inclusive employment process. This approach enabled the collection of comprehensive data reflecting multiple dimensions of the problem and the development of recommendations based on practical experience and the real needs of employers and people with disabilities. All recorded semi-structured interviews were transcribed verbatim in local languages: Kazakh or Russian, depending on the language the research participants spoke. The qualitative interview data was processed inductively according to the main themes.

4. Research Results

Kazakhstan is implementing measures to encourage the inclusion of citizens with disabilities in the labour market. As of 1 January 2024, the proportion of working persons with disabilities in the Republic of Kazakhstan was 36 per cent (138,800 out of 385,800 working-age persons (Ministry of Labor and Social Protection of the Republic of Kazakhstan).

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According to some scholars (Ikutegbe et al., 2024) successful employment of people with disabilities is influenced by certain factors, including the nature of the disability, personal motivation, employer attitudes, job characteristics, community attitudes and others. The same results are confirmed by our research on the example of the Republic of Kazakhstan.

As part of the research on inclusive employment of persons with disabilities, semi-structured interview questions were developed and used with employers, predominantly social entrepreneurs. The primary purpose of these questions was to identify the current status, barriers and prospects for inclusion of persons with disabilities in the labour process. Social entrepreneurs participated in the survey, and 70% of them were women and 30% were men. The average age of respondents was 40 years old. The sphere of activity of the employers who participated in the expert interview is social entrepreneurship, namely social cafes, production, and education. On average, the experience in this sphere is about 10 years. Table 1 presents a set of questions for interviews with employers.

Table 1. Structure of questions for employers

Area	Questions
Introductory	Your full name, age, gender, place of residence
Professional	1. Field of activity 2. Work experience in this field
Employment experience of persons with disabilities	1. Do you have experience in the employment of people with disabilities? 2. what is the reason for businesses' low interest in employing people with disabilities? 3. Does your recruitment company interact with the Human Resources Development Center (Employment Center)?
Recommendations	1. What suggestions can you give to address the employment issue of persons with disabilities? 2. is it necessary to improve the legislative system concerning the employment of persons with disabilities?

Source: compiled by the authors

The first set of questions was aimed at finding out the existing experience of employers in the employment of persons with disabilities. The interviewees were asked whether they had previous experience working with this category of employees and what difficulties and successes they had noted in integrating persons with disabilities into work teams.

The second set of questions focused on analyzing the reasons for the low interest of businesses in employing persons with disabilities. Employers shared their views on possible barriers and obstacles that prevent companies from more actively recruiting employees with disabilities. They discussed the problems of stereotypes and the lack of information about the potential benefits of inclusion.

The following essential aspect of the interview included questions about the interaction of employers with state and public organizations involved in employing persons with disabilities, such as the Centre for the Development of Labour Resources (Employment Centre). This made it possible to assess the level of cooperation and support entrepreneurs receive in this context.

In addition, employers shared their suggestions for improving the employment situation of persons with disabilities. They considered possible measures that could contribute to increasing the employment rate of this category of citizens, including recommendations for adapting workplaces, training and skills development programmes.

Finally, the need to improve the legislative system in employing persons with disabilities was discussed. Employers expressed their opinions on what changes in legislation could contribute to creating more favourable conditions for inclusive employment.

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The following are the detailed responses to the semi-structured interviews with employers.

Question: "What do you think is the low interest of business in employing persons with disabilities?
All respondents answered that they have experience in employing persons with disabilities. 30% of respondents noted that the attitude towards this category of people has not changed in our country and that there is no notion in our society that people with disabilities have the same rights as other citizens and that they can benefit society. 20% of respondents noted the difficulty of adaptation, instability, lack of knowledge and skills of personnel, and fears and risks. 50% of the surveyed employers said businesses lack knowledge, fear, and stereotypes about people with special needs. There is also a lack of accessible environments for people with disabilities.

Question: "What suggestions can you make to address the employment issue of persons with disabilities?".
Almost all surveyed employers noted that it is necessary to carry out explanatory work for HR to develop a programme for adapting persons with disabilities in workplaces. 25% of respondents noted that it is necessary to conduct training for businesses that want to create jobs for persons with disabilities. 15% of respondents said that it is required to provide information support and amendments to legislation to stimulate entrepreneurs to create jobs. In addition, 10% of respondents recommended studying the experience of advanced countries that have passed this way and using their laws and rules suitable for Kazakhstan.

Question: "Is it necessary to improve the legislative system in the employment of persons with disabilities?"
All respondents answered unanimously that it is mandatory to improve the legislative framework, such as support for persons with disabilities on quota compliance. In addition, all respondents answered that their enterprises cooperate successfully with the Centre for the Development of Human Resources (employment centre) on the issues of personnel recruitment.

Question: "Does your enterprise cooperate with the Centre for the Development of Labour Resources on personnel recruitment?"
6 out of 9 experts applied to the Labour Resource Development Centre, where they were matched with employees. The other employers hired only citizens who applied independently.

Question: "In your opinion, what are the main reasons that deter employers in Kazakhstan from hiring persons with disabilities? And people from other categories."
5 employers responded that there is a stereotypical mindset in Kazakhstan whereby many employers believe that people with disabilities will not do their jobs well, will have health problems, and will take frequent sick leave.
3 employers agreed that many employers fear that particular jobs for persons with disabilities must be created, which requires significant financial investments.

One expert replied that he had encountered a problem with the employment of orphanage graduates due to their unwillingness to work permanently in one place. In the expert's opinion, this category of workers is looking for a "warmer" workplace, so they do not linger in any one job. Most likely, the expert believes, this is because graduates of orphanages are «hungrier» and are looking for better conditions.

The following results were obtained from the expert interview:
1. There is stereotypical thinking about persons with disabilities in Kazakhstani society, both among employers, businesses and the general population. In addition, it can be noted that among persons with disabilities, there is also a dependent state - "everyone owes me".
2. The state attempts to employ persons from social categories by offering various employment programmes. For example, the Centre for Human Resources Development in Astana has several employment directions: the programme "Social Jobs"; the programme "Special Workplace for Persons with Disabilities"; grants to start their own business, etc. The Centre for the Development of Human Resources in Astana has several employment programmes.
3. All large organizations should observe compliance with state quotas on employing persons with disabilities. Increasing fines for non-compliance with this quota may help to "discipline" this process. According to

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experts, the low compliance with the quota of jobs for persons with disabilities may be due to a lack of awareness and knowledge of employers, as well as the lack of adapted workplaces and infrastructure for persons with disabilities. In addition, there are stereotypes and prejudices in society regarding work opportunities for persons with disabilities.

4. The low interest of employers in employing persons with disabilities in Kazakhstani society can be explained by the lack of information about the benefits and opportunities for creating such jobs, as well as the lack of readiness and resources to adapt to the working environment and infrastructure.

To better understand this issue, research was also conducted through in-depth interviews with persons with disabilities. These interviews revealed the immediate difficulties and barriers faced by persons with disabilities.

In-depth interviews with persons with disabilities revealed another side of the employment problem. Interviews were conducted with 18 respondents who differed in gender, age, disability group, and type of impairment. All respondents had a permanent job at the time of the interview—the in-depth interview aimed to identify the difficulties the respondents faced in finding a job.

Table 2. Socio-demographic portrait of the study participants (persons with disabilities, n=18)

No.	Age	Sex/gender	Disability group	Congenital/acquired disability/ childhood invalid	Type of disease	Education	Job place
1	24	Male	1	Acquired	Musculoskeletal Diseases	College	Marketing, Project Manager, SMM
2	31	Male	1	Acquired	Musculoskeletal Diseases	Mba	Entrepreneur Head Of The Asar Rehabilitation Centre
3	29	Female	2	Congenital Disability	Mental Disability	School	Social Workshop
4	40	Female	2	Childhood Invalid	Musculoskeletal Diseases	College	Social Enterprise
5	43	Male	2	Acquired	Schizophrenia	Bachelor Degree	Social Enterprise
6	36	Male	2	Acquired	Mental Disability	Bachelor Degree	Social Enterprise
7	54	Male	2	Acquired	Musculoskeletal Diseases	Bachelor Degree	Social Enterprise
8	21	Female	1	Congenital Disability	Mental Disability	School	Social Enterprise
9	47	Male	3	Acquired	Oncology	Bachelor Degree	State Company
10	40	Female	3	Childhood Invalid	Hearing Disability	College	Secondary School, Technical Staff
11	28	Female	1	Congenital Disability	Musculoskeletal Diseases	School	Social Enterprise
12	33	Female	1	Acquired	Musculoskeletal Diseases	Bachelor Degree	Self-Employed
13	43	Male	3	Acquired	Oncology	Bachelor Degree	Government Employee
14	19	Male	2	Congenital Disability	Mental Disability	School	Social Cafe
15	26	Male	1	Childhood Invalid	Vision Disability	School	Social Enterprise
16	50	Female	1	Acquired	Musculoskeletal Diseases	College	Self-Employed
17	55	Female	2	Acquired	Hearing Disability	College	Social Enterprise
18	36	Male	1	Acquired	Musculoskeletal Diseases	Bachelor Degree	IT Company

Source: compiled by the authors

The information on respondents in Table 2 shows the characteristics of persons with disabilities who participated in in-depth interviews. Respondents can be categorized according to the following characteristics: age, gender, and disability group and education (Figure 1).

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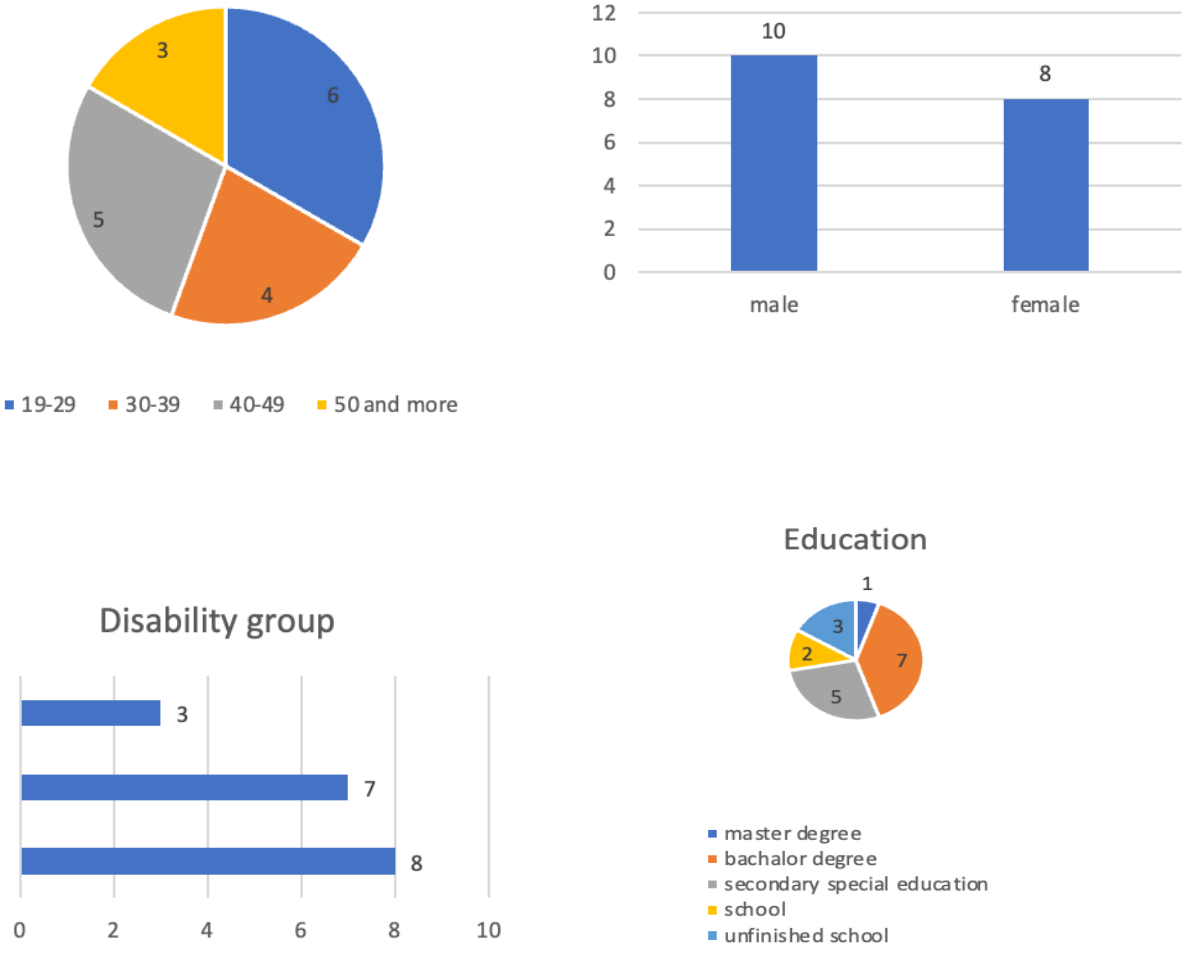


Figure 1. Classification of respondents by characteristic features
Source: compiled by the authors

As can be seen from Figure 1, among the 18 interviewed persons with disabilities, 10 are men and 8 are women. 44% (8 persons) have higher education and master's degree, while 5 persons (28%) have secondary specialized education (college), school education and those who have not completed their entire schooling - also 28%.

The average age of the interviewees with disabilities is 36 years old. More than 80% of interviewees have 1 and 2 disability groups.

In-depth interview questions were designed to address issues related to the barriers that persons with disabilities faced or did not face when looking for a job. One group of questions was introductory to determine their main characteristics (gender, age, type of impairment, disability group). In the other group, questions of a psychological nature were created to highlight their situation in obtaining a disability group or finding a job. For example, what were their motivations for finding a job, whether they received psychological support or needed it? In the third set of questions, we tried to find out whether they had encountered barriers to employment, and if so, which ones and how they manifested themselves. The last block of questions aimed to determine the attitude of persons with disabilities to the state social policy pursued in the country and how aware and satisfied they are with the state measures to support the employment of this category of people.

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Table 3. The structure of in-depth interview questions with people with disabilities

Subject	Questions
Introductory	1. Your name and age 2. What is your disability group? 3. What type of impairment do you have (hearing/vision, etc.) 4. At what age did you receive your disability?
Professional competences	1. Do you have higher or secondary specialized education? 2. Did you have work experience before receiving disability?
Psychological	1. Has your life changed professionally since becoming disabled? Have you had to change jobs since then? If yes, for what reason? 2. What motivated you to look for a job? Who motivated you to look for a job (if you are working)? 3. After receiving disability status, who provided you with the most robust psychological support? 4. Do you think that attention should be paid to the psychological recovery of persons with disabilities when they receive this status? If so, who can do this? 5. Maybe it is necessary to open free psychological rehabilitation centres. 6. Have you felt a negative attitude towards yourself at work because of your disability? If yes, how did it manifest itself? What, in your opinion, can change this?
Employment barriers	1. In your opinion, are there barriers to finding a job for people with disabilities? 2. Do you think the disability allowance amount is sufficient? If it is not a secret, please tell me your allowance amount. 3. Are there any restrictions on formal employment and receiving disability benefits? 4. Why do you think some persons with disabilities do not work or do not want to work? 5. Have you encountered barriers (discrimination) to employment because of disability? If yes, what reasons did the employer give? In your opinion, what was the reason for the refusal of the employment objective? 6. What difficulties do you face when looking for a job (no special conditions for you, remoteness from home, low salary, etc.)? 7. Do you think that barriers to an accessible environment affect the employment of persons with disabilities? 8. In your opinion, does your work experience and education affect your employability? Do you think that age and disability groups directly impact the likelihood of employment?
Government support	1. What state programmes to support persons with disabilities do you know? 2. How and where do you look for a job? Do you use the services of the Employment Centre? 3. Do you think it is essential to educate (educate) society about the attitude towards people with disabilities?

Source: compiled by the authors

The conducted interview with persons with disabilities showed the following results:

Question: "Have you encountered problems in employment related to your disability?"
Male, 31 years old, acquired (musculoskeletal): "Yes, there have been difficulties in employment. I think that because in the Soviet Union, people did not see people with disabilities, there was no inclusive education. Now that there is already inclusive education, it turns out the new generation will be quite normal to accept such people with special needs, even if they can find their best sides. I think so. Many people, because they do not know how people with disabilities will work, do not want to hire because they do not know what a person with disabilities is since it was a closed topic in the Soviet Union. But now the situation is much better, and this issue will be resolved over time. In modern society, young people see children with disabilities from childhood; they know how to communicate with them as equals, and society is becoming more inclusive. When these children grow up and mature, they will know how to communicate with persons with disabilities, including at work. At present, I believe there are no barriers to employment for people with disabilities".

Some of the respondents answered that they did not. Acquired work skills and education made the process of employment easy. However, this applied only to those people who had acquired disability. Before the injury, these people had work experience and higher education and, therefore, had no problems finding a job. After receiving an injury, one of the respondents was trained in the Bastau Business Programme, received a certificate and applied for a grant, which he successfully won. With the money received from the Foundation, the person opened his rehabilitation centre, which is currently functioning quite successfully.

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The conducted interview shows that the active life position of a person who has been injured still will allow him to be competitive in the labour market and find a job. According to respondents Yeldos and Yerzhan, the motivating factor for job search and further employment is the presence of family and financial obligations. "We don't want to be worse than others", states respondent Yeldos.

Based on the results of the interviews, it was concluded that people with congenital disability found it challenging to find a job because congenital disability deprived them of the opportunity to get higher or secondary specialized education, and, as a rule, due to their disability they changed their place of work frequently. The reasons for this are physical condition and health deteriorating occasionally. At the moment, the principal place of work of persons with congenital disabilities is social enterprises, which purposefully employ people from such categories.

The interview also revealed that persons with mental disabilities are also employed in social enterprises, where there is monotonous work that does not require socializing with people and where it is necessary to perform one specific action.

Question: "Has your life changed professionally since receiving your disability? Have you had to change jobs since then? If yes, for what reason?"
Male, 24 years old, acquired disability group 1 (musculoskeletal system). "Yes, life has changed, especially in the professional sphere. Naturally, I can no longer work as a waiter now. I work 50% remotely - marketing, project management, and SMM. Work related to marketing, mostly. In the rehabilitation centre, I work as an administrator and manager.

Question: "Can you please tell me what motivated you to look for a job, who or what motivated you to look for a job (if you are working)?"
Male, 43 years old, acquired disability (mental impairment): "I was at home for a long time, I couldn't work, then after that there was rehabilitation, the doctor told me that there is such a programme and there is such an institution at psychiatry, here they treat and give courses, CPSR. There were dances, self-development, handicrafts, carpentry shops, and locksmith shops". The respondent discusses a social enterprise established at the Centre for Psychiatric Care (Astana).

Question: "In your opinion, are there barriers to finding a job for people with disabilities?"
Male, 31 years old, acquired (locomotor apparatus): "I can say that in the past there were indeed such problems, barriers, but nowadays, persons with disabilities are much better employed. But in my opinion, people should be offered jobs only after a course with a psychologist, when a person is ready for work, considering his/her new peculiarities".
Woman, 29 years old, disabled as a child (mental retardation): "Nowadays, yes, it is difficult. I was refused when they learnt that I had a group" (note: on disability).
Woman, 40 years old, childhood disability (musculoskeletal): "Very strong. No one wants to take people with disabilities; they all want healthy people. They are probably afraid... I can tell you from my experience that I worked from 9 to 6, and we sometimes worked on Saturdays, but my employer told me that I should say that I work fewer hours and that I don't work on Saturdays. Most employers do not want to take me on if they get some benefits from the state... And then they do not take me on, especially with such severe problems as mine, for example.

Question: "Do you think it is necessary to carry out some educational work in society about the attitude towards people with disabilities? What kind of knowledge should it be? What should be told about in the first place?"
Woman, 40 years old, disabled as a child (hearing impaired): "Yes, it is very important. People with disabilities are the same people; they just have a little bit of limitations, some of them mentally and some of them physically. People perceive it inadequately; I know for sure. It's not just children, adults, and young people, from 15 years old, who have an inadequate attitude toward it.

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Question: "In your view, what more needs to be done in Kazakhstan to develop an inclusive labour market?"
Male, 54 years old, acquired (musculoskeletal system): "The state should pay more attention. It is necessary to pay attention to entrepreneurs, cut taxes, or something else to motivate them to take people with disabilities. And as much education as possible should be given to people with disabilities".

As follows from the above quotes from the interviews, people with disabilities believe that in Kazakhstan, employers do not seek to employ people with disabilities because they are afraid of difficulties, do not want to create adaptive workplaces, there are fears of ignorance of how to work with people with disabilities.

The study revealed the significant difficulties faced by people with disabilities in finding employment. Based on interviews with 18 respondents representing a variety of disability groups and impairment types, it found that despite their current employment, many faced significant barriers to employment. These barriers include employer bias, lack of accessible jobs, lack of adaptive accommodations, and limited access to information about job openings.

Particular attention should be paid to the fact that all respondents could find employment despite the difficulties, indicating considerable potential and motivation among people with disabilities. However, to improve the situation, more effective support and adaptation programmes must be developed and implemented, as well as campaigns to raise awareness among employers of the importance of inclusive employment.

These findings highlight the need for a comprehensive approach to addressing the employment of persons with disabilities, including legislative measures and public initiatives to create a more inclusive labour market.

Analysis of semi-structured interviews with 9 employers with experience of employing persons with disabilities revealed several key challenges and barriers faced by Kazakhstani businesses. Firstly, many of them need more information about the specific needs of such employees and how to effectively integrate them into the work process, indicating a lack of awareness. Secondly, there is a tangible lack of state support: there are insufficient financial and organizational resources to assist enterprises willing to employ people with disabilities. The third problem is stereotypes and prejudice towards workers with disabilities, which creates additional barriers to their employment. Finally, employers face legal and administrative difficulties in complying with legislation and procedures governing the employment of persons with disabilities.

To improve the situation, employers suggested the following measures that the state could take:
1. Development and implementation of training and professional development programmes for employers to improve their competence in employing persons with disabilities.
2. Strengthening state support. Introduction of tax incentives, subsidies and grants for businesses employing people with disabilities.
3. Public campaigns and educational programmes: conduct campaigns to raise awareness and change public opinion about the employability of persons with disabilities.
4. streamlining the legislative framework: Simplifying administrative procedures and providing more transparent and more understandable regulation of labour relations involving persons with disabilities.
These findings emphasize the need for a comprehensive and coordinated approach involving the active participation of both government and business in addressing the employment of people with disabilities in Kazakhstan.

Conclusions

The conducted research has shown that despite all the positive changes in the state social policy, the time has not yet come for a significant improvement in the lives of people with disabilities. Public opinion remains biased, there is insufficient support from society, and people with disabilities themselves often lack incentives to achieve a better life. This leads to a gap between state policy goals for integrating this category of people into society and their actual participation in various spheres of life. All this creates severe obstacles for

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persons with disabilities to realize their rights to work and well-being, which prevents the full realization of their social citizenship.

This study makes a unique contribution to the study of inclusive employment by identifying and systematizing the main barriers faced by both persons with disabilities and employers. Based on in-depth and expert interviews with various stakeholders of the inclusive labour market in Kazakhstan, the study provides, for the first time, a comprehensive analysis of the interrelationships between different factors that hinder the employment of persons with disabilities. In addition, the study offers a new theoretical framework for understanding the mechanisms of adaptation and inclusion of persons with disabilities in the working environment, contributing to the development of inclusive employment theory.

The practical relevance of this study lies in its ability to offer concrete recommendations for improving inclusive employment in Kazakhstan. The study highlights the need to develop and implement educational programmes for employers, strengthen state support through tax breaks and subsidies, and conduct public campaigns to change stereotypes and raise awareness of the employability of persons with disabilities. These recommendations can be used as a basis for creating more effective government policies and support programmes aimed at the integration of persons with disabilities into the labour market, which will ultimately contribute to the socio-economic development of the country and improve the living standards of this group of the population.

This study was conducted in the Republic of Kazakhstan, and the object of the research is stakeholders in the inclusive labour market. In Kazakhstan, socially vulnerable segments of the population include persons with disabilities, mothers raising children with disabilities, large families, former convicts and other categories. This study is limited to the study of employment of persons with disabilities. At the same time, it is necessary to pay attention to the employment issue of the categories mentioned above in the following studies.

Sociological research on disability and inclusive employment has contributed to the growth of public recognition of the rights of people with disabilities and a change in social work discourse. However, the situation with the employment of persons with disabilities remains unchanged.

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LEADERSHIP AND COMMUNICATION IN SUSTAINABLE MANAGEMENT OF LOCAL GOVERNMENTS – A PERSPECTIVE OF SLOVAK MAYORS*

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Abstract. With the release of the 2030 Agenda, sustainability is becoming a progressively more debated topic in public life. Municipalities expected to develop sustainably in line with the Sustainable Development Goals are no exception. The essence of implementing sustainability in municipal management is the knowledge of this concept and, above all, the will to continue to learn and improve. The carriers of this will are mainly mayors and other local government leaders who can influence the perception of sustainability issues in local government and encourage municipal staff to further their education. Our research focused on Slovak local governments of different sizes and conducted structured electronic interviews with 21 of their representatives. Based on our theoretical findings, we established one hypothesis closely linked to the five research questions. The main finding is that mayors are interested in sustainability issues and want to consider them in their governance. However, they feel only moderately informed, perceiving a need for more interest in these topics, especially from the state.

Keywords: local governments, sustainability, sustainable management of local governments, mayors, perspectives on sustainability information

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1. Introduction

As the world's crises grow in importance, so does the need to behave more sustainably. A sustainable environment is most often associated with ecological approaches and nature conservation. The term 'sustainability' is also used in other areas. These are more precisely described in the 2030 Agenda, a set of global commitments to respond to today's global challenges. The agenda also identifies all issues as interlinked and, therefore, need to be addressed together, rather than separately and in isolation, which could lose effectiveness. The 2030 Agenda concerns everyone (countries, local governments, individuals) and includes the following 17 goals (MoE SR, 2019):

- No poverty
- No hunger
- Quality of health and life
- Quality education
- Gender equality
- Clean water and sanitation
- Affordable and clean energy
- Decent work and economic growth

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- Industry, innovation and infrastructure
- Reducing inequalities
- Sustainable cities and communities
- Responsible consumption and production
- Climate protection
- Living under water
- Life on land
- Peace, justice and strong institutions
- Partnerships for the Goals

Even though this concept is most often associated with ecology and purchasing behaviour, it also affects local governments (mainly the goal of Sustainable cities and communities). According to Eurostat (2024), there is progress in achieving SDGs in Slovakia and the EU, too. As the smallest local government units, municipalities, in particular, can act as exemplary organizations sustainably. Moreover, the findings show that municipalities have high credibility among citizens (SITA, 2021) and can thus be initiators of sustainability communication. We understand this concept from three perspectives - economic, ecological, and social - and together, we form a sustainable development system. Recent findings show that one pillar can only function with the other, and the system can only be fully sustainable if sustainability is achieved in each pillar. It is, therefore, important for local governments to be exemplary public officials who can stimulate interest in this issue among citizens and strengthen the motivation to improve the situation in Slovak regions.

Local governments play a crucial role in giving information to citizens (Čičmancová, 2022; Shava, Vyas-Doorgapersad, 2023). In all of its forms, communication in local government should be considered in the strategies and be a priority for the representative person (Svirak, Kwarteng & Pilík, 2023).

The mayors need to be active in the process of communication and try to involve citizens as much as possible so that they feel heard. However, the sustainability problems in local governments still have to be covered in the academic literature. More specialized research is needed to fill the research gap.

2. Theoretical background

Attention to self-governing units in Slovakia is found in the first half of the 13th century. In those times, some towns had the privilege to elect their representatives to their executive bodies. Regional territories with their administration began to emerge in the Middle Ages. In the course of history, the territorial administration in the Slovak territory changed several times until it reached its present form (Nižňanský, 2002). The Government of the Slovak Republic approved the concept of decentralization in April 2000; thus, a second level of self-government was created, and a higher territorial unit was added to the municipal system. It is important to note that it was stipulated that there should be no relationship of superiority and inferiority between the city authorities and the local government bodies of the higher self-government units; both levels have clearly defined roles, competencies, powers or responsibilities towards the citizens. In the same way, the state and local governments are supposed to represent a cooperation relationship, and the state only supervises local governments in terms of laws (Nižňanský, 2002).

Local governments in Slovakia are established according to Act No.369/1990 Coll. on Municipal Establishment and Act No.302/2001 Coll. on Self-Government of Higher Territorial Units (Act on Self-Governing Regions). All the main definitions and principles of management, whether of a municipality or a self-governing region, are subject to these two Acts.

Mederly et al. (2017) state that a municipality is "a self-governing unit exercising a part of public authority". Although the municipality acts as the universal administrator of the territory, not all parts of the administration in a given territory fall under its competence. Nižňanský (2002) argues that municipal or local government does not act on behalf of the state but on behalf of the citizens. Thus, local government is relatively independent from the state administration.

Local governments belong by nature to the public sector, which, together with the private sector, forms the mixed economy of the state (Jankelová et al., 2018). Rektořík defines the public sector as "the part of the national economy in which public services are performed in the public interest, is financed predominantly from public budgets, is governed and administered by the public administration, is the subject of public decision-making

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and is subject to public control" (Rektořík, 2007). Thus, it is essential to note that the public sector in the conditions of the Slovak Republic may differ from the public sectors of other countries, as it also reflects the culture of a given country, the political situation or legislative statutes.

Another difference between the public and private sectors is the nature of public services provided by local governments. Local governments are tasked with providing a wide range of public services that affect residents' daily lives. These services range from basic infrastructure and social services to cultural and recreational activities.

The public sector, and therefore local authorities, have a significant role to play in the field of communication. Communication between local government and citizens is a vital tool for informing them about local government services, projects and plans. It also allows citizens to express their needs, comments and expectations. Consistent and transparent communication builds public confidence in local authorities and their decisions.

Pavlik (2014) recommends using the PDCA cycle in municipal management, which mainly aims to improve processes continuously. This cycle can help mayors better plan their activities and achieve sustainability in the management sooner. Its main components - Plan - Do - Check - Act - run in a continuous cycle, and the process can thus be improved and improve its quality. This system is mainly applicable in local governments in providing services to citizens, where we can include all routine acts in contact with the citizens in the municipal office. The different steps of PDCA are shown in Table **1**.

Table 1. Steps of the PDCA cycle

Section	Activities
PLAN	Defining the context of the organization Defining the vision, goal and objectives Defining the organization's processes, their inputs and outputs Defining responsibilities Defining the need for documentation Describing the limitations, risks and activities in the processes Defining the means of monitoring and measuring results
DO	Implementation of activities, monitoring and control Defining the necessary resources
CHECK	Verifying the process and comparing it with the plan
ACT	Bringing change The process of improvement

Source: STN ISO norm 9001:2015

According to Epstein (2014), sustainable management is to be based mainly on the strong leadership of the manager. Leadership is part of the processes necessary for governance, along with a clearly defined sustainability strategy, a sustainability structure, and defined sustainability systems, programs, and actions. However, to ensure processes are in place, it is necessary to understand the external context of the organization (or local government), its internal and organizational context, and its human and financial resources. These components represent inputs to the processes. The outputs are then the sustainability performance, particularly the social impact, together with stakeholder reactions, which can be reflected in the financial implications of sustainable management. All outputs combine to form the primary outcome, which is the long-term financial performance of the organization (or local government). Again, this shows a concentric understanding of sustainability, in which the last and most nested component is economic sustainability, which can be achieved by adequately grasping the other two components of sustainable development. The leaders in local government can perceive a higher level of economic and financial sustainability of the local government when collaborating with different stakeholders (Kim, 2018). These can be neighbouring municipalities and their representatives or active citizens.

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The leadership in the local government can transform into digital leadership when using modern methods coming with the digital transformation of today's world (Branderhorst & Ruijer, 2024). However, the mayors or other managers in municipalities need to be informed about various management methods and communication with citizens. Also, continuing education is required to strengthen the knowledge of these methods. The lack of such information can be addressed by improving the systems for communication in the municipal office, mainly by organizing the responsibilities and competencies of each employee (Holubčík et al., 2024). Big data solutions are advised when working with a lot of information in a local government (Andrews, 2018; Koman et al., 2019). Larger municipalities can even use sustainability performance systems to address the problems, help organize the work in the municipal office, and plan strategies according to the sustainability development goals (Deslatte & Stokan, 2020).

Even though the approach to sustainable management can vary from person to person, their political preferences do not play a vital role, especially in local governments (Bisogno et al., 2023). Sustainability may also be connected to ethics, and some authors advise that the mayors or other representatives, including the employees of the municipal office, undergo some ethical training to achieve more ethical and moral decision-making in the municipality (El Haber & Nagpal, 2023). The mayor and their strong leadership can also determine whether the working environment is balanced and non-discriminative. In local governments, female employees may be overlooked and need to achieve higher management positions (Hutchinson et al., 2014).

Wang, Wart and Lebredo (2014) argue that the most critical communication carrier is the local government representative. Therefore, they emphasize good leadership, which, according to the authors, can achieve a higher level of communication and actual management in local government. It also describes two different approaches to improving sustainability. The first is bottom-up communication, which actively involves local government residents in planning and deploying sustainable activities, emphasizing the importance of citizen support throughout the process. The second approach described is top-down communication, i.e. it uses professional expertise to support decision-making regarding sustainability.

Communication can occur at different levels and in various forms in an organization. Based on the nature and number of actors involved in communication, three main types of communication can be described, namely intrapersonal, interpersonal and mass communication. These are described in more detail in Table 2 below.

Table 2. Types of communication and their use in local government

Type of communication	Meaning	Character	Use in local government
Intrapersonal	It takes place in the inner psychological environment of the individual, the inner conversation.	It is part of every communication process, The essence is knowledge about oneself, All the thought processes associated with the functions of management take place within it, Important for management in terms of developing strategies and tactics, The output is preparation for other types of communication.	Reflection of the managing person Preparation for business and municipal council meetings
Interpersonal	The process of exchanging information between the originator and the recipient of a message.	A complex and multifaceted process, It is ongoing in the organization, It is a product of social-psychological and interpersonal relationships or organizational structure, It takes place within or between levels of management, It is applied in the allocation of tasks, evaluation, control, motivation, release of employees, in the areas of personnel management and other managerial functions, It involves managerial communication, Empathy, assertiveness are applied,	Between the managing person and the employees or the members of municipal council Personal interviews with citizens Visits

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Mass	It disseminates information to a large group of people through mass communication tools.	It allows the transfer of information in a large number of identical copies to an anonymous mass of recipients, Information is communicated to a large and diverse audience, Sender and recipient are not in direct, immediate contact, It has a plural and public character, Its main functions are democratizing, socializing, rationalizing, informative, informative, cognitive, promotional, educational, ethical-aesthetic, The process follows specific rules, This includes internet communication.	Disseminating information to all citizens Social networks Municipal Radio Official and information boards Website Municipal events

Source: Szarková, 2011 and own elaboration

The efforts to improve communication with inhabitants should involve the local government strategies and internal processes, with the mayor or other representative responsible (Abhayawansa et al., 2021). Especially since addressing this topic to the public is complex (Demjanovičová & Varmus, 2021).

For this research, we understand and define the terms used as indicated in Table **3** based on previous research, experience, and information gained.

Table 3. Understanding and definitions of used terms

Term	Definition
Sustainability	A concept of three pillars, economic, environmental and social, aiming to maintain or improve the status quo with the help of available resources, not restraining future generations.
Sustainable management	The approach to management considers the principles of sustainability and sustainable development.
Sustainable management of a local government	The approach to management mainly applied to local governments, is slightly different from the management of a business with a need to understand and plan regular communication with citizens. An important aspect is strong leadership.

Source: Own elaboration

Based on the theoretical information, the research gap still exists, mainly in terms of the managerial perspective on this topic. More research was needed to cover the views and opinions of mayors of local governments, especially the smaller ones, on their approach to education, leadership and relationships with citizens.

3. Research objective and methodology

This article aims to present the perspective of mayors of Slovak municipalities and their approach to the management of communication and sustainability in the municipality. In our research, we focus on how the representatives of Slovak local governments (mainly smaller ones) approach management in terms of their leadership and communication and whether and how they gain information on sustainability. The focus is also on involving citizens in the management process, thus creating a sustainable environment in the local government. We worked with one hypothesis based on five research questions.

H: If mayors are knowledgeable about sustainability, they consider this information in their management approach.

The theoretical findings suggest that an essential element in the sustainability of local government is leadership, which is exercised by the person in charge, i.e. the mayor(s) or mayoress(es). We assume that an informed manager makes more thoughtful decisions and thus applies knowledge directly to governance.

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RQ_1 How do municipalities enable citizens to engage in governance?
The main objective is to determine whether and how the municipality seeks to actively involve citizens in governance and consequently improve citizens' quality of life in various aspects. We assess not only the level of public involvement in governance and how citizens perceive it but also factors such as the use of digital services or the overall willingness to adapt to citizens' needs.

RQ_2 How do those in charge approach the needs of citizens?
The research question is based on several indicators and focuses on whether municipal leaders respond in any way to the expressed needs of their citizens. Thus, various indicators are evaluated, exploring perspectives on measuring needs and their recognition or opportunities for public involvement in municipal governance. It also partially relies on identifying problems and needs, as these can often be based on citizen demands. The interest of citizens in what is happening in the municipality may also be decisive, which is necessary for sustainable governance, as this is the only way for citizens to express their needs.

RQ_3 How do managers support staff training and professional development?
The third research question seeks to answer whether education or training is carried out regularly and systematically in municipal offices and whether the persons in charge thoroughly support it. The aim is to determine whether higher and more regular continuing education can support sustainability work in municipal governance or raise awareness. We assume that with higher and more intensive training, a higher likelihood is present that employees will have better and more precise information about sustainability.

RQ_4 Can managers identify what influences the management of local government?
The question aims to determine whether local governments are likely to become more sustainable just by clearly understanding these impacts. In addition to the effects, this research question also measures whether those in charge are willing to carry out trust measurements of citizens and employees, which can clearly impact governance.

RQ_5 What information do local government managers have on sustainability?
The research question closely relates to how prepared municipalities are for sustainable management. It aims to discover what municipalities know about sustainability and whether they can translate it into management. Evaluated indicators measure knowledge of the pillars of sustainable development, expectations from sustainable management, and knowledge of its benefits, as well as general work with and understanding of sustainability in the municipality.

All respondents received the same set of questions to make it easier to evaluate their responses statistically:

- Law 17/1992 defines the concept of sustainable development in Section 6 as follows: "Sustainable development of society is such development which maintains the possibility for present and future generations to satisfy their basic needs of life, while not reducing the diversity of nature and preserving the natural functions of ecosystems." Have you come across sustainable development or sustainability as such in practice in any way? Do you work with it in community management?
- Do you expect to improve the situation in the municipality if you start working more on sustainability, or is this topic not a priority for you?
- Are the manager and the municipality/office staff sufficiently informed about the benefits of sustainable management in the municipality? Where do you get such information from?
- Do you identify the most significant impacts on governance (management) in the municipality? If so, how and what are they, and where do they operate? Please give an example.
- Do you support your training as a manager and the municipality/office staff? If yes, in what ways?
- Do you undertake opinion polls of citizens in any way? For example, measuring trust in the municipality or you as a manager by municipal/office staff and citizens, measuring satisfaction with life in the municipality, etc. If yes, what kind, how, and how often will it be?
- How can your citizens participate in governance and have their needs heard?

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We looked for evidence in the responses that could be used to measure the indicators, and we later coded these responses according to pre-specified values from 0 to 5. These values were then statistically evaluated and compared to describe the general situation in these surveyed communities. Thus, in addition to the quantitative output, a qualitative output is also present, with specific responses from the respondents.

During February 2024, 117 requests to participate in the research were sent out via e-mail. The sample consisted of all municipalities from the districts of Prievidza, Bytča and Žilina, including towns. Out of the 117 messages, two could not be received due to the non-functioning of the mailbox. The municipalities did not have another e-mail address on their website, so the request was not resent. Of the remaining 115 requests, two municipal representatives apologized for not participating in the research due to workload. There were 21 positive responses, with the highest representation of municipalities from the Prievidza district (18 municipalities). 2 municipalities (including 1 town) from the Žilina district and 1 municipality from the Bytča district participated.

Participating local government leaders responded by return e-mail, and these responses were collected on March 10, 2024. Given the work responsibilities of the directors, there was an assumption that if they did not respond within 15 working days (3 weeks), the likelihood of a further response would decrease (e.g., also due to the receipt of new e-mails in their inboxes). We decided only to contact the municipalities that responded again.

Responses from the mayors were mainly brief but informative. Given the diversity of responses and the different communication styles of the respondents, we transcribed each interview, emphasizing the essential parts of the answers to the questions, following the interview scoring procedure of Hendl and Remr (2017):

- When transcribing the interviews, only the most important findings for each question were recorded for each respondent.
- The findings were categorized into lists with similar themes, thus simplifying the evaluation through descriptive statistics.
- Only then were codes assigned to the responses.

Due to the variety of responses and the number of responses, it was only possible to code some immediately, primarily for work purposes. In the paper, the results are described verbally with support in the form of graphs and tables.

4. Results and discussion

4.1. Results from the interviews

Working with sustainability in municipal governance

To avoid misunderstandings or different interpretations of the term sustainability, the term was described in the introduction to the interviews. Seventeen local government representatives said they regularly encounter sustainability and sustainable development goals (SDGs) in their management. Most who do not experience this issue are local government leaders with a population of less than 1,000. A paradoxical finding was that even the representative of the largest rural municipality involved needed to record regular encounters with this concept in governance. However, he stated that actions in line with SDGs are being taken in the municipality (Figure 1).

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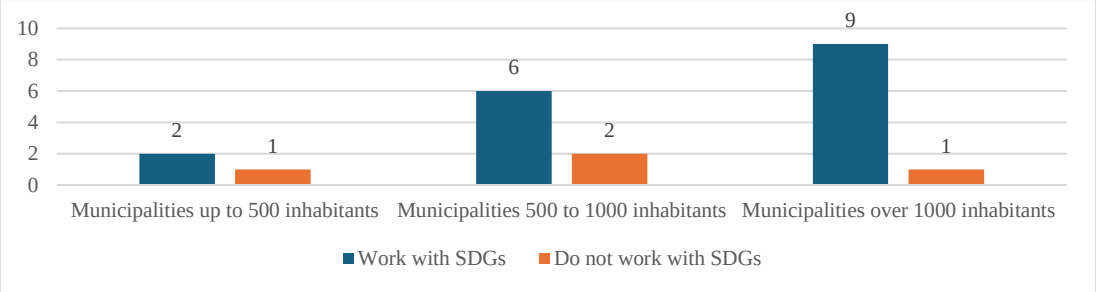


Figure 1. Work with SDGs in municipalities

Municipalities that regularly deal with this issue said they most often understand it in ecological terms. They mainly take measures that contribute to improving the environment. Representatives described working with solutions that support ecosystems, for example:

- Energy efficiency in buildings,
- Use of photovoltaics,
- Water conservation measures,
- Construction of composting sites,
- Promoting waste management and preventing black dumps,
- Environmental protection and education.

Municipal representatives also emphasized the social understanding of sustainability, mainly by supporting employment in municipalities, educating and informing citizens, promoting rental housing and providing social services.

Of all the mayors interviewed, only 5 explicitly stated that they understood sustainability in the municipality, mainly economically. In this regard, they are taking steps to promote a healthy economy in the municipality:

- Strategic Financial Planning,
- Adherence to strategies, especially the own strategic documents and Agenda 2030,
- Provision of financial contributions for civic projects,
- Use of state and EU subsidies.

A crucial positive finding for this research was that municipalities consider it essential to inform and educate citizens about sustainability. By linking this with the content analysis of the websites and strategic documents, we found that those municipalities that participated in the interviews do indeed inform about the facts mentioned above on their websites.

Expectations for improvement in the municipality when working with sustainability

The second question in the interviews touched on expectations when working with sustainability. Those representatives who do not regularly engage with the SDGs stated that the topic is not a priority for them, and thus, they have no expectations. In the case of the municipality involved, which has over 2,000 inhabitants, the representative expects to improve the situation in the municipality, even if the topic of TUR needs to be actively addressed at the moment and the agenda is only in the planning process. In the case of the municipalities already working with sustainability, they have only noticed a positive impact, an improvement in the condition of the municipality and an increase in the satisfaction of the citizens.

On this issue, some representatives expressed that the barrier to more sustainable governance is finance and the need for more capacity for community development. Mayors feel overwhelmed by other responsibilities; thus, there is no space left for planning with sustainability in the village environment.

However, the essential finding remains that municipal leaders are interested in working with sustainability if the abovementioned barriers are removed. Municipalities also rely on funding and subsidies from the state or the EU.

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Awareness of the benefits of sustainable management

In the interviews, we also explored subjective feelings of awareness of sustainability issues. Of the 21 representatives, up to 9 said they needed to be more sufficiently informed and felt a strong need for increased awareness and support from the state. In the interviews, the directors stated that information on sustainable management does not come to the municipalities systematically but sporadically, and they do not see any structured information network for this type of information. As sources of information, representatives most frequently mentioned:

- Internet and self-initiated search,
- Generative information exchange in management,
- Association of Towns and Municipalities of Slovakia,
- District Environmental Offices,
- Media,
- Practice of other municipalities in Slovakia and the Czech Republic,
- Available training and seminars.

Figure 2 below shows the level of awareness of sustainable management by municipality size. Awareness is balanced in both size groups of participating municipalities. An important observation is that up to 52% of the representatives reported that their understanding of sustainable management and its benefits needs to be at a sufficient level to be able to implement this knowledge in their management.

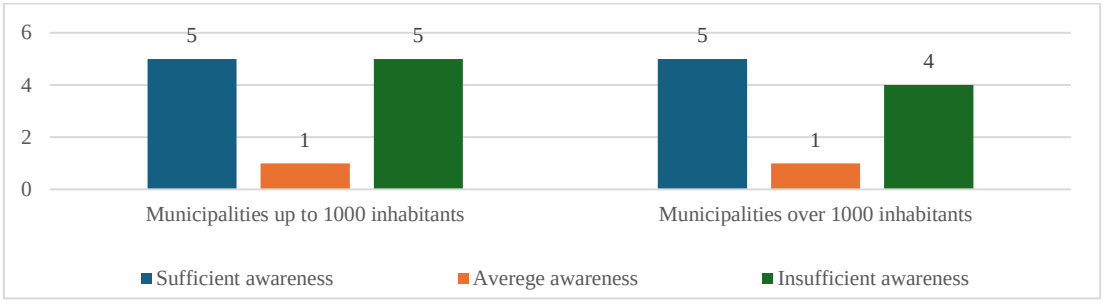


Figure 2. Perception of awareness of sustainable local government management

The interviews also revealed a perceived need for more state engagement in information transfer to local governments. Managers often need more space to promote sustainability awareness, especially if they do not consider it a priority. In the Slovak local government environment, it is still seen as a supplementary agenda rather than a primary one.

Identification of impacts on management

Citizen satisfaction was the most recurrent response to the question of impacts on governance. Governors stressed that it is essential that citizens feel safe and happy in the municipality and are interested in the functioning of the municipality. Other management decisions are often based on this factor, and objectives are adapted. Where municipalities do not identify any influences on governance, they follow standard regulations and their discretion. In addition, municipalities identify the following significant impacts:

- Laws, regulations,
- Government and political situation in Slovakia,
- Involvement of the professional public,
- Environmental protection and compliance,
- Finances and how to redistribute them,
- Constructive suggestions from citizens,
- Civic associations, NGOs and interest groups,
- Lack of skilled workers in the labour market, lack of experience of municipal employees.

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Regarding staff, managers further commented on the importance of improving the working environment, communicating with staff and sensitizing them to the challenges and changes in the municipal offices. Employee satisfaction was thus also one, albeit less pronounced, element influencing the municipality's management.

Support for management and staff education

The working environment in municipal offices was also touched upon in the fourth question in the interviews. The aim was to determine how managers approach further training and staff development. A positive finding was that all the municipal government leaders interviewed had a positive attitude towards training. Only the forms in which this training is provided differed. An overview of the most common ones is shown in Figure 3.

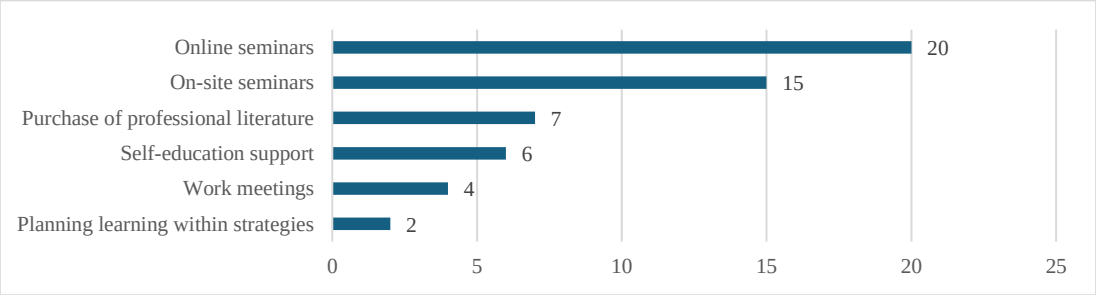


Figure 3. Most used methods of staff learning in municipalities

Most representatives support a form of online employee training. They appreciate the ease of access and conducting the learning process on-site at the workplace. Slightly less popular are face-to-face seminars, which often require municipalities to allocate more funding and are more time-consuming. Seven municipalities also make purchases of literature and subsequently support staff in the self-learning process. Four municipalities consider workshops as a tool for staff training. Two municipalities stated that they plan staff training in their strategies and have funds allocated for these activities in advance.

A recurring theme in the responses was the interest in training and seminars organized by third parties. In the Prievidza district, it was mainly the Regional Training Centre of Nitra Municipality (RVC Nitra), an association of municipalities that regularly organizes training activities for municipal representatives and employees. This centre belongs to the Association of Local Government Education (AVS), which, in addition to the RVC Nitra, also has associations in the municipalities of Martin, Rovinka, Senica, Trenčín and Trnava (AVS, 2024). In addition to organizing seminars and training courses, AVS is also involved in preparing and distributing literature for the further education of employees in local government.

Other external organizations mentioned included universities and training academies, but also associations of municipalities. For example, the Association of Towns and Municipalities of Slovakia, representatives of which are also mentioned as a source of information on sustainability, and the Association of Towns and Municipalities of Upper Nitra. In this respect, municipalities consider cooperation with other cities or third parties as key to sustainability, as they are often essential in obtaining information and education.

Conducting opinion polls

None of the interviewed municipalities systematically organize public opinion polls, nor do they have any efforts to do so. Occasionally, citizens' satisfaction is surveyed, especially when drafting strategic documents such as the PHSR or the Community Social Services Plan. However, municipalities stated that this was the case in the past, and today, they do not even resort to such measures. Officials often responded that they consider elections public opinion polls to confirm citizens' satisfaction with their governance. Some respondents stated that they have been in office for more than 3 terms. Therefore, there is no need to survey satisfaction; it is just the knowledge that the citizens have re-elected them to the municipality's leadership.

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The most immediate form of gauging citizen satisfaction and increasing their perception of sustainability was personal interviews with citizens and encouraging attendance at municipal council meetings. One representative confirmed holding monthly public meetings with citizens and collecting feedback through word of mouth. Two representatives said that citizens could give such feedback through forms on the website, which was confirmed in the content analysis of the websites of these municipalities.

However, in general, leaders prefer personal and direct communication with citizens, citing the size of the municipality and the fact that in smaller municipalities, citizens know each other and have a higher chance of meeting with a representative than in a larger municipality or city. The only town involved expressed that they felt the need for regular monitoring of citizen and/or staff satisfaction in their management, but this was not possible due to the high workload of the office staff.

Listening to citizens' needs and involvement in the management of the municipality

Municipal leaders are inclined to listen to citizens' needs, even if they do not regularly monitor them (based on findings from the previous interview question). According to the directors, personal interviews can gather the necessary information to ensure that citizens' needs can be heard and considered in governance. Each municipal official interviewed recalled encouraging active participation in municipal/city council meetings among citizens. They believe it is where citizens' needs can be heard and discussed the most. The mayors are also open to visits to the municipal office during office hours, which they say is used on average by citizens. They also confirmed their efforts to respond to citizens' phone calls and e-mail communication. Thus, the most frequently cited opportunities to engage in governance were:

- Active participation in the meetings of the Local Assembly,
- Personal conversation with the mayor or staff of the local authority,
- Telephone or e-mail communication,
- Public meetings and rallies,
- Systems for leaving suggestions on the website.

The finding that local government leaders want to listen to citizens and their needs is essential. It is, therefore, up to the citizens to increase their involvement in the municipality's governance and to want to be involved in the opportunities provided. Moreover, the officials interviewed said that the opportunities they provide for citizens to get involved in governance are sufficient but that citizens are only sometimes willing to use them.

Additional findings from the interviews

Outside of the structured questions, the representatives were allowed to comment on important topics related to sustainability and communication with citizens. Most often, they emphasized the openness of the governing body and its willingness to communicate with citizens. This is a means of increasing transparency and trust in the municipality. Representatives of rural municipalities also pointed to the differences between villages and towns and the advantages of proximity, openness and personal communication. On the issue of sustainability, there was a recurring emphasis on environmental protection, biodiversity conservation, and education.

A positive finding was that mayors generally perceived communication as a strongly supportive tool in building a sustainable community. However, the need for more awareness and reduced ability to convey this information to citizens remains a problem. In the words of the municipal leaders involved, it is vital that the state also powerfully demonstrates its efforts to inform and develop municipalities, which they commented negatively on, especially in the context of the current political situation in Slovakia. They also consider the training of employees and their high level of qualification to be essential factors. One representative commented that processes in the municipality can slow down considerably if it is not possible to find a sufficiently qualified person to work with sustainable development.

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4.2. Hypothesis evaluation

The following hypothesis was stated: **If mayors are knowledgeable about sustainability, they consider this information in their management**
approach.

We needed to answer the connected research questions to evaluate the hypothesis correctly.

RQ_1 How do municipalities enable citizens to engage in governance?
The interviews revealed that the governing officials try to encourage citizens to participate in the municipal council/municipal assembly meetings, which they perceive as an appropriate means for citizens to be involved in governance. However, in the words of the mayors interviewed, this option is not often used, and citizens want to see results without their direct involvement. Respondents reported that citizens can also be involved in the municipality's management through traditional conversations with them or with staff, whereby they can make suggestions and proposals for improvement, which they seek to have discussed at meetings of the Municipal Assembly.

RQ_2 How do those in charge approach the needs of citizens?
Citizens' needs are the priority for many mayors and are the most considered in management. Interviewed mayors consider citizen satisfaction as one of the biggest influences on governance, and they want to increase the active participation of citizens in governance. They are interested in the needs of citizens and are open to communicating with them, either in person or in other ways.

RQ_3 How do managers support staff training and professional development?
Managers are firmly open to further education for themselves and staff, as they say, they recognize the importance of updating the knowledge and information exchanged in municipal and city offices. At the same time, they also have the will to translate the acquired data into management and communication with citizens, especially in sustainability. Municipal leaders describe the need for more support from the state but often try to compensate for this with their positive approach to education and information.

RQ_4 Can managers identify what influences the management of local government?
The most significant influence, as we have already mentioned, is the satisfaction of the citizens, and those in charge try to take steps to ensure that the space of the municipality is improved to the satisfaction of the people. Another significant influence is the political situation in Slovakia and the EU, together with the laws and regulations from these bodies, which municipalities cannot influence and must react to. They often feel overwhelmed by their responsibilities and cannot attend to other problems in the municipality. However, the municipalities interviewed do not have a systematic procedure to identify impacts; these were only results from observation and the experience of the persons in charge.

RQ_5 What information do local government managers have on sustainability?
Municipal representatives said they are moderately informed about sustainability issues and work with them accordingly. However, they again identified a need for the part of the state and its approach to conveying such information, as they often must do their research and be proactive in education. They most often understand this issue from an ecological point of view, as this is where they carry out most of their actions and activities for the municipality and citizens. Managers clearly stated that if they have such information, they see no reason not to take it into their management and try to translate it as much as possible into their managerial responsibilities in the municipalities.

Based on the findings from the research and the answers to the research questions, we can logically argue that **hypothesis H is confirmed.** Thus, when mayors have sufficient information on sustainability issues and management, they will most likely consider this information in the municipality's management process. It is, therefore, essential that the mayors feel informed about sustainability and sustainable management.

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4.3. Discussion

According to Fenton (2016), urban sustainability can be influenced by five main factors, both internal and external, namely *capacity*, *mandate*, *resources, scope* and *will*. These findings partially agree with our conclusions regarding influences on the sustainable management of local governments. In our research, the interviewed mayors stated mainly the external factors, such as *laws, environmental and financial policies* or *stakeholder groups.* The factor of *will* has been examined through the research questions, and we found that the mayors are open to education and more sustainable development and management in the municipalities.

A very similar research to ours was conducted in 2019 in Serbia, where the authors interviewed a couple of leaders in local governments, asking them questions on their approach to sustainability, development and education on these topics. They found that when the mayors have the needed knowledge about sustainability, they apply it to their management. This finding entirely agrees with our findings. The study also confirmed that effective local self-government leadership correlates with sustainable development principles (Marjanović et al., 2019).

The authors of a 2024 study in Africa argue that public-private partnerships can help local governments be more informed on sustainable development and achieve the desired status more easily (Ramolobe, Knahdanisa, 2024). They also state that communication is vital to achieving such partnerships and building and strengthening trust. In our research, the mayors realized that the right communication approach can help build relationships with the citizens, strengthening the community and trust.

Research from 2022 showed that a mayor's style of communication and leadership can positively influence the growth of businesses in the area (Meirobe et al., 2022). Even though we did not examine this factor, the chosen representative's communication approach can positively affect the whole community and the sustainability of the municipality.

According to 2019 research in China, a municipality's representative's leadership and management style plays an essential role in achieving sustainability in said municipality. Moreover, the study confirms that external communication with other municipalities can embrace these relationships, leading to better problem-solving (Liu, Yang, 2019). In our research, we agreed on the importance of internal or external communication.

When engaging citizens in the management process, Davies (2008) stated that communication with the municipality's representative can improve the relationships in the community and help to strengthen engagement. When the mayors knew how to interact with citizens, they used it in their management, which agrees with our findings.

Uncertain finances are also related to the possibilities for further education and increasing expertise in local governments. In our research, municipal representatives described insufficient interest and support in education from the government. These problems may continue to deepen, so managers and employees will not acquire the necessary information for sustainable management. A study from Brazil also indicated the need for more interest in communication between the state and local governments, leading to a lack of information on SDGs. The authors stated that this lack of information may lead to the failure to consider SDGs in regional plans. Still, they also found that this problem is connected to limited resources (as stated in our research), lack of political will (contrary to our findings) or the overall ability to implement SDGs to the local government management (Carvalho et al., 2024). Our research showed similar results, where the interviewed mayors stated that one of the main reasons for not implementing sustainability into the local government management is needing more information from the state.

A significant limitation of this study is the low interest among the contacted managerial personnel in participating in the research through interviews. As some have expressed, we understand that these representatives receive similar requests daily. From this perspective, it is undoubtedly appropriate to conduct similar research again and ensure a higher level of participation. This problem was also addressed in a 2022 study of Portugal municipalities, where the authors stated that there is still space for improvement in the digital

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communication of representatives with citizens and other stakeholders, primarily via e-mail (Lameiras et al., 2022).

Several representatives of the studied municipalities mentioned in interviews that one of the most significant influences on the municipality's management is the government and the political situation in the country. Since municipalities are part of public policy, this factor must be considered, even considering limitations. During the past four years, four governments operated in Slovakia: those of Igor Matovič, Eduard Heger, the caretaker government of Ľudovít Ódor, and in September 2023, the return of Robert Fico's government after several years. Consequently, local governments lack a sense of certainty as regulations constantly change. The current government (as of April 2024) is already known for various controversial measures during its six-month tenure, including amendments to the penal code, the issuance of a law on public television and radio, and the announced potential loss of the flow of EU funds to Slovakia, particularly from the Recovery Plan (RTVS, 2024). EU funds are a crucial part of financing sustainable projects in municipalities. Thus, the uncertain financial situation may lead municipalities to decisions that deprioritize sustainability and focus only on immediately visible problems with pragmatic solutions. Moreover, if implemented, the latest draft of the road law would significantly limit the powers of municipalities, for example, in installing traffic signs or building bike paths, which are often part of municipalities' sustainable strategies (Zdút, 2024). The Association of Towns and Villages of Slovakia and SK8, the association of self-governing regions, has already opposed this proposal.

For future research, it would be suitable to broaden the research sample to other regions in Slovakia or neighbouring countries. Also, a second round of these questions would bring interesting information on whether anything has changed in the meantime, mainly influenced by the new government of Slovakia and the new President. Focusing more on communication with citizens may be useful, especially in researching the methods the interviewed mayors prefer to use, whether personal or digital.

Conclusions

An essential finding of this study is the link between knowledge of sustainability and management approach. Managers who are aware of sustainable principles are more likely to consider these aspects in the management process, which is critical to sustainable development. The concept of sustainability can contribute significantly to the effective management performance of local governments. It highlights the real needs of citizens and the professional work of local governments that consider these needs in a broader context: environmental, economic and social. From a managerial perspective, the process of education is necessary here. This needs to occur on the part of local government - its executive and managerial arms. Equally important is the education of citizens, which is the task of local authorities and, in the context of research, also of the State and the European Union. Yet, there still needs to be an excellent research gap addressing how local government representatives handle information on sustainability and how to implement it in management. Our research found that the Slovak mayors are willing to learn more about this topic and implement the information gained in their decision-making.

It is important to note that the mayors are open to citizens and their needs since they are considered to have the greatest impact on local government management. Thus, the representatives try to make space for the citizens to be heard and often engage with them in formal or non-formal meetings. Yet, the managers prefer direct contact and see no relevance in conducting polls among inhabitants. The interviewed mayors agree that communication is an excellent tool in achieving sustainability in a local government and want to be present for the citizens. The mayors' approach to sustainability in Slovakia has yet to be academically researched. Thus, this paper provides not only practical but also theoretical value.

In conclusion, this paper can contribute to the research on sustainable local governments by bringing together various perceptions of Slovak mayors. From the practical point of view, this study covers the actual and realistic approach to sustainability in Slovak local governments in 2024.

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SPORTS MANAGEMENT IN THE CONTEXT OF SUSTAINABILITY*

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Abstract. This paper explores the intersection of strategic sports management and sustainability, focusing on the perceptions and practices of Slovak sports managers. Through a comprehensive literature review, data analysis from a questionnaire survey involving 177 respondents and interviews with sports managers and sports professionals (n = 3), we identify the key factors influencing the integration of sustainability into sports management. The findings highlight the importance of stakeholder engagement, the challenges faced by sports organizations in implementing sustainable practices, and the role of marketing in promoting sustainability. Our results suggest that despite the growing awareness of sustainability, many sports managers lack the necessary background in management and economics, indicating a need for targeted educational resources. This study contributes to the broader understanding of how sustainability can be effectively incorporated into the strategic management of sports organizations.

Keywords: sports management; sustainability; strategy

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JEL Classifications: L83, Z23, M31

1. Introduction

The concept of sustainability has gained significant attention across various sectors, including sports management. As environmental, social, and economic challenges intensify, the need for sustainable practices in sports organizations becomes increasingly critical. Sustainability in this context refers not only to environmental stewardship but also to the ability of sports organizations to maintain long-term viability by addressing social responsibilities and economic realities.

This paper aims to explore how sustainability is perceived by researchers and implemented by sports managers. By examining the theoretical underpinnings of sustainability and its application within the sports industry, we seek to identify the factors that facilitate or hinder sustainable practices. The study also evaluates the current state of knowledge and practices among sports managers, emphasizing the importance of education and strategic planning in achieving sustainability goals.

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Our research is based on a detailed literature review and an empirical study involving a questionnaire survey of Slovak sports managers. The survey data, complemented by semi-structured interviews, provide insights into the practical challenges and opportunities faced by sports organizations striving for sustainability. This paper offers a framework for integrating sustainability into the strategic management of sports clubs, highlighting the role of stakeholder engagement, marketing, and innovative financial strategies.

2. Theoretical background

Despite its complex and multifaceted historical development, the concept of sustainability remains context-specific and ontologically open (Purvis et al., 2018). As defined by the Cambridge Dictionary (2024), sustainability refers to the ability to maintain something (such as the quality of a product) over time. In the context of the environment, sustainability is defined as the ability to cause minimal or no harm to the environment, enabling the entity to continue its operations for an extended period (Cambridge Dictionary, 2024).

In recent years, sustainability has emerged as a prominent concept driven by the need better to manage limited resources, address deteriorating environmental conditions, and tackle other societal challenges. This concept has permeated the management field, fundamentally transforming its principles and practices.

Barile and Saviano (2017) describe the approach to achieving sustainability, emphasizing that for a system (or an organization's system) to survive, it must establish relationships with other viable entities (suprasystems) that possess the resources necessary for its survival and effective functioning. To access these resources, decision-makers within the system must engage suprasystems (and subsystems) in a network of relationships. The effectiveness of this network depends on the ability to harmonize multiple, often divergent, interests and to involve actors in the process of value co-creation. It is crucial to focus management attention on stakeholders of critical importance to the enterprise.

Businesses bear social responsibility because of their economic power (Guevara et al., 2021; Daugaard & Ding, 2022). With economic power comes increasing societal expectations that companies will contribute to solving problems, whether on a global scale (such as addressing global warming) or on a local level (such as tackling recycling issues in the city where the company is based).

Businesses are responsible for addressing issues related to their impact on society (Daugaard & Ding, 2022). This means that companies should responsibly manage the externalities created by their activities. It is also suggested that business managers are guided by moral principles that motivate them to act responsibly. In response to the growing emphasis on sustainability, concepts such as ESG (environmental, social, and governance) are becoming more prominent (Li et al., 2021).

Stakeholder theory is closely related to the ESG framework since stakeholders form demands placed on the enterprise and control the scarce resources it needs. These demands can be environmental, social, or economic and may also include solutions to broader societal issues. The specific ESG outputs an enterprise delivers depend on the nature of its stakeholders (Daugaard & Ding, 2022). Stakeholder theory assumes that stakeholders are interested in various aspects of the enterprise, such as outputs, processes, and inputs. However, the relationship should be reciprocal; the enterprise must also address stakeholder requirements to achieve its goal of profitability. Therefore, a cooperative relationship between stakeholders and the enterprise is mutually beneficial, especially when pursuing social objectives.

Savio et al. (2023) investigated the association between the ESG concept and the COVID-19 pandemic. Their analysis revealed that most reviewed publications report a positive impact of robust ESG practices on stock prices. They found that a solid commitment to ESG values provides insurance during bear markets by fostering moral capital and building loyal stakeholder relationships. Specifically, ESG performance has been shown to offer a form of protection against economic declines during crises such as COVID-19. This is supported by studies showing that companies with low ESG performance, particularly those with higher carbon intensity in sectors such as oil extraction, aviation, and refining, experienced significant stock value declines (Savio et al.,

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2023). Wang et al. (2023) also describe the positive effects of integrating ESG concepts into corporate culture. The pandemic crisis has underscored the critical need for individual sports organizations to adhere to business principles. This need existed even before the pandemic, as state budget support often fails to cover the total costs of these organizations. To ensure their sustainability, it is essential for sports organizations to explore new entrepreneurial concepts to achieve economic sustainability (Lindsey, 2008; Hu et al., 2016; Trail & McCullough, 2019).

Zhu et al. (2023) explored the significance of sustainability in sports club management, highlighting that renewable resources and environmental challenges have become central topics in academic debate and international discourse. They noted that research on improving renewable and environmental resources from various perspectives is gaining momentum. Zhu et al. conducted a questionnaire survey with 439 respondents from China, Iran, South Korea, Japan, Vietnam, Singapore, and Kazakhstan, disseminated through sustainability NGOs. The results revealed a consistent belief among respondents, regardless of their work experience, in the importance of greening sports management. Their research emphasizes the need to develop green financing tools, use various media to raise public awareness about sustainable sport management and promote green energy generation for sports venues such as stadiums and swimming pools.

Among the business aspects that require proper setup and continuous management, marketing is essential for sustainability. This involves marketing what can be described as a sports product (Vamplew, 2018; Siani et al., 2021). Typically, this product is a sporting event, with customers as spectators, either on-site or through broadcasts.

From a sustainability perspective, building a membership base and ensuring the long-term functioning of sports organizations is only possible with effective marketing strategies. These strategies should focus on gaining attention, reaching out, and recruiting new athletes from early childhood (Radojevic et al., 2011; Nemec et al., 2019). Emphasizing this aspect of sustainability is crucial for the continued existence and operation of sports organizations. It is also essential to consider the perceived popularity of different sports among various age groups. Differences in the popularity of sports among different age groups (Spehar et al., 2008; Petric et al., 2011) may indicate changing preferences among the younger generation.

McCullough et al. (2020) analyzed the web groups of 147 North American sports organizations and their associated web groups for environmental performance communication. They found that only one sports organization featured an environmentally themed message in its web group, while 42 sports organizations highlighted environmental initiatives through dedicated web groups for the respective team or match venue. These communications primarily focused on fan engagement initiatives (i.e., awareness and participation) but lacked goal setting, measurement metrics, or performance summaries. Therefore, sports organizations may need to be sufficiently addressing sustainability.

Approaches to sustainability vary depending on the size of sports clubs (Moon et al., 2022). For the most prominent sports organizations, such as international sports federations, sustainability is implemented in several ways:

- **Pilot sustainability events**: For example, at the 2018 ICF Canoe Slalom World Cup in Augsburg, Germany, the ICF distributed reusable bottles to athletes and glass bottles to volunteers and staff (Moon et al., 2022).
- **Partnering with non-profit organizations**: This approach is suitable for smaller sports organizations. Non-profits are interested in expanding sustainability, particularly environmental initiatives, while sports organizations aim to optimize costs, creating opportunities for natural partnerships.
- **Partnering with sustainability-focused consultancies**: This paid form of outsourcing requires a more significant monetary commitment and is likely more suitable for large sports organizations.
- **Establishing a sustainability committee or commission**: This approach requires sufficient financial and human resources, experience in sustainability, and senior management support and belief in

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sustainability concepts (Moon et al., 2022). This concept is also primarily suitable for large sports organizations.

- **Implementing a comprehensive sustainability strategy** involves appointing at least one full-time sustainability-focused manager, indicating the sports organization's commitment to taking the entire initiative on sustainability issues rather than outsourcing. This approach includes making critical strategic decisions, such as avoiding partnerships with companies in industries that could jeopardize the organization's image as an environmental leader.

Barbu et al. (2022) highlight the growing importance of sustainability concepts in research and practice within sports settings. They demonstrate that sports managers are committed to implementing social responsibility concepts and allocating resources to these activities. By doing so, sports organizations benefit financially, improve their reputation and image, increase fan loyalty, and attract new potential talent to their membership base. Acknowledging their dependence on the community, sports managers are motivated to put social responsibility concepts into practice. Specifically examining the Romanian sports market, Barbu et al. (2022) state that social responsibility and sustainability are essential for the sustainable management of sports organizations and significantly impact their economic performance.

Cury et al. (2022) addressed environmental sustainability in sport, identifying it as a recent and growing area. They emphasize that the urgency and complexity of environmental issues necessitate a global perspective and adopting methods and theories that foster closer collaboration between researchers and practitioners to develop and implement effective solutions. Implementing environmental concepts in the sports market can be challenging due to barriers such as the need for more relevant knowledge among sports managers.

Financial sustainability is also an important topic. For instance, modern football has seen tremendous growth in revenue, yet clubs face serious financial challenges (Ali, 2023). In 2010 UEFA's introduced Financial Fair Play (FFP) regulations due to financial instability among European clubs, many of which were operating at a loss. Effective regulation requires legislative authority, accountability, fairness, expertise, and efficiency. The core idea of FFP is to ensure clubs spend no more than they earn and pay their debts timely. As an effect of FFP, debt generally has tended to reduce substantially, with UEFA revealing that the combined net debt of Europe's top division clubs decreased from 65% of revenue in 2010 to 40% in 2018. (Dunbar & Middleton, 2022)

Sports organizations and federations need to develop strategies for innovation and implement strategic management to address long-term challenges and improve performance (Tjønndal, 2016).

Interestingly, as Ivašković & Čater (2018) found, the level of public funding influences non-profit basketball clubs to adopt strategies focused on community benefits rather than competitive sports success, which negatively affects their overall performance. Implications found in Varmus et al. (2023) suggest the future creation of a database that captures public sports funding, with established rules for its continuous operation and updating. To enhance transparency, this database could be powered by blockchain technology. These recommendations may lead to more sustainable sports systems.

Over the centuries, strategical management has been defined by many authors, each offering different interpretations, though many of these definitions agree on various points. For instance, David (2011) views strategic management as an art and science of formulating, implementing, and evaluating decisions that enable an organization to achieve its objectives. To achieve organizational success, strategic management integrates management, marketing, finance/accounting, production/operations, research and development, and information systems. Nag et al. (2007) view it as an attempt to identify optimal plans to achieve and maintain competitive advantages. It is an interdisciplinary field that deals with the behaviour of companies and other market participants. It involves their strategic behaviour, decisions they make regarding the organization of their production, mutual relationships, and competitive position. All this is based on a thorough understanding of the broader environment in which companies must operate (Nag et al., 2007). Wheelen et al. (2015) state that the core of strategic management consists of analyzing the organization as a whole and integrating various disciplines. It also involves studying the organization's competitiveness in the market and the industry in which

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it operates. Concepts of corporate social responsibility and ethics are also applicable in strategic management. A study by Bezerra et al. (2024) found several of the most frequent keywords linked with the term strategic management are a process (sequence of steps to achieve a specific goal), an art (creativity, innovation), a knowledge (about an internal and external environment), a set (of people, or things, resources, actions), a system (a series of inputs transformed into products or results). All of these keywords point in a direction of what the term incorporates.

Strategic management is generally a process based on knowledge of one's organization and the external environment. Based on this knowledge, it is necessary to form a long-term plan (Adámik et al., 2021) for all organizational processes to be adapted. Additionally, strategizing means deciding whether to cooperate or compete with entities around sports clubs. It is essential to seek synergies in cooperation (Holubčík et al., 2023).

Although numerous articles individually address strategic sports management and sustainability topics, more research is needed to integrate these themes into a comprehensive framework. While specific issues are often discussed in the literature, our study highlights the need for a more practical theory to guide professional sports managers in effectively addressing sustainability challenges.

3. Research aim and methodology

Annesi et al. (2023) identified clusters of sustainability-related studies and calculated their occurrence in sports-oriented literature: environmental sustainability – 27 %, social sustainability 9 %, economic sustainability 5 %, combined environmental, social, and economic sustainability – 13 % (including CSR). This shows sports management scientists are focused on environmental sustainability. However, a complex view of the whole ESG concept occurred in 13 % of cases. The true sustainability is only achieved when all the parts of ESG are addressed. Therefore, the authors of this article focus on the broader sustainability perspective. This article links context to sustainability and strategy based on a literature review.

Additionally, partial data from a questionnaire in which Slovak sports managers participated as respondents are provided. Responses were collected from early February 2024 to March 2024. 177 responses were collected. A 90% confidence interval corresponds to a statistical error of 6.06%. To assess the internal consistency and reliability of the questionnaire data, Cronbach's alpha test was used, with values ranging between 0 and 1. The test result had a value of 0.71, indicating that the questionnaire data was highly reliable. The claims and models are supported by validation through semi-structured interviews (n = 3) with practising sports managers and academic sports managers. The main focus of the interview was the model visualized in Figure 2, although general ideas and concepts in this article were also discussed.

Our research concluded that sports managers are generally not professionals and lack managerial or economic backgrounds. Therefore, we endeavoured to synthesize all the key sustainable and strategic management aspects. The outcome is an easy-to-follow map of steps designed to promote more responsible management, leading to the incorporation of sustainability into strategy.

This research aims to develop a comprehensive model that elucidates the key factors and processes involved in integrating sustainability into the strategic management of sports organizations. By employing a mixed-method approach that includes a detailed literature review, a questionnaire survey of Slovak sports managers, and semi-structured interviews, this study seeks to construct a practical and theoretical framework to guide sports managers in embedding sustainable practices into their strategic planning and operations.

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4. Results and discussion

The majority of respondents (sports managers), approximately 59.32 %, indicated no distinction between the roles of manager and coach in their sports club. This can be attributed to the likelihood that the sample comprises predominantly small and medium-sized sports clubs, which may need more budgets to pay separately for a sports manager and a sports coach. Additionally, approximately 72.88 % of the respondents do not have a degree in economics and management, while 24.86 % indicated that they have a degree in this field. The remaining respondents reported having only basic education in this area. This suggests the need to provide contextual materials for sports managers. They need to see the broader perspective to understand the connections between various aspects of managerial work, which will enhance their ability to lead sports clubs toward sustainability.

First, to explain where the requirements for sustainability originate and to illustrate the direction of stakeholder demands for implementing CSR and sustainability concepts, visualization in Figure 1 is provided.

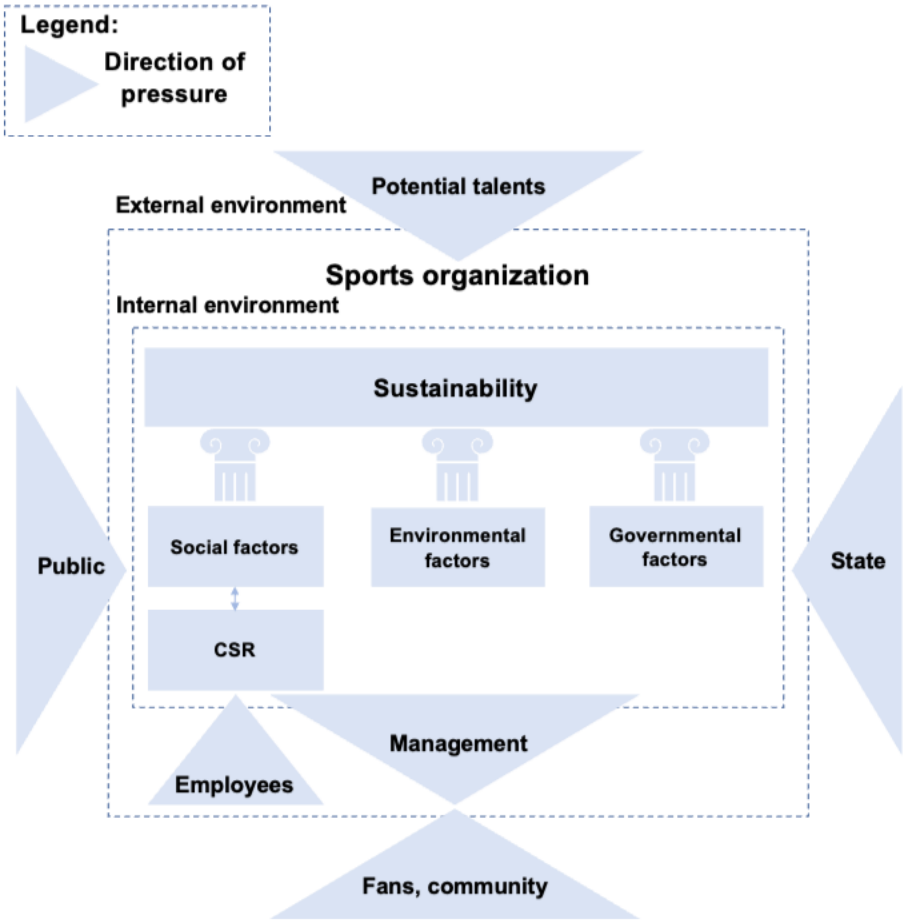


Figure 1. Impact on the Implementation of Sustainability Concepts in a Sports Organization
Source: Own elaboration

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The centre of Figure 1 illustrates the pillars of sustainability derived from ESG, represented by social, environmental, and governance factors. Additionally, the CSR concept is shown to be closely related to the social factors of sustainability. CSR encompasses a set of tools for building a company's image as responsible towards its environment, particularly when the enterprise is strategically focused on long-term branding. The aforementioned concepts are enclosed within a dashed rectangle, representing a logical set in the context of the illustration. The larger dashed rectangle delimits the internal environment of the sports organization.

The figure's triangles represent the pressure direction from selected stakeholders, particularly those mentioned in the studied literature. Within the internal environment, employees may advocate for the implementation of sustainability. Conversely, the management of the sports enterprise can sometimes act as a barrier to implementing sustainability concepts, depending on their attitudes towards the issue. However, it is also in the management's interest to ensure the continuation of core processes within the sports organization (e.g., organizing training sessions, matches, etc.).

Therefore, management must prioritize resource allocation towards these core processes. As a result, management often needs to temper the expectations of other stakeholders based on the assumption that these expectations exceed the organization's capacity and willingness to implement sustainability concepts. This situation can occur even if management supports sustainability concepts but faces limited options, which other stakeholders may not always accept.

External stakeholders, including the public, fans, community members, potential members (or potential sporting talent), and the state, exert pressure on the organization to behave responsibly towards its environment and to adapt its processes to align with their expectations regarding social, environmental, and governance factors of sustainability.

The state, in particular, can legislate and enforce sustainability measures. Potential members (i.e., individuals considering membership in a sports club) can also base their decision-making process on these sustainability factors. As previously mentioned, the strength of the pressure to implement these concepts depends on the size of the sports organization itself.

Achieving sustainability is a long-term endeavour. Steering an organization towards sustainability requires setting strategies and goals, possibly adjusting the organizational structure, and changing the reward and motivation system, among other actions. The strategy and objectives must be coherent and aligned with the ultimate goal of sustainability. Given this task's complexity, the article's authors have mapped out the steps that need to be addressed or modified to guide the company towards sustainability. The model is illustrated in Figure 2.

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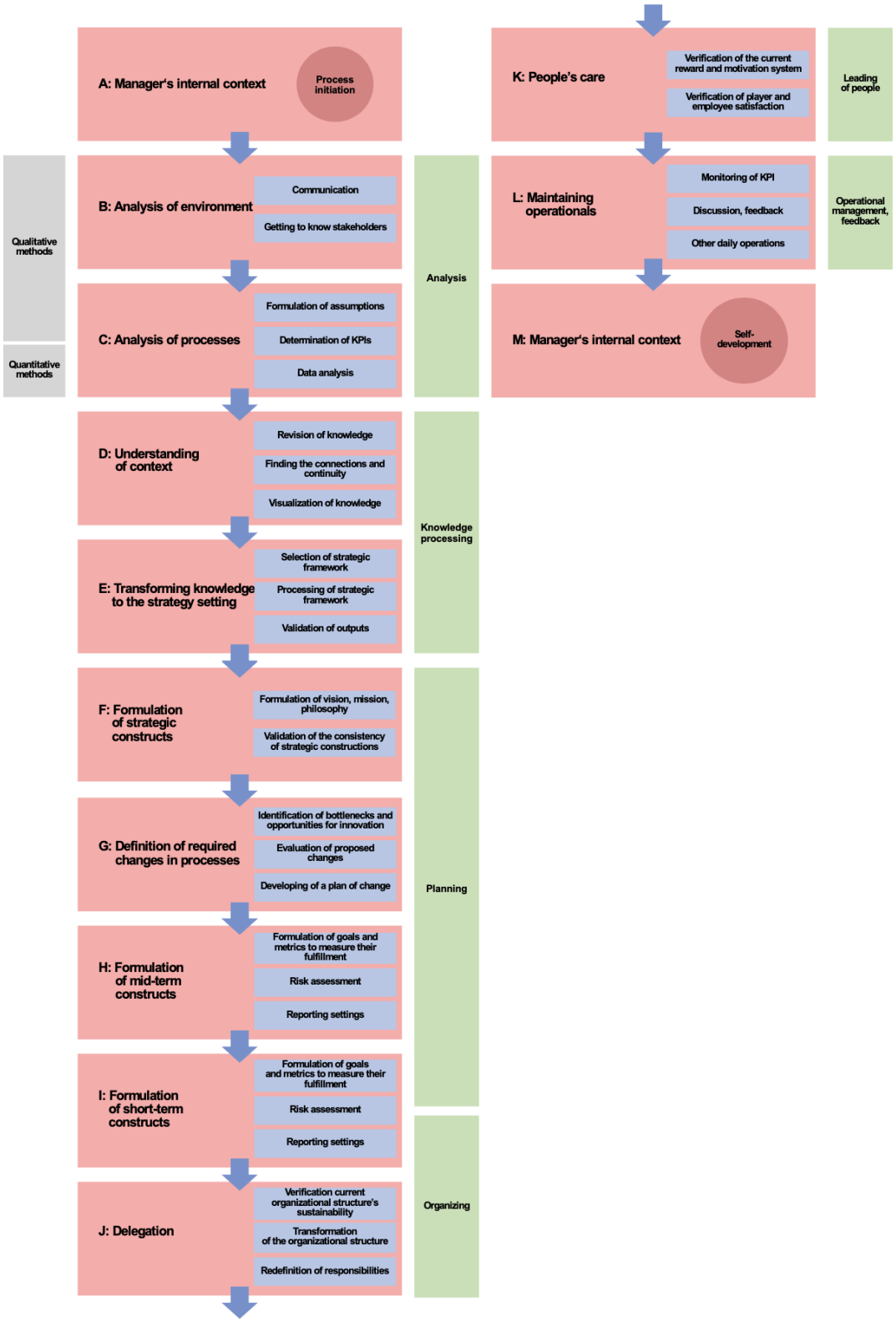


Figure 2. Map of Actions for Moving Towards Sustainability
Source: Own elaboration

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The red formations represent the downstream process. The green units categorize processes according to basic management activities (analysis, planning, organizing, leading people, etc.). The grey services are shown only for the analytical part, categorizing analytical methods. Here, qualitative methods (interviews, observation, and analysis of existing documents such as accounting documents) dominate and are recommended to sports managers as they are typically less costly. The blue departments briefly describe some key process activities.

The model comprises thirteen sections, labelled alphabetically from A to M. Throughout the model, it is assumed that the sports club budget is severely constrained. Data analysis is recommended for quantitative methods primarily focused on analyzing the current state of processes (how they meet objectives, key drivers, etc.). The approach depends on the size of the club and other factors. In larger clubs, a sports manager might delegate data analysis to a data analyst or reporting staff member. However, in smaller clubs with limited staff, the sports manager should endeavour to conduct the data analysis personally if time permits. Data analysis should not be omitted or neglected.

The model is designed from a managerial perspective, providing practical steps that can be followed or adapted to specific environments. One key idea of the model is that the manager is involved at the beginning, throughout, and at the end of all processes. The manager's internal context influences all processes and stakeholder groups. Managers need to be aware of this.

The manager is responsible for the business's performance and determining the sports club's direction. Managers should understand how their behaviour affects those around them and adjust their attitudes, decisions, and communication styles accordingly. Therefore, the manager's internal context (A, M) is present at the model's beginning and end.

This model can be helpful for managers joining a new sports club, long-standing managers revising processes, or individuals without a management background who have accepted a managerial role. The latter situation is common, as small sports clubs often need more resources to differentiate between coaching and organisational roles, or the managerial role is assumed by individuals without formal management training.

The manager initiates all processes. Analyzing the state of the environment is an essential starting point for managing the enterprise. The manager gets to know the people or representatives of various stakeholders, continuously adjusting their internal context based on new insights. Qualitative methods are primarily used in this phase. Qualitative and quantitative methods, such as data analysis, are utilized to understand how different processes work. If comprehensive data analysis is not feasible, examining accounting documents is crucial. The primary focus should be on cash flow and the state of the most liquid funds of the sports club. Understanding the sources and amounts of incoming and outgoing funds is essential. Prioritizing the settlement of liabilities with the shortest maturity is necessary. Focusing on deleveraging is vital for long-term sustainability if the sports club is indebted. The manager must learn about the sports club's operations during the analytical phase (as indicated in the green box to the right of analytical sections B and C). Decision-making, strategy setting, planning, and objective setting should only occur when the manager is confident in their understanding of the complex environment in which they operate.

It is beneficial to visualize the sports environment using modelling for internal purposes. Writing notes on findings or documenting the processes of learning about the environment and processes is advisable. A whole category of processes is dedicated to forming an understanding of complex contexts (Part D). This activity, along with translating understanding into the setting of strategic constructs (Part E), falls under knowledge processing. In Part E, the manager selects frameworks, standardized models, sequences, and other tools to translate their understanding into knowledge that others can grasp. For example, they may use SWOT analysis or follow ISO standards and similar frameworks. The goal is to process knowledge more efficiently, preparing it for setting strategic constructs such as philosophy, mission, and vision. Once the knowledge is processed, it moves to the next category of activities: planning. This involves using a funnel effect, starting with long-term constructs, followed by medium-term and then short-term plans. These plans comprise a set of various objectives.

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The level of goal-setting intervention by a manager depends on the organizational structure. If a single manager manages a sports club, they must set short-term or operational goals themselves. If another manager is responsible for operational objectives, the supervisor delegates the setting of these objectives to that manager. It is also necessary to define how processes will evolve. The manager analyses the processes, processes the knowledge about them, and identifies their strengths and weaknesses. If the SWOT analysis is used, the manager identifies strategic directions for managing the sports club. If weaknesses dominate, processes should be adjusted to address and strengthen these areas. The manager leverages their knowledge (derived from their internal context, including education and awareness of trends in sports management) to suggest process changes. The definition of process changes is part of Part G, which follows Part F, where the long-term direction of the sports club is established.

Proposed changes in processes should be directed towards fulfilling strategic goals; they should align with the sports club's philosophy, vision, and culture. The defined changes need to be included and described in setting the medium and short-term goals and plans that follow in sections H and I of the Comprehensive Model. Part I, i.e., setting short-term constructs, already extends into the category of organizing. Here, however, Part J, delegation, is central. At this point, the manager knows the people, their character and abilities (resulting from the analysis of the environment and the processing of knowledge about the environment) and accordingly delegates duties, responsibilities, and authority to persons suited to the positions. Leading people follow the category of organizing. Here, the manager is concerned with the motivation of staff and athletes, the reward system, and the general satisfaction of staff and athletes in the environment. These activities are described in section K - care of players and staff. At this point, the manager already understands who has what motives and what individuals' personal goals are and also understands how to motivate individuals to perform better. This knowledge also comes from the getting to know the environment section. Based on this knowledge, the manager will adjust employees' and players' rewards, motivation, and learning. After setting up processes, goals, and strategies, making metrics to measure performance and measuring the fulfilment of goals, it is possible to move on to operational management or managing the running of the sports club. Activities falling under this category are included in Part L - Maintaining the Smooth Running of the Business. In principle, the manager's daily activities must align with the set objectives and strategies, which should then be integrated into the club's activities. The manager performs various daily tasks, such as tracking key performance indicators (KPIs) and monitoring cash flow, but effective communication is paramount.

The manager is the central communication hub for any business or sports club, necessitating interaction through various communication channels with different stakeholders. The manager must align activities and schedule them to suit each stakeholder. Developed management communication skills are a key predictor of a sports club's success. Therefore, the model begins and ends (Part M) with the manager and their internal context. It is essential for the manager to develop both personally and professionally continually. The manager should adapt their personality to circumstances and reflect on the effectiveness and appropriateness of their communication. On the knowledge side, the manager should stay informed about new concepts that reshape management perspectives. They should also keep up with technical trends in sports, scientific publications, training opportunities, and the political landscape. Managers should also follow technical trends that permeate sports, take an interest in scientific publications, engage in training, and stay informed about the political situation, among other areas. The manager should maintain a broad outlook but be able to identify key concepts that warrant more time and attention, considering the economics of time. To save time, sports managers may utilize e-learning concepts, described as an innovative approach to providing well-designed, individually oriented, interactive learning environments (Koman et al., 2024). This method supports individual growth for both themselves and their employees. For larger sports clubs, it may be beneficial to create an e-recruitment style web page targeting new employees or potential sports talents, as Koman et al. (2023) suggested for organizations. Larger sports clubs should also be interested in Big Data solutions to enhance managerial decision-making, as Koman et al. (2023) suggest.

Feedback from sports professionals on the model indicates that the content is valuable for sports managers. However, presenting the information in an even simpler context is advised. Sports managers often lack the time and motivation to educate themselves on complex topics.

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Conclusion

The findings of this study underscore the complex relationship between strategic management and sustainability in sports organizations. Despite a growing recognition of the importance of sustainable practices, many sports managers in Slovakia face significant challenges, primarily due to a lack of formal education in management and economics. This gap necessitates the development of targeted educational programs and resources to equip managers with the necessary skills and knowledge.

Our research reveals that stakeholder engagement is crucial for successfully implementing sustainability initiatives. To achieve their sustainability goals, sports organizations must foster cooperative relationships with key stakeholders, including fans, community members, and government entities. Additionally, effective marketing strategies are essential in promoting sustainability and enhancing the public image of sports clubs. The study also highlights the importance of financial sustainability, particularly in modern sports, where revenue generation and cost management are critical. Integrating ESG (Environmental, Social, and Governance) principles and innovative financial tools can help sports organizations navigate their economic challenges.

In conclusion, achieving sustainability in sports management requires a multifaceted approach that includes education, strategic planning, stakeholder engagement, and financial innovation. By addressing these areas, sports organizations can enhance their sustainability and ensure long-term success.

In conclusion, this study contributes novel insights into integrating sustainability within sports management by developing a model that identifies and prioritizes critical factors influencing sustainable practices. The practical value of this research lies in its ability to provide sports managers with a structured approach to embedding sustainability into their strategic planning, thereby enhancing their capability to effectively address environmental, social, and economic challenges.

However, this research has certain limitations. The study is primarily based on data collected from Slovak sports managers, which may limit the generalizability of the findings to other contexts. Additionally, the interview sample size was relatively small, which might affect the depth of qualitative insights.

Future research should validate and refine the proposed model across different geographical regions and types of sports organizations. Longitudinal studies could provide deeper insights into the long-term impacts of sustainable practices in sports management. Moreover, exploring the role of technology and innovation in promoting sustainability in sports could be a promising direction for further investigation.

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TAX REVENUES AND TAX RATES IN THE CONTEXT OF MACROECONOMIC DETERMINANTS*

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Abstract. There is general agreement that taxes are a significant political tool making a macroeconomic impact. Therefore, alternative tax policies must be assessed to understand how they affect tax revenues. This paper focuses on quantifying the impact of tax rates and selected macroeconomic indicators on corporate tax revenues in European Union (EU) countries from 2002 to 2021. Data were drawn from the databases of the European Commission (2022), OECD (2022), ZEW (2021), and the World Bank (2022). Three models were estimated to evaluate the impact: the pooling model, the fixed effects model, and the random effects model. Cluster analysis grouped countries based on the similarity of their tax systems. Ward's method was used for comparison, and the similarity of countries was assessed using the Euclidean distance. The result of the cluster analysis was two groups of countries: the first group mainly included Eastern European countries, and the second group included Western European countries. We used panel data regression analysis to evaluate corporate income tax determinants in individual country clusters. The results confirmed the suitability of the random effects model. The study indicates that direct foreign investment is the most significant variable affecting corporate income tax in the first cluster. In contrast, in the second cluster, it is direct foreign investment, unemployment rate, and gross domestic product.

Keywords: corporate taxation; tax revenues; macroeconomic determinants; regression analysis

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1. Introduction

Corporate tax revenues are, on the one hand, an essential source of state budget income. Still, on the other hand, their overall amount is influenced by economic, social, and political factors, whose influence may change according to the intensity of the relationship between them. Each country strives to attract as many foreign investors as possible by creating an attractive economic, legislative, and tax environment that would be preferred over other countries. Governments of individual countries also try to achieve changes in corporate tax revenues through various governmental actions and legislative changes. However, we must consider that the level of corporate tax revenues also depends on the tax policy of neighbouring countries. Taxes should be regarded as not static but dynamic, and it is essential to note that various external factors influence their revenue development

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over time. Monitoring tax revenues is a frequently discussed topic nowadays, as we have recently been affected by many negative experiences, such as the pandemic crisis and the war conflict in Ukraine, which significantly depleted the budgets of individual countries. Both foreign and domestic studies confirm that to discuss tax revenues, we need to examine the crucial determinants that significantly affect these revenues and their components in individual countries.

2. Literature review

As mentioned above, several determinants influence the inflow of tax revenues. Due to their nature, these determinants can be divided into economic, legal, political, social, socio-historical, demographic, or even technological aspects. Montero and Parga (2023) emphasized that each government should legislate a tax policy that would positively impact economic activity, supporting healthy business growth and increasing tax revenues. Studies by Karpowicz and Majewska (2018), McNabb (2018), Ťahlová and Bánociová (2019), Cung and Son (2020), and Helcmanovská and Andrejovská (2021) focused on monitoring the impact of economic determinants on tax revenues in various world countries or groups of countries over different time intervals. In most countries, corporate tax rates are very high, and the taxation process is complex, leading to discussions on rationalizing these systems. Some argue that lower tax rates push businesses to be more innovative and, thus, more competitive. However, opponents claim that reducing corporate tax rates would disrupt government budget balances and increase inequality. The critical question is whether corporate taxes have a decisive impact on tax revenues (Fuest, Hugger & Wildgruber, 2022).

The correlation between tax rates and tax revenues interests all EU countries. Generally, the relationship between tax rates and tax revenues is complex and can change depending on various factors, including the elasticity of taxable income, taxpayer behaviour, and broader economic conditions. In certain situations, extremely high tax rates can lead to a decrease in tax revenues. On the other hand, the effective tax rate, which expresses the actual tax rate, is subject to variability resulting from applying specific tax deductions and credits available to corporations, modifying their overall tax liability (Todorovic, Dordevic & Cakic, 2022).

Corporations sometimes apply aggressive strategies, such as shifting profits to low-tax jurisdictions to reduce their effective tax rate compared to their incomes (OECD, 2015). A negative effect was confirmed when evaluating the impact of inflation on tax revenues. Dhaliwal et al. (2015) confirmed that during higher inflation rates, the average tax burden on companies increases, reducing the purchasing power of money, investments, and production, negatively impacting tax revenues. A negative effect is also confirmed by Bánociová and Ťahlová (2019) when examining tax revenues and unemployment rates, based on the assumption that the higher the unemployment rate, the more significant the decline in the profitability of the corporate sector, ultimately causing lower corporate tax revenues. Urbancová and Hudáková (2015) and Tosun (2017) examined employment and unemployment indicators as explanatory variables potentially affecting tax revenues, highlighting a significant link between the labour market and tax policy. Spataro and Crescioli (2023) think that lower tax rates for smaller companies can stimulate investment and business expansion. In their study, Garcia-Bernardo et al. (2023) refute previous claims that corporate tax rates do not affect unemployment. They found the opposite and confirmed that an increase in the effective average corporate tax rate significantly increases unemployment. Delgado Fernandez-Rodriguez and Martinez-Arias (2014), Víghová et al. (2023) and Saidin et al. (2023) considered the relationship between foreign investments, tax rates, and corporate tax revenues. All analyses have shown that direct foreign investments are sensitive to differences in tax rates. A positive two-way relationship was found between tax revenues and GDP.

Delgado, Fernandez-Rodriguez and Martinez-Arias (2014) showed that the GDP indicator level positively affects tax revenues. Dávila and Hébert (2022) examined economic determinants negatively or positively in relation to corporate tax revenues. Our effort in this paper is to determine the decisive factors for the level of tax revenues.

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3. Materials and Methodology

This paper aimed to verify the impact of tax rates and selected macroeconomic indicators on corporate tax revenues in EU countries. Through the analysis, we aimed to answer the following research question: "Are revenues in new and old member states affected by the same variables, or are there differences between them?" The first part of the research focused on the impact of selected indicators on corporate tax revenues using panel regression, where three models were estimated: the pooling model, the fixed effects model, and the random effects model. Subsequently, a correlation analysis was conducted, a prerequisite for cluster analysis to ensure that the input variables are not correlated. In the second part of the paper, EU countries were grouped using cluster analysis, specifically Ward's method, based on the similarity of their tax systems. Cluster analysis was performed for 2021 with variables that did not show significant correlation: effective corporate tax rate, gross domestic product, unemployment rate, foreign direct investment, inflation, and corporate tax revenues. Two econometric models were then constructed to test the impact of selected indicators on corporate tax revenues.

The basis for the analysis is annual data from EU27 countries from 2002–2021. This period shows the development of individual indicators even before the new member countries joined the EU in 2004. The countries analyzed are current EU member states: Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Germany (DE), Estonia (EE), Greece (EL), Spain (ES), Finland (FI), France (FR), Croatia (HR), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), Luxembourg (LU), Latvia (LV), Malta (MT), Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovenia (SI), Slovakia (SK).

Numerous empirical studies have examined the factors that can affect tax revenues in EU countries. The selection of indicators for the analysis was conditioned by the authors: Clausing (2007), Bayer (2015), Karpowicz and Majewska (2018), Finocchiaro et al. (2018), Barro and Furman (2018), Puliková (2019), Nalyanya et al. (2020), Block (2021), Fernández-Rodríguez et al. (2023), who analyzed the impact of macroeconomic determinants on corporate tax revenues. They also claim that corporate tax revenues are influenced by both the level of statutory and effective tax rates and macroeconomic indicators affecting the investment environment.

Panel regression shows the relationships between corporate tax revenues and selected economic determinants (see Table 1 below).

Table 1. Overview and Description of Variables

Variable	Unit	Label	Source	Description
Dependent Variable				
Corporate tax revenues	% GDP	CIT	Eurostat, OECD	Taxes on the income or profit of legal entities, including holding gains (as a percentage of GDP).
Independent Variables				
Nominal rate	%	STR	European Commission	The highest statutory rates of corporate income tax (including surcharges).
Effective average tax rate	%	EATR	Eurostat, ZEW	Effective average tax rates of large corporations in the non-financial sector calculated using the Devereux/Griffith methodology.
Gross domestic product per capita	euros per capita	GDP	Eurostat	The ratio of real GDP to the average population in a given year at constant prices (2010).
Harmonized index of consumer prices	%	INF	World Bank	Harmonized index of consumer prices for international comparison of consumer price inflation, expressed as an annual average index and rate of change.

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Foreign direct investment	% HDP	GDP	World Bank	Net inflow of foreign direct investment from non-resident investors, expressed as a percentage of GDP.
Unemployment	%	Unemp	World Bank	Annual unemployment rate by gender (men and women) and age (15-74 years), measured as a percentage of the workforce.

Source: Own processing

Table 2 lists studies examining the relationship between corporate tax revenue, the variables used in the analysis, and their predicted impact on corporate tax revenue.

Table 2. Expected Impact of Selected Variables on Corporate Income Tax

Author, Year	Variable	Relationship between Dependent and Independent Variables	Expected Relationship
Clausing (2007)	**EATR, STR**	positive	+
Weybourne (2021)		negative	
Delgado, Fernandez-Rodriguez and Martinez-Arias (2014)	**GDP**	positive	+
Clasuing (2007), Delgado, Fernandez-Rodriguez and Martinez-Arias (2014)	**Unemp**	negative	-
Delgado, Fernandez-Rodriguez and Martinez-Arias (2014)	**FDI**	positive	+
Andrejovská & Helcmanovská (2021)	**INF**	positive	+
Cung & Son (2020)		negative	

Source: Own processing

The analysis was based on the following hypotheses:

- The most significant variable affecting corporate tax revenues is tax rates.
- An increase in the unemployment rate has a positive impact on corporate tax revenues.

To confirm/reject the hypotheses, the following econometric model was created:

$$CIT_{it} = ÄŖĀ^2{}_0 + ÄŖĀ^2{}_1 EATR_{it} + ÄŖĀ^2{}_2 STR_{it} + ÄŖĀ^2{}_3 GDP_{it} + ÄŖĀ^2{}_4 Unemp_{it} + ÄŖĀ^2{}_5 FDI_{it} + ÄŖĀ^2{}_6 INF_{it} + u_{i,t}$$

where:

the dependent variable is $cit_{i,t}$, representing the average corporate tax income of member countries i in year t. The independent variables include *STR*: average statutory tax rate of member countries i in year t; *EATR*: average effective tax rate of member countries i in year t; *GDP*: average gross domestic product of member countries i in year t; *FDI*: average foreign direct investment of member countries i in year t; *INF*: average inflation rate of member countries i in year t; *Unemp:* average unemployment rate of member countries i in year t. β_0 represents the intercept; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the regression coefficients representing the change in the dependent variable for a unit change in the independent variable $cit_{i,t}$.

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The Chow test was used to test the suitability of the pooling model. Through the F-test and Lagrange Multiplier test, the pooled model was compared with the fixed effects model and the random effects model. The estimated model was tested for the basic assumptions of panel data regression models, specifically: stationarity of data (Madal and Wu unit root test), heteroskedasticity (Breusch-Pagan test), serial correlation (Breusch-Godfrey test), and cross-sectional dependence (Pearson CD test). Violations of assumptions can lead to biased results; therefore, the model's deficiencies must be addressed using the variance-covariance matrix.

4. Results and Discussion

4.1. Panel Regression Analysis of the Econometric Model for EU27

Three models were estimated to evaluate the impact of selected tax rates and macroeconomic indicators on corporate tax revenues in EU countries: the pooling model, the fixed effects model, and the random effects model. The individual models were subjected to basic assumption testing. Based on the results of testing time and individual effects (p-value<0.05), we found that both effects are statistically significant and should be included in the model. We used the Chow test to select the appropriate model (p-value=$2.2x10^{-16}$). To assess the suitability of the fixed or random model, we used the Hausman test (p-value=$2.2x10^{-16}$), which confirms the rejection of the null hypothesis. The random effects model is inconsistent, so we proceed with the fixed effects model.

The fixed effects model was tested to see if it meets the basic assumptions for panel data regression models. Using the command putrest, we tested the stationarity of the data.

The p-value (p-value=$1.5x10^{-8}$) lower than the significance level of 0.05 leads to the rejection of the null hypothesis of non-stationary data. Further statistical tests confirmed the presence of serial correlation (p-value=$2.2x10^{-16}$), cross-sectional dependence (p-value=$8.4x10^{-3}$) and heteroskedasticity (p-value $7.8x10^{-11}$), which can lead to biased results and also to bias in statistical significance. Na odstránenie uvedených nedostatkov modelu a presnejšie odhadnutie výsledkov bola použitá variačno-kovariančná matica. The results after applying the variance-covariance matrix are shown in Table 3.

Table 3. Robust Results of the Fixed Effects Model

Variable	Estimate	Std. Error	t-value	p-value
EATR	0.0263	0.0201	1.3039	0.1929
STR	0.0263	0.0234	1.1256	0.2609
GDP	$8.0x10^{-6}$	$1.4x10^{-5}$	0.5523	0.5810
Unemp	-0.0234	0.0165	-1.4246	0.1549
FDI	0.0011	0.0023	0.4624	0.6440
INF	0.0320	0.0155	2.0720	0.0388*
R^2		0.1006		
Model p-value		0.0047		

Source: Own processing based on results in RStudio

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The determination index of the estimated model is at the level of 0.10064, which means that the model explains 10% of the variability of the variable CIT. Based on the p-value of the corresponding F-test, we can confirm the statistical significance of the model as a whole. The model contains one statistically significant variable, inflation, at the significance level of 0.05. The results suggest that if inflation increases by 1%, corporate tax revenues will increase by 0.03%. This phenomenon should occur with a probability of 99.96%. Other variables are statistically insignificant. According to the panel regression results for all EU countries, represented by a low determination index and only one statistically significant variable, we decided to perform cluster analysis, dividing countries into multiple clusters. The prerequisite for cluster analysis is uncorrelated input variables.

4.2. Correlation Analysis

In Table 4, we observe the values of the correlation coefficient, which range from -0.55 to 0.86. A value of +1 indicates a positive correlation and a value of -1 indicates a negative correlation.

Table 4. Correlation Matrix of Monitored Variables

	CIT	**EATR**	**STR**	**GDP**	**Unemp**	**FDI**	**INF**
CIT	**1.00**	0.20	0.07	0.39	-0.16	-0.26	-0.37
EATR	0.20	**1.00**	0.86	0.30	0.26	-0.27	-0.53
STR	0.07	0.86	**1.00**	0.17	0.12	-0.11	-0.55
GDP	0.39	0.30	0.17	**1.00**	0.02	-0.20	-0.30
Neemp	-0.16	0.26	0.12	0.02	**1.00**	-0.09	-0.33
PZI	-0.26	-0.27	-0.11	-0.20	-0.9	**1.00**	0.11
INF	-0.37	-0.53	-0.55	-0.30	-0.33	0.11	**1.00**

Source: Own processing based on results in RStudio

There is a strong dependency between EATR and STR (0.86), meaning that an increase in the effective corporate tax rate (EATR) will likely lead to a rise in the nominal (statutory) corporate tax rate (STR) or vice versa. We can also observe a moderately increased negative correlation (-0.55) between the nominal (statutory) corporate tax rate (STR) and inflation (INF). Almost zero correlation can be observed for the unemployment rate with each variable except inflation (INF), effective corporate tax rate (EATR), and our dependent variable (CIT), where the correlation coefficient ranges from -0.33 to 0.26. For the variable foreign direct investment (FDI), we can observe a moderate negative correlation to almost zero correlation with each variable except the relationship with inflation (INF), where the correlation coefficient has a positive low correlation (0.11). Higher but still in the norm, negative correlations can be observed between the variable inflation (INF) with each variable except for the higher-mentioned variable, foreign direct investment. This phenomenon may appear positive if the inflation rate is around the inflation target set by the ECB. On average, during the observed period in EU27 countries, inflation was 2.2%, which is very close to the inflation target of 2%.

On average, during the observed period in EU27 countries, inflation was 2.2%, which is very close to the inflation target of 2%. Regarding the explained variable (CIT), we observe only moderate dependencies. Moderate negative dependencies can be observed with the variables inflation (-0.37), foreign direct investment (-0.26), and unemployment rate (Neemp). The moderate negative dependence between CIT and Neemp can be explained by the fact that if the unemployment rate increases, i.e., there will be fewer employed people in companies, businesses will not be able to produce more products because of the lack of workforce, resulting in lower

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revenues and ultimately lower corporate tax revenues. The highest dependence on our explained variable is observed with the gross domestic product (GDP), where the correlation coefficient is 0.39. The second highest dependence (-0.37) with our explained variable is associated with the variable inflation (INF). This dependence is negative, meaning that if inflation increases, corporate tax revenues should decrease. This impact may be driven by the fact that as inflation rises, companies set higher prices, and thus, their profits should be higher, leading to higher taxes. However, this only sometimes applies, as it also depends on demand and the purchasing power of residents. If consumers buy less during periods of higher inflation, business profits will be lower, reducing the tax companies must pay to the state. Based on the results of the correlation analysis, we concluded that for the use of cluster analysis, we will exclude the variable STR, which is highly positively correlated with the variable EATR. This ensures the fulfilment of the prerequisites for performing cluster analysis, i.e., non-correlation of input variables. In the panel regression, we can expect the highest dependency between the explained variable CIT and the independent variables GDP, INF, and FDI.

4.3. Cluster Analysis

The clustering of countries based on the similarity of their tax systems was carried out for 2021 to highlight the post-COVID period. Two additional variables, trade openness and the corruption index, were added to the analysis, which has a positive statistical impact on corporate tax revenues, according to Delgado, Fernandez-Rodriguez and Martinez-Arias (2014).

Among the agglomerative hierarchical clustering methods, we used Ward's method, which creates clusters of similar size and is most commonly used in practice. We first used clustering quality indicators to determine the number of clusters, which recommended three. Based on the similarity of the second and third clusters, we opted for a heuristic approach and decided to create two clusters. The resulting dendrogram is shown in Figure 1.

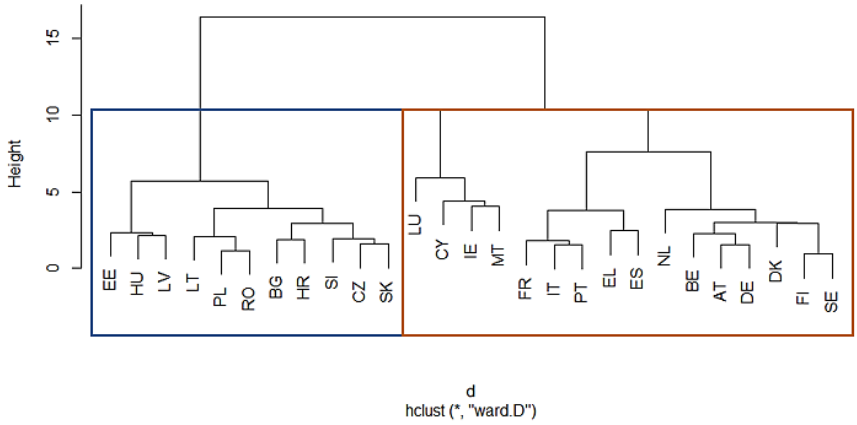


Figure 1. Cluster Dendrogram
Source: Own processing based on results in RStudio

The first cluster comprises 11 countries: Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Bulgaria, Croatia, Slovenia, Czech Republic, and Slovakia. This cluster consists of new EU member states, and the countries in the cluster belong to the eastern part of Europe. Most of these countries joined the European Union in 2004, except Bulgaria (2007), Romania (2007), and Croatia (2013). In Table 5, we can see the minimum and maximum values of variables in the first cluster.

Table 5. Minimum and Maximum Values of Variables in the First Cluster

Variable	CIT	EATR	GDP	Unemp	EXIM	FDI	CPI	INF

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Min. Values	0.3	9.0	6950	2.887	87.36	0.83	42	1.92
Max. Values	3.7	18.7	21310	8.683	187.83	19.21	74	5.11

Source: Own processing based on results in RStudio

Companies in Estonia paid the lowest corporate tax revenues in 2021. Estonia has had a unique taxation system since 2000, which has been effective in the long term. Conversely, the Czech Republic paid this cluster's highest corporate tax revenues. According to the tax complexity index, the Czech Republic ranks among the countries with the most complex tax system. Flagmeier et al. (2023) The effective corporate tax rate reached its minimum values in Bulgaria and the highest values in Slovakia.

Regarding GDP per capita, the lowest value was again in Bulgaria and the highest in Slovenia. Although the Czech Republic recorded the highest corporate tax revenues, the unemployment rate was lowest among Eastern European countries. Compared to the Czech Republic, Croatia had a 580% higher unemployment rate in 2021. The least open economy was Romania, and the most open was Slovakia, which participates the most in international trade. Slovakia is a small, open economy whose competitiveness depends on external links. Although Slovakia is the most open economy in Eastern Europe, the net inflow of foreign direct investment was the lowest among the countries of the first cluster. The highest net inflow of foreign direct investment was in Estonia, which has an effective tax system and the lowest level of corruption in Eastern Europe. Bulgaria had the worst score in the corruption index. Based on the results of the macroeconomic variables in the first cluster, we concluded that Estonia is the country that achieved the best results among the new member states for 2021.

The second cluster comprises 16 countries: Luxembourg, Cyprus, Ireland, Malta, France, Italy, Portugal, Greece, Spain, Netherlands, Belgium, Austria, Germany, Denmark, Finland, and Sweden. This cluster consists of old EU member states, except Malta and Cyprus, which joined the European Union in 2004. The countries in the cluster belong to the western part of Europe, except Cyprus, which is classified among Eastern European countries. In Table 6, we can see the minimum and maximum values of variables in the second cluster.

Table 6. Minimum and Maximum Values of Variables in the Second Cluster

Variable	CIT	EATR	GDP	Unemp	EXIM	FDI	CPI	INF
Min. Values	1.8	13.4	17610	3.499	60.84	-15.89	49	1.22
Max. Values	6.5	29	84490	14.795	388.12	25.14	88	3.14

Source: Own processing based on results in RStudio

The highest corporate tax revenues in the second cluster were paid by Cyprus. This country is classified among the new member states. However, the values of macroeconomic determinants are closer to those of the old member states. Cyprus is considered a tax haven, also known as an offshore financial centre. Low tax rates characterize tax havens. The corporate tax rate in Cyprus was the lowest in the second cluster, at 13.4%. Another feature of tax havens is a low population. According to the World Bank (2021), Cyprus had 2.4 million inhabitants in 2021. According to Elenes Platona (2022), tax havens are characterized by low transparency, a favourable tax system for foreign investors, banking secrecy, and low availability of company information. The lowest corporate tax revenues were paid by legal entities in Greece. Greece is characterized by higher corporate tax rates, which may be a reason for tax avoidance.
Other reasons for low taxes may be the high unemployment rate, which was the highest in the second cluster in Greece, at 14.795%, and the lowest GDP per capita of 17,610 euros. Greece belongs to the countries with low inflation, 1.22%, and the highest corruption in the EU, which may result from lower tax payments. Effective international trade requires an open economy of 8.946% in Greece. The highest effective corporate tax rate is in

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Spain. Herranz and Turino (2023) state that real taxation in Spain needs to be higher and more efficient. The government could increase tax revenues by reducing corporate income tax rates. According to Oliveira (2022), Luxembourg is the wealthiest country in the EU based on the highest GDP per capita. During one year, it produced the most goods and services within the country. It is also one of the countries with the highest economic openness, 38.812%. The Ministry of Foreign Affairs (2022) states that the high openness of the economy is evidenced by the fact that all international companies are represented in Luxembourg, and half of the working people are citizens of neighbouring countries. Malta, one of the countries classified as a tax haven, recorded the lowest unemployment rate and the highest inflow of foreign direct investment. France had the lowest level of trade relations with other EU countries, at 6.084%. The net inflow of foreign direct investment in the Netherlands was negative (-15.89%). This trend continues from the previous year. Denmark and Finland are among the countries with the lowest corruption, where the corruption index reached 88 points. The highest inflation in the second cluster was in Germany, at 3.14%.

4.4. Panel Regression Analysis of the Econometric Model for the First Cluster

After dividing the countries based on their similarity into two clusters, we performed a panel regression analysis for each cluster for a more detailed analysis. Again, three models were estimated. The choice between the fixed effects and random effects model is based on the results of the Hausman test (p-value = 0.973). A p-value higher than the significance level of 0.05 leads to the rejection of the alternative hypothesis, and therefore, we continue with the random effects model in the further analysis. The results of the F-test (p-value < 0.001) further indicate that individual and time effects are significant and should be included in the analysis. The random effects model was tested to see if it meets the basic assumptions for panel data regression models. Based on the results of individual tests: Breusch-Godfrey test (p-value 0.00000); Pearson CD test (p-value = 0.011); Breusch-Pagan test (p-value = 0.00000); Madal and Wu (p-value 0.002), we found that the model has a problem with serial correlation, cross-sectional dependence, and heteroskedasticity. The data used in the analysis are stationary. To estimate robustness, we used the vcocHC command. This model transformation represents the best way to eliminate deficiencies in the model. The results are shown in Table 7.

Table 7. Robust Results of the Random Effects Model

Variable	Estimate	Std. Error	t-value	p-value
EATR	-0.0003	0.8365	-0.0060	0.3201
STR	0.0593	0.0579	1.0435	0.9952
GDP	4.0×10^{-5}	5.7×10^{-5}	0.7148	0.2967
Unemp	-0.0074	0.029877	-0.2463	0.8054
FDI	0.0048	0.0004	11.3580	2.2×10^{-16} ***
INF	0.0280	0.0190	1.4711	0.1413
R^2			0.2053	
Model p-value			2.2×10^{-16}	

Source: Own process; R-commander output

The p-value of the model lower than the significance level of 0.05 confirms the statistical significance of the model. Among the analyzed variables, direct foreign investment (PZI) is statistically significant at the 0.001 level. The regression coefficient estimate indicates that if direct foreign investment increases by 1%, corporate tax revenues will increase by 0.0048% of GDP. This result can occur with a 99.99% probability. This finding is

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consistent with previous studies, specifically Monteiro (2011) and Clausing (2007). The other regression coefficients, however, are not statistically significant. The regression coefficient β1 (EATR) estimate indicates that an increase in the effective tax rate by 1% will decrease corporate tax revenues by 0.0003% of GDP, representing a minimal change with a 68% probability. The increase in STR is associated with increased corporate tax revenues (opposite to EATR).

Another monitored macroeconomic indicator is gross domestic product, whose regression beta coefficient estimate is at the level of 0.000004, meaning that an increase in GDP per capita by 1,000 is associated with a decrease in the corporate tax rate by 0.000004% of GDP. The probability of this phenomenon is 70%. The regression coefficient β4 is at the level of -0.007, representing a negative linear dependence and a positive impact on corporate tax revenues from the perspective of businesses. An increase in the unemployment rate by 1% is accompanied by a decrease in corporate tax revenues by 0.007% of GDP.

Based on the results of the panel regression analysis, the most significant statistical significance and positive linear dependence are exhibited by direct foreign investment. A positive linear dependence was also recorded for nominal (statutory) tax rate, gross domestic product, direct foreign investment, and inflation. The effective corporate tax rate and unemployment rate variables negatively impact corporate tax revenues. The result of the unemployment rate variable is consistent with all scientific studies listed in Table 2. The variable effective corporate tax rate is contrary to the studies by Clausing (2007), where the effective corporate tax rate positively impacted corporate tax revenues.

4.5. Panel Regression Analysis of the Econometric Model for the Second Cluster

The same panel data regression analysis was applied to the second cluster of countries. The resulting random effects model was chosen based on the results of the Hausman test (p-value = 0.8648). The model underwent the same tests as the model for the first cluster. Based on the results, it is possible to conclude that the pooling model is unsuitable. When comparing the pooling model with the fixed/random effects models, we found that these models are more appropriate for analysis. The Chow test (p-value < 0.001) and the Breusch-Pagan test (p-value < 0.001) showed that the effects included in the models are statistically significant.

The model was then tested for the assumptions of panel data regression models. The model has problems with serial correlation (p-value = $4.2x10^{-16}$), cross-sectional dependence (p-value = $1.9x10^{-7}$), and heteroskedasticity (p-value = $6.0x10^{-6}$). The unit root test results (p-value = $6.1x10^{-7}$) confirmed the stationarity of the used data. The estimate based on the variance-covariance matrix provides robust results, as shown in Table 8.

Table 8. Robust Results of the Random Effects Model

Premenné	Estimate	Std. Error	t-value	p-hodnota
EATR	0.0353	0.0185	1.9062	0.0566
STR	-0.0002	0.01450	-0.0119	0.9905

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GDP	2.5x10-5	$7.3x10^{-6}$	3.3700	0.0008***
Unemp	-0.0635	0.0193	-3.2996	0.0010***
FDI	0.0021	0.0003	7.9375	$2.2x10^{-16}$ ***
INF	0.0395	0.0314	1.2583	0.2083
R^2			0.25281	
Model p-value			$2.2x10^{-16}$ ***	

Source: Own process; R-commander output

The first explanatory variable is the effective corporate tax rate. Looking at the p-value of the regression coefficient before and after the model adjustment, the statistical significance of the variable remained unchanged at the significance level of 0.1. The regression coefficient β1 (EATR) indicates that if the effective corporate tax rate increases by 1%, corporate income taxes will increase by 0.035% of GDP. This situation would occur with a 94% probability. The nominal (statutory) corporate tax rate has the opposite impact on corporate income taxes. The regression coefficient β2 is not statistically significant, and an increase in the statutory corporate tax rate by 1% would cause a decrease in corporate income taxes by 0.0002% of GDP. Among the most significant regression coefficients is β3 (GDP), which is statistically significant at the 0.001 level. An increase in gross domestic product per capita by 1,000 euros would, with a 99% probability, increase corporate income taxes by 0.000025% of GDP. This regression coefficient and the regression coefficient β4 represent the same statistical significance before and after the model adjustment. In the case of the regression coefficient β4, an increase in the unemployment rate by 1% is associated with a decrease in corporate income taxes by 0.0635% of GDP, representing a positive impact from the perspective of businesses. The last statistically significant regression coefficient β5 indicates that an increase in the variable foreign direct investment by 1% is associated with increased corporate income taxes by 0.00021% of GDP. This regression coefficient was statistically significant at the 0.05 level before the transformation of the model, and after using the variance-covariance matrix, it is significant at the 0.001 level. The last macroeconomic determinant of corporate income taxes is inflation. The regression coefficient β6 is not statistically significant. An increase in inflation by 1% has a negative impact on corporate income taxes, which would increase by 0.004% of GDP.

Based on the interpretation of the results of the panel data with random effects, the most statistically significant variables are gross domestic product, unemployment rate, and foreign direct investment. The positive impact from the perspective of businesses is represented by the unemployment rate, where an increase is associated with a decrease in the income tax companies must pay to the state. The nominal corporate tax rate also recorded a positive impact with a lower probability. The negative impact on corporate income taxes is represented by the variables effective corporate tax rate, GDP, foreign direct investment, and inflation.

To answer the research question: "Which macroeconomic variable most influences corporate tax revenues?" we obtained cluster analysis and panel regression results. In the case of the effective corporate tax rate (EATR), we observe a negative impact on corporate tax revenues in the countries of the first cluster, meaning that an increase in the variable EATR will reduce corporate tax revenues. In the countries of the second cluster, we observe a positive relationship between the effective corporate tax rate and corporate tax revenues. This means that in the countries of the second cluster, an increase in EATR will cause an increase in corporate tax revenues. The expected impact of EATR was confirmed only for the countries of the second cluster, which consists mainly of old member states and countries of Western Europe. In the case of the nominal (statutory) corporate tax rate (STR), a positive expected relationship between the rate and corporate tax revenues was confirmed for the countries of the first cluster. We can note that neither corporate tax rate is statistically significant, except for

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EATR in the case of the second cluster, where the p-value is just above the significance level of 0.05. The statistical insignificance of the relationship between corporate tax rates and corporate tax revenues was also found by Kawano et al. (2012). The gross domestic product (GDP) is statistically significant only in the countries of the second cluster, where an increase in GDP by 1% is associated with a 99% probability of an increase in corporate tax revenues. In the case of the countries of the first cluster, the statistical significance was not confirmed, but the β coefficient has a positive sign, meaning that an increase in GDP will cause an increase in corporate tax revenues. This statement is consistent with studies and expected relationships. In both groups of countries, we also observe a negative relationship between the unemployment rate (Neemp) and corporate tax revenues. In the case of the countries of the second cluster, the statistical significance of this variable was confirmed. These statements are also consistent with studies and expected relationships. Direct foreign investments (PZI) have the greatest statistical significance, where an increase in PZI by 1% will cause an increase in corporate tax revenues by 0.0005% of GDP in the countries of the first cluster and by 0.0001% of GDP in the countries of the second cluster. This phenomenon will occur with a 99% probability. The last variable analyzed is inflation (INF). The results show a positive relationship between inflation and corporate tax revenues, contrary to the findings of Cung & Son (2020), who found a negative relationship between these variables. The statistical significance of this variable was not confirmed in either group of countries. Therefore, we can conclude that direct foreign investments are the most statistically significant variable affecting corporate tax revenues in both countries.

Based on the research question and the panel regression analysis, we verified the validity of our hypotheses. The hypothesis: "The most significant variable affecting corporate tax revenues is tax rates" can be rejected. Based on the analysis results, the most significant variable affecting corporate tax revenues in the first cluster is direct foreign investments (PZI). In the case of the countries of the second cluster, they are direct foreign investments (PZI), the unemployment rate (Neemp), and gross domestic product (GDP).

The second hypothesis: "An increase in the unemployment rate positively impacts corporate tax revenues." In the case of the countries of the first cluster, the statistical significance between the unemployment rate and corporate tax revenues was not confirmed, unlike in the case of the countries of the second cluster. In the case of statistical significance, an increase in the unemployment rate by 1% would cause a decrease in corporate tax revenues in the countries of the first cluster by 0.0007% of GDP and in the countries of the second cluster by 0.063% of GDP. From the perspective of businesses, we can confirm this hypothesis, as an increase in the unemployment rate positively impacts businesses that will pay less income tax to the state budget. From the perspective of the state, we would reject this hypothesis because an increase in unemployment means that the state finances the unemployed, for example, through unemployment benefits, increasing state expenditures, and the state's income from corporate tax revenues decreases based on the results of the analysis.

5. Conclusion

The conducted analysis and its results led to several conclusions. During the observed period, the new member states had lower tax burdens than the old member states of the EU. Although we observe a declining trend in corporate tax rates, corporate tax revenues did not decrease but mainly increased. The level of corporate tax revenues was, on average, 2.71% of GDP in the EU member countries during the observed period. In the old member states, the value of corporate tax revenues was, on average, 2.81% of GDP; in the new member states, it was lower by 0.20%. The cluster analysis results indicated that the macroeconomic variables of the EU member states are divided into Eastern and new member states, and the second group consists of Western and old member states. Direct foreign investments are the most statistically significant variable affecting corporate tax revenues in both countries. The impact of individual economic determinants on the mentioned groups of countries significantly differs as they depend on the governmental decisions of the respective state. Despite the European Union's efforts to harmonize and integrate corporate tax rates, we can observe noticeable differences between the EU member states. The differences also indicate the existence of tax competition among the EU member states,

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which strive to attract foreign investors and thus create more jobs, reduce the unemployment rate, and increase the economic growth and prosperity of the country. Within this topic, the analysis could also be conducted on more macroeconomic indicators such as trade openness (export/import) or microeconomic indicators like capital intensity, size, number of businesses, indebtedness, and profitability of companies. A longer observed period can be introduced to gain an even better perspective on the development and impact of economic determinants on corporate tax revenues.

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HUMAN CAPITAL AND ECONOMIC GROWTH UNDER MODERN GLOBALIZATION

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Abstract. In the modern globalized world, human capital and economic growth roles have become increasingly vital, demanding a closer examination of their dynamics. It is crucial to grasp the unique nuances of globalization to comprehend how it shapes global socio-economic systems and impacts individual nations. This understanding also highlights the evolving challenges and opportunities for human capital in driving economic progress. Moreover, the distinct circumstances small countries face amidst globalization must be noted. Studies have confirmed that these nations operate under unique mechanisms that influence their socioeconomic development. This study focuses on a macro systemic analysis of the interplay between human capital and economic growth, explicitly offering tailored recommendations for Georgia. Research leveraged econometric methods and harnessed the power of artificial intelligence, specifically employing machine learning models. The analysis shows that the null hypothesis about no cointegration was rejected for the GDP per capita and spending on healthcare with the P-value of 0.0354, while for the GDP per capita (or GDP growth) and spending on environment had the P-value of 0.0074 (0.0052) in Georgia. This reflects the impact of spending on human capital on the economy (in Georgia and Ireland) and vice versa (in Georgia, Latvia and Lithuania). Research findings show that future-oriented skills training for entrepreneurs and specialists is essential in a modern, globally competitive environment, focusing on adaptability and global best practices.

Keywords: Human Capital; Modern Globalization; Economic Growth

JEL Classification: C53, J53, O11, O43

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1. Introduction

In today's interconnected world, a hallmark of globalization, it's vital to grasp the current challenges it faces. The COVID-19 pandemic highlighted this interdependence by disrupting the flow of goods, people, and information. Now, with the war in Ukraine and the economic sanctions on Russia from the West, it is already clear a new aspect of globalization – one marked by deeper political and economic rifts, indicating a more confrontational phase.

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In the context of a confrontational globalization landscape, a critical macrosystemic challenge arises from heightened uncertainty. This phenomenon transcends the boundaries of individual domains, stemming from a complex interplay of processes across diverse societal spheres. Uncertainty manifests as cascading shock effects that disrupt seemingly unrelated fields, further amplifying the challenge. Additionally, the simultaneous influence of multiple interconnected factors acts as a multiplier, exacerbating the inherent uncertainties and creating a volatile and unpredictable environment.

It is noteworthy that the growing uncertainty caused by both economic and non-economic factors is of a macrosystem nature. This is evidenced, for example, by the global problem of climate change, the most critical problem in the era of globalization, including in the economic and social aspects.

In the face of confronting globalization, human capital remains essential and valuable. It includes knowledge, skills, experience, education and talent and contributes to creating tangible and intangible assets. There is no doubt that individuals with good health, education and motivation can work effectively and, as a result, contribute significantly to economic growth.

The problems of human capital, economic growth and their interaction require identifying the features that accompany the modern stage of globalization and the growth of the uncertainty factor. Taking them into account, the requirements for human capital itself should be formulated based on the positions of more effective promotion of economic growth and sustainability of the state's socio-economic system.

2. Theoretical Background and Hypotheses

Human capital theory evolved from earlier economic thought. As economies modernized and technology advanced, the demand for skilled labour grew, highlighting the increasing importance of human capital in economic progress.

The Solow-Swan model attributes economic growth to labour, capital, and technological progress. Initially excluding human capital, the model was refined to explain productivity and growth disparities (Solow, 1956; Swan, 1956). Mankiw, Romer, and Weil (1992) linked human capital (measured by education) to economic growth, demonstrating its crucial role in boosting labour productivity and overall economic expansion.

Lucas (1988) emphasized human capital accumulation through education and training, leading to a more productive workforce and long-run economic growth.

Romer's 1990 model (endogenous growth theory) highlights epistemic capital (knowledge) and technological innovation as key growth drivers. He argues a skilled workforce (high human capital stock) is crucial for ideating, developing, and spreading new technologies, which fuel sustained economic growth.

Galor and Weil's (2000) theory integrates demographic transitions and human capital accumulation. It posits that as economies develop, investments in human capital lead to lower fertility rates and higher economic growth, facilitating a transition from stagnation to sustained growth.

Barro (1991) examined a substantial number of countries and discovered a positive correlation between higher education levels and economic growth. He highlighted the significance of primary and secondary education in fostering economic development.

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Acemoglu (2002) examines the impact of technological change on wage inequality. His research suggests that technical advancements have disproportionately benefited skilled workers over the past six decades. This "skill-biased" technological change is identified as a primary driver of the recent rise in income inequality.

Hanushek and Woessmann (2008) used international assessments to show cognitive skills, not just years of schooling, have a stronger link to economic growth. This implies the quality of education, measured by its ability to develop these skills, is crucial for economic prosperity.

For developing countries, studies like those by Psacharopoulos and Patrinos (2004) have shown that returns to investment in education are exceptionally high in these regions, suggesting significant potential for human capital to drive growth.

Case studies of rapidly growing economies such as South Korea and Singapore illustrate how targeted investments in education and skill development can transform economic prospects (Lee, 2001).

Research by Bloom, Canning, and Sevilla (2004) indicates that health improvements contribute significantly to economic growth. Healthier populations are more productive, and reductions in mortality rates can lead to increased investment in education and skills.

Aghion and Howitt (2009) discussed how human capital in the form of research and development (R&D) personnel drives innovation and technological advancements, further promoting economic growth.

Governments should prioritize investments in both the quantity and quality of education. Ensuring access to primary, secondary, and tertiary education, coupled with improvements in educational infrastructure and teaching quality, is essential.

Vocational training and continuous professional development programs align the workforce's skills with the evolving demands of the economy.

Public health policies to improve healthcare access can have substantial economic benefits. Programs targeting maternal and child health, nutrition, and disease prevention are particularly effective. Encouraging innovation through investment in R&D and fostering collaborations between universities, research institutions, and industry can drive technological advancements and economic growth.

The modern theory of human capital originated in the 1960s, following the works of American scientists Schultz (1961) and Becker (1964). According to neoclassical growth theory, as stated by Solow (1956) and Swan (1956), capital, labour, and technological development play a significant role in economic growth.

The importance of education for human capital development, particularly oriented towards the implementation of new technologies, was highlighted by Nelson and Phelps (1966). Romer (1990), in the endogenous economic growth theory, emphasized the priority of human capital and its significance in economic growth through the generation of new ideas.

Endogenous growth models link specialized education to economic growth. These models show how a skilled workforce focused on research and development (R&D) boosts productivity and economic expansion.

The authors have contributed significantly to the literature addressing this research problem, offering theoretical and practical insights. For example, Smith (1938) explores the foundational aspects of human capital in economic theory, while Barro (2001) examines its impact on economic growth. Becker (1964) is renowned for his

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groundbreaking work on human capital theory, further developed by Blaug (1976) in his analyses of education and economics.

Jones (2014) and Kuznets (1955) delve into historical and empirical aspects of economic growth, focusing on human capital. Mankiw, Romer and Weil (1992) and Lucas (2015) offer influential models that underscore the importance of human capital in macroeconomic contexts. Recent studies, such as those by Bulina Mozgovaya and Pakhnin (2020), Deming (2022) and Bedianashvili (2023), provide contemporary perspectives on the evolving role of human capital in the global economy.

Manuelli and Seshadri (2014) present empirical analyses of the return on investment in human capital, while Mincer (1958) and Schultz (1961) are pioneers in the study of the economic value of education. Solow (1991) and Uzawa (1965) contribute to understanding the relationship between technological change and human capital. Finally, Weil (2007) synthesizes these concepts, providing a comprehensive view of human capital's role in economic development.

Modern views on human capital's role in economic growth are captured by the Human Development Index (HDI) and Human Capital Index (HCI). The HDI (UNDP, 2015) offers a broad view of a nation's human development in terms of health, knowledge, and living standards. The HCI (World Bank, 2018) focuses on health and education, which directly impact future worker productivity.

The literature consistently affirms the pivotal role of human capital in driving economic growth. Theoretical frameworks and empirical studies support the notion that investments in education, health, and innovation are instrumental in enhancing productivity and sustaining long-term economic development. To cultivate robust and inclusive economic growth, policymakers must prioritize the creation of environments conducive to human capital formation.

Based on the review of the existing literature, it is worth noting the weak reflection of the features and challenges of modern globalization in the studies surrounding the problem of human capital and economic growth, the failure to consider the growing economic uncertainty and the simplified representation of human capital as a complex systemic phenomenon. All this points to the urgency of further research in this field.

This paper aims to determine the features of the interaction between human capital and economic growth, considering the specifics of modern globalization, distinguishing the features of Georgia and formulating recommendations. Based on the literature review and the abovementioned, the conceptual model of the study is presented in Figure 1, and the research hypotheses are as follows.

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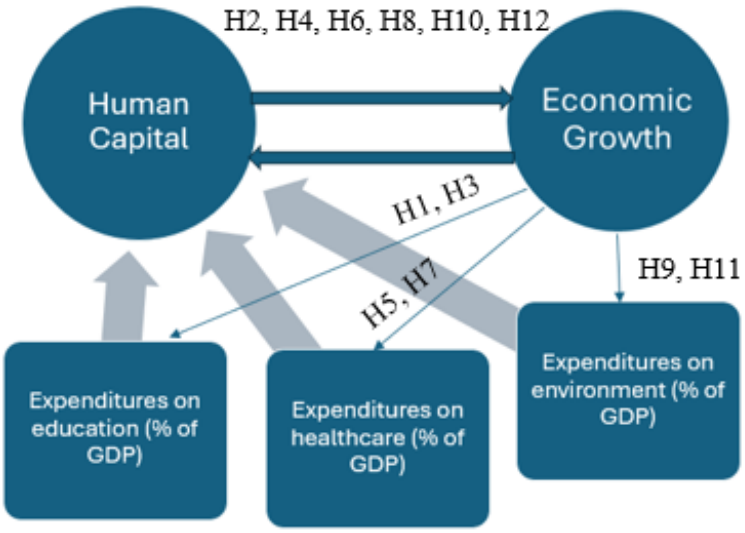


Figure 1. Conceptual Framework

The above conceptual framework refers to Gross Domestic Product (GDP) per capita and GDP growth as indicators of economic growth, but the hypotheses are assumed separately. Education, healthcare, and environmental expenditures reflect human capital development with some conditions. This analysis measures human capital by considering expenses on education, healthcare, and the environment.

H1: GDP per capita has a significant influence on expenditure on education.
H2: Expenditure on education has a significant influence on GDP per capita.
H3: GDP growth has a significant influence on expenditure on education.
H4: Expenditure on education has a significant influence on GDP growth.
H5: GDP per capita has a significant influence on expenditure on healthcare.
H6: Expenditure on healthcare has a significant influence on GDP per capita.
H7: GDP growth has a significant influence on expenditure on healthcare.
H8: Expenditure on healthcare has a significant influence on GDP growth.
H9: GDP per capita has a significant influence on expenditure on environment.
H10: Expenditure on environment has a significant influence on GDP per capita.
H11: GDP growth has a significant influence on expenditure on environment.
H12: Expenditure on the environment has a significant influence on GDP growth.

3. Research Methodology and Methods

A mixed-methods approach was used, combining qualitative and quantitative techniques. Data was collected from literature, Georgian Statistical Office (Geostat) and analyzed statistically. Comparative and benchmarking methods were also applied (Bedianashvili & Kokhreidze, 2024).

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One of the important methodological frameworks and foundations of the research is confrontational globalization under growing uncertainty as a systemic concept of modern globalization (Bedianashvili, 2021, 2023; Papava, 2022a, 2022b).

The statistical data used in the study were sourced from various organizations, including the International Monetary Fund (IMF), World Bank (WB), United Nations (UN), and Geostat. In addition to these data sources, the research employed econometric methods and advanced artificial intelligence (AI) techniques. Specifically, the study utilized machine learning (ML) models, drawing on the methodologies and findings of notable works such as those by Breiman (2001), which introduced fundamental concepts in ML, and Lundberg and Lee (2017), who developed methods for interpreting ML models. Further contributions from Lundberg et al. (2020) expanded on these interpretative techniques. Pedregosa et al. (2011) provided essential tools for implementing ML algorithms, and Shapley (1951) offered foundational insights into cooperative game theory that are now applied in ML to explain model predictions.

Data from several small countries was used to evaluate how human capital might affect economic growth. Alongside Georgia were selected benchmark countries, considering factors such as population size, country area, and development level. Three European Union (EU) member countries were chosen as benchmark countries: Ireland, Latvia, and Lithuania. The table below presents the primary characteristics of these countries in terms of area and population (Table 1).

Table 1. Area and number of populations in Georgia and benchmark countries, 2023

Country	Number of population (mln)	Area (km2)
Georgia	3.73	69700
Ireland	5.06	70273
Latvia	1.83	64589
Lithuania	2.72	65300

Source: www.imf.org, www.worldometers.info

The data analyzes the relationship between economic growth and human capital for Georgia and benchmark countries. It measures economic growth using GDP per cent change and Purchasing Power Parity (PPP) per capita. Public spending data includes expenditures on education, healthcare, and the environment. Education is measured by the total years spent in primary and secondary school.

The analysis also includes the HDI, using average life expectancy for healthcare and CO2 emissions for environmental indicators. Data from 2000-2021 comes from the IMF, World Bank (WB), and the UNDP for HDI. The World Bank Human Capital Project provides data, with the latest from 2020.

For simplification used the abbreviations of the variables: GDP, GDP_ppp, exp_edu, exp_h, exp_env. Below, the variables used in the analysis and their respective abbreviations are explained (Table 2).

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Table 2. Abbreviations of used variables

Variable	Abbreviation
Gross Domestic Product	GDP
Economic Growth	Y_gr
GDP per capita by Purchasing Power Parity	Y_capita
expenditures on education (% of GDP)	exp_edu
expenditures on healthcare (% of GDP)	exp_h
expenditures on environment (% of GDP)	exp_env

Considering the causal relationship between economic growth and expenditures on human capital such as education, healthcare and environment, the appropriate quantitative estimation is based on the cointegration analysis. The analysis, cointegration enabled the identification of long-term equilibrium relationships between the variables shown above. First, it should be noted that human capital consists of expenditures on education, healthcare and the environment as well. On the other hand, there is economic growth and GDP per capita data. During the analysis, it formulated the null and alternative hypothesis and tested them. Cointegration testing is crucial to determine if there is a causal relationship between the mentioned variables, and if there is, to identify which variable causes changes in the other. The null hypothesis was that there is no level relationship among the tested time series, while the alternative hypothesis is that there is a level relationship among these series. The casual relationship is tested for the following variables: on the one hand, expenditures on education, healthcare, and the environment as a percentage of GDP, and on the other hand, GDP per capita. The null hypothesis of no cointegration between these variables was rejected in the following cases:

- GDP growth and expenditure on education for Ireland and Latvia;
- GDP per capita and expenditure on healthcare for Georgia and Ireland;
- GDP growth and expenditure on healthcare for Ireland;
- GDP per capita and expenditure on the environment for Georgia and Latvia;
- GDP growth and expenditure on the environment for Georgia, Ireland, and Lithuania.

Considering this, it can express the Granger Causality Test hypothesis as follows (Table 3).

Table 3. Granger Causality Test hypotheses

Null Hypothesis (H0) and Alternative Hypothesis (H1-H12)	Result for Georgia	Result for Ireland	Result for Latvia	Result for Lithuania
H0: Y_capita does not ➔ Exp_edu H1: Y_capita ➔ Exp_edu	H0	H0	H0	H0
H0: Exp_edu does not ➔ Y_capita H2: Exp_edu ➔ Y_capita	H0	H0	H0	H0
H0: Y_gr does not ➔ Exp_edu H3: Y_gr ➔ Exp_edu	H0	H0	H0	H0
H0: Exp_edu does not ➔ Y_gr H4: Exp_edu ➔ Y_gr	H0	H0	H0	H0
H0: Y_capita does not ➔ Exp_h **H5: Y_capita ➔ Exp_h**	H1	H0	H0	H0
H0: Exp_h does not ➔ Y_capita **H6: Exp_h ➔ Y_capita**	H1	H0	H0	H0

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H0: Y_gr does not ➔ Exp_h H7: Y_gr ➔ Exp_h	H0	H0	H0	H0
H0: Exp_h does not ➔ Y_gr H8: Exp_h ➔ Y_gr	H0	H0	H0	H0
H0: Y_capita does not ➔ Exp_env **H9: Y_capita ➔ Exp_env**	H1	H0	H1	H0
H0: Exp_env does not ➔ Y_capita **H10: Exp_env ➔ Y_capita**	H0	H1	H0	H0
H0: Y_gr does not ➔ Exp_env **H11: Y_gr ➔ Exp_env**	H0	H0	H0	H1
H0: Exp_env does not ➔ Y_gr H12: Exp_env ➔ Y_gr	H0	H0	H0	H0

4. Results

The study explores the causal relationship between education, healthcare, and environment, expressed as a percentage of GDP, on one hand, and economic growth on the other hand. To analyze these interconnections, the first step involves examining stationarity to determine the degree of integration. This is achieved by conducting unit root tests through various methodologies. Subsequently, cointegration is assessed to measure the correlation between the time series. After assessing the degree of cointegration, causality is defined using appropriate tests, providing insights into whether the selected public spending influences economic growth in the chosen countries.

Public spending for education, healthcare, and the environment is represented as a percentage of GDP. As the initial data were non-stationary, they underwent transformation to achieve first-order difference stationarity. This transformation enables the estimation of cointegration in the time series, allowing for the investigation of causality among the variables. In some instances, no cointegration vector was identified, or it was impractical to assess cointegration. For example, the Johansen cointegration test for economic growth and public spending on education did not reject the Null hypothesis, indicating any cointegration in the model for Georgia.

The cointegration test between economic growth and public spending on healthcare yields the same result. Concerning spending on the environment, the Trace Statistic test reveals two vectors, whereas the Maximum Eigenvalue test indicates no cointegration vector among these variables.

Since one of the tests demonstrates correlation, Granger Causality tests are employed to investigate causality. The selected variables are initially nonstationary but attain stationarity through first-order differencing, denoted as I(1). The Vector Error Correction (VECM) method is employed for causality testing. However, the results indicate that none of these variables cause another. If replaced GDP per capita data for economic growth, the findings persist. There is still no discernible relationship for spending on education and healthcare. Both Trace Statistic and Maximum Eigenvalue tests confirm a single cointegration vector for spending on the environment see Table 4).

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Table 4. Johansen cointegration test for Georgia, between GDP per capita and spending on environment

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.753213	20.73164	15.49471	0.0074
At most 1	0.078362	1.142443	3.841465	0.2851
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.753213	19.58919	14.26460	0.0065
At most 1	0.078362	1.142443	3.841465	0.2851
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

During the causality testing, the results indicate that the GDP per capita causes changes in spending on the environment (see Table 5).

Table 5. Granger Causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
GEORGIA_EXPENDITURE_ON_ENVIRONMENT_PROTECTION does not Granger Cause GEORGIA_GDP_PER_CAPITA	14	0.28353	0.7596
GEORGIA_GDP_PER_CAPITA does not Granger Cause GEORGIA_EXPENDITURE_ON_ENVIRONMENT_PROTECTION		4.94484	0.0356

As it was received the result that there is at most 1 cointegration vector, one can use the Granger Causality test and see whether spending on environment causes GDP per capita or GDP per capita causes spending on environment in Georgia.

The Johansen test reveals one cointegration vector between economic growth and spending on education and economic growth and spending on the environment for Ireland. Additionally, two vectors are identified for economic growth and spending on healthcare. However, causality analysis indicates that none of these variables causes another.

In the case of GDP per capita analysis and causality tests for the same variables, the results show that public spending on the environment causes a change in GDP per capita. This causality is also confirmed for Latvia, where GDP per capita causes a change in spending on the environment. Johansen tests for Latvia indicate one cointegration vector between spending on education and economic growth, a finding was supported by Trace Statistics and Maximum Eigenvalue Statistics. On the other hand, for Lithuania, the causality is observed in the economic growth and expenditure on the environment, where economic growth causes spending on the environment.

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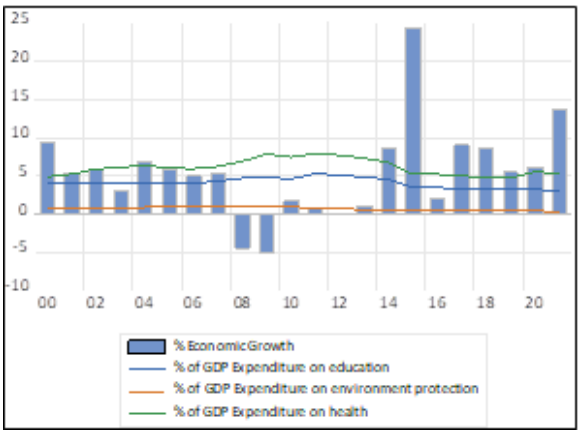
Table 6 below shows the p-values for all four analysed countries, where it tested if there was a cointegration vector. In cases where the results show that no cointegration vector was observed, they had a probability higher than 5 per cent. Otherwise, the p-value was less than 0.05.

Table 6. The p-values for analysed countries

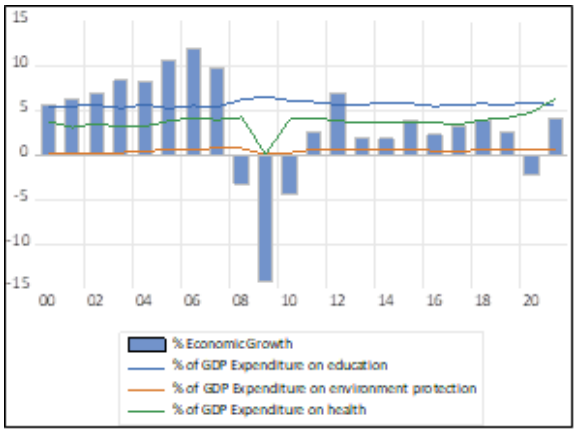
Null Hypothesis (H0) and Alternative Hypothesis (H1)	P-value for Georgia	P-value for Ireland	P-value for Latvia	P-value for Lithuania
H0: No cointegration vector between Y_capita and Exp_edu H1: At least 1 cointegration vector between Y_capita and Exp_edu	0.7995	0.1228	0.0582	0.5117
H0: No cointegration vector between Y_gr and Exp_edu **H1: At least 1 cointegration vector between Y_gr and Exp_edu**	0.0784	0.0197	0.0012	0.0552
H0: No cointegration vector between Y_capita and Exp_h H1: At least 1 cointegration vector between Y_capita and Exp_h	0.0354	0.0294	0.2109	0.3634
H0: No cointegration vector between Y_gr and Exp_h **H1: At least 1 cointegration vector between Y_gr and Exp_h**	0.1091	0.0103	0.1369	0.08
H0: No cointegration vector between Y_capita and Exp_env **H1: At least 1 cointegration vector between Y_capita and Exp_env**	0.0074	0.0954	0.034	0.4744
H0: No cointegration vector between Y_gr and Exp_env **H1: At least 1 cointegration vector between Y_gr and Exp_env**	0.0052	0.0274	0.0649	0.0038

Furthermore, the causality analysis reveals that GDP per capita is a driving factor for changes in spending on the environment in both Georgia and Latvia. Conversely, in Ireland, the spending on the environment serves as the explanatory variable. This discrepancy suggests the potential influence of other variables related to human capital, which were not included in the analysis. The relationship between these omitted variables for Georgia and benchmarking countries is illustrated in Pictures 1-6 below.

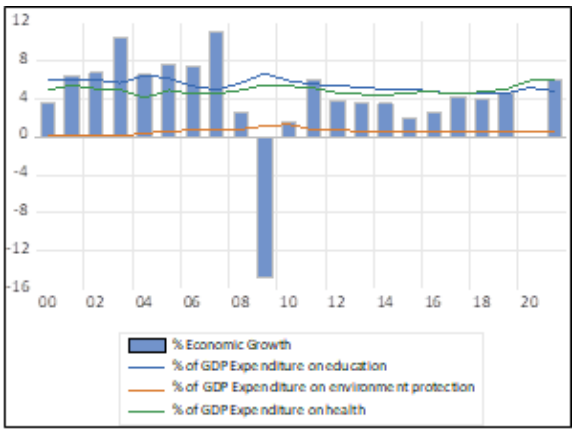
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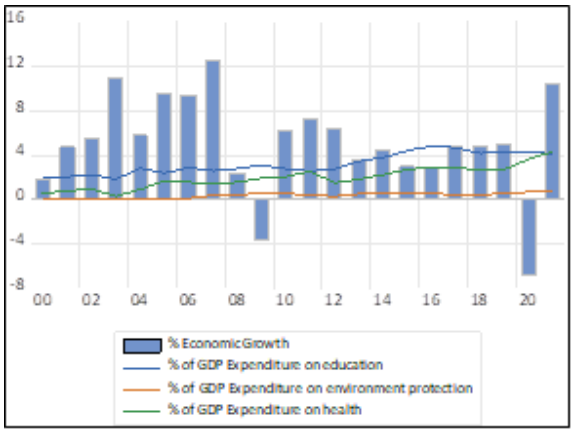
Picture 1. Ireland



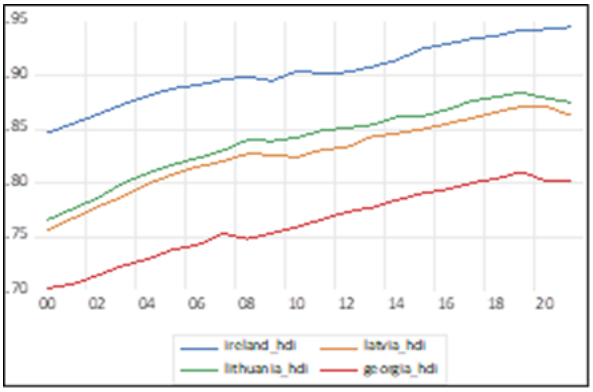
Picture 2. Latvia



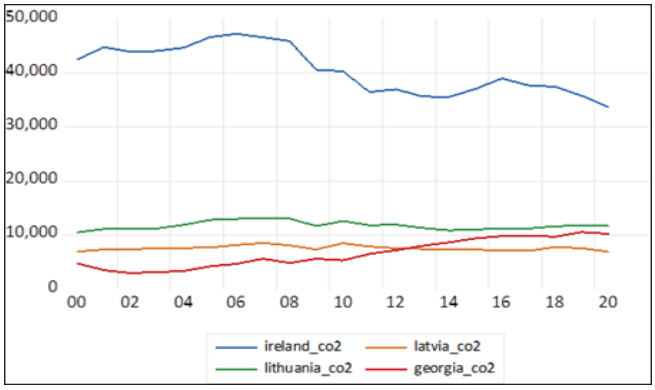
Picture 3. Lithuania



Picture 4. Georgia



Picture 5. HDI



Picture 6. CO_2 emmision (kilotones)

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Considering one of the main factors affecting income in the human capital analysis, it is crucial to assess the factors influencing income. Similar studies have been conducted in other countries (e.g., Chakrabarty, Biswas, 2018).

Georgian 2019-year labour force survey data analysis using machine learning by Bedianashvili et al. (2023) extracted meaningful insights about relationships between income as the dependent variable and various features like age, education, sex, worked hours, etc. It would be scientifically interesting to analyze 2022-year survey data of Geostat (https://www.geostat.ge/en/modules/categories/130/labour-force-survey-databases) using same methods for two reasons: 1. There was Covid-19 pandemic in the world in 2021; 2. The Russian-Ukrainian war affected the world economy in different ways in 2022. So, these two events might affect relationships between variables described above. There is a difference in methodologies between the 2019 and 2022 surveys. Classifiers are changed, but the general picture is the same.

In 2022-year survey dependent variable in database is B24_B25_Net_earnings, which is the interval of net earnings in the main job for the last worked month in Georgian Laris (GEL). It contains several intervals, but authors removed 'Refuse the answer' and 'Has not received earnings for the last working month', then combined some intervals and created classes. The intervals and created classes are:

- '100 GEL or less': 0,
- '101-150 GEL': 0,
- '151-200 GEL': 0,
- '201-300 GEL': 0,
- '301-400 GEL': 0,
- '401-500 GEL': 0,
- '501-600 GEL': 0,
- '601-800 GEL':1,
- '801-1000 GEL':1,
- '1001-1500 GEL':2,
- '1501-2000 GEL':2,
- 'More than 2000 GEL':3.

So, Class 0 contains 600 GEL or less income, class 1 contains earnings from 601 GEL to 1 000 GEL, class 2 is earnings from 1 001 to 2 000 GEL and class 3 is earning more than 2 000 GEL.

The independent variables from the survey database are sex, age, the second job ('Second_Job' in databases), education (Education attainment level), the status in employment at the main job, occupation (The authors converted the four-digit level ISCO-08 code for the main job occupation to a two-digit level according to the international standard classification of occupations.), atypical work, the number of hours worked in the main job during the last 7 days (denoted as 'M_Actually_worked' in database), the authors converted the NACE Rev.2 four-digit level code for the kind of economic activity (referred to as 'Brunch' in database) to a three-digit level, the permanence of the job, authors mapped null values as 'No' for income sources across variables H2_1_Income_sources through H2_7_Income_sources.

In study was encoded categorical variables. If variable had only two categories, 0 and 1 was used. For example, in variable 'Sex' woman was encoded as 0 and man was encoded as 1. In 'Second Job' variable 'No' was encoded as 0 and 'Yes' was encoded as 1. All other categorical variables were encoded using One-Hot Encoding method using sklearn programming library with drop_first=True parameter. Authors removed rows with missing variables. At last authors got 12 362 rows and 258 columns in 2022-year data.

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It used Random Forest algorithm for classification (Breiman, 2001). This method is based on decision trees. After that data was split in training and testing datasets using sklearn's train_test_split method, this method used shuffling (for research reproducibility *random_state=365* parameter was used). The size of test dataset was 10% of preprocessed data. Because of class imbalance problem in datasets stratification was used while splitting.

In study used balanced subsample method in Random Forest to deal with imbalanced classification (for research reproducibility *random_state=365* parameter was used). For hyperparameter tuning authors used randomized search cross-validation, where focusing hyperparameters were (some of them were from Bedianashvili et al., 2023):

Number of decision trees: [30, 37, 45, 53, 61, 68, 76, 84, 92, 100];
Maximum tree depth: [10, 14, 18, 22, 26, 30, 34, 38, 42, 46, 50, None];
Minimum samples required to split a node: [2, 5, 10];
Minimum samples required at each leaf node: [1, 2, 3, 4, 5, 6, 7];
Bootstrap sampling: [True, False].

As for randomized search cross-validation, number of iterations was 50 and cv parameter was 10.
After that for this model, the found hyperparameters were:

The number of trees were 92, minimum samples required to split a node was 2, the minimum samples required at each leaf node was 1, the maximum tree depth was 46, bootstrap sampling was True. The score was 0.7137115644411695.

Random Forest used balanced subsample here also.

Using balanced subsample method and these hyperparameters authors trained model and tested it using F1 (weighted) and Jaccard (micro) scores on test dataset. As for model performance, the F1 (weighted) score was 0.726 and Jaccard (micro) was 0.574.

5. Discussion

The analysis aims to comprehend the link between human capital and economic growth. It was included expenditures on education, healthcare, and the environment as components of human capital since investments in these sectors contribute to its development.

Therefore, the table below illustrates the cointegration analysis examining the relationship between economic growth and human capital (Table 7).

Table 7. The table below illustrates the cointegration analysis examining the relationship between economic growth and human capital

Null Hypothesis (H0) and Alternative Hypothesis (H1)	Result for Georgia	Result for Ireland	Result for Latvia	Result for Lithuania
H0: Human capital does not ➔ Y_capita H1: Human capital ➔ Y_capita	H0	H1	H0	H0
H0: Y_capita does not ➔ Human capital H1: Y_capita ➔ Human capital	H1	H0	H1	H0
H0: Human capital does not ➔ Y_gr H1: Human capital ➔ Y_gr	H0	H0	H0	H0
H0: Y_gr does not ➔ Human capital H1: Y_gr ➔ Human capital	H0	H0	H0	H1

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The table above shows that for Georgia and Latvia, higher GDP per capita leads to higher spending on human capital, while for Ireland, spending on human capital drives higher GDP per capita. This result, combined with the findings above, is logical: countries with rising GDP per capita are investing more in human capital, such as education, healthcare, and the environment, which in turn stimulates economic activity and increases GDP per capita. Additionally, expenditure on education is crucial, especially as environment and climate issues become more prominent, illustrating a bidirectional relationship where economic growth enables more environment spending, which is a form of human capital spending that fosters further economic growth.

In conclusion, it should be noted that spending on human capital does not directly cause economic growth, and this finding can be attributed to various factors. The analysis was constrained by the limited time period, hindering a comprehensive examination of time series with structural variables. The impact of spending on the economy may take years to manifest, underscoring the importance of considering time lags. Moreover, a possible reason could be that a bachelor's degree is sometimes not tailored to real-world practice. Hence, spending on education might not be the right instrument to drive economic growth. Additionally, Georgia is at a developmental stage where prioritizing economic growth is necessary for a shift towards emphasizing capital spending over current spending. The public spending categories analyzed primarily constituted current spending, which typically garners more attention in later stages of development. This trend is observed in other countries that also redirected focus towards education and the environment after reaching a specific stage of development.

From the results of the empirical research, it can be seen that the trace cointegration test confirms that there is 1 cointegration vector (at the 0.05 level) between the GDP per capita and spending on the environment for Georgia. The probability of the null hypothesis about no cointegration vector was set at 0.0074, meaning that the p-value is statistically significant, which implies rejecting the null hypothesis. The alternative hypothesis about at most 1 cointegration vector has the probability at 0.2851, and therefore, it cannot reject this hypothesis, meaning that there is 1 cointegration vector. The same result is from the Maximum Eigenvalue test, with null hypothesis of no cointegration vector and alternative hypothesis of at most 1 cointegration vector. Null hypothesis has the probability at 0.0065, which is statistically significant, and it must reject it, while alternative hypothesis has the p-value at 0.2851, so one cannot to reject this hypothesis and say that there is 1 cointegration vector between the GDP per capita and spending on environment.

Using the Granger Causality test, it turned out that P-value for the null hypothesis that spending on environment causes GDP per capita is 0.7596 with the F-statistic 0.28353, which shows that it is not statistically significant and hence, cannot be reject null hypothesis. This confirms that spending on environment does not cause GDP per capita at this point. On the other hand, another null hypothesis indicates that GDP per capita causes spending on the environment; this has a probability of 0.0356, which is less than 5 per cent and F-statistic is higher, 4.94484. Therefore, one can conclude that can reject the null hypothesis and confirm that GDP per capita causes spending on environment in Georgia.

The possible reason for the abovementioned aspect is that spending on human capital is spending on education, healthcare, and the environment, which creates healthy and educated people who are capable of working better and hence, they are more expected to contribute to the economy. On the other hand, when a country has a higher GDP per capita, it is already in the developing stage and starting to have more concentration on the human capital aspects, such as the education of its population, healthcare and climate-related issues.

It is meaningful to interpret models; sometimes, imbalance of classes and multicollinearity might affect insights, and balanced subsampling can alleviate imbalanced class problems. There are different approaches to get insights from models and data, but authors made interpretation using Shapley values (Shapley, 1951) with Python SHAP library (Lundberg and Lee, 2017). The authors used the TreeExplainer algorithm (Lundberg et al., 2020) on test

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datasets; this algorithm reduces the effects of multicollinearity. The algorithm gave results. Variables are ranked in descending order by average impact on model output magnitude on Diagram 1.

As for 2022-year model, the most important variables are sex, actually worked hours, age and education level of master's degree or equivalent as displayed on Diagram 1. It is meaningful to consider that SHAP is interpreting here categorical variables as dummy variables after One-Hot Encoding, but the main interest of the study is to interpret individual categories.

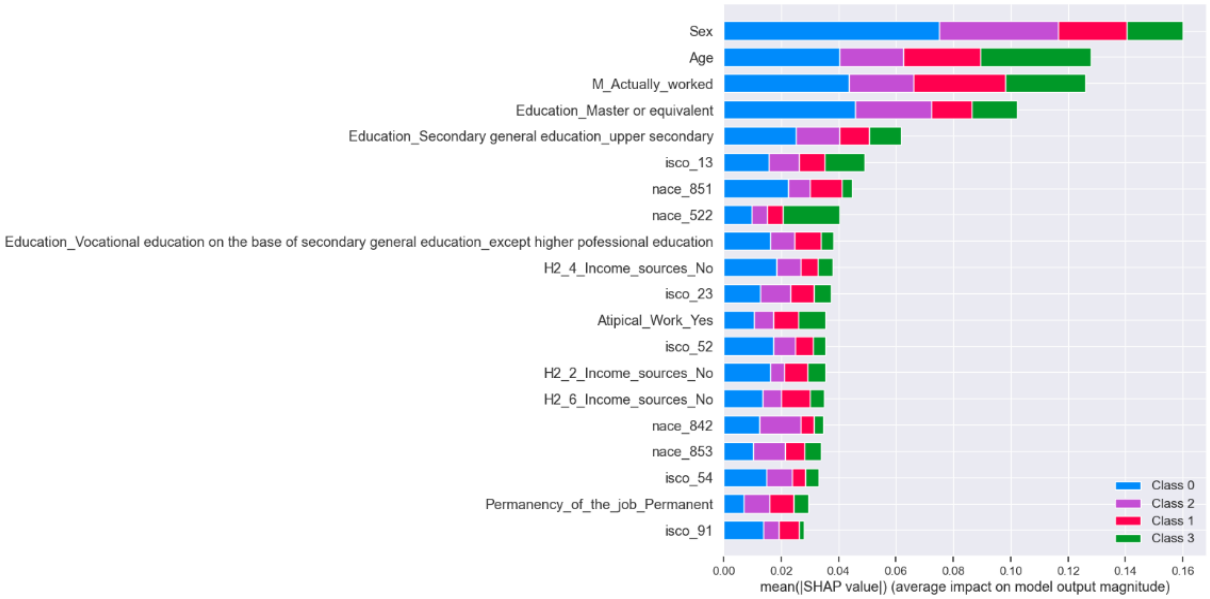


Diagram 1. Average impact on model output magnitude

Next, it's important to interpret features for individual classes. To illustrate the results, it is interesting to consider the year 2022. Diagram 2 shows variable impact for individual classes for 2022-year model.

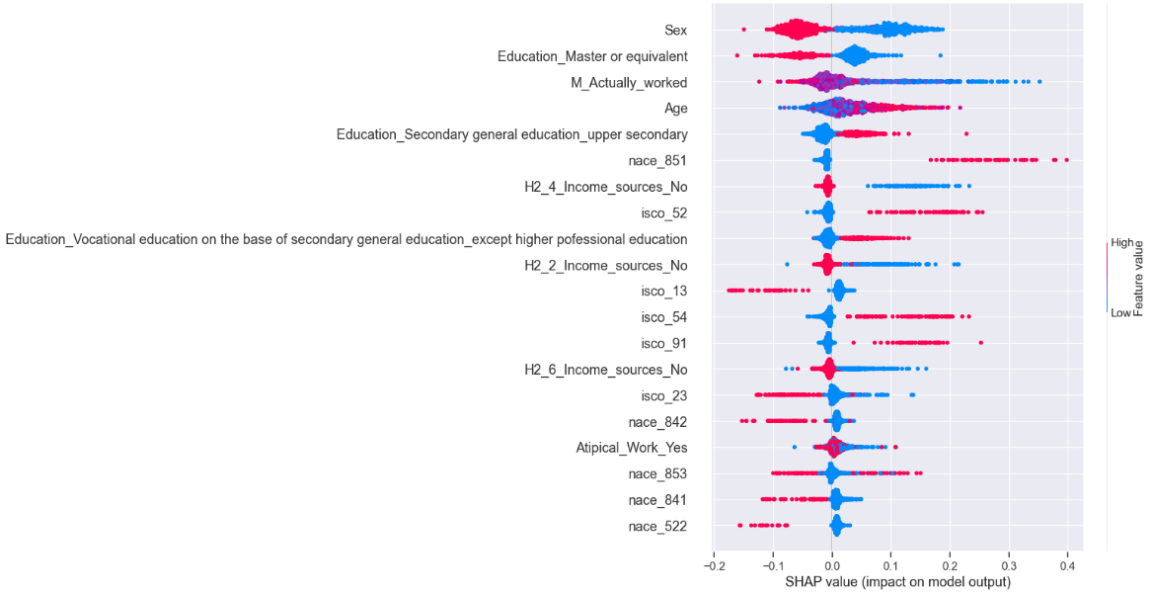
Diagram 2(I) shows the main factors for which the model classifies a particular observation as having a net income of 600 GEL or less. Males are less likely to be included in this class compared to females, increasing actually worked hours per week decreases the probability of inclusion the person in this class, people with master's degree and equivalent are less likely to be included in this class. Older people and people whose highest-level education is secondary general education/upper secondary are more likely to be included in this class. If the person works in economic activity, which NACE Rev.2 code is 85.1 (Pre-primary education), then the model will more likely include the person in this class. Diagram 2(II) shows the main factors for which the model classifies a particular observation as having a net income from 601 GEL to 1 000 GEL. Here actually worked hours per week and age are the most important factors, but these require further analysis. Males are more likely to be included in this class than females. Education shows a nonlinear relationship, but people with master's degrees are more likely to be included in this class. Diagram 2(III) shows the main factors for which the model classifies a particular observation as having a net income from 1 001 GEL to 2 000 GEL. Males, people with master's degree, teaching professionals (ISCO-08 sub-major group 23) or equivalent are more likely to be included in this class.

In contrast, people whose highest education level is secondary general education/upper secondary are less likely to be included here. Diagram 2(IV) shows the main factors for which the model classifies a particular observation

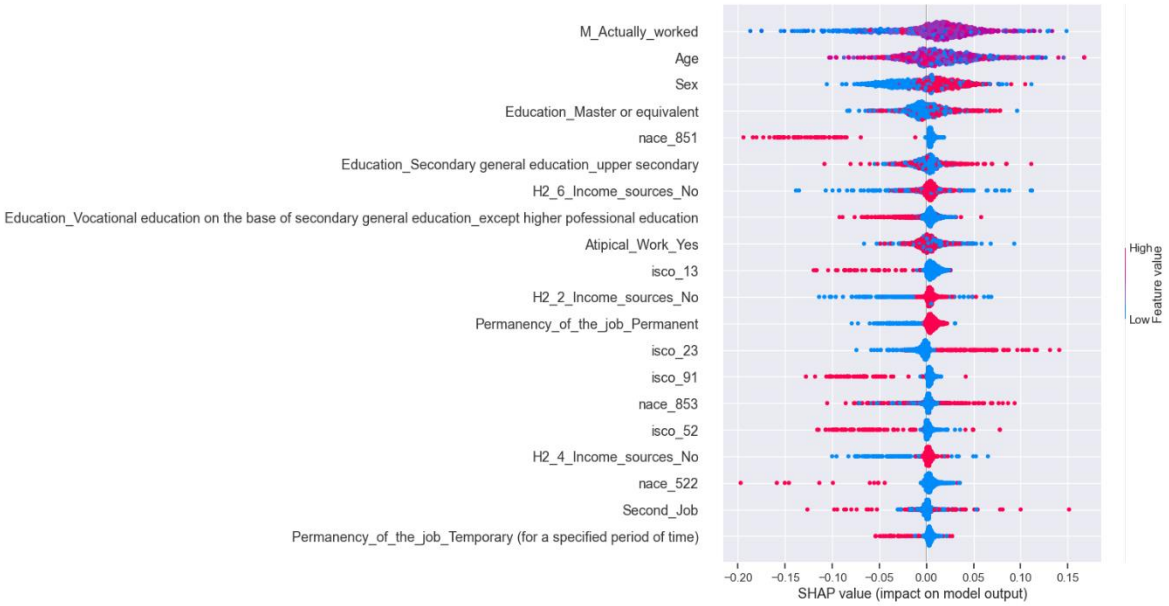
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as having a net income from 2 001 GEL or more. Older people are less likely to be included here. Still, males, people with master's degrees or equivalent, production and specialized services managers (ISCO-08 sub-major group 13), and people who work in economic activity NACE Rev. 2 52.2 (Support activities for transportation) are more likely to be included here.

I

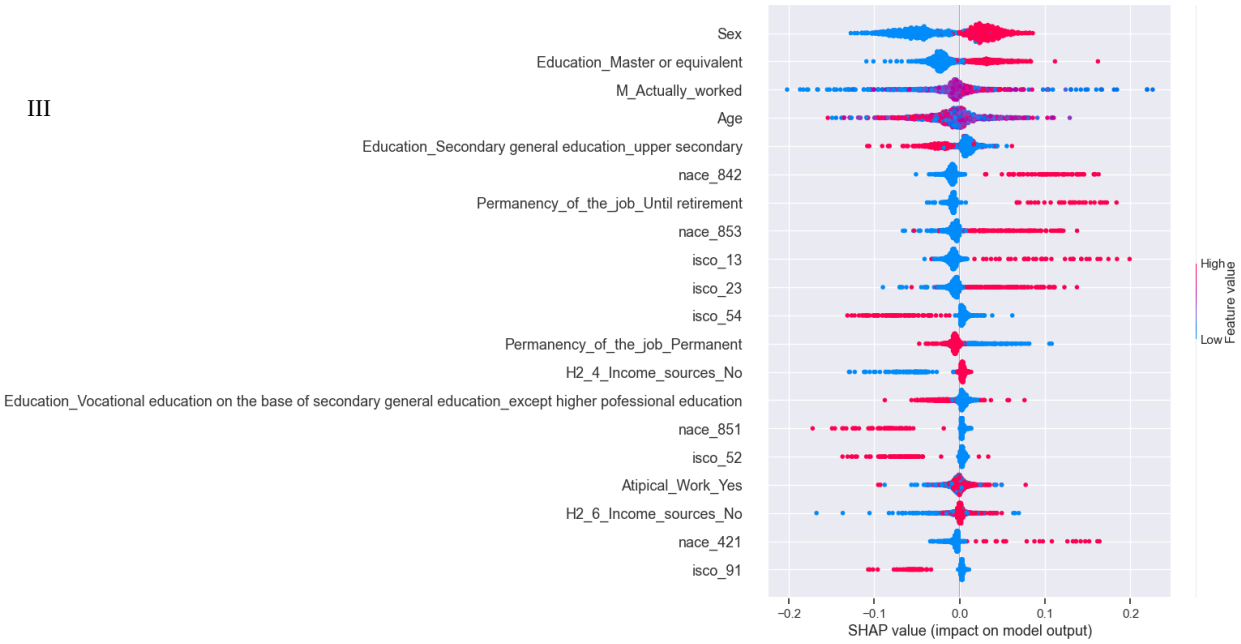


II



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III



IV

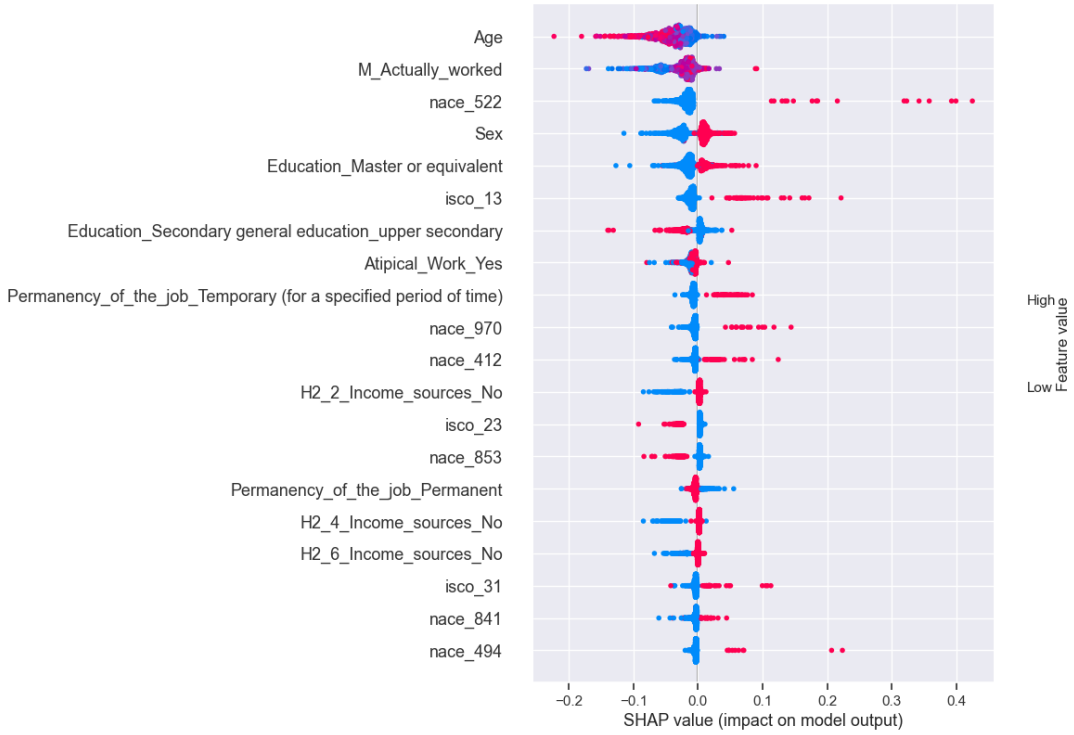


Diagram 2. 2022-year model summary plots for individual classes

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6. Conclusion and Recommendations

The examination of the previous period reveals that the contemporary global and national economies are characterized by a new, distinctively confrontational nature of globalization. Amidst confrontational globalization, heightened uncertainty emerges as a pivotal macrosystemic challenge, underscoring the critical importance of maintaining stability within the socio-economic systems of individual countries. Human capital remains crucial in the face of confrontational globalization.

Spending on human capital may not immediately affect economic growth due to long-term effects and structural inefficiencies. Developing social infrastructure like healthcare and social security is vital for overall well-being and economic growth.

Countries that invest in human capital tend to achieve higher GDP per capita. Conversely, countries with rising GDP per capita are more likely to increase their spending on human capital.

One potential explanation for the phenomenon is that investments in human capital - such as education, healthcare, and environmental protection - lead to a healthier and more educated population. These individuals are better equipped to contribute to the economy. Conversely, countries with higher GDP per capita are often already on a path of development and tend to prioritize human capital factors like education, healthcare, and environmental sustainability.

The results show that in Georgia, higher GDP per capita causes more expenditure on human capital, which combines education, healthcare, and environment. However, during the detailed analysis, more impact was visible on the spending on healthcare and the environment. Spending on the environment can be explained by the recent interest in climate issues, as climate-related risks create additional pressure on the economy. Hence, countries realized that it is crucial to consider climate aspects and increase environmental financing. On the other hand, spending on healthcare is vital as it affects productivity and can affect economic activity. At the same time, countries with high GDP per capita are more concerned about the improvement of the healthcare system in the economy.

The study showed that Georgia needs a holistic approach to human capital development. Initial levels of education may not strongly impact worker earnings, emphasizing the need for quality institutions. Professional education should be integrated and elevated within the broader education system.

As a result, the study recommends that to overcome the uncertainty surrounding the future workforce, the education of business founders and professionals should prioritize the development of skills oriented to future trends, with a focus on facilitating the forming of adaptation skills.

The next research focus will be on examining how digital transformation and AI influence human capital development and economic growth. Additionally, it will comprehensively explore the impact of life expectancy on economic growth, the effect of education quality on economic activity, and the influence of the environment on productivity.

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DETERMINANTS OF CHANGES IN PERCEPTION OF THE QUALITY OF DAIRY PRODUCTS BY POLISH CONSUMERS*

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Abstract. The quality of dairy products covers areas that independently determine preferences, purchasing behaviour and eating habits. The concept of a three-dimensional structure of food quality has been the subject of numerous analyses. Many authors emphasize that research on the consumer quality structure should show orthogonal quality areas and the importance of these areas for individual user segments. It can be assumed that a specific modification in the perception of the quality of food products occurred under the influence of the COVID-19 pandemic. The research examines a perception of the quality of dairy products in the Polish market after the COVID-19 pandemic. It is assumed that the obtained research results will allow the adaptation of previously existing quality management systems to the new conditions. The research was conducted in the third quarter of 2022 and involved a survey targeting residents across all 16 voivodeships of Poland. The survey results underwent principal components analysis using the Statistica 13.3 package. The number of principal components was determined using the Kaiser method and the percentage of explained variance method. Factor loadings were calculated post-rotation using the "normalized varimax" method proposed by Pieczonka (2009). According to research, the quality of dairy products, in the opinion of the Polish consumer, is a multidimensional concept. The most critical areas of the quality of dairy products for both women and men are their nutritional and health-promoting value. Consumers considered the elements of the highest importance to be freshness and naturalness, the absence of contamination and chemical additives, durability and essential organoleptic features, taste and smell.

Keywords: dairy products; quality structure; quality management; quality of dairy products; food quality; consumer

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1. Introduction and review of literature

The food industry is crucial to the European Union's economic system. The milk production and processing industry is an integral and vital part of the food sector (Radu et al., 2023).

The Polish dairy products market transformed into a consumer market about thirty years ago. This forced producers to use marketing mix tools actively. One of the primary goals of the marketing mix is the transfer of information between the enterprise and the consumer (Chen et al., 2021; Choroszy, 2021). Information sent by producers should be a source of knowledge about its quality for consumers while limiting the phenomenon of various types of uncertainty (Nowak, 2008). It is believed that the one uncertainty most strongly felt by consumers is the quality of dairy products. The above relationship makes it difficult to attach to the brand's postmodern consumer (Skorek, 2015). Overcoming it with skilful marketing activities and a high-quality product offer allows one to compete in the market (Kraś, 2017), as quality is essential for the consumer when making a purchase decision.

Food quality is a complex phenomenon that has changed dynamically in recent years, and this trend is assumed to continue. The premise for such predictions is the variety of objective and subjective factors determining the quality of food products, resulting from the expectations of all entities involved in the food chain. The main links in the food chain are production, storage, distribution and consumers (Bukała et al., 2000; Chen and Antonelli, 2020; Boustani et al., 2021).

Food quality attributes are vital for consumers. The perception of quality by final recipients is a complex concept, conditioned by many characteristics, the area and rank of which depend on buyers' socio-demographic and psychographic profiles. In management theory, quality is defined as the degree to which the product purchased by the consumer meets his expectations.

One of the classic approaches to the quality of food products, adopted in the marketing literature, is Nelson's proposal (Nelson, 1974), which assumes its three-dimensional structure. According to this concept, in discerning quality, the consumer uses searching features (the consumer can evaluate them before purchasing, e.g., colour), experiential features (the consumer evaluates them only based on direct experience with the product, e.g., taste and smell) and features accepted A priori (usually the consumer cannot consider them himself, e.g., nutrient content) (Nelson, 1970; Pinson and Jolibert, 2001; Stobiecka, 2010).

The concept of a three-dimensional structure of food quality has been the subject of numerous analyses. Many authors emphasize that research on the consumer quality structure should show orthogonal quality areas and the importance of these areas for individual user segments (Sun, 2006). Moreover, these processes change dynamically under the influence of multiple factors (Choroszy, 2021; Kraus, 2015). Many authors have attempted to organize the quality parameters of food products, allowing for substantive interpretation of the results. The above research aimed to make it easier for entities operating in the food market to make accurate marketing decisions. The tool that enables such ordering of the quality determinants of food products is the analysis of the main components. It may be based on the interpretation of the results of the determination of physio-chemical quality parameters or sensory evaluation of selected food groups. Attempts of this type were made by, for example, Iezzoni et al. (1991), Borgognone et al. (2001), Probola and Zander (2007), Luciano et al. (2009), Ghosh et al. (2012), Granè et al., Cozzolino et al. (2014). Principal component analysis is fundamental when it comes to analysing the acceptability of fermented food samples, and the overall acceptance of the sample depends on various attributes, namely, appearance, texture, taste, feel in the mouth, and acidity. These studies also showed that the texture of fermented food samples could be considered the main feature. By analysing the physical quality of fermented food samples, namely compressive load and shear load, it can be concluded that they are the essential criteria for its acceptance, as they are related to the texture of the ready product.

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Polish researchers also addressed the issue of consumer assessment of the quality structure. This research involved measuring the importance of individual features and factors shaping consumption behaviour in the food market. Cichocka and Pieczonka, 2004 established the Polish consumer structure of the quality of food products. Pieczonka made another attempt to construct a consumer quality structure for dairy products in 2009. In subsequent research in 2015, Kraus presents the results of a principal components analysis covering factors influencing decisions about purchasing and consuming functional food. This concept was developed in 2021 by Choroszy. The above research shows that there are three segments of Polish consumers, each significantly different in terms of how they perceive behaviour-shaping quality characteristics in the food market. The following properties showed disparities across all three groups: naturalness, visual appeal, shelf life and level of processing, fat content and calorific value, health-promoting ingredients, and absence of chemical additives. Significant discrepancy.

It can be assumed that a specific modification in the perception of the quality of food products occurred under the influence of the COVID-19 pandemic. This assumption seems to be justified because the effects of COVID-19 were the widespread isolation of large human populations, the disruption of existing shopping habits, the emergence of new rules for food distribution, including the intensive development of e-commerce trade (Lee, 2024; Burgess et al., 2023).

The research aimed at the quality of dairy products in the Polish market after the COVID-19 pandemic. It is assumed that the obtained research results will allow the adaptation of previously existing quality management systems to the new conditions.

2. Materials and methodology

The research was conducted in the third quarter of 2022 and involved a survey targeting residents across all 16 voivodeships of Poland. Respondents were selected using the quota method, based on Central Statistical Office data concerning gender, age, education level, and place of residence.

The questionnaire was divided into two parts: the first part gathered demographic details, and the second part included eighteen questions to evaluate subjective importance. These questions explored various characteristics that might influence respondents' purchasing decisions and consumption behaviour in the dairy products market.
The characteristics assessed included:

- Nutritional value (protein and calcium)
- The presence of health-promoting ingredients
- Microbiological purity
- Absence of chemical contamination
- Absence of chemical additives
- Freshness
- Low-calorie content
- Taste and smell
- Durability
- Package size
- Producer
- The naturalness of the product
- Presence of probiotics in the product
- Possibility to follow a diet
- Absence of lactose
- Positive impact on well-being
- Aesthetic values of the product or packaging
- Low fat

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Respondents rated these characteristics on a 7-point interval scale, a unipolar structural graphic scale with verbal extreme categories: 1 point representing "extremely unimportant" and 7 points representing "extremely important." The survey results underwent principal components analysis using the Statistica 13.3 package (Stanisz, 2007. The number of principal components was determined using the Kaiser method and the percentage of explained variance method. Factor loadings were calculated post-rotation using the "normalized varimax" method proposed by Pieczonka (2009).

3. Results and discussion

51 people aged from 18 to 66 took part in the survey. The socio-geographic characteristics of the study participants are presented in Table 1.

Table 1. Characteristics of respondents

Characteristic	Segment	**N**	**%**
Sex	Man	235	45,7
	Woman	279	54,3
Age (years)	16-35	179	34,8
	36-50	228	44,4
	>50	107	20,8
Education	Lower than average	65	12,6
	Medium	258	50,2
	Higher	191	37,2
Domicile	Village	234	45,5
	City up to 100 thousand	177	34,4
	A city with over 100,000 inhabitants	103	20,0

Source: own study

Most respondents were women (54.3%). The largest share of the surveyed population, 44.4%, comprised people aged 36-50. Individuals younger than 35 years old made up 34.8% of the total study population, while the age group above 50 was the smallest, comprising 20.8% of the respondents. Regarding educational background, respondents with secondary education were the most numerous, making up over half of the participants. Additionally, a significant portion, 37.2%, held higher education degrees.

Urban residents dominated the study, accounting for 54.4% of the total respondents, with 20% living in cities with more than 100,000 inhabitants. Rural respondents constituted 45.5% of the study population. According to data from the Central Statistical Office, this socio-demographic distribution closely mirrors the structure of Polish society in 2022. Women comprised approximately 52% of the population, and the age distribution was: pre-working age (18.2%), mobile working age (37.1%), non-mobile working age (22.5%), and post-working age (22.2%). Additionally, about 33% of Poles had higher education, and urban residents made up 60% of the population.

Given these statistics, the research sample can be considered representative of Polish consumers of dairy products.
Before performing the principal components analysis, preliminary conditions were checked by determining the correlation matrix between the primary variables and calculating Cronbach's alpha index. The correlation matrix indicated that each variable was significantly correlated ($r>0.3$) with at least three others. The Cronbach's alpha value was 0.91, suggesting a very high reliability of the variables used, surpassing the acceptable threshold of 0.6.

The principal components analysis was conducted separately for men (Table 3) and women (Table 5). For men, three independent areas in their perception of dairy product quality were identified. These three main components were associated with the significance of nearly all assessed qualitative characteristics. The eigenvalues were 6.59, 2.43, and 1.24, explaining 69.1% of the total variance (Table 2).

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Table 2. Results of principal components analysis for men (eigenvalues and percentage of explained variance

Eigenvalue	% of total variance	Cumulative eigenvalue	Cumulative % of total variance
6,59	31,2	6,59	31,2
2,43	23,6	9,02	54,8
1,24	14,3	10,26	69,1

The values of factor loadings are listed in Table 3.

Table 3. Results of the principal components analysis for men (factor loading values)

Characteristic	Main component		
	1	2	3
Freshness	**0,855**	-0,138	0,307
Taste and smell	**0,709**	0,135	0,036
Durability	**0,719**	0,355	0,157
Package size	0,325	**0,803**	-0,063
Producer	0,166	**0,658**	0,299
Aesthetic values the product or packaging	-0,124	**0,736**	0,168
Low fat	-0,046	**0,750**	0,224
Nutritional value (protein and calcium)	0,397	-0,013	**0,689**
The presence of health-promoting ingredients	0,266	0,073	**0,735**
Microbiological cleanliness	0,289	0,104	**0,780**
Absence of chemical contamination	0,492	0,022	**0,657**
Absence of chemical additives	0,307	0,016	**0,720**
Low-calorie content	0,204	0,153	**0,851**
The naturalness of the product	-0,099	0,225	**0,779**
Presence of probiotics in the product	-0,074	0,125	**0,791**
Possibility to follow a diet	-0,006	0,107	0,241
Absence of lactose	-0,121	0,231	0,362
Positive impact on well-being	0,013	0,236	0,483

Source: own study

The three-dimensionality of men's perception of the quality of dairy products confirms the system proposed by Nelson, 1970;1974. Features correlated with the main component 2 can be called search features, distinguishable before purchasing and after reading the information provided on the packaging. The manufacturer presents its logo and informs customers about net weight and fat content. The correlation of the "aesthetic values of the product or packaging" with this main component indicates that men are interested in the aesthetics of the packaging, not the product contained in it.

The first principal component is represented by features that we can call experiential, i.e. those that can be assessed only after opening the package. The most important thing here is freshness. The product's taste and smell characteristics also co-occur with this main ingredient. This is confirmed by the results presented by other authors (Ruiz-Capillas and Herrero, 2021). Most often, the term "fresh product" is associated with high-quality flavour and aroma; defects in the taste or smell of a dairy product inform us about its staleness. This type of association caused men to place durability next to this main component, which suggests that they treat this term as a simple antonym of freshness. (Tan et al., 2020).

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According to Nelson's theory, the third area of quality consists of features taken on faith, elusive to the consumer. The results in Table 2 show that the third principal component represents this area. The highest value of factor loading occurs in the case of the parameter called "low caloric value". This indicates that men do not automatically associate the caloric value of a dairy product with the fat content, but - probably - also with other energy ingredients. Several features are also correlated with this main ingredient: nutritional value, associated primarily with the content of protein and calcium, microbiological purity and lack of contamination and chemical additives, and the presence of health-promoting ingredients. Therefore, this is an area that, according to Szczucki, 1970 and Baryłko-Pikielna, 1983; Baryłko-Pikielna and Wasiak-Zys 2004, can be called "health", expanded to include the term "functionality" of a food product, introduced at the end of the 20th century. The analysis also indicates that men believe that the product's naturalness is the fundamental guarantee of dairy products' safety and functionality
.
Pieczonka presented similar results in 2009. In the men's segment, the same areas of quality of dairy products were revealed: a group of experiential features (freshness, organoleptic properties and durability), features taken on faith (nutritional value parameters, health benefits, harmful contaminants and additives, caloric value), a set of search features (packaging features, brand). Comparing the results and results obtained by Pieczonka with your results, it can be concluded that over the last dozen or so years in Poland, men's understanding of the quality and preferences of quality features of dairy products has stabilized.

A slightly different structure - for all food products - is presented in the study by Cichocka and Pieczonka (2004). Research by these authors carried out about 20 years ago showed that there are also three independent groups of quality characteristics in the men's segment, confirming the system Nelson proposed. The differences lie in the correlation of different quality characteristics with each of these areas. Apart from being healthy and safe to eat, the features taken on faith include freshness, ecological safety and a high degree of processing. Taste is accompanied by three availability parameters: time, ease of culinary preparation and packaging functionality. Men, therefore, treat these properties as empirical. Purchasing decisions are made based on the view of the third group of features called search features by the authors: attractiveness of the packaging, compliance of quality with the canons of current fashion, features that allow you to stand out in the environment (Żakowska-Biemans and Kuc, 2009; Żakowska-Biemans, 2011).

Earlier (last decade of the 20th century) research on the processed meat market and the demand for these products, using principal component analysis, showed the consumer structure of the quality of processed meats in accordance with the so-called commodity theory (Baryłko-Pikielna and Wasiak-Zys, 2004; Szczucki, 1970). Both women and men placed the quality characteristics presented in the survey in three areas: health, organoleptic quality and availability.

The conducted research shows that four main components can be distinguished for the women's segment, which are related to the importance of the indicated quality parameters of dairy products. The subsequent eigenvalues were as follows: 5.72; 2.87; 1.55; 1.17. The remaining eigenvalues were lower than 1.0.

The isolated principal components explain 70.7% of the total variance in the results (Table 4).

Table 4. Results of principal components analysis for women (eigenvalues and percentage of explained variance

Eigenvalue	% of total variance	Cumulative eigenvalue	Cumulative % of the total variance
5,72	31,2	5,72	31,2
2,87	17,6	8,59	48,8
1,55	11,5	10,14	60,3
1,17	10,4	11,31	70,7

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The values of factor loadings (rounded ≥ 0.7) allow for the clear assignment of almost all primary variables (except for the positive impact of the consumed product on well-being) to the next main component (Table 5).

Table 5. Principal components analysis results for women

Characteristic	Main component			
	1	2	3	4
Nutritional value (protein and calcium)	**0,727**	0,050	0,054	0,216
The presence of health-promoting ingredients	**0,791**	0,012	0,132	0,109
Microbiological cleanliness	**0,844**	0,045	0,139	0,136
Absence of chemical contamination	**0,867**	0,119	-0,142	-0,036
Absence of chemical additives	**0,837**	0,058	-0,073	0,006
The naturalness of the product	**0,717**	-0,087	0,050	-0,120
Presence of probiotics in the product	**0,701**	0,168	0,059	0,128
Freshness	0,377	**0,693**	-0,249	0,051
Taste and smell	0,143	**0,853**	-0,017	0,072
Durability	-0,123	**0,786**	0,310	0,043
Aesthetic values of the product or packaging	0,101	**0,695**	0,218	0,243
Package size	-0,156	0,255	**0,763**	0,183
Producer	0,192	0,094	**0,743**	0,035
Low-calorie content	0,267	0,437	-0,079	**0,665**
Possibility to follow a diet	0,126	0,165	0,041	**0,694**
Absence of lactose	-0,030	-0,132	0,352	**0,700**
Low fat	0,088	0,194	0,074	**0,838**
Positive impact on well-being	0,241	0,354	-0,110	0,331

Source: own study

From women's perspective, dairy product quality has four orthogonal areas. The quality features in these areas independently determine women's preferences and purchasing decisions. The variables related to the nutritional value of dairy products, traditionally understood as a valuable source of animal protein and calcium, correlate with the first principal component. In addition, there are health-promoting parameters and no microbiological or chemical contamination. These are features directly related to the health and functionality of the product (Baryłko-Pikielna, 1983; Baryłko-Pikielna and Wasiak-Zys, 2004). This area can, therefore, be called quality accepted mechanically (without reflection, without thinking). Additionally, it is attributed to the product's naturalness, which emphasises this parameter's importance for women. It should be added that "naturalness" as one of the critical features of food products is increasingly appreciated by the Polish consumer and is sought among regional or traditional products (Ruiz-Capillas and Herrero, 2021).

The taste and smell of the product mainly represent the second principal component. They also coexist with the main components: freshness, durability and those features that can be visually assessed during purchase or after opening the package. Generally, in the opinion of consumers, these features best describe the freshness of a dairy product. This is, similarly to the men's segment, an area covering experiential features, most often assessed after making a purchase immediately before consumption. It should also be noted that women understand the term "aesthetic values of the product or packaging" - unlike men - as the visual features of the product itself, not the packaging.

Two features correlated with main component 3 can be called search features: package size and manufacturer. This suggests that when purchasing dairy products, women are primarily looking for their favourite (proven) brand and the size of the packaging adapted to the current needs of the household.

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The fourth main component can be called the dietary value of the dairy product. It consists of low-fat content, the associated low caloric value, and the possibility of consumption when following a specific diet, e.g., lactose-free. Therefore, regardless of the first main component, these features constitute the second group of parameters accepted thoughtlessly.

Analyses previously performed by other authors also showed that women's perception of the quality of food products is more detailed than men's, manifested in the number of isolated latent variables. According to Pieczonka, 2009 women distinguish five areas of the quality of dairy products: sensory quality, safe consumption, protein content, functional features (including calorie content) and price. The analysis of the principal components performed for all food products also proves that women identify five independent groups of quality characteristics: organoleptic characteristics along with freshness, the healthiness of the product along with the presence of functional ingredients, a group of dispositional characteristics that facilitate the use of the product, features of "symbolic" consumption and dietary values (Cichocka and Pieczonka, 2004). Choroszy (2021) put it slightly differently in her study. The author initially distinguished, using cluster analysis, three segments of respondents participating in the survey, and then analysed the main components of the importance of qualitative characteristics within each segment. The first segment deserves special mention here, constituting 70% of the surveyed population, with approximately 85% of this group being women. This segment of the Polish consumer distinguishes six areas of food product quality: features of the nutritional value of the product, health-promoting nature and the ability to influence well-being, symbolic value of the product, freshness including organoleptic features, parameters determining the safety of consumption, and availability features.

A comprehensive assessment of the quality structure should include comparing the importance of individual quality characteristics for separate market segments. Data on this subject relating to the assessed population are summarized in Table 6.

Table 6. Average importance of features

Characteristic	Women	Men	Together
	$\overline{x}$		
Freshness	**6,54**	**6,32**	6,44
Absence of chemical contamination	**6,28**	**6,05**	6,17
Taste and smell	6,05	6,13	6,09
Absence of chemical additives	**5,94**	**5,52**	5,75
Durability	5,88	5,59	5,73
Naturalness of the product	**5,88**	**5,64**	5,73
Nutritional value	**5,55**	**5,29**	5,43
Presence of health-promoting ingredients	**5,61**	**5,10**	5,37
Microbiological purity	**5,54**	**5,14**	5,36
It has a positive impact on your well-being	**5,40**	**5,09**	5,25
Presence of probiotics in the product	**5,29**	**4,71**	5,02
Possibility to follow a diet	**4,94**	**4,59**	4,84
Aesthetic values of the product or packaging	4,52	4,27	4,40
Packaging size	4,46	4,25	4,35
Low calorie	4,40	4,28	4,35
Producer	4,35	4,26	4,31
Low fat content	3,95	3,68	3,83
Absence of lactose	**3,60**	**3,12**	3,38

Values in bold differ significantly in the Fisher-Snedecor F test ($p<0.05$)

Source: own study

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All respondents' perceptions of the importance of the quality parameters of dairy products allow for the identification of four groups of these parameters. The first one, with the highest average importance - from 5.7 to 6.4, which can be described as an "essential element (feature)", features characterizing various areas of quality. They include freshness and naturalness, which indicates the existence of a strong demand for regional or traditional dairy products and the interest in purchasing these products directly from the producer (e.g., at local bazaars). The absence of contamination and chemical additives are also essential parameters, which confirms the "chemophobia" of the Polish consumer that has existed for many years. Other significant features are taste and smell, and durability. It seems evident that the respondents indicated the key organoleptic features, such as taste and smell. These parameters were suggested in many other studies as particularly important in consumer perception (Lim et al., 2022). As shown by the statistical analysis, both women and men in the study group emphasize the high importance of dairy products' durability, which seems complicated to achieve when we expect that there will be no chemical additives in these products, which are substances usually associated with preservatives. There is a well-known view in the literature that modern consumers expect durable products free of preservatives, which may be an indication for producers to implement new methods of preserving dairy products other than chemical and thermal preservation. It should be noted that technological progress in food storage and preservation makes it possible to find alternative systems to ensure the safety and durability of dairy products, e.g., high-pressure packing technology and ozonation (Botondi et al., 2023).

The data in Table 4 further confirm the thesis that the importance of features related to the nutritional value and safety of consumption, the health-promoting and dietary value of a food product, or properties affecting the consumer's well-being is higher in the opinion of women than in the opinion of men. The "important" elements - on average from 4.8 to 5.4 - are nutritional value and features that determine the healthiness of the product or the possibility of its use in dietary nutrition. It seems surprising that the nutritional value of the analysed group of products is included among the moderately essential features. According to contemporary nutritional principles, dairy products are crucial, providing primary and supplementary nutrients, including valuable minerals and vitamins. The results indicate a change in the role of dairy products that modern consumers associate with them. Analogous results are presented in reports by other authors (Cichocka and Grabinski, 2009; Niewczas, 2013; Orkusz, 2014; Tijssen et al., 2017; Hanus, 2017; Hoek et al., 2017; Chen and Antonelli, 2020; Choroszy, 2021).

According to Choroszy, 2021, the very structure of perceived food quality among Polish consumers has changed over the last 15 years. Around 2005, Polish women abandoned the three-dimensional quality model to incorporate two additional independent areas: pro-health and symbolic value. Currently, a similar structure of quality is observed among consumers below 50 years of age, both women and men, except that in their case, the emergence of dietary, rather than pro-health, value can be observed.

According to Cichocka and Grabinski (2009), half of those declaring eco-consumption were consumers who do it for health reasons. The mature consumer type in terms of eating behaviour dominates into two groups of eco-consumers: health-motivated and futuristic. Two types of consumers represent ecological motivation: the sceptic and the traditionalist. In turn, Wardle et al. (2004) found that women in almost all 23 countries were more likely than men to avoid high-fat foods, eat fruit and fibre, and limit salt (to a lesser extent). They were also more likely to diet and attach greater importance to healthy eating. As reported by the authors, gender differences in dietary choices may be partly attributable to women's more significant commitment to weight control and partly to their vigorous belief in healthy eating.

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Conclusions

1. In the opinion of the Polish consumer, the quality of dairy products is a multidimensional concept. The results cover five areas that independently determine preferences, purchasing behaviour, and eating habits.
2. The most critical areas of the quality of dairy products for both women and men are their nutritional and health-promoting value, which, in the minds of consumers, is shaped by protein and calcium content, microbiological and "chemical" purity, and the presence of probiotic microflora as a functional factor. These features are perceived as critical factors in determining purchasing decisions. According to the nomenclature proposed in marketing literature, quality parameters taken on trust should be considered.
3. A characteristic feature of the structure women perceive is a second set of features accepted on trust. These are the elements that should be called the dietary values of the product (low fat and calorie content, absence of lactose). The perception of these features is independent of the product's nutritional value or functional properties.
4. The research shows that a significant parameter determining the choice of a product is its freshness. Due to the short shelf life of most dairy products, freshness is associated with durability or naturalness. The importance of these three elements and their co-occurrence indicates that the consumer niche looking for regional or traditional dairy products or purchasing directly from the breeder has significantly increased in the Polish market.
5. The main "search" characteristics that determine the choices made when purchasing is the brand (producer) and the packaging, mainly its size. These are not highly important features, indicating that buyers make a purchase automatically, choosing a product from a well-known manufacturer in an optimally sized package.
6. A comprehensive assessment of the consumer quality structure allowed for the identification of 4 groups of these parameters. Consumers considered the elements of the highest importance to be freshness and naturalness, the absence of contamination and chemical additives, as well as durability and significant organoleptic features, taste and smell.

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ANALYSIS OF SUSTAINABILITY ACCOUNTING STANDARDS: A REVIEW

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Abstract. The United Nations (UN), one of the international organizations, carries out various studies within the framework of their objectives for protecting the environment for sustainable development and against the climate crisis. This study is also an academic written source that supports the UN's goals. This study conducted a bibliometric analysis of 128 articles scanned in the Web of Science SSCI index within the scope of sustainability accounting standards. Because of the study, it is noteworthy that there has been an increase in the number of publications on sustainability accounting standards after 2017. In recent years, enterprises have increased awareness about sustainability, and accordingly, they attach importance to environmental practices in the production process. Another finding is that the publications are mostly co-authored, and these authors are from different countries. In this regard, it was observed that the authors who contributed the most works were from Spain. As a result of creating a word cloud image, it was determined that the word sustainability was the most frequently used keyword. The analysis revealed that the journal "Sustainability" publishes the most works on this subject. This study, a reference source for new studies, is thought to contribute to the international literature.

Keywords: Sustainability; Sustainability Accounting; Sustainability Accounting Standards

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JEL Classifications: Q56, M40, M41

1. Introduction

Meeting unlimited needs with limited resources is the basis of economics. Today's natural disasters remind mankind of the importance of limited resources. In this direction, scientists carry out various studies under the umbrella of “sustainability”.

In 1987, the concept of sustainability was explained in the United Nations Brundtland Report (Maniora, 2018). The concept of sustainability is used as French “Durabilite”, Dutch “Duurzaamheid” and German “Nachhaltigkeit” (Öktem & Karabinar, 2022; Demircioğlu & Ever, 2019). It is explained as sustainability, "the use of natural products and energy in a way that does not harm the environment" from the Oxford Advanced Learner's Dictionary. Another definition of sustainability was provided by Goedertier et al. (2023): "Sustainability has three dimensions for consumers: social equality, naturalness, circularity-recycling”. The other dimensions of sustainability are economic, social, and environmental (University of Mississippi, Office of Sustainability). Sustainability accounting, a sub-branch of accounting, is a science that records, classifies, summarizes, analyses and reports data that includes social and environmental impacts of businesses other than economic events.

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Many organizations are seriously promoting sustainability within the scope of natural disasters, epidemics, and environmental protection. The Sustainability Accounting Standards Board is one of the organizations working in accounting for sustainability. It is a non-profit organization that creates sustainability accounting standards that require businesses to comply with sustainability. The Sustainability Accounting Standards Board, the Global Reporting Initiative and the International Integrated Reporting Committee differ (Akarçay, 2014).

The Sustainability Accounting Standards Board (SASB), funded by Bloomberg, Rockefeller Foundation, Deloitte, Ernst & Young, Price Waterhouse Coopers, and the Ford Foundation, among others, has developed standards for measuring and reporting on ESG metrics (Parfitt, 2024). The Sustainability Accounting Standards Board (SASB) continues its activities with the IFRS organization. The fact that there are 564 letters with comments to IFRS on sustainability accounting standards shows the interest in this issue (Garvey et al., 2021). Established in 2011, SASB has developed sustainability accounting standards in 11 sectors - 77 industries. These sectors are as follows:

Table 1. The Sustainability Accounting Standards Board (SASB) Materiality Map

Dimension	**General Issue Category**
Environment	GHG Emissions
	Air Quality
	Energy Management
	Waste &Waste Water Management
	Waste &Hazardous Material Management
	Ecological Impacts
Social Capital	Human Rights & Community Relations
	Customer Privacy
	Data Security
	Access & Affordability
	Product Quality & Safety
	Customer Welfare
	Selling Practices & Product Labelling
Human Capital	Labour Practices
	Employee Health & Safety
	Employee Engagement, Diversity & Inclusion
Business Model & Innovation	Product Design & Lifecycle Management
	Business Model Resilience
	Supply Chain Management
	Materials Sourcing & Efficiency
	Physical Impacts of Climate Change
Leadership & Governance	Business Ethics
	Competitive Behaviour
	Management of the Legal & Regulatory Environment
	Critical Incident Risk Management
	Systemic Risk Management

Source: The Sustainability Accounting Standards Board (SASB)
https://sasb.ifrs.org/wp-content/uploads/2021/11/MMap-2021.png

Sustainability requires reporting that includes financial and non-financial data. SASB has played an important role by guiding businesses in creating sustainability reports in a common language. Sustainability accounting has emerged with the necessity of creating the data for this report. In addition to financial data, investors are also interested in non-financial data of corporate enterprises (Öktem & Karabinar, 2022; Demircioğlu Ever, 2019). Sustainability accounting also serves investors in this respect. Sustainability accounting differs from traditional accounting and environmental accounting. Sustainability accounting has a broader perspective than environmental accounting. While traditional accounting (financial accounting) deals only with the financial situation of enterprises, it can be stated that sustainability accounting plays a role within the scope of

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management accounting, except for the financial situation. In short, Sustainability accounting is a branch of science that deals with economic, social and environmental impacts in an integrated manner (Can ve Özarı, 2023).

In addition, studies on carbon accounting are included in the academic literature. Sustainability accounting also has differences from carbon accounting. Fidancı and Yükçü (2018) stated in their research that carbon accounting is within the scope of sustainability accounting.

Sustainability accounting is a discipline in which non-financial information that contributes to the performance of the business is presented to business interest groups (Sahib & Malik, 2023). Demircioğlu and Ever (2019) summarized the benefits of the sustainability accounting system to businesses in their study as follows:

- Sustainability accounting contributes to the determination of production costs,
- Demonstrates the benefits, financial opportunities and cost-saving advantages of sustainability-oriented activities,
- Helps to control risks and costs as a result of assessing risks and costs,
- It increases resource efficiency by tracking energy and material flows in enter-prises,
- As a result of increasing the awareness of business employees, it strengthens the responsibilities of employees,
- Ensures that the public is aware of corporate responsibility, transparency and credibility in social and environmental issues,
- An enterprise's environmentally sensitive and socially responsible behaviour provides a more favourable investment environment for institutional investors,
- It helps to strengthen relations with external stakeholders.

Sustainability accounting has benefits for businesses, society, employees, the environment and other living things. In summary, sustainability accounting contributes to companies within the framework of the social responsibility principle of accounting and is in line with the United Nations' sustainability development goals. Sustainability accounting and sustainability accounting standards are, therefore, important fields. From a bibliometric point of view, it is clear that internationally listed studies will contribute to the literature.
Many different sustainability standards have been established nationally and internationally. Different organizations publish different standards, codes, frameworks and guidelines. The standards established by the Sustainability Accounting Standards Board represent a common denominator. When these standards are analyzed (Goedertier, et al., 2024);

- Applicable to all investors,
- Relevant and relevant across the industry,
- Focused on value creation,
- Expected to bring benefits above perceived costs,
- Easily verifiable,
- Impartial and supportive of decision-making,
- The highest possible quality,
- Reflects the views of all stakeholders,
- Committed to supporting the transition to integrated reporting,
- Committed to supporting harmonization with international accounting standards

2. Materials and Methods

Sustainability accounting standards from a holistic bibliometric perspective. Bibliometric is defined as “the numerical analysis of publications produced by individuals or institutions in a specific field in a specific period and in a specific region and the relationships between these publications” (Tübitak Ulakbim Cahit Arf Knowledge Center).

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Bibliometric analysis provides information on trends, collaborations, etc., within the scope of big data in the literature on the subject planned to be researched. Mapping the literature allows academics in the relevant field to 1) gain a holistic perspective on the subject, 2) see academic gaps on the subject, and 3) provide ideas for future studies (Castañeda et al., 2022).

In this context, studies on sustainability accounting standards have been tried to be mapped with the bibliometric analysis technique. First of all, according to the deductive method, the general information and data collection process obtained as a result of the literature search on the subject in the Web of Science is presented in Table 2 and Table 3.

Table 2. Data Collection Process and Limitation of the Research

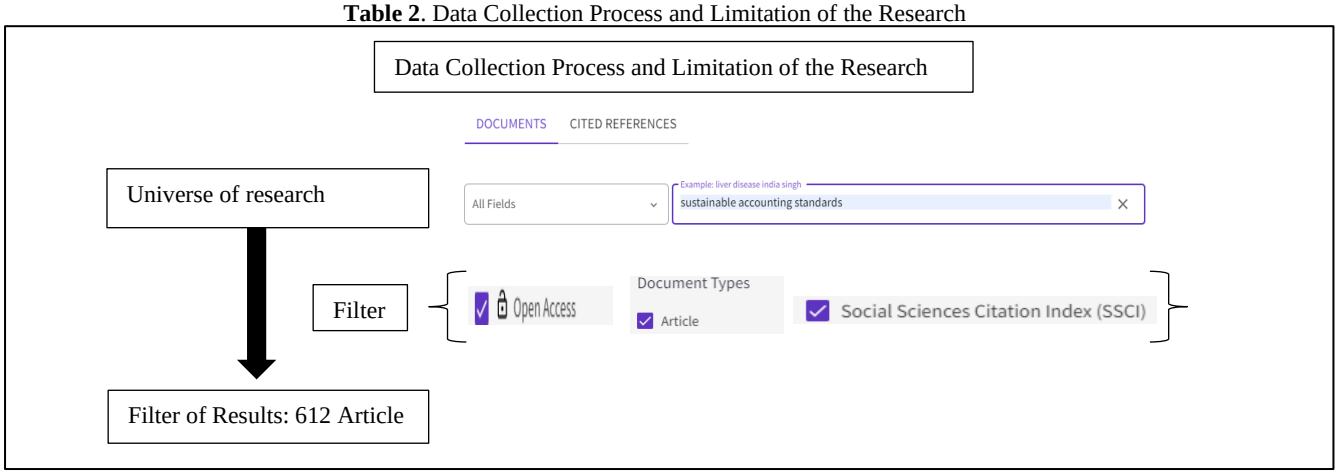


Table 3. General Information

	Results
Number of Articles	612
Timespan	1994:2024
Document Language	611 Article: English / 1 Article: Africa
Affiliations	200 different institutions
Countries/Regions	80 different countries
Number of Publishers	46
Research Area Types	46

Index scanning of the related research was made on 10.03.2024. As a result of the search of the studies titled "Sustainability Accounting Standards", 612 articles were made available to readers as Open Access. 1 article was withdrawn. 611 Articles are written in English, and 1 Article is written in the African language.

In the distribution of open-access articles within the scope of Web of Science SSCI, according to the authors' countries, the country with the highest number of publications is "The People's Republic of China". More than 20 notable scientific articles have been published by more than 20 co-authors.

Limitations of the Research: Although there are 612 articles within the scope of Sustainability Accounting Standards, studies related to fields other than accounting and finance were excluded from the scope of the research. Table 4 lists 128 studies that relate accounting and finance disciplines.

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Table 4. Published in Web of Science within the Scope of Sustainability Accounting Standards within the Scope of Accounting and Finance Division

	Author	Article Name	Journal Name	Year	Basic Topic of Article
1	Cooper, D.J., Everett, J., Himick, D. & Senkl, D.	Rethinking Accounting, Accountability, and Accounting Regulation: Concerns about the Proposed Canadian Sustainability Standards Board	Accounting Perspectives	2023	The views of business academics were examined by the Canadian Sustainability Standards Board
2	Poppe, K., Vrolijk, H., de Graaf, N., van Dijk, R., Dillon, E. & Donnellan, T	Sustainability Monitoring with Robotic Accounting-Integration of Financial and Environmental Farm Data	Sustainability	2022	The farm management information system is explained by expanding the sustainability criterion of financial farm accounting.
3	Maechler, S.	Accounting for whom? The financialisation of the environmental economic transition	New Political Economy	2023	It was explained that international academics showed little interest in accounting standards related to sustainability and that more attention should be paid to this issue.
4	Farooq, M.B. & DeVilliers, C.	The shaping of sustainability assurance through the competition between accounting and non-accounting providers	Accounting Auditing & Accountability Journal	2019	The impacts of the sustainability assurance system between accounting sustainability assurance providers and non-accounting sustainability assurance providers were investigated by analysing interviews in Australia and New Zealand.
5	Sellare, J., Meemken, E.-M., Chrıstophe Kouamé, Ch. & Qaım, M.	Do Sustainability Standards Benefit Smallholder Farmers Also When Accounting for Cooperative Effects? Evidence from Cote d'Ivoire	American Journal of Agricultural Economics	2020	Fair trade certified and non-certified farmers in Cote d'Ivoire were examined in terms of sustainability standards and the effects of cooperativism.
6	Parte, L., Garvey, A.M., McNally, B. & Gonzalo-Angulo, J.A.	True and fair view/fair presentation as a nexus between conventional accounting, sustainability accounting and Islamic accounting: unifying three frameworks?	Economic Research-Ekonomska Istrazivanja	2019	The compliance with sustainability accounting and Islamic accounting ethical rules and true and fair view /fair presentation were examined.
7	Majid, M.F., Meraj, M. & Mubarik, M.S.	In the Pursuit of Environmental Sustainability: The Role of Environmental Accounting	Sustainability	2022	GDP and firm size were compared with environmental accounting reports, including sustainability.
8	Kulik, A. & Dobler, M.	Stakeholder participation in the ISSB's standard-setting process: the consultations on the first exposure drafts on sustainability reporting	Sustainability Accounting Management and Policy Journal	2023	Stakeholder engagement was examined during the standard-setting phase of the International Sustainability Standards Board.
9	Macellari, M., Yuriev, A., Testa, F. & Boiral, O.	Exploring bluewashing practices of alleged sustainability leaders through a counter-accounting analysis	Environmental Impact Assessment Review	2021	A counter-accounting approach was applied to a sample of 28 companies to conduct a content analysis of their relationship with the Sustainable Development Goals.
10	Maughan, R. & O'Dochartaigh, A.	New boundaries for sustainability accounting? A case study of multi-entity accounting and reporting in the agrifood sector	Accounting Auditing and Accountability Journal	2023	The role of accounting within the multi-entity sustainability initiative is explained in the study
11	Garvey, A.M., Parte, L., McNally, B. & Gonzalo-Angulo, J.A.	True and Fair Override: Accounting Expert Opinions, Explanations from Behavioural Theories, and Discussions for Sustainability Accounting	Sustainability	2021	24 accounting experts on the alignment of true and fair view and fair presentation in financial statements with sustainability accounting explained by applying a questionnaire regarding
12	Jaksic, M., Fabris, N. & Jesic, M.	Intertemporal current account sustainability in the presence of structural breaks	Zbornik Radova Ekonomskog Fakulteta U Rijeci-Proceedings of Rijeka Faculty of Economics	2018	The sustainability of current accounts in the Czech Republic, Hungary, Poland and Serbia is analyzed with unit root tests.
13	Truant, E., Corazza, L. & Scagnelli, S.D.	Sustainability and Risk Disclosure: An Exploratory Study on Sustainability Reports	Sustainability	2017	The study analyzed the data of organizations that publish sustainability disclosures in accordance with the global reporting initiative
14	Andre, C., Balcilar, M., Chang, T., Gil-Alana, L.A. & Gupta, R	Current account sustainability in G7 and BRICS: Evidence from a long-memory model with structural breaks	Journal of International Trade and	2018	The current account sustainability of G7 and BRICS countries is modelled with gross domestic product, and structural breaks are analyzed.

			Economic Development		
15	Smit, A.	Analysing the contributory role of the accounting profession to save our planet	Tydskrif Vir Geesteswetensk appe	2020	The study explains how environmental costs should be measured and how sustainability accounting should be evaluated in management accounting. The relationship between the accounting profession and these developments is mentioned.
16	Kasperzak, R., Kureljusic, M., Reisch, L. & Thies, S.	Accounting for Carbon Emissions-Current State of Sustainability Reporting Practice under the GHG Protocol	Sustainability	2023	Carbon emission accounting is empirically examined by analyzing the data of 16604 companies between 2009 and 2019.
17	Farooq, M.B., Zaman, R. & Nadeem, M.	AccountAbility's AA1000AP standard: a framework for integrating sustainability into organisations	Sustainability	2021	This study evaluated the integration of corporate sustainability in New Zealand companies through interviews with company managers.
18	Cerilli, S.L.N.A., Pisani, D., Vallecillo, S. & Tubiello, F. N	A sustainability scoreboard for crop provision in Europe	Ecosystem Services	2020	In this study, an attempt has been made to create a measurement system within the scope of the accounting system by creating a sustainability scoreboard for selected crops in European countries.
19	Zdolšek, D. & Beloglavec, S.T.	Sustainability Reporting Ecosystem: A Once-in-a-Lifetime Overhaul during the COVID-19 Pandemic	Sustainability	2023	this study examines the impact of the COVID-19 pandemic on sustainability reporting disclosure
20	Callway, R., Pineo, H. & Moore, G.	Understanding the Role of Standards in the Negotiation of a Healthy Built Environment	Sustainability	2020	Healthy Built Environment principles are examined in the study
21	Barker, R.	Corporate natural capital accounting	Oxford Review Of Economic Policy	2019	The author explained the need for corporate natural capital accounting and reporting systems
22	Dorn, F., Gaebler, S. & Roesel, F.	Ineffective fiscal rules? The effect of public sector accounting standards on budgets, efficiency, and accountability	Public Choice	2021	The authors explained the impact of accounting standards on governments
23	Campos, P., Alvarez, A., Mesa, B., Oviedo, J.L., Ovando, P., & Caparros, A.	Total income and ecosystem service sustainability index: Accounting applications to Holm Oak Dehesa case study in Andalusia-Spain	Land Use Policy	2020	System of National Accounts and Agroforestry Accounting System (AAS) system results are compared.
24	Hong, N., & Shim, J.	The Effect of the Adoption of International Accounting Standards No. 12 (IAS No. 12) for Firms Reporting Losses: Evidence from Korea	Sustainability	2019	Compared the profitability of Korean Standard Accounting No. 12, Income Taxes (IAS No. 12) and Korean Generally Accepted Accounting No. 16, Accounting for Income Taxes (K-GAAP No. 16) in cases where losses are reported
25	Escoto, X., Gebrehewot, D. & Morris, K.C.	Refocusing the barriers to sustainability for small and medium-sized manufacturers	Journal Of Cleaner Production	2022	The benefits of small and medium-sized manufacturers investing in sustainability initiatives and compliance with sustainability standards are explained.
26	Boiral, O., Heras-Saizarbitoria, I. & Brotherton, M.-Ch.	Professionalizing the assurance of sustainability reports: the auditors' perspective	Accounting Auditing & Accountability Journal	2019	38 semi-directed interviews examined the professionalism of sustainability assurance providers
27	Mozaffer, K., George, S. & Aaron, Y.	Corporate Sustainability: First Evidence on Materiality	Accounting Review	2016	The study attempts to develop a dataset on sustainable investments with firm-specific sustainability ratings.
28	Lee, W.L.	Toward Sustainable Accounting Information: Evidence from IFRS Adoption in Korea	Sustainability	2019	The comparison of the financial statements of Korean enterprises before and after the application of IFRS is examined.
29	Bonin, H., Patxot, C. & Souto, G.	Cyclically-Neutral Generational Accounting	Fiscal Studies	2014	In Spain, data from 1996 and 2005 shows that the sustainability indicator plays a sensitive role in businesses within the scope of generational accounting.
30	Wang, J.-B., Wang, G.-H. & Ou, Ch.-Y.	The Key Factors for Sustainability Reporting Adoption in the Semiconductor Industry Using the Hybrid FRST-PSO Technique and Fuzzy DEMATEL Approach	Sustainability	2023	A hybrid model using fuzzy rough set theory with particle swarm optimization (FRST-PSO) and a fuzzy decision-making trial and evaluation laboratory (Fuzzy DEMATEL) was developed taking into account sustainability reporting.
31	Thomă, J., Dupré, S. & Hayne, M.	A Taxonomy of Climate Accounting Principles for Financial Portfolios	Sustainability	2018	The taxonomy of climate accounting for financial portfolios is analyzed.

32	Afolabi, H., Ram, R. & Rimmel, G.	Harmonization of Sustainability Reporting Regulation: Analysis of a Contested Arena	Sustainability	2022	Different institutions that play an important role in sustainability reporting are evaluated in terms of legislation.
33	Traxler, A. A., Greiling, D. & Hebesberger, H.	GRI Sustainability Reporting by INGOs: A Way Forward for Improving Accountability?	Voluntas	2020	The practice of sustainability reporting by international non-governmental organizations has been investigated.
34	Michelon, G., Patten, D. M. & Romi, A.M.	Creating Legitimacy for Sustainability Assurance Practices: Evidence from Sustainability Restatements	European Accounting Review	2018	Between 2010 and 2014, sustainability reports in terms of sustainability reporting assurance (SRA) were analyzed by taking US enterprises as an example.
35	Cardillo, E. & Longo, M.C.	Managerial Reporting Tools for Social Sustainability: Insights from a Local Government Experience	Sustainability	2020	The contribution of accounting to sustainable regional development is examined.
36	Amiano Bonatxea, I., Gutiérrez-Goiria, J., Vazquez-De Francisco, M.J. & Sianes, A.	Is the global reporting initiative suitable to account for university social responsibility? Evidence from European institutions	International Journal of Sustainability In Higher Education	2022	European HEI reports were analyzed within the framework of the global reporting initiative (GRI) standards used by universities to report their social responsibility activities.
37	Boiral, Olivier; Heras-Saizarbitoria, Inaki	Sustainability reporting assurance: Creating stakeholder accountability through hyperreality?	Journal Of Cleaner Production	2020	A qualitative content analysis of 337 sustainability reports from the mining and energy sectors was conducted to analyze the status of sustainability reporting assurance providers.
38	Gale, Fred; Ascui, Francisco; Lovell, Heather	Sensing Reality? New Monitoring Technologies for Global Sustainability Standards	Global Environmental Politics	2017	The study states that official standard-setting organizations need to monitor big data with new technological tools.
39	Luis Garcia, Jorge; de los Rios, Ignacio	Model to Develop Skills in Accounting Students for a 4.0 Industry and 2030 Agenda: From an International Perspective	Sustainability	2021	The study stated that those in the field of accounting needed help to adapt to sustainability accounting. The development of accounting skills according to Industry 4.0 and the 2030 agenda was emphasized.
40	Cantele, Silvia; Tsalis, Thomas A.; Nikolaou, Ioannis E.	A New Framework for Assessing the Sustainability Reporting Disclosure of Water Utilities	Sustainability	2018	The sustainability reporting of Italian water utilities was assessed.
41	Afolabi, H., Ram, R. & Rimmel, G.	Influence and behaviour of the new standard setters in the sustainability reporting arena: implications for the Global Reporting Initiative's current position	Sustainability Accounting Management And Policy Journal	2023	Global Reporting Initiative (GRI) has been examined by the European Financial Reporting Advisory Group/European Commission.
42	Jørgensen, S., Mjøs,A. & Tynes Pedersen, L.J	Sustainability reporting and approaches to materiality: tensions and potential resolutions	Sustainability Accounting Management And Policy Journal	2022	The importance of sustainability performance and measurement by relevant stakeholders was assessed.
43	Chua, W.F., James, R., King, A., Lee, E. & Soderstrom, N.	Task Force on Climate-related Financial Disclosures (TCFD) Implementation: An Overview and Insights from the Australian Accounting Standards Board Dialogue Series	Australian Accounting Review Sustainability	2022	The study presents an opinion on sustainability reporting within the Australian Accounting Standards Board framework.
44	Vackaru, D. & Grammatikopoulou, I	Toward development of ecosystem asset accounts at the national level	Ecosystem Health And Sustainability	2019	Ecosystem status and measurement are examined within the scope of ecosystem accounting with examples from the Czech Republic.
45	Muhammad, R., & Nugraheni, P.	Sustainability of Islamic Banking Human Resources Through the Formulation of an Islamic Accounting Curriculum for Higher Education: Indonesian Perspective	Sage Open	2022	This study proposes an Islamic accounting curriculum for Islamic banking in Indonesian higher education institutions.
46	Moneva, J. M., Scarpellini, S., Aranda-Usón, A., & Alvarez Etxeberria, I.	Sustainability reporting in view of the European sustainable finance taxonomy: Is the financial sector ready to disclose circular economy?	Corporate Social Responsibility And Environmental Management	2023	An approach for sustainability for the measurement of non-financial information is presented..
47	Chindarkar, N. & Thampapillai, D.J.	Rethinking Teaching of Basic Principles of Economics from a Sustainability Perspective	Sustainability	2018	The study also stated that basic economics needs to be updated within the sustainability framework in addition to traditional knowledge.

48	Sandhu, Harpinder; Jones, Adele; Holden, Patrick	True Cost Accounting of Food Using Farm Level Metrics: A New Framework	Sustainability	2021	The application of true cost accounting within the scope of sustainability has been examined.
49	Tugui, Alexandru; Agheorghiesei, Daniela Tatiana; Asandului, Laura	An Informal Ethics Auditing in Authorized Valuation for Business Sustainability in Romania	Sustainability	2020	Research on ethics for business sustainability in Romania was conducted using a survey method.
50	Gutierrez-Ponce, Herenia	Sustainability as a strategy base in Spanish firms: Sustainability reports and performance on the sustainable development goals	Sustainable Development	2023	The relationship between corporate sustainability reports and the sustainability development goals of businesses in Spain is examined.
51	Boiral, O., Heras-Saizarbitoria, I. & Brotherton, M.C.	Assessing and Improving the Quality of Sustainability Reports: The Auditors' Perspective	Journal Of Business Ethics	2019	Analysis of the opinions of sustainability assurance providers.
52	Park, J.M., Lee, H.Y., Park, S.H. & Han, I.	Value Relevance of Accounts Receivable Factoring and Its Impact on Financing Strategy under the K-IFRS after COVID-19 from the Perspective of Accounting Big Data	Sustainability	2020	COVID-19 effect is analyzed within the framework of accounting data.
53	Vidal-Meliá, C., Ventura-Marco, M. & Pérez-Salamero González, J.M.	Social Insurance Accounting for a Notional Defined Contribution Scheme Combining Retirement and Long-Term Care Benefits	Sustainability	2018	The study develops a social insurance accounting model.
54	Feldermann, S.K. & Hiebl, M.R.W.	Using quotations from non-English interviews in accounting research	Qualitative Research In Accounting And Management	2019	The studies of non-English speaking researchers published in Accounting, Auditing and Accountability Journal, Accounting journals were examined.
55	Costa, E., Pesci, C., Andreaus, M. & Taufer, E.	When a sector-specific standard for non-financial reporting is not enough: evidence from microfinance institutions in Italy	Sustainability Accounting Management And Policy Journal	2022	In this study, the non-financial information of 98 Italian cooperative banks is analyzed and applied in the field of microfinance.
56	Bellantuono, N., Pontrandolfo, P. & Scozzi, B.	Capturing the Stakeholders' View in Sustainability Reporting: A Novel Approach	Sustainability	2016	A quantitative unstructured study was conducted to consider stakeholder engagement in sustainability reporting.
57	Silva, A.P., Fontes, A., Menezes, C. & Montenegro, T.M.	Transitioning to an IFRS-Based Accounting System: Longitudinal Insights from Practitioners in Portugal	Sustainability	2023	The transition to IFRS in Portugal was also examined and found to be useful.
58	Adams, C. A. & Mueller, F.	Academics and policymakers at odds: the case of the IFRS Foundation Trustees' consultation paper on sustainability reporting	Sustainability Accounting Management And Policy Journal	2022	The views of academics and policymakers were assessed after reviewing 577 submissions for IFRS.
59	La Notte, A., Valecillo, S., Marquez, A. & Maes, J.	Beyond the economic boundaries to account for ecosystem services	Ecosystem Services	2019	The System of Environmental and Economic Accounting – Experimental Ecosystem Accounting will be beneficial in terms of sustainability.
60	Ciołek, M. & Emerling, I.	Can We Shape Trait Professional Skepticism through University Accounting Programs? Evidence from Polish University	Sustainability	2019	As a result of the questionnaire applied to 432 Poznań University of Economics students, Professional Skepticism was measured and evaluated.
61	Colignatus, T	National accounts in the anthropocene: Hueting's environmental functions and environmentally sustainable national income: Translation and relevance for ecosystem services	Ecosystem Services	2020	The study considers the Roefie Hueting view of environmentally sustainable national income and the terminological translation related to the ecosystem.
62	Campos, P., Alvarez, A., L. Oviedo, J., Mesa, B., Caparros, A. & Pvando, P.	Environmental incomes: Refined standard and extended accounts applied to cork oak open woodlands in Andalusia, Spain	Ecological Indicators	2020	Agroforestry Accounting System and refined standard accounts system were implemented in cork oak open woodlands.
63	Rice, J.M., Wilson, T., Temple, J.B. & McDonald, P.	The Impact of Demographic and Economic Change on the Australian Generational Economy: Financial Sustainability, Intergenerational Inequality, and Material Living Standards	Frontiers In Public Health	2022	In the Australian generational economy context, an assessment has been made on financial sustainability and living standards in the following processes.
64	Hay, D., Harding, N., Gan, C., Ge, I., Ho, L., Ranasinghe, D., Singh, H., Sultana, N. & Zhou, S.	Comments of the AFAANZ Auditing and Assurance Standards Committee on the Proposed Standard on Assurance Engagements over GHG Emissions Disclosure	Accounting And Finance	2023	This study includes a presentation by The Auditing and Assurance Standards Committee of AFAANZ, The New Zealand External Reporting Board on GHG emissions.

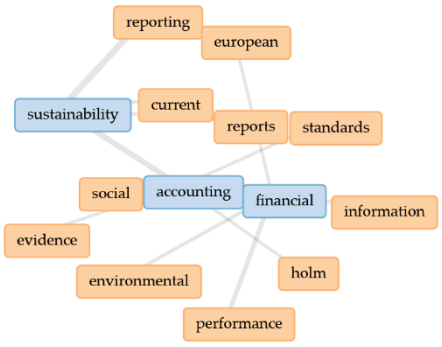
65	Campos, P., Álvarez, A., Oviedo, J. L., Ovando, P., Mesa, B. & Caparrós, A.	Income and Ecosystem Service Comparisons of Refined National and Agroforestry Accounting Frameworks: Application to Holm Oak Open Woodlands in Andalusia, Spain	Forests	2020	System of National Accounts and Environmental-Economic Accounting The ecosystem types of yellow pine-oak open woodland ecosystems in Andalusia, Spain, is examined in this study.
66	Tsai, W-H., Lan, S-H. & Lee, H-L.	Applying ERP and MES to Implement the IFRS 8 Operating Segments: A Steel Group's Activity-Based Standard Costing Production Decision Model	Sustainability	2020	The impact of environmental sustainability is explained in a case study of a steel group under IFRS 8.
67	Alhawtmeh, O.M.	The Impact of IFRS 17 on the Development of Accounting Measurement and Disclosure, in Addition to Improving the Quality of Financial Reports, Considering Compliance with the Requirements of IFRS 4-Jordanian Insurance Companies-Field Study	Sustainability	2023	Jordanian insurance companies are analyzed within the scope of IFRS 4 and IFRS 17.
68	Evans, L.	Language, translation and accounting: towards a critical research agenda	Accounting Auditing & Accountability Journal	2018	Accounting standards and their translations are analyzed in this study.
69	Arjalies, D-L., Laurel-Foris, D. & Mottis, N.	Prison break from financialization: the case of the PRI reporting and assessment framework	Accounting Auditing & Accountability Journal	2023	In this paper, sustainable accounting standards are examined.
70	Deev, M., Gamidullaeva, L., Finogeev, A., Finogeev, A. & Vasin, S.	The Convergence Model of Education for Sustainability in the Transition to Digital Economy	Sustainability	2021	Approaches to the education model within Penza State University's sustainability framework are described.
71	Schönherr, N., Vogel-Pöschl, H., Findler, F. & Martinuzzi, A.	Accountability by design? Exploring design characteristics of corporate social responsibility standards	Sustainability Accounting Management and Policy Journal	2002	The design of 50 corporate social responsibility standards is comparatively analyzed in the study.
72	Peršić, M., & Lahorka	Exploring the quality of social information disclosed in non-financial reports of Croatian companies	Economic Research-Ekonomska Istrazivanja	2018	According to the Croatian accounting law, an analysis of the sustainability reports of Croatian enterprises is included in this study.
73	Pirmana, V., Alisjahbana, A.S., Hoekstra, R. & Tukker, A.	Implementation Barriers for a System of Environmental-Economic Accounting in Developing Countries and Its Implications for Monitoring Sustainable Development Goals	Sustainability	2019	The environmental economic accounting system, which includes environmental information, is evaluated for developing countries.
74	Jebe, R.	The Convergence of Financial and ESG Materiality: Taking Sustainability Mainstream	American Business Law Journal	2023	"Environmental, social, and governance" assessment within the framework of sustainability reporting.
75	Us, A. & Nazarova, K.	Analysis and Audit of Reporting on Sustainable Development for Trade Networks and Directions for Their Improvement	Problemy Ekorozwoju	2023	The sustainability performance of companies engaged in retail trade is analyzed.
76	Campos, P., Álvarez, A., Oviedo, J. L., Ovando, P., Mesa, B. & Caparrós, A.	Refined Systems of National Accounts and Experimental Ecosystem Accounting Versus the Simplified Agroforestry Accounting System: Testing in Andalusian Holm Oak Open Woodlands	Forests	2020	This study tested the Agroforestry Accounting System (AAS) and the System of National Accounts (SNA) in holm oak open woodland in Spain.
77	Vardon, M., May, S., Keith, H., Burnett, P. & Lindenmayer, D.	Accounting for ecosystem services - Lessons from Australia for its application and use in Oceania to achieve sustainable development	Ecosystem Services	2019	System of Environmental-Economic Accounting is examined conceptually and theoretically in terms of sustainable development in the ocean and recommendations are presented.
78	Xie, J., Tanaka, Y., Keeley, A.R., Fujii, H., & Managi, S. (2023).	Do investors incorporate financial materiality? Remapping the environmental information in corporate sustainability reporting	Corporate Social Responsibility and Environmental Management	2023	Mapping was carried out again within the framework of the standards of the sustainable accounting standards board.
79	Hwang, I.T., Hur, K.S. & Kang, S. M.	Does the IFRS Effect Continue? An International Comparison	Sustainability	2018	An international comparison of the effects of the IFRS process was carried out in this study.
80	Wang, B., Chen, T. & Liu, W.	Accounting for the Logic and Spatiotemporal Evolution of the Comprehensive Value of Cultivated Land around Big Cities: Empirical	Sustainability	2023	In this study, the evaluation of cultivated land was empirically analyzed.

		Evidence Based on 35 Counties in the Hefei Metropolitan Area			
81	Hussain, S., Hoque, M. E., Susanto, P., Watto, W. A., Haque, S. & Mishra, P.	The Quality of Fair Revaluation of Fixed Assets and Additional Calculations Aimed at Facilitating Prospective Investors' Decisions	Sustainability	2022	Financial analysis of sugar companies operating in the sugar market in Pakistan was carried out.
82	Cunningham, M. A. & Leventhal, K. G.	From Emissions Inventories to Cost Accounting: Making Business as Usual Visible for Climate Action Planning	Sustainability	2023	An evaluation was made in terms of cost accounting by taking into account greenhouse gas emission inventories in a town in New York state.
83	Saraite-Sariene, L., Alonso-Cañadas, J., Galán-Valdivieso, F. & Caba-Pérez, C	Non-Financial Information versus Financial as a Key to the Stakeholder Engagement: A Higher Education Perspective	Sustainability	2020	In this study, which considers stakeholder participation in terms of financial and non-financial information, content analysis of university web pages and Facebook pages was carried out.
84	Rodrigues, M.A.B. & Morais, A.I.	How to Challenge University Students to Work on Integrated Reporting and Integrated Reporting Assurance	Sustainability	2021	The subject of integrated reporting was evaluated in terms of educational curricula at universities.
85	Silva, C.A., Ordeñana, X., Vera-Gilces, P. & Jiménez, A.	Global Imbalances: The Role of Institutions, Financial Development and FDI in the Context of Financial Crises	Sustainability	2021	Evaluations regarding the financial development of countries in terms of global changes and financial crises were made in this study.
86	Cerciello, M., Busato, F., & Taddeo, S.	The effect of sustainable business practices on profitability. Accounting for strategic disclosure	Corporate Social Responsibility and Environmental Management	2023	The sustainable business practices of 11-euro zone countries included in the Euro Stoxx 300 index were examined.
87	Marco-Fondevila, M., Llena-Macarulla, F., Callao-Gaston, S. & Jarne-Jarne, J. I.	Are circular economy policies actually reaching organizations? Evidence from the largest Spanish companies	Journal Of Cleaner Production	2021	This study analysed corporate reports and environmental scores of companies in Spain from a circular economy perspective.
88	Buchholz, H., Eberle, T., Klevesath, M., Jürgens, A., Beal, D., Baic, A. & Radeke, J.	Forward Thinking for Sustainable Business Value: A New Method for Impact Valuation	Sustainability	2020	A new method has been developed as sustainable business value in terms of stakeholder value and financial performance of companies.
89	Manikas, A.S., Kroes, J.R. & Foster, B.P.	Does the importance of environmental issues within an industry affect the relationship between lean operations and corporate financial performance?	Sustainable Production And Consumption	2021	The Sustainability Accounting Standards Board (SASB) industry Environmental Materiality Map was used for lean operations and environmental sustainability.
90	Santos, PGd., Albuquerque, F., Rodrigues, M.A.B. & Morais, A.I.	The Views of Stakeholders on Mandatory or Voluntary Use of a Simplified Standard on Non-Financial Information for SMEs in the European Union	Sustainability	2022	In this study, the applicability of non-financial reporting standards for small and medium-sized enterprises was examined.
91	da Silva, Diana; Schutte, Danie; Surujlal, Jhalukpreya	Unpacking the IFRS Implications of COVID-19 for Travel and Leisure Companies Listed on the JSE	Sustainability	2021	The impact of COVID-19 on travel and entertainment companies was examined in this study.
92	Stolowy, H. & Paugam, L.	The expansion of non-financial reporting: an exploratory study	Accounting And Business Research	2018	In this study, companies in South Africa were taken as a sample, and the non-financial reporting situation was evaluated.
93	Kshetri, N.	Blockchain and sustainable supply chain management in developing countries	International Journal of Information Management	2021	The importance of sustainability standards in developing countries was mentioned.
94	Herrador-Alcaide, T. & Hernández-Solís, M. (2019)	Empirical Study Regarding Non-Financial Disclosure for Social Conscious Consumption in the Spanish E-Credit Market	Sustainability	2019	The impact of non-financial information on the Spanish e-credit system.
95	Yim, S-G	The Influence of IFRS Adoption on Banks' Cost of Equity: Evidence from European Banks	Sustainability	2020	The researchers in this study analysed the impact of IFRS on bank cost of equity.
97	Carmo, C. & Ribeiro, C.	Mandatory Non-Financial Information Disclosure under European Directive 95/2014/EU: Evidence from Portuguese Listed Companies	Sustainability	2022	In line with Directive 95/2014/EU, the impact of non-financial information on Portuguese enterprises is analyzed.
98	Chu, J., Heo, K. & Pae, J.	Does a Firm's Corporate Governance Enhance the Beneficial Effect of IFRS Adoption?	Sustainability	2019	The impact of IFRS adoption on corporate governance is analyzed through a sample in Korea.

99	Alharasis, E. E., Haddad, H., Shehadeh, M. & Tarawneh, A.S	Abnormal Monitoring Costs Charged for Auditing Fair Value Model: Evidence from Jordanian Finance Industry	Sustainability	2022	In a 15-year period, publicly traded Jordanian companies are analyzed and the concept of fair value is examined.
99	Aras, G. & Hacioglu, K. E.	Enhancing Firm Value through the Lens of ESG Materiality: Evidence from the Banking Sector in OECD Countries	Sustainability	2022	Sustainability performance of environmental, social and corporate governance (ESG) factors were evaluated.
100	Thuy, C.T.M., Khuong, N.V., Canh, N.T. & Liem, N.T.	Corporate Social Responsibility Disclosure and Financial Performance: The Mediating Role of Financial Statement Comparability	Sustainability	2021	A comparative analysis of corporate social responsibility and financial performance of companies in Vietnam.
101	Madison, N. & Schiehll, E.	The Effect of Financial Materiality on ESG Performance Assessment	Sustainability	2021	ESG performance review was conducted according to the Sustainable Standards Board.
102	Sichigea, M., Siminica, M., Cristea, M., Noja, G. G. & Circiumaru, D.	Materiality Conditions in the Interplay between Environment and Financial Performance: A Graphical Modeling Approach for EEA Oil and Gas Companies	Complexity	2021	The data of oil and gas companies were analyzed using Structural Equation Modeling and the Gaussian Graphical Models, taking into account the materiality map of sustainability accounting standards.
103	Borrego, A. C., Abreu, R., Carreira, F. A., Caetano, F. & Vasconcelos, A. L.	Environmental Taxation on the Agri-Food Sector and the Farm to Fork Strategy: The Portuguese Case	Sustainability	2023	This study analyses the agri-food sector using the farm-to-farm (F2F) strategy.
104	Lee, S.C., Park, J., Rhee, M. & Lee, Y.	Moderating Effects of Agency Problems and Monitoring Systems on the Relationship between Executive Stock Option and Audit Fees: Evidence from Korea	Sustainability	2018	The relationship between stock options and audit fees is examined.
105	Rehman, Z.U., Zahid, M., Rahman, H.U., Asif, M., Alharthi, M., Irfan, M. & Glowacz, A	Do Corporate Social Responsibility Disclosures Improve Financial Performance? A Perspective of the Islamic Banking Industry in Pakistan	Sustainability	2020	The relationship between corporate social responsibility disclosures and financial performance in Pakistan's Islamic banking system.
106	Park, W. & Byun, C.	Effect of SME's Managerial Ability and Executive Compensation on Firm Value	Sustainability	2021	The impact of managerial ability on enterprise value in SMEs was analyzed.
107	Hummel, K., Laun, U. & Krauss, A.	Management of environmental and social risks and topics in the banking sector - An empirical investigation	British Accounting Review	2021	Management of environmental and social risk performance in banking was analyzed using a survey method.
108	Li, C., Pervaiz, K., Asif Khan, M., Ur Rehman, F. & Oláh, J	On the Asymmetries of Sovereign Credit Rating Announcements and Financial Market Development in the European Region	Sustainability	2019	The short-term impact of sovereign credit rating on financial markets is analyzed.
109	Carp, M. & Istrate, C. (2021)	Audit Quality under Influences of Audit Firm and Auditee Characteristics: Evidence from the Romanian Regulated Market	Sustainability	2021	Audit quality is investigated in terms of auditors and audited entities through companies in Romania.
110	Ji, H.	Financial Analyses and Corporate Evaluation on Sustainable Ability to Generate Excess Profit	Sustainability	2020	regression analysis was used to make a financial assessment of goodwill.
111	Ionascu, M., Ionascu, I., Sacarin, M. & Minu, M.	Women on Boards and Financial Performance: Evidence from a European Emerging Market	Sustainability	2018	The relationship between gender diversity and business performance was examined
112	Bai, G., Yang, Q. & Elyasiani, E.	Managerial Risk-Taking Incentives and Bank Earnings Management: Evidence from FAS 123R	Sustainability	2022	We examine the impact of risk-taking incentives from stock options on the earnings management effect.
113	Humphrey, C., Sonnerfeldt, A., Komori, N. & Curtis, E.	Audit and the Pursuit of Dynamic Repair	European Accounting Review	2021	The impact of audits on corporate financial responsibilities is examined in the study
114	Feria-Domínguez, J. M., Jiménez-Rodríguez, E. & Merino Fdez-Galiano, I.	Financial Perceptions on Oil Spill Disasters: Isolating Corporate Reputational Risk	Sustainability	2016	The corporate reputation of US oil and gas companies on the New York Stock Exchange is examined in this study.
115	Nie, D., Panfilova, E., Samusenkov, V. & Mikhaylov, A.	E-Learning Financing Models in Russia for Sustainable Development	Sustainability	2020	A viable e-learning financing model has been developed in Russia.
116	Elghaish, F., Hosseini, M.R., Talebi, S., Abrishami, S., Martek, I. & Kagioglou, M	Factors Driving Success of Cost Management Practices in Integrated Project Delivery (IPD)	Sustainability	2020	The integrated project delivery (IPD) model is discussed in the study, along with cost management.
117	Zoghi, M. & Kim, S.	Dynamic Modeling for Life Cycle Cost Analysis of BIM-Based Construction Waste Management	Sustainability	2020	The construction waste and management (CWM) model is examined in the study, and recommendations are presented.

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118	Huerga, A. & Rodríguez-Monroy, C.	Mandatory Convertible Notes as a Sustainable Corporate Finance Instrument	Sustainability	2019	The implicit cost of mandatory convertible notes was analyzed for 2010-2018.
119	Gualandris, J., Klassen, R.D., Vachon, S. & Kalchschmidt, M.	Sustainable evaluation and verification in supply chains: Aligning and leveraging accountability to stakeholders	Journal Of Operations Management	2015	The dimensions of sustainable supply chain management, sustainable evaluation, and verification il are examined.
120	Shen, Y., Guo, X. & Zhang, X	Digital Financial Inclusion, Land Transfer, and Agricultural Green Total Factor Productivity	Sustainability	2023	In the context of digital financial inclusion, agricultural green total factor productivity is analyzed with an econometric model.
121	Xu, S., Qamruzzaman, M. & Adow, A. H	Is Financial Innovation Bestowed or a Curse for Economic Sustainably: The Mediating Role of Economic Policy Uncertainty	Sustainability	2021	The relationship between financial innovation and economic growth in the Indian and Pakistani economies.
122	Kumar, L., Nadeem, F., Sloan, M., Restle-Steinert, J., Deitch, M.J., Ali Naqvi, S., Kumar, A. & Sassanelli, C	Fostering Green Finance for Sustainable Development: A Focus on Textile and Leather Small Medium Enterprises in Pakistan	Sustainability	2022	The effects of green financing package on Pakistan leather and textile sustainability.
123	Ong, T.S., Lee, A.S., Teh, B.H. & Magsi, H.B.	Environmental Innovation, Environmental Performance and Financial Performance: Evidence from Malaysian Environmental Proactive Firms	Sustainability	2019	The relationship between environmental performance and financial performance in Malaysia was investigated.
124	Samusevych, Y., Lyeonov, S., Artyukhov, A., Martyniuk, V., Tenytska, I., Wyrwisz, J. & Wojciechowska, K.	Optimal Design of Transport Tax on the Way to National Security: Balancing Environmental Footprint, Energy Efficiency and Economic Growth	Sustainability	2023	Factors such as the environmental footprint of transportation taxes in ensuring national security are examined.
125	Bahuguna, P., Masaki, E., Jeet, G. & Prinja, S.	Financing Comprehensive Immunization Services in Lao PDR: A Fiscal Space Analysis From a Public Policy Perspective	Applied Health Economics and Health Policy	2023	An analysis of the comprehensive immunization package of primary health care services was carried out.
126	Timmermans, B. & Achten, W.M.J.	From value-added tax to a damage and value-added tax partially based on life cycle assessment: principles and feasibility	International Journal of Life Cycle Assessment	2018	Value added tax (VAT) is examined within the scope of the life cycle of goods and services.
127	Ji, H.M.	The Usefulness of Accounting Information Derived by Applying the Percentage of Completion Method to Enhance Sustainable Business Practices: Evidence from South Korea	Sustainability	2019	The utility of accounting information in the Korean stock exchange between 2011 and 2017 was realized through an empirical study.
128	Weyand, A., Bausch, P., Engel, B., Metternich, J. & Weigold, M.	Analysis of Uncertainty Factors in Part-Specific Greenhouse Gas Accounting	Sustainability	2023	The uncertainty between accounting standards and the assessment of carbon footprint in GHG accounting calculation has been done by the researchers.



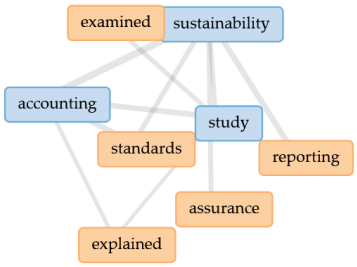


Figure 1. Titles of the papers **Figure 2.** Abstracts of the papers
Source: the author, created using https://voyant-tools.org/

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The article titles and main topics of the 128 articles constituting the analysis sample were visualized using the AI tool (Figure 1, Figure 2). When the relevant visuals are analyzed, it is understood that the concepts of sustainability and accounting come to the forefront. These concepts constitute the focus of the study. When 128 studies on the relationship between accounting and sustainability are evaluated in general, the following outputs are summarized by the author:

- Inclusion of sustainability accounting in university education curriculum
- Different institutions should take part in a common ground
- Adapting accounting to new developments in the era of processes such as big data and industry 4.0
- Campos, P. et al. have more than one research on sustainability

The main topics covered in sustainability-related studies are corporate social responsibility, environmental-social and governance (ESG) model, COVID-19 impacts, agri-environmental accounting, auditing and training.

3. Results

While 13 articles on sustainability accounting standards were published by a single author, 115 articles were written by more than one author. The study titled "Comments of the AFAANZ Auditing and Assurance Standards Committee on the Proposed Standard on Assurance Engagements over GHG Emissions Disclosure" was a joint work produced by the most authors with 9 authors. There are works produced by authors from different countries with sustainability accounting standards. When the researchers who produced the most works on the related subject are analyzed on country basis; Spain, South Africa, Italy and Germany were found to be the countries.

The distribution graph of articles by year is presented in Figure 3. In the number of publications by year, an increasing trend is observed after 2017, especially within the scope of sustainable accounting standards. The highest number of published articles was in 2023.

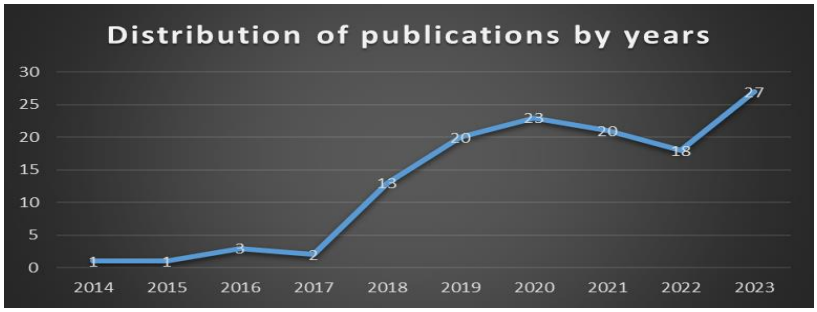


Figure 3. Number of publications by years

When the relevant articles that constitute the study's sample are examined, the journal that publishes the most scientific articles within the scope of sustainability accounting standards is "Sustainability". Other journals are as follows, respectively:

• Sustainability
• Accountıng Audıtıng & Accountabılıty Journal
• Corporate Socıal Responsıbılıty and Envıronmental Management
• Economıc Research Ekonomska Istrazıvanja
• Ecosystem Servıces
• European Accountıng Revıew
• Forests
• Journal of Cleaner Productıon
• Sustaınabılıty Accountıng Management and Polıcy Journal

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The 1186 keywords obtained from articles on sustainability accounting standards were processed as data entry on the website wordclouds.com. As a result of the data entry, a word cloud image was obtained. The word cloud image is shown in Image 1.



Image 1. Word cloud visualization
*Source***:** Created by the author on wordclouds.com

According to the word cloud image, the most frequently used keywords in scientific articles on sustainability accounting standards are sustainability, accounting, reporting, environmental, and financial standards.

The study that uses the most references is "The Convergence of Financial and ESG Materiality: Taking Sustainability Mainstream", written by Jebe (2019), using 225 references. The study with the least number of references is the article titled “Task Force on Climate-related Financial Disclosures (TFCD) Implementation: An Overview and Insights from the Australian Accounting Standards Board Dialogue Series” by Chua, W.F. et al. (2022) using 11 references. 128 The average number of references is 70.

Conclusions

Sustainability covers all areas of life, from individuals to organizations. Sustainability within the circular economy is difficult for businesses to adapt to (Ruginė & Žilienė, 2023). Recently, due to the frequent occurrence of natural disasters, sustainable living has gained more importance and gained an international dimension. Different organizations have developed various measurement techniques and rules related to sustainability.

This study analysed articles related to sustainability accounting standards, in which the concept of sustainability is considered together with the accounting perspective. The study's limitations are that the articles on sustainable accounting standards were collected from only one database and analyzed through various filters. These limitations can be extended in future research. Multiple findings were obtained as a result of 128 articles analyzed in the Web of Science index within the scope of research limitations related to sustainability accounting standards. In particular, it has been observed that the number of studies on sustainability accounting standards has increased after 2017. It was determined that the journal with the highest number of publications in this field is the "Sustainability" journal. The relevant journal contains various scientific works examining sustainability in fields other than accounting and finance. As a result of the literature review and the study findings, the level of awareness of sustainability by organizations and individuals has gradually increased over the years.

It is understood from the word cloud image that the keywords most frequently used by the researchers in the studies are sustainability, accounting, reporting, environmental, financial, and standards. In addition, the

findings state that more than one author co-authors most of the studies. This shows that collaboration is preferred among researchers.

This study is a written text explaining the theoretical relationship between sustainability and accounting. It is also an important source for future studies in which articles on sustainability accounting standards are discussed.

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ECONOMIC IMPACTS OF THE ENERGY CRISIS ON LOCAL GOVERNMENTS IN THE SLOVAK REPUBLIC AND THE CZECH REPUBLIC

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Abstract. The main objective of the presented article is to analyze the impacts of the energy crisis (2022-2023) on the budgets of selected Slovak (Trenčín Self-Governing Region) and Czech (Zlín Self-Governing Region) local governments. In addition, it is essential to find out how they limited the impact of the crisis on their everyday activities and to what extent they had to suspend their development activities. The secondary objective was to compare in which country (the Slovak Republic and the Czech Republic) local governments managed the impacts of the energy crisis better and more efficiently. In the first research question, we found out whether selected Slovak and Czech local governments agree with the opinion that the energy crisis has affected their basic function, and the second research question aimed to answer whether the increase in energy prices has affected their economic functioning. We also asked what budget they had before the energy crisis. In addition, we asked to what extent their local economy was affected by high energy prices. In the end, we found out what planned investments in the field of development specific local governments had to suspend due to the energetic crisis. As a part of the third research question, we asked whether the Czech and Slovak governments helped sufficiently address local governments with specific financial means. In addition, we asked how they evaluated the communication with government institutions in the field of energy price compensation at the time. Finally, we found out what specific measures Czech and Slovak local governments used to address the impact of high energy prices on their local budgets.

Keywords: energy crisis; local governments; economy; Slovak Republic; Czech Republic

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1. Introduction

As a result of the Russian Federation's unjustified military invasion of Ukraine, energy prices reached their all-time high in 2022. This situation was also because the Russian side began to use natural gas supplies as a weapon of war. The wholesale price of electricity on the internal market of the European Union is directly linked to the price of gas, which is mainly imported. The deliberate reduction of gas supplies by the Russian Federation was

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the main cause of the sharp increase in gas prices in the European Union. This affected the price of electricity produced by gas-fired power plants and electricity prices in general. In response, EU countries adopted an emergency intervention regulation to address high prices and help citizens and businesses most affected by the energy crisis (Unknown author, 2024). The energy crisis (2022-2023) affected all of us, which we still feel today. It is, therefore, important to keep addressing this topic. In addition to states, companies and ordinary people, increased energy prices have also affected the basic functioning of local governments – towns and municipalities. Local governments, which have the closest direct contact with the citizens of each democratic state, had to save on their local budgets during the energy crisis and temporarily suspend a large part of their investment plans and activities. To this day, many local governments are recovering from its impacts. Based on this, this issue is still relevant this year.

According to Greek authors Vasiliki Vrana, Dimitrios Kydros, Iordanis Kotzaivazoglou, and Ioanna Pechlivanaki, Russia's invasion of Ukraine has disrupted the global energy market (Vrana, Kydros, Kotzaivazoglou and Pechlivanaki, 2023). *"EU countries, which import around 90% of their natural gas, have recognised the emergency and transformed Europe's energy system by ending their dependence on Russia. Fossil fuels gradually and the solution to the climate crisis."* (Vrana, Kydros, Kotzaivazoglou and Pechlivanaki, 2023, p. 1). German authors Oliver Ruhnau, Clemens Stiewe, Jarusch Muessel and Lion Hirth argue that at that time, Europe was in the most severe energy crisis since the oil price shock of 1973 (Ruhnau, Stiewe, Muessel and Hirth, 2023). In this context, we can also mention the Polish author Jakub Mazurkiewicz, who says that the disruptions caused by the Russian war in Ukraine have highlighted the interconnected nature of global supply chains not only in the field of energy but also in the field of fertilizers and food (Mazurkiewicz, 2022). According to Javier Arribas Cámara and Vicente Sánchez Jiménez from Spain, the European Union has been suffering from an energy crisis since June 2021 due to cyclical and structural factors such as the climate crisis, the war in Ukraine and dependence on fossil fuels (Arribas Cámara and Sánchez Jiménez, 2023). According to Romanian author Livia Cebotari, the European Union is one of the world's leading energy consumers, with little international influence in this area (Cebotari, 2022). *"While the European Union has a competitive advantage in other sectors, the EU's vulnerability to Russia is fully felt in the energy sector."* (Cebotari, 2022, p.1) The consequences of the energy crisis caused by the war in Ukraine have also affected, for example, the Australian continent. According to Australian author Paul Simshauser, in 2022, Australia's national electricity market (NEM) experienced its most turbulent year. The volatility of the wholesale electricity market has brought soaring fuel costs – coal and gas, which have reached record prices internationally due to the war in Ukraine (Simshauser, 2022). In this regard, he also recalls that the war in Ukraine and the related energy crisis in 2022 have had far-reaching effects, with coal prices by sea gas reaching multiples of their historical averages. As he says, Europe was its epicentre, and distant countries such as Australia felt its consequences (Simshauser, 2023). For example, in the European Union member state of Latvia, in the event of an energy crisis, all customers were to be divided into several groups if the supply of natural gas was interrupted. For example, the priority group was supposed to be households, schools, preschool facilities, hospitals, state and local government institutions of long-term social care and social rehabilitation (Zemite et al., 2021).

The main objective of the presented article is to analyse the impacts of the energy crisis (2022-2023) on the budgets of selected Slovak (Trenčín Self-Governing Region) and Czech (Zlín Self-Governing Region) local governments. At the same time, we want to find out how its impacts limited their everyday activities and to what extent they had to suspend their development activities. **The secondary objective** was to compare in which country (the Slovak Republic and the Czech Republic) local governments managed the impacts of the energy crisis better and more efficiently. As part of the research, we set three questions, from which specific open and closed questions were created in a semi-structured interview.

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2. Theoretical background

Even at the beginning of 2023, according to Zdeněk Čech, head of the economic analysis team of the Representation of the European Commission in Slovakia, the European Union was going through the most difficult energy crisis in modern history. At the beginning of 2023, Michal Kaliňák, the then central director of the office and spokesman for the Association of Towns and Municipalities of Slovakia, the current State Secretary of the Ministry of Investments, Regional Development and Informatization of the Slovak Republic, said that towns and municipalities in Slovakia are the largest founders of schools and school facilities, including 2,754 kindergartens and 1,886 primary schools. They cover social service facilities, 711 residential facilities, daycare centres for social services, and budgetary organizations in the field of culture. *"In the spring of last year, the Association of Towns and Municipalities of Slovakia asked the government to use as many unspent EU funds as possible not only to finance the year-on-year increase in energy prices but also for investments in photovoltaics, geothermal energy, guaranteed energy services, thermal insulation of buildings or the use of waste for energy production, as well as the development of heat management based on the use of wood mass, such as pellets and the like. Although the energy crisis caught us unprepared, as did any other country, it turns out that investments in the energy sector would add value to solving problems in times of economic crisis."* (Jenčová, 2023). Within the Czech Republic, the Union of Towns and Municipalities of the Czech Republic already warned in 2022 that rising energy and fuel prices also had a harsh impact on local municipal budgets. In his opinion, the effects of the energy crisis at that time led many municipalities to consider, for example, limiting the heating or lighting of public buildings and spaces (Unknown author, 2022).

2.1. History and functioning of Czech and Slovak local governments

2.1.1 Czech Republic

A settlement structure was created on the territory of the Czech Republic several centuries ago. As far as territorial local government and especially municipal local government are concerned, its germs can be registered on Czech territory as early as the period of the existence of Great Moravia (Klimovský, 2010). *"However, the performance of administration at the local and regional level in the interwar Czechoslovak Republic, i.e. in 1918 – 1938, came closest to the current form of territorial local government."* (Klimovský, 2010, p. 33) Towns and villages in the Czech Republic are currently covered mainly by the Union of Towns and Municipalities of the Czech Republic, which was founded in 1989 as a non-political and voluntary organization. (Collective of authors 2023a). Another important professional organization is the Association of Local Governments of the Czech Republic. (Collective of authors 2023b). The Czech Republic has one of the highest territorial fragmentations of municipalities in Europe, also because the issue of decentralisation has been overemphasized in local government policy since 1989 (Soukopová et al., 2014).

On 12 April 2000, Act No. 128/2000 Coll. on Municipalities (Municipal Establishments) was adopted in the Czech Republic regarding the functioning of local self-government. According to paragraph 1, a municipality is a basic territorial self-governing community of citizens forming a territorial unit. Paragraph 2, part (1) states that a municipality is a public corporation with its property, which acts in legal relations under its name. According to part (2) of the same paragraph, the municipality ensures the all-round development of its territory and the needs of its citizens. According to paragraph 3, part (1): *"A municipality with at least 3 000 inhabitants shall be a town if the President of the Chamber of Deputies so determines on the proposal of the municipality after the Government has expressed its opinion."* According to paragraph 4, statutory towns are: Kladno, České Budějovice, Plzeň, Karlovy Vary, Ústí nad Labem, Liberec, Jablonec nad Nisou, Hradec Králové, Pardubice, Jihlava, Brno, Zlín, Olomouc, Přerov, Chomutov, Děčín, Frýdek-Místek, Ostrava, Opava, Havířov, Most, Teplice, Karviná, Mladá Boleslav, Prostějov a Třinec. According to paragraph 35, part (1), matters that are in the interest of the municipality and its citizens belong to the independent competence of the municipality. Paragraph 61, part (1)

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speaks of delegated competencies in matters stipulated by specific laws. Paragraph 67 mentions the municipal council, composed of members of the municipal council. Its members are elected in direct elections according to other legal regulations. Paragraph 103 defines the function of the mayor of the municipality. According to part (1), he represents the municipality externally. Part (2) of the same paragraph states that **the mayor, deputy mayor(s) are elected to their positions by the municipal council.** (Parliament of the Czech Republic, 2000a).

Act No. 250/2000 Coll. on Budgetary Rules of Territorial Budgets of 7 July 2000 states in paragraph 4, part (1) that the budget of a territorial self-governing unit and a union of municipalities is a financial plan that governs their activities. Parts (4) and (5) of the same paragraph, in turn, say that: ***"As a rule, the budget is drawn up as balanced. It can be approved as surplus if some of the income of a given year is intended to be used only in subsequent years or if it is intended to repay the principal of loans from previous years... A budget can only be approved as a deficit budget if the deficit can be recovered."*** (Parliament of the Czech Republic, 2000b).

2.1.2. Slovak Republic

The beginnings of local state administration in the territory of the Slovak Republic, as well as in the Czech Republic, are known as early as the 9th century within the first Slavic state of Great Moravia (Volko and Kiš, 2007). Before 1989, the fall of communist totalitarianism, most decisions and resources came from the central government. For example, in 1950 there were 3,344 local self-government units in the Slovak Republic, while in 1989 their number fell to the lowest level (2,694). Shortly after the Velvet Revolution, 242 newly founded municipalities were gradually established in the territory of the Slovak Republic (Csachová and Nestorová-Dická, 2011). The interests of Slovak local governments are covered by the Association of Towns and Municipalities of Slovakia and the Union of Towns of Slovakia.

Within the Slovak Republic, the Act of the Slovak National Council No. 369/1990 Coll. on Municipal Establishment, as amended, was adopted on 6 September 1990 regarding the functioning of local self-government. According to paragraph 1, part (1), a municipality is an independent territorial, self-governing and administrative unit of the Slovak Republic associating persons with permanent residence. At the same time, he says that the municipality is a legal entity that independently manages its property and its income under the conditions laid down by law. Paragraph 5, part (1) says that some tasks of state administration can be transferred to the municipality by law if their performance is more rational and efficient in this way. *"With the transfer of tasks to the municipality, the state will provide the municipality with the necessary financial and other material resources."* According to paragraph 10, part (1), the municipal authorities are: the municipal council and the municipality's mayor. Paragraph 11, part (1) stipulates that the municipal council is a representative institution of a municipality composed of deputies elected in direct elections by the inhabitants of the municipality for four years. Based on paragraph 13, part (1), the municipality's representative and the municipality's highest executive institution is the mayor. (Slovak National Council 1990). According to Act No. 180/2014 Coll. on the Conditions for the Exercise of the Right to Vote and on the Amendment of Certain Acts, as amended, **the mayor of a municipality is elected directly by the voters.** According to paragraph 165, a resident of a municipality who has permanent residence in the municipality in which he or she is a candidate and reaches the age of twenty-five on the day of the election at the latest may be elected mayor of a municipality (National Council of the Slovak Republic, 2014).

According to paragraph 22, Part (1) (Act of the Slovak National Council No. 369/1990 Coll. on Municipal Establishment, as amended), the National Council of the Slovak Republic may declare a municipality as a town based on criteria set out by law on 1 January at the proposal of the Government. Part (6) of the same paragraph says that based on a resolution of the National Council of the Slovak Republic, the government will issue a certificate of declaring the municipality a town. Paragraph 24, part (1) states that the Town Council is an institution of the town's local government. *"Its position shall be subject to the provisions of this Law on the*

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Municipal Council." Part (2) of the same paragraph states that the representative of the city and its highest executive institution is **the lord mayor of the city.** *"The provisions of this Act on the Mayor shall apply to his position."* (Slovak National Council, 1990).

Paragraph 7, part (1) (Act of the Slovak National Council No. 369/1990 Coll. on Municipal Establishment, as amended) states that the municipality finances its needs primarily from its own revenues, subsidies from the state budget and from other sources. According to part (2) of the same paragraph, a municipality may use repayable sources of financing and funds from extra-budgetary monetary funds to perform its tasks. Part (3) of paragraph 7 says that a state subsidy may be provided to the municipality for the implementation of the municipality's development program or for the performance of another task in which the state is interested. (Slovak National Council 1990). Two laws regulate the status of the municipality's budget. The first is Act No. 583/2004 Coll. on Budgetary Rules of Local Self-Government and on Amendments to Certain Acts. In paragraph 4, part (1), it is written that the municipal budget is the basic instrument of financial management in the relevant financial year, which governs the financing of tasks and functions in the relevant financial year. The municipal budget is also part of the budget of the public administration sector. Part (2) of paragraph 4 says that the financial year is identical to the calendar year. Part (3) of the same paragraph stipulates that the budget of a municipality expresses the independence of its management. Part (4) of paragraph 4 states that the budget of the municipality includes budgets of revenues and expenditures of budgetary organizations and contributions to contributory organizations established by the municipality, etc. Paragraph 10, part (7) stipulates that the municipality's budget is compiled **as balanced or surplus. The current budget** can only be drawn up **as a deficit budget** under strictly defined conditions. **The capital budget is also drawn up as balanced or surplus. It is also set as a deficit budget under rigorous conditions.** (National Council of the Slovak Republic 2004a). In Act No. 523/2004 Coll. on Budgetary Rules of Public Administration and on Amendments to Certain Acts, Paragraph 30a, Part (1) states that: *"The public administration budget should be **balanced or surplus**."* (National Council of the Slovak Republic, 2004b).

2.1.3. Brief comparison

In Czech municipal local government, the municipal council has a dominant position, which follows directly from the Czech Constitution and is confirmed by Act No. 128/2000 Coll. on Municipalities (Municipal Establishment). According to the Czech political scientist Igor Palúš, the municipal council elects two other municipal institutions that have an important position within the separation of powers, i.e. the council of municipal and the mayor, both of which are responsible for the performance of their function to the municipal council, which can dismiss them at any time (Palúš, 2021). *"In this context, the elections to the municipal council are indirectly also the elections of other municipal institutions, and in this spirit, pre-election considerations about possible coalitions in the municipal council and especially negotiations on coalition groupings after the elections are of fundamental importance. The persons who appear on the candidate lists are potential members not only of the future municipal council but also the future council of municipal, and the future mayor will also emerge from such candidates."* (Palúš, 2021, p. 118)

According to Igor Palúš, the Slovak legislation on the application of the principle of separation of powers at the municipal level is constitutionally based on the equal (partner) status and powers of municipal institutions, i.e. the municipal council and the mayor (Palúš, 2021). *"The influence of the inhabitants of the municipality on the creation of municipal local government institutions is undoubtedly greater than in the Czech Republic, but this can also have a negative impact when the political composition of the council and the political affiliation of the mayor is different, and this fact is sometimes negatively reflected in their mutual relationship in the organization and management of the municipality administration. This is also one of the reasons why the number of independent candidates in the elections to municipal local government institutions has been increasing over the years, especially for the municipality's mayor position."* (Palúš, 2021, p. 119)

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In the same way, the highest representatives of the regions in the Slovak Republic and the Czech Republic, who are responsible for the region's administration, are also elected. The method of direct election is part of the Slovak electoral system. In the Czech Republic, on the other hand, representatives of regions are elected by indirect election. They are elected by democratically elected regional councils (Janas and Jánošková, 2022). The differences between individual states can also be seen in the perception of European citizenship and European identity, which several authors pointed out (Hubálek et al., 2018).

2.2. Economics of local government

A municipality has a natural obligation to provide conditions to meet the needs of its inhabitants, but also the right to regulate the development of its territory. Although the role of the local government is not to generate economic development directly, it is strongly responsible for creating suitable conditions for investment and business activities. The municipality is thus an important integration factor for the effective development of the territory. According to Katarína Liptáková and Zuzana Rigová, the municipal government knows local needs. It provides many services directly impacting local development, such as infrastructure, education, spatial planning, security, children, care for older people, etc. (Liptáková and Rigová, 2020). The economy of municipalities is governed by several regulations that directly affect the functioning of municipalities in the Slovak Republic and in other countries (Vavrek, Adamisin and Kotulic, 2017). Towns and municipalities can also play an important role in creating closed-loop production and consumption systems (Budde Christensen, 2021). The strategic plan, which sets out the municipality's development, is also a key document for the general development of municipalities. It lists the planned investments, their priorities and the schedule for their implementation (Řehoř and Šebestová, 2013). Within the economy of local governments, local governments are one of the basic components of public administration in a democratic state. In accordance with the official European "ideology" – the principle of subsidiarity and decentralisation – these decentralisation units have played an important role in the economy, public administration and society in the Czech Republic since 1990 (Matějová et al., 2014). The basis of economic thinking about decentralization is the assumption of differences in demand for public goods (Bikker and van der Linde, 2016). On the other hand, it must be said that the combination of post-communist economic transformation with increasing globalization has left some regions on the national periphery (Jiří Pánek et al., 2021). For example, in the districts of the Capital City of Prague, Prague-West, Brno-City, Prague-East and Plzeň-City, higher concentrations of business activity were reported in the years 2010 to 2013 than in other districts of the Czech Republic (Hamplová and Kovárník, 2018). According to Czech economist Marek Jetmar, most of the population's daily activities take place in the municipality's territory or in its wider area. This includes the so-called functional micro-region, often the corresponding territorial district of municipalities with extended powers, in which the municipality with extended competence is the centre of higher services (secondary schools, specialised health care). At the same time, it offers a wide range of job opportunities (Jetmar, 2013). The highly fragmented structure of municipalities in the Czech Republic and Slovakia has been discussed for a long time. Several authors cite a number of problems arising from the sustainability of the operation of a very small municipality, as well as the lack of will to merge municipalities. On the other hand, there are also opinions in favour of territorial fragmentation, which are based primarily on arguments relating to democracy, contacts between the municipal council and citizens, etc. One of the most important arguments against the fragmentation of municipalities is related to the economic side, specifically the lack of funds to ensure the technical infrastructure of municipalities (Lešková and Vaishar, 2018). Based on the analysis by Eva Balážová, Viera Papcunová and Peter Ágh, it turned out that in the conditions of Slovak local governments, there were lower budgetary effects from business activities compared to Czech municipalities (Balážová, Papcunová and Ágh, 2018). The better results of municipalities located in western Slovakia are probably also due to the fact that the self-governing regions of western Slovakia are the regions with the largest share of foreign investments. Based on this fact, it is important to maintain a favourable economic situation for municipalities through an active approach on the part of municipalities and the state (Liptáková and Rigová, 2021). In this regard, it is also important to

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remember that the capital of the Slovak Republic, Bratislava, has the strongest economy. According to Slovak political scientists Andrej Kóňa, Dušan Guťan and Peter Horváth, the reason may be the proximity of the border with Austria, the Danube River and the location of multinational corporations in the city (Kóňa, Guťan and Horváth, 2020).At the same time, the green economy and development could move towards a clear transition towards sustainable community and local development (Turvey, 2015). The financial literacy of specific elected mayors, especially smaller municipalities, is also important. Financial literacy can be characterized as knowledge and understanding of financial concepts and risks and skills, motivation and confidence in applying this knowledge and understanding in making effective decisions in different financial contexts, improving the financial well-being of individuals and society, and enabling participation in economic life (Táncošová et al., 2023).

3. Methodology

In the presented research, we set ourselves three research questions:

RQ1: How has the energy crisis affected the basic functions of local governments?

Explanation of RQ1: As part of the first research question, we asked selected Slovak and Czech local governments whether they agree with the opinion that the energy crisis has affected their basic functions. We were also interested in whether they had to optimize their activities due to increased energy costs. In addition, we found out in which specific areas Czech and Slovak local governments were forced to cut their spending. In the end, we asked by what percentage the costs of energy prices for Slovak and Czech local governments have increased compared to the pre-crisis period.

RQ2: How has the economic functioning of local governments been affected by the increase in energy prices?

Explanation of RQ2: As part of the second research question, we asked selected Slovak and Czech local governments whether they agree that the increase in energy prices has affected the economic functioning of local governments. We also found out what budget they had at their disposal before the energy crisis. In addition, we asked to what extent the economy of Czech and Slovak local governments has been affected by high energy prices. In the end, we found out what planned investments in the development of a particular local government were suspended due to the energetic crisis.

RQ3: To what extent has the Slovak or Czech government helped local governments with high energy prices?

Explanation of RQ3: As part of the third research question, we asked whether the Czech and Slovak governments had sufficiently helped Slovak and Czech local governments with specific financial means. In addition, we asked how they evaluated the communication with government institutions in the field of energy price compensation at the time. Finally, we found out what specific measures Czech and Slovak municipalities used to address the impact of high energy prices on their local budgets.

Research sample

As part of the quantitative research on data collection, we chose the method of a semi-structured interview, which was sent electronically to selected Czech and Slovak municipalities in the second quarter of 2023. As a research sample, we have set representatives (mayor, lord mayor, authorized employee) of specific municipalities who will answer predetermined open and closed questions. We purposefully tied the semi-structured interview to specific local governments – one local government = one answer. Based on the e-mail addresses we received, we sent the

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interview to all local governments of the Trenčín Self-Governing Region (Slovak Republic) and the Zlín Self-Governing Region (Czech Republic).

Out of 276 municipalities and towns, 97 out of 276 municipalities and towns responded for the Slovak self-governments of the Trenčín Self-Governing Region, which is 35.1%. Includes: Beckov, Bodiná, Bolešov, Bošany, Brezolupy, Bukovec, Bystričany, Čachtice, Čavoj, Čelkova Lehota, Červený Kameň, Dolná Mariková, Dolné Vestenice, Domaniža, Drietoma, Dubnica nad Váhom, Dubnička, Haláčovce, Handlová, Horná Breznica, Horná Mariková, Horná Súča, Horné Srnie, Horné Vestenice, Horný Lieskov, Hrabovka, Hradište, Hrašné, Jasenica, Ješkova Ves, Kamenec pod Vtáčnikom, Kameničany, Kľačno, Kostolná Ves, Košecké Podhradie, Krásna Ves, Krivoklát, Krivosúd-Bodovka, Lazany, Lazy pod Makytou, Libichava, Lipník, Lúky, Ľutov, Malá Hradná, Malé Kršteňany, Malé Lednice, Malé Uherce, Mestečko, Motešice, Nedašovce, Nemšová, Nitrianske Pravno, Nitrianske Sučany, Nová Ves nad Váhom, Nováky, Omastiná, Opatovce, Opatovce nad Nitrou, Oslany, Otrhánky, Partizánske, Plevník – Drienové, Podhradie, Pochabany, Poluvsie, Považská Bystrica, Pravotice, Prečín, Priepasné, Pruské, Pružina, Púchov, Ruskovce, Rybany, Sádočné, Slatinka nad Bebravou, Slopná, Soblahov, Stará Lehota, Streženice, Šišov, Trenčianska Turná, Trenčín, Udiča, Valaská Belá, Veľké Bierovce, Veľké Držkovce, Veľké Chlievany, Veľké Uherce, Višňové, Vrbovce, Vršatské Podhradie, Zárieče, Zemianske Kostoľany, Zemianske Podhradie, Žitná – Radiša.

Out of 307 municipalities and towns, 89 out of 307 municipalities and towns responded for the Czech self-governments of the Zlín Self-Governing Region, which is 28.9%. Includes: Bánov, Bařice-Velké Těšany, Blazice, Bratřejov, Břest, Březnice, Buchlovice, Cetechovice, Dešná, Dolní Bečva, Dolní Němčí, Drslavice, Držková, Francova Lhota, Fryšták, Hluk, Holešov, Horní Lideč, Hostějov, Hulín, Huštěnovice, Hutisko-Solanec, Kašava, Kladeruby, Kněžpole, Koryčany, Kostelec u Holešova, Košíky, Lechotice, Lidečko, Lípa, Lopeník, Loučka, Lubná, Luhačovice, Machová, Martinice, Míškovice, Morkovice-Slížany, Napajedla, Nedachlebice, Nedašov, Nedašova Lhota, Neubuz, Nová Dědina, Ořechov, Otrokovice, Oznice, Pitín, Pozlovice, Prostřední Bečva, Přílepy, Rokytnice, Rožnov pod Radhoštěm, Rudice, Rymice, Sazovice, Seninka, Slavičín, Slavkov, Slavkov pod Hostýnem, Staré Hutě, Střílky, Sulimov, Svárov, Štítná nad Vláří – Popov, Šumice, Trnava u Zlína, Uherské Hradiště, Uherský Brod, Uherský Ostroh, Újezd, Valašaké Klobouky, Valašská Bystřice, Valašská Polanka, Valašské Meziříčí, Vážany, Velehard, Velké Karlovice, Velký Ořechov, Vizovice, Vlčková, Vrbka, Zádveřice - Raková, Zástřizly, Zborovice, Zděchov, Zlín, Žeranovice.

4. Results

In the first question of the semi-structured interview, 94.9% of the addressed Slovak municipalities agree with the opinion that the energy crisis has affected the basic functions of local governments. Only one per cent disagrees. Only 4.1% cannot assess our question. In the case of the Czech Republic, only 66.3% of municipalities agree with the opinion that the energy crisis has affected the basic functions of local governments. On the contrary, as many as 27.0% disagree. It could not judge 6.7% (see Table 1).

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Table 1. Do you agree with the opinion that the energy crisis has affected the basic functions of local governments?

	Slovak Republic		Czech Republic	
	Number of local governments	**%**	**Number of local governments**	**%**
Agree	92	94.9	59	66.3
Disagree	1	1.0	24	27.0
Not know	4	4.1	6	6.7
Altogether	**97**	**100**	**89**	**100**

Source: Processed based on the results of own research.

In the second question of the semi-structured interview, 91.8% of Slovak municipalities had to optimize their current activities due to increased energy costs. On the other hand, only 8.2% did not have to. In the case of Czech local governments, only 59.6% of municipalities had to optimize their current activities, and up to 40.4% did not have to (Table 2).

Table 2. As a town/municipality, have you had to optimize your current activities due to increased energy costs?

	Slovak Republic		Czech Republic	
	Number of local governments	**%**	**Number of local governments**	**%**
Yes	89	91.8	53	59.6
No	8	8.2	36	40.4
Altogether	**97**	**100**	**89**	**100**

Source: Processed based on the results of own research.

In the third question of the semi-structured interview, "In which specific areas have you, as a local government, been forced to cut your spending?" representatives of Slovak and Czech local governments could indicate several answers. **In the case of the Slovak Republic,** as many as 63 local governments responded to the answer "maintenance and reconstruction of local transport infrastructure", which is 64.9%. Within the framework of "culture and sport", 58 local governments answered positively – 59.8%. The answer to "education" was only 12 local governments, which represented 12.4%. The option to mark the answer "basic operation of local government" was used by 54 local governments – 55.7%. The column "grant and subsidy schemes and support for local organizations" was marked by 40 local governments, which represents 41.2%. Nine local governments also used the option to mark the "other" option. In it, they stated, for example, switching off or limiting public lighting, the planned construction of a cultural house, the preparation of projects and geodetic plans, the development of the city, the social area or the limitation of the operation and heating of the cultural house. **In the case of the Czech Republic,** the answer "maintenance and reconstruction of local transport infrastructure" was given by 37 local governments, which is 41.6%. The column "culture and sport" was marked by 17 local governments – 19.1%. The answer "education" was indicated by only 5 local governments, which represents 5.6%. As an option, 19 local governments indicated the "basic operation of local government" – 21.3%. The answer "grant and subsidy schemes and support for local organizations" was indicated by 21 local governments, which represents 23.6%. In the answer "other", we learned, for example, that the 5 local governments addressed, which is 5.6%, did not limit their expenses in any way. The remaining additional answers were always from one, maximum two local governments. They concerned various areas in which the affected local governments had to reduce their spending. In one answer, we could learn, for example, that as a local government, they were able to ensure all planned expenses.

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In the fourth question of the semi-structured interview, 7.2% of Slovak local governments increased the cost of energy prices in the range of 0-20% compared to the pre-crisis period. 18.6% of municipalities increased by 21-40%. 14.4% of respondents answered that their costs increased by 41-60%. As many as 59.8% of Slovak municipalities saw an increase in energy prices compared to the pre-crisis period of 61% and more. On the other hand, Czech local governments were slightly better, 23.6% had their energy costs increased by 0-20%. As many as 38.2% of municipalities in the Czech Republic saw their costs increase by 21-40%. Only 22.5% of the surveyed Czech municipalities had their costs increased by 41-60%. Only 15.7% in the Czech Republic increased costs by 61% or more (Table 3).

Table 3. How much per cent have your energy costs increased compared to the pre-crisis period?

	Slovak Republic		**Czech Republic**	
	Number of local governments	**%**	**Number of local governments**	**%**
0-20%	7	7.2	21	23.6
21-40%	18	18.6	34	38.2
41-60%	14	14.4	20	22.5
61 and more %	58	59.8	14	15.7
Altogether	**97**	**100**	**89**	**100**

Source: Processed based on the results of own research.

In the fifth question of the semi-structured interview, 93.8% of Slovak municipalities agree that the increase in energy prices has affected the economic functioning of local governments. It is only 79.8% of Czechs. On the other hand, 1.0% of Slovak and 6.7% of Czech municipalities disagree with our statement. 5.2% of Slovak and 13.5% of Czech municipalities could not assess our answer (Table 4).

Table 4. Do you agree that the increase in energy prices has affected the economic functioning of local governments?

	Slovak Republic		**Czech Republic**	
	Number of local governments	**%**	**Number of local governments**	**%**
Agree	91	93.8	71	79.8
Disagree	1	1.0	6	6.7
Not know	5	5.2	12	13.5
Altogether	**97**	**100**	**89**	**100**

Source: Processed based on the results of own research

In the sixth semi-structured interview question, 73.2% of Slovak and 64.0% of Czech municipalities had a balanced budget before the energy crisis. In the pre-crisis period, 26.8% of Slovak and 36.0 Czech municipalities had a surplus budget (Table 5).

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Table 5. What budget did your town/municipality have before the energy crisis?

	Slovak Republic		Czech Republic	
	Number of local governments	**%**	**Number of local governments**	**%**
Balanced	71	73.2	57	64.0
Surplus	26	26.8	32	36.0
Altogether	**97**	**100**	**89**	**100**

Source: Processed based on the results of own research

In the seventh question of the semi-structured interview, the economy of 34.0% of Slovak local governments was highly affected by high energy prices—Czech only 6.7%. In a moderate way, high energy prices affected the economy of 55.7% of Slovak and 46.1% of Czech municipalities. They had a low impact on 9.3% of Slovak and 41.6% of Czech municipalities. Not in any way 1.0% of Slovak and 5.6% of Czech municipalities (Table 6).

Table 6. To what extent has the economy of your local government been affected by high energy prices?

	Slovak Republic		Czech Republic	
	Number of local governments	**%**	**Number of local governments**	**%**
Highly	33	34.0	6	6.7
Medium	54	55.7	41	46.1
Low	9	9.3	37	41.6
No way	1	1.0	5	5.6
Altogether	**97**	**100**	**89**	**100**

Source: Processed based on the results of own research

In the eighth question of the semi-structured interview, "What planned investments in the development of your town/municipality have been suspended due to the energy crisis?" representatives of Slovak and Czech local governments could again indicate several answers. **In the case of the Slovak Republic,** the option "local transport infrastructure" was indicated by 66, which represents 68.0% of local governments. The column "support of the business environment" was marked by 6 local governments – 6.2%. The option "school and cultural infrastructure" was given by 39 local governments, which is 40.2%. In the "Other" option, for example, property settlement, participation in larger challenges, extension of the cultural house, etc., appeared. **In the case of the Czech Republic,** the option of "local transport infrastructure" was given by 41 local governments – 46.1%. The column "support of the business environment" was given by 11 local governments, representing 12.4%. As an option, 12 local governments gave "school and cultural infrastructure" – 13.5%. Different answers appeared in the "Other" option. For example, 11 local governments – 12.4% – did not limit their planned investments in any way despite the energy crisis. The remaining answers concerned, for example, the suspension of housing development or municipal property management.

In the ninth question of the semi-structured interview, whether the government of the Slovak Republic or the Czech Republic helped sufficiently with specific funds, only 6.2% of Slovak local governments answered positively. 21.3% of Czech local governments answered positively to the same question. As many as 93.8% of the addressed Slovak local governments answered negatively. 78.7% of Czech local governments answered negatively (Table 7).

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Table 7. Has the Government of the Slovak Republic or the Czech Republic helped enough with specific funds?

	Slovak Republic		Czech Republic	
	Number of local governments	**%**	**Number of local governments**	**%**
Yes	6	6.2	19	21.3
No	91	93.8	70	78.7
Altogether	**97**	**100**	**89**	**100**

Source: Processed based on the results of own research

In the tenth question of the semi-structured interview, when asked how Slovak and Czech local governments evaluate the communication with government institutions in the section of energy price compensation at that time, only 2.1% of local governments in Slovakia expressed themselves positively. In the Czech Republic, it was 11.2%. As many as 51.5% of Slovak and 25.9% of Czech local governments answered negatively. 46.4% of Slovak and up to 62.9% of Czech local governments could not assess (Table 8).

Table 8. How do you assess the communication with government institutions in the section of energy price compensation so far?

	Slovak Republic		Czech Republic	
	Number of local governments	**%**	**Number of local governments**	**%**
Positively	2	2.1	10	11.2
Negatively	50	51.5	23	25.9
Not know	45	46.4	56	62.9
Altogether	**97**	**100**	**89**	**100**

Source: Processed based on the results of own research

In the eleventh question of the semi-structured interview, "What specific measures have you, as a local government, taken to address the impact of high energy prices on your local budget?" **97 Slovak local governments** responded in the same way. Many of them were forced to turn off public lights at night, reduce the mayor's working hours, increase local taxes and rents, and limit the overall operation of local governments. At the same time, they were forced to save every euro in their budgets. **89 Czech local governments** answered the same question, more or less the same as Slovakia. Some of them were forced, for example, to suspend the construction of photovoltaic power plants.

5. Discussion

As part of the main objective of the research, we managed to analyse how selected Slovak local governments (Trenčín Self-Governing Region) and Czech local governments (Zlín Self-Governing Region) addressed or did not address the impacts of the energy crisis. **In the case of the secondary objective**, we were able to compare and find out that Czech local governments managed the impacts of the energy crisis somewhat better and more efficiently.

In response to the first research question, we concluded that the energy crisis had a more negative impact on the basic functions of local governments in the Slovak Republic. Local governments in the Czech Republic were slightly better. There are several reasons. The main one is the fact that the Czech Republic has twice as many

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inhabitants as the Slovak Republic. At the same time, the territory of the Czech Republic within the former Czechoslovakia has always been somewhat more economically efficient and developed compared to the territory of the Slovak Republic. This situation has not been reversed even more than thirty years after the dissolution of the Czech and Slovak Federative Republic. The author Hubálek and his team of authors (Hubálek et al., 2018) also very correctly assessed that the differences between individual states can also be seen in the perception of European citizenship and European identity, which have been pointed out by several authors. In this respect, we can only agree to add that the Slovak Republic, despite its twenty years of membership in the European Union, has not been able to fully come close to European standards of political culture compared to the Czech Republic, which is also reflected in the functioning of Slovak local governments.

In response to the second research question, we again found that Slovak local governments were more affected by their economic functioning by increasing energy prices than local governments in the Czech Republic. Economic crises are becoming the dominant topics of election campaigns for local governments (Čársky et al., 2021). I can only agree with this statement. However, it should be emphasized that managing or not managing the impacts of the energy crisis is also about the financial literacy of specific elected mayors, especially smaller local governments, which was pointed out by the author Táncošová and her team (Táncošová et al., 2023). However, we are of the opinion that the worse results of Slovak local governments in dealing with the effects of the energy crisis compared to local governments in the Czech Republic are also due to the fact that Slovak mayors **are elected in direct election –** by a direct mandate from the people. The councils of municipalities and towns in Slovakia are not able to dismiss them.

On the other hand, in the Czech Republic, **mayors are elected indirectly – by the councils of specific towns and municipalities.** Thanks to this, councils can dismiss them at any time in case of dissatisfaction with the development of municipalities and towns. This fact is indirectly pointed out in their article by the authors Janas and Jánošková (Janas and Jánošková, 2022). This means that if it turns out that Czech mayors, especially of smaller municipalities, are not financially literate enough, for example, the local councils can dismiss them at any time. Therefore, we can argue that this fact also had a certain impact on the fact that Czech municipalities were slightly less affected by their economic functioning by the increase in energy prices than local governments in the Slovak Republic.

As part of the answer to the third research question, we again found that Slovak local governments fared much worse in this case as well. According to our findings, the Czech Republic has helped its local governments slightly more than the Slovak Republic. The topic of high energy prices in the local government needs to be addressed through regional marketing activities (Lincényi, 2017). One can also agree with this statement. The main reason why Slovak local governments performed worse than local governments in the Czech Republic in this comparison was the former government of Eduard Heger (2021-2023). Instead of targeted aid for Slovak local governments, its former Minister of Finance, Igor Matovič, increased the child tax bonus at a critical time in 2022 and 2023, which, according to local government representatives at the time, cost more than five hundred million euros. Therefore, the new government of Robert Fico must not only consolidate the public finances of the Slovak Republic but also systematically support Slovak local governments to at least somehow come closer to Czech standards.

One of the recommendations on how to improve the financial condition of Slovak local governments is not only to consider a possible change in the election of mayors and lord mayors from direct to indirect but also to strengthen Slovak political parties at the local level. In this way, not only could the financial literacy of mayors of smaller municipalities, in particular, be improved, but it also put pressure on their mandate that they can be cancelled at any time if they fail to fulfil their competencies. We also recommend that the new Slovak government create a clear crisis plan on what to do in another energy crisis. It should rely mainly on possible

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assistance to the affected local governments if they cannot fulfil their statutory obligations in times of crisis. At the same time, it should help local governments in those areas that are recommended to it by representatives of towns and municipalities of the Slovak Republic. A proposal to improve the economic performance of Slovak local governments is the gradual merging of smaller municipalities into one unit. In this way, not only would various management processes be streamlined, but considerable funds would also be saved on bureaucracy and on the salaries of mayors, deputies and employees of the smallest municipalities.

Conclusion

The energy crisis from 2022 to 2023 largely affected the basic functioning of Slovak and Czech local governments. Based on our findings, neither the Czech nor Slovak governments have been able to help their municipalities to a sufficient extent. However, local governments in the Czech Republic have indeed dealt with the effects of the energy crisis a little better. 97 local governments from the Slovak Republic (Trenčín Self-Governing Region) and 89 local governments from the Czech Republic (Zlín Self-Governing Region) are a sufficient relevant sample to assess the fundamental issues of the recent energy crisis. Using quantitative data collection using a semi-structured interview, in which we addressed representatives of specific Slovak and Czech municipalities, we obtained the above research results. In addition to meeting the main and secondary objectives, we were able to answer our three research questions.

As mentioned, the Czech Republic has twice as many inhabitants as the Slovak Republic. This fact, together with the historical context, is related to the fact that the economy of the state and Czech local governments is more efficient than the economies of Slovak governments. This is also reflected in the difference in European citizenship and identity perception. The management or failure to deal with the effects of the energy crisis could be partly related to the level of financial literacy of specific elected mayors, especially of smaller local governments, especially in Slovakia. A possible reason may be the difference in the electoral systems for the election of mayors and lord mayors in the Czech Republic and Slovak Republic. The Czech model is far more effective than the Slovak one. This could also have resulted in better management of the effects of the energy crisis by Czech local governments. We are also convinced that the former Slovak government of Eduard Heger (2021-2023) could have done much more for Slovak local governments in the crisis period. We have already outlined our recommendations and proposals for dealing with the impacts of a possible next energy crisis. The research results can serve as a tool for creating better and more effective tools to help Slovak and Czech local governments in the event of future energy crises.

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FORMAL AND INFORMAL INNOVATION NETWORKS: A REVIEW

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Abstract. The paper addressed the important problem of systematization of empirical research in the field of formal and informal innovation networks. After an extensive literature study of 65 papers from 2003-2023, four thematic areas were formed: innovation network creation, structure and participants; innovation network evolution, activities and interactions; factors influencing innovation networks; and results from innovation network activities for the participants and third parties. Besides them, several interesting topics were discovered concerning network-specific structural forms, peculiarities of adaptive management, and the knowledge transfer mechanics of contracting for innovation. The systematization also showed several contradictions in the results and gaps in the empirical research, which outline the need for more studies about the intensity of formal and informal contact between participants and their influence on the transformation, development and sustainability of the networks and the contribution of formal and informal networks to the diffusion of knowledge and innovations.

Keywords: innovation; formal networks; informal networks; survey; empirical analysis; systematization

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1. Introduction

The innovation network was defined as a group of agents (e.g., individuals, teams, organizations) connected via relationships that enable exchanging information and/or other resources. (Schilling, 2017). They create opportunities for their members to pool together, exchange ideas, transfer knowledge, and share resources, enhancing the innovative outcomes of all participants and partners. Innovation networks are regarded as a key structural part of the innovation process (including members and their relationships). Still, they were also connected with the cognitive aspects of knowledge diffusion and social interactions in their environment, currently referred to as knowledge transfer or technology transfer (Ahrweiler, Keane, 2013; Ochoa, Arranz, Arroyabe, 2023).

The importance of knowledge transfer for innovation, competitive advantage, and economic growth led to abundant empirical research in innovation networks. They were studied from various perspectives and with diverse methods, both qualitative and quantitative. Among the interesting topics of empirical study were the metrics of innovation output (Owen-Smith, Powell, 2004; Casarin, 2023), the creation of innovation networks (Goyal, 2009), the interactions of networks with their surroundings (Klerkx et al., 2010), especially the social capital and culture (Malecki, 2012), the dynamics of networks, and their development or degradation (Vicsek

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et al., 2016), the institutional influence (Schøtt, Jensen, 2016). The factors that affect the network's success were also subject to intensive survey (Voorberg et al., 2015).

Empirical research sometimes explores very narrow topics concerning specific structural forms (Ter Wal et al., 2016), a functional peculiarity of 'adaptive management' (Klerkx et al., 2010), and interesting knowledge transfer mechanics like 'contracting for innovation' (Gilson et al., 2009).

Some attempts to systematize the research were made for strategic alliances (Gulati, 2012) and university-industry alliances (Perkmann et al., 2011). Others just pointed out core ideas for research (Balkundi, Kilduff, 2006), or were concerned with generalized topics (Voorberg et al., 2015). From a theoretical point of view, major innovation network features were studied by Gulati et al. (2012). Theories attempted to respond to the divergent signals that came from empirical observations of different networks in practice – about the models for successful functioning of networks, when a network was sustainable and when it was doomed to failure and collapse. Theoretical works were somewhat restricted, especially when considering the incentives for developing networks, and many gaps remained, like innovation forms, network configuration and third parties' role (Pittaway et al., 2004).

The systematic analysis was lacking, and there is still open space to develop a conceptual framework of the innovation networks analysis that would allow the complex study of the phenomena, its nature, structure, measurement, evaluation, and so on. Thus, the goal of this paper was to create a summary of the research, define major thematic areas and their subdivisions, and outline important topics, thus making an essential step towards developing the network analysis conceptual framework.

2. Materials and Methods

In the present study, the emphasis was placed on innovation networks, which, in the narrow sense of the term, consisted of organizations and individuals aimed at the development of innovative products or services. In the broad sense, innovation networks included, in addition to the participants, also the environment in which organizations in each cluster, hub (or other type of formation) interact to generate, produce, test, or disseminate the result of the innovation process (Latour, 2005).

The main method was an extensive bibliographic review of empirical research in the thematic area of innovation networks. We also used methods of analysis and synthesis, logical processes, comparative analysis, content analysis, and basic statistical methods (statistical tables) to outline major patterns. From the conceptual point of view, in the current study of empirical research on innovation networks, we used a systematic, interdisciplinary approach merging together the traditional approaches of describing static objects and phenomena with the ideas of actor-network theory, social network analysis and structural analysis.

Research interest in the development of innovation networks started at the end of the 20th century. In recent decades, there has been a dynamic transformation of all social systems, which were rapidly evolving. The participants and the relationships between them changed, creating uncertainty and making it necessary for a new perspective and new tools for the study of non-permanent and non-traditional social constructions.

Actor-Network Theory (Latour, 2005) is associated with the ideas of post-structuralism, i.e., it is described as an anti-foundationalist approach (Law, 2009) and is therefore somewhat neglected in empirical research. Actor–Network Theory views a network in a broad sense as composed of actors that are not just people or organizations (Czarniawska, 2006). The so-called nonhuman actors in networks are objects, animals, natural phenomena, facilities, etc. (Sayes, 2014), with which people and organizations interact to create meaningful outcomes. According to Latour, networks are both material and semiotic, as far as part of the network are "strategies for linking different elements together in a network so that they form an apparently coherent whole." Thus, in defining the scope of our analysis, we were concerned with both cognitive and material perspectives of the innovation networks, their creation and participants, members' abilities, goals and established roles in the networks.

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As the actor-network theory does not describe the type of networks or their evolution, we also employed some of the ideas of social network and structural analysis.

Social Network Analysis (Borgatti et al., 2009) was undergoing serious methodological development and was widely applied in determining the cohesion potential of networks and the reciprocity of resource sharing. Techniques of relational sociology were also applied, combining qualitative and quantitative research (Vicsek et al., 2016) to delve into more complex topics and phenomena and gain a deeper understanding of the complexity of social relations and their dynamics (Edwards, 2010; Du et al., 2023, Ochoa, Arranz, Arroyabe, 2023). To reckon with the networks' complexity and dynamic nature we explored empirical evidence with strong emphasis put on the innovation networks typology, development, and evolution; their activities and performance; the interactions and major drivers of change; the spatial perspectives and performance results as economic and social benefits for the members and outside third parties.

The review covered more than 100 papers published from 2003 to 2023. From all those, 66 were selected to focus on the primary research topic of the survey – the empirical research about formal and informal innovation networks. The papers were published in journals with subject fields in Management, Marketing, Research Policy, Knowledge Transfer, Organizational Science and Technology. All those papers were indexed in Scopus, Web of Science, and global reference databases. The paper selection was performed based on the important terms and categories used in the title, abstract, and author-supplied keywords. The words included 'innovation networks', 'innovation', 'empirical', 'survey', 'statistical', 'regression', 'econometrics', 'study', and 'evidence'.

3. Literature Review

Analysing the research papers that conducted empirical studies of innovation networks, we were able to outline several major thematic areas, covering a) innovation networks creation, structure and participants; b) innovation networks evolution, activities and interactions; c) factors influencing innovation networks; and d) results from innovation networks activities for the participants and third parties.

3.1. Innovation networks creation, structure and participants

The empirical research on the topics of the networks' emergence and governing was focused on their creation, antecedents, informal connections, network typology and structure. The networks were always created with certain goals, and the members were joining with inherent motivation connected to but not limited to, the benefits of knowledge sharing and collaboration. Goyal (Goyal, 2009) developed a general theory of network formation and analysed the location of every participant and its connection with the received benefits. Šūmane et al. (2018) explored the role of networking in European sustainable agriculture. They found that the purpose of network formation was to bring access to new and diverse knowledge, new forms of knowledge and new learning processes. The best form was the multi-actor knowledge network that allowed collaboration between farmers (local experience-based knowledge) and the co-generation of ideas and innovations. The complexity and local specificity brought forth the need for flexible knowledge generation, integration and sharing models. The creation of the network was eased or hampered by the presence or absence of pre-existing co-relations between the actors and the availability of formal and informal elements. Pittaway et al. (2004) analysed the link between firm's networking behaviour and innovations. They pointed out the role of networking configurations and the importance of participation and contribution of third parties like professional or trade associations. Giuliani (2013) explored local clusters and how they helped form networks for knowledge transfer and innovations. The analysis of network dynamics and actor-oriented modelling revealed that the cohesion effects and weak knowledge base facilitated the formation of a stable hierarchical structure in time. McEvily et al. (2014) analysed the role of informal and formal elements in organizational activities and interactions. There was conceptual logic in combining formal with informal connections that could improve the reasoning of networks' emergence, development, and functionality.

Networks appeared in different forms and followed different models in their evolution. Volberda et al. (2010) examined the research literature about networks in the context of absorptive capacity and concluded that organizational design and antecedents were not in the focus of the researcher and remained neglected or unclear. Bodas Freitas et al. (2013) explored the two main models governing university-industry relations: institutional

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and personal. The former was preferred by the large firms with vertical integration of their R&D, while small firms in the technology field and with open innovation strategies favour personal contractions. Ter Wal et al. (2016) differentiated network configurations into two dimensions – access, where networks could be open or closed, and expertise, which identified specialized and diverse networks. The resulting four combinations (closed-diverse, open-specialized, open-diverse, closed-specialized) offered different potentials for sharing redundant or diverse information and the easiness of interpretation of that knowledge. The empirical study of venture capital investment in the information technology sector (USA) showed a higher success rate of open-specialized and closed-diverse networks that capitalized on the advantages of sharing and interpretation. Hurmelinna-Laukkanen et al. (2021) identified three innovation network profiles by combining fundamental determinant properties (activities and resources) and interdependency between members. The labelled profiles, translative, transformative, and transcending, strongly impacted the size, density, structure and other essential network properties.

Network structure was explored in various aspects ranging from cognitive to geographical. Cowan and Jonard (2003) considered network structure in relation to the co-innovations and absorption potential. The network structure influenced the patterns and frequency of innovations, with communications structure being of key concern. The small world structure excelled at low absorption capacity, while the large capacity benefited from the organizational structure with a short path length. Owen-Smith and Powell (2004) examined the relationship between network structure (geographical and organizational) and information flows. They found that some nodes dominated the knowledge transfer and determined the state of open or restricted information access. As a result, the benefits from networking were either narrowed to the centre of the networks or spread broadly for many participants. Balkundi and Killduff (2006) considered the network in two dimensions: as cognitive structures and as structures of opportunity. The network activities could be facilitated or constrained by the three types of connections – between leaders, leaders inside the organizations and between leaders as representatives. Tahi et al. (2022) investigated structural holes and personal network efficiency in the biopharmaceutical industry. They found that private actors benefited from the control of knowledge transfer and played a central role in the evolution and development of innovation networks. Li et al. (2023) analysed the resilience of regional innovation networks. They found the vital role of internal connectivities between sub-networks and the important impact of structural heterogeneity that was profound in academic subnetworks compared to the enterprise ones.

3.2. Innovation networks evolution, activities and interactions

Evolutionary research in network development focused on the drivers of networks (Giuliani, 2013) and the context in which they had emerged (Greany, Higham, 2018). How the "life" of a network proceeded, what was the trajectory of its development, and what determined its transience and constant making and re-making (Giuliani, 2013) were questions to which scientific literature continued to seek answers from several different perspectives.

The Spatial Perspective was the oldest perspective for obvious reasons. It allowed the researchers to determine the unit of analysis (including geographically). It originated from the works of Alfred Marshall, who brought out the benefits of spatial grouping. On this basis, the theories of the agglomeration effect of spatially connected economic agents were developed, as well as the centre-periphery models, which examined the relationship between economic centres and less developed places around them (Press, 2006). The spatial perspective in more recent research was primarily associated with clusters, which might be geographically localized (regional clusters) but might also have a global presence (global networks). The factors for developing a given cluster in this case were considered in the literature as related to endogenous development, for example, the presence of social capital in the region where the network was located (Thompson, 2018). Wang and Zhang (2022) estimated regional innovation efficiency in China and found several regional imbalances. The developed provinces were more efficient than the less developed, and the efficiency was better at the R&D phase than in the commercialization stage. Regional conditions and innovation structure were important determinants of innovation investment enthusiasm and needed to be properly addressed by policy and the creation of a stable, transparent environment.

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Network Position Perspective was linked with a member's position in the network as a measure of the extent to which a participant was more active in exchanging resources and information with others, regardless of geographic distance. Unlike hierarchical structures, where formal relations in networks determine power, there was no prior distribution of power positions. They depended on the capacity of an actor to attract and communicate with other actors and to be useful in the network. The reciprocity of sharing resources and information was also seen as a factor of network cohesion (Goswami et al., 2023). The heterogeneity of firms in terms of their accumulated resources and capabilities contributed to forming hierarchical network structures where firms with more capabilities occupied privileged positions within the local network (Giuliani, 2013). Companies that established many new connections contributed to the cohesive effect of the network because it became more attractive.

The Digitization Perspective has developed rapidly in recent years. Digitalization has played a huge role in the development of innovative networks. On the one hand, it mediated communications through innovative tools. On the other hand, digital technologies fostered new forms of innovation and entrepreneurial initiatives by integrating digital and non-digital assets and accelerating the creation, scaling and evolution of new ventures (Nambisan et al., 2019). One of the research directions was related to the optimization and/or synchronization of the network development strategy to achieve technical compatibility. For example, Arvidsson and Mønsted reported on optimizing the number of applications in a cluster of 11 hospitals from a region in Norway. As a result of the synchronization, the number of used applications was reduced from 3000 to 700 (Arvidsson, Mønsted, 2018).

In this way, entrepreneurs quickly identified potential and sought new opportunities by re-combining resources in such a way that the development and scaling of new applications was a powerful driver for the development of the network. The flexibility of digital technologies made innovation outcomes increasingly open. Digital transformation changed entrepreneurial business models by stimulating businesses to rethink relationships with other partners and users. The following directions were noted in the analysis: 1) facilitated network collaboration and co-creation among actors for the solution of complex problems; 2) increasing network potential for combining resources; and 3) recombining technologies (Nambisan et al., 2019). In a broader plan, the digital transformation had another effect – related to changing policies to stimulate innovation, respectively to stimulate openness and data privacy protection, and to create an environment for combining digital affordances, spatial affordances, institutional affordances, social affordances (Nambisan et al., 2019). The combination of all new possibilities led to a redefinition of the boundaries of innovation networks and clusters.

Performance Perspective. Networks exist to enable communication between participants, resulting in meaningful outcomes that the agents in the network cannot individually create. Therefore, the performance evaluation should be closely related to whether network members tend to cooperate with other members (Vicsek et al., 2016). The reduction of communication and the exchange of resources and information is a sure sign of a destructive trend. After a certain threshold of need for communication, the network begins to break down. By the same logic, the growth of the network, i.e., attracting new members, should indicate better performance. Access to networks facilitates the easier exchange of information and resources, which is why networks are becoming a major component of markets (Owen-Smith, Powell, 2004). Almeida et al. (2003) compared the performance of networks and transnational corporations in terms of knowledge transfer and innovation. The corporations excelled in the implementation of both formal and informal mechanisms for knowledge building (incl. transborder sharing). Their flexibility facilitated dynamics, integration, and development of technical knowledge. Swan and Scarbrough (2005) explored the innovations that occur at the intersection of collaborating actors. They found that networks excelled in hierarchical and market-based forms in knowledge creation and integration and that the coordination of networks played a more significant role than their formation.

Knowledge Transfer Perspective. Knowledge transfer is one of the most attractive areas for researchers in network studies. The knowledge network provides firms with access to diverse knowledge to develop and improve products (Carnabuci, Operti, 2013), but it is important to how knowledge is integrated into the network, depending on its structure and density. In innovation networks, knowledge transfer was a major reason for gradually rethinking organizational boundaries and their blurring over time (Lawson et al., 2009). Dimitrova and Dakova (2021) explored the knowledge transfer interaction between academics and business. The higher

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education innovation centres served as mediators of the process, facilitating the technological transfer from the producers (usually the academic research teams) to the business user implementing the new knowledge in practice. In a wide and diversified network of knowledge, the subjects of innovation could benefit much better from the three stages of knowledge transfer: knowledge transmission, knowledge absorption, and the use of the knowledge (Szilágyi, 2017), and from the lower costs of knowledge acquisition and transformation (Zhou, 2022).

The lack of connections between network participants (aka structural holes) might impede the flow of information. They could be due to a lack of trust or competitive rivalry but might also be caused by normative constraints, e.g., required permissions to access information (Zhou, 2022). Burt et al. (2013) considered structural holes from a sociological point of view as a buffer that was surrounded by different flows of information. The buffer was more often formed because the participants were busy with other activities or tasks and missed direct connections with each other. Bridging structural holes contributed to turning potential connections in a network into actual ones, strengthened the central positions of actors contributing to these new connections (Chen et al., 2019), and could enhance innovation performance (Sun et al., 2022). Structural holes were detrimental to team knowledge sharing and diffusion, as they inhibited the creation of new team knowledge (Li et al., 2017).

3.3. Factors influencing innovation networks

The problems of factors that influenced innovation networks' success encompassed empirical studies about the efficiency and the results of the innovation networks' functioning. These factors were the focus of empiric research activity in co-creation or co-production innovations while the goals and outcomes were somewhat neglected (Voorberg et al., 2015). The area covers knowledge transfer, network management, environment and outside conditions that influence how innovation networks appear, function, develop and/or degrade. In that area we were able to outline several narrow fields of research, pointing to the different factor groups concerning a) the management of networks and knowledge transfer; b) the spatial aspects of knowledge transfer and innovation; c) the connection between the social capital and innovation processes; d) the institutional aspects of knowledge transfer and innovation networks.

The management of networks and knowledge transfer are key factors because the networks were created and functioned through the interactions of their members. While the innovation networks were studied in detail regarding their structural properties (Swan, Scarbrough, 2005), there were other problems linked to their development or degradation and to the specific forms and ways to share knowledge. Swan and Scarbrough (2005) examined the roles of network structure and politics of network development dynamics. They found that the coordination of the network was more important than its formation. Liu et al. (2022) explored the relationship between the innovation outcomes of SMEs, planning and execution capability, and operational improvement capability. They found that operational improvement impacted innovation output more than planning and execution. While exports and formal business networks presented different knowledge opportunities, the latter amplified the effect of planning and execution on innovation, and the former reduced the benefits of planning and execution on innovations. Savino et al. (2017) pointed out the key role of knowledge search and recombination in innovation development. The quality of knowledge plays a more significant role as variety and diversity of knowledge proved crucial for achieving breakthrough innovations. Knowledge impact importance was reinforced by Lungeanu et al. (2022) when exploring expertise diversity and its relation to quality and innovation output. Their findings presented evidence that the success of product and service innovation relied on the diversity and complexity of both private and public actors' complementariness and interdependencies in various fields of knowledge.

An interesting moment was marked by Gilson et al. (2009) when exploring interfirm collaboration and seeing vertical disintegration. They found that the firms developed a new form of contracting - ‘contracting for innovation’ to support iterative cooperative innovations along the supply chain. Yeniyurt et al. (2014) analysed the North American automotive industry. They found that co-innovation was influenced by communication along the supply chain, expected long-term returns, and the development of mutual trust and interdependence.

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Adaptive innovation management was surveyed considering the interaction between innovation networks and their environment and the limited abilities of the networks to influence and change the environment (Klerkx et al., 2010). Special attention was given to the constant reflection of the innovating actors and to the so-called flexible support instruments and their role in effectively managing environmental change.

The influence of management and spatial aspects of knowledge transfer and innovation was focused on the location of the network's members. Geography plays a significant role in developing innovative networks, while digitalization presents new opportunities with the ability to change the entire image. Gittelman (2007) studied the connection between spatial disposition and innovations based on the collaborative research projects of small biotechnology firms. Two types of links were discovered. In the first, the research teams were closely clustered and created innovative knowledge that was implemented in the practice, resulting in high citations of their patents. The second type of cooperation connected team members through longer distances, providing better geographical coverage in sharing knowledge and disseminating scientific findings, resulting in more publications citing scientific papers. Morrison et al. (2013) modelled the connection between innovations, the growth of clusters, and global pipelines. The diffusion and accumulation of knowledge were found to be supported by the global pipelines in limited situations with high-quality clusters or in small and knowledge-poor ones. Binz et al. (2014) analysed the innovation processes at different spatial scales – national and regional. Using data from social networks about publications on membrane bioreactor technology, they found that when knowledge transfer was concerned, the spatial characteristics of the cooperation varied substantially, even in short periods. Liu et al. (2022) explored the cultural industry clusters and the influence of geographical, technological, and social proximity on the evolution of innovation networks. They found that the innovation networks improved their centrality and interconnections, and social proximity remained a pivotal factor in the development of cultural industry networks, while geographical proximity impact was diminishing. Digitalization and the ongoing processes of social and entrepreneurial conversion can transform the role and significance of location as digital technologies present new opportunities to achieve openness, affordability and generativity (Nambisan et al., 2019).

The impact of social capital on innovation processes was studied from several points of view, including the role of culture as an essential element of it. Hinrichs et al. (2004) used data from 1999 survey in US states of California, New York and Iowa. They found that social learning through interactions with customers and vendors was a crucial factor in marketing innovations, although moderated by structural factors and human capital. Mu et al. (2008) analysed social capital, the transfer of knowledge and the role of interfirm networks. They presented a mechanism explaining how weak ties develop trust and lead to solid inter-firm relationships, enhancing the interaction process and accelerating knowledge flow. Kaasa (2009) explored the impact of social capital on innovative activity at the regional level. While the significant role of social capital in promoting innovations was confirmed, the various aspects of social capital were found to have dissimilar effects on innovation intensity. Cheung et al. (2010) examined the resource sharing between suppliers and buyers, the inter-firm collaboration in learning and value creation. They found that when strong ties were created in the supply chains, the propensity to share knowledge between the partners was not influenced by cultural distance, even in cross-border cases.

Malecki (2012) considered social capital the culture of communication, learning, trust, and openness toward external ideas. The extraordinary pool of social capital – quality and quantity, was the basis for regional growth, innovation conductive environment, and building an economy based on knowledge. The cultural distinction of different regions – the culture of trust, learning, and interaction between peoples and organizations was related to knowledge transfer, the formation of an innovation-beneficial environment, and regional economic growth. Yun et al. (2020) studied the role of culture when considering the dynamics of open innovations. They noted two problems – 1) the requirement to understand diverse cultures, and 2) the need to control the complexity of open innovations. Examining the different entrepreneurial dimensions of interactions (novice, existing and organizational), they found the various aspects and roles that culture plays in boosting open innovations. Barroso-Méndez et al. (2020) analysed the interaction between business and non-profit organizations and established that the partnership's outcome depended on the partner's characteristics, such as the complementarity of their resources and the sharing of common values. Satisfaction and achievement of goals developed trust and more commitment, helping develop regional capital. Mukherjee and Jain (2022) explored the impact of social

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brokerage on innovation networks' output and found that the relation exhibited a U-shaped form. The biggest and the smallest social brokerage was associated with higher innovation scores as perceived by the other community users. Wand and Zhu (2022) explored the relations between social capital, industry-university-research networks, and innovation performance in the petroleum industry. Empirical research showed evidence that social capital and innovation performance were benefitted by the centrality of the cooperation network as well as its strength, while, at the same time, the network scale had no significant impact on either social capital or performance. Social capital, per se, showed a mediating effect between centrality and performance.

The institutional impact on knowledge transfer and innovation networks received less attention even if the institutional role was major catalyser for innovation networks in any stage of their development, and institutional actions could have as much beneficial as detrimental effects. Spielman et al. (2011) explored the innovative abilities of rural stallholders in Ethiopia. They found that smallholder networks were strongly influenced by public administration, sometimes even at the expense of market-based enterprises and civil society. Schøtt and Jensen (2016) used data from the Global Entrepreneurship Monitor (18,880 firms in 68 countries) and found that institutional support did not increase the quantity of networking. On the other hand, the process and product innovations benefited from institutional support for networking. Godlewska et al. (2022) explored the influence of institutions on the innovation process in Poland. They found that previous cooperation between local governments and special local institutions improved network participation. Moreover, formal networks were better than informal ones in limiting undesirable behaviour like opportunism, distrust, rent-seeking, instability, and a lack of compliance with established rules.

3.4. Results from innovation networks activities for the participants and third parties

Innovation networks have played a significant role in economic development and social transformation. The resulting innovations from the network's performance created important benefits for the network's members and other stakeholders. The co-innovation effects were studied in connection with supply chains (Wang, Hu, 2020; Lawson et al., 2009), cultural and creative industries (Santoro et al., 2018), investment companies (Ter Wal et al., 2016), aerospace, ceramics, information technology and software, textiles and healthcare (Tomlinson, 2010), automotive equipment (Yeniyurt et al., 2014), semiconductors (Ansell, 2000).

Measuring the effect of networking between companies and universities was focused on the use of easily quantifiable outcomes, e.g. patents and scientific publications (Perkmann et al., 2011). The other outcomes were difficult to quantify and included participant satisfaction with the knowledge transfer process and innovation outcomes, the long-term benefit of the generation of scientific knowledge.

Pittaway et al. (2004) conducted a systematic review of the connection between networking and innovation capacity and derived the primary benefits for the stakeholders. Financial and legal benefits were expressed in improved risk management, safeguarding property rights, and practical ones, such as easy access to new markets and speeding the products to the market. At the same time, the sharing aspects included knowledge transfer and pooling complementary resources. On the other hand, when firms didn't engage in cooperation activities, their long-term knowledge base was restricted, and their potential for future exchange was reduced.

Perkmann et al. (2011) commented on the rising number of official alliances between businesses and universities pointed towards innovations. Some benefits were specific for the industry branches – pharmaceutical firms gained information about new diseases; IT engineering gained advantages in software development. Common benefits included easy communication with the students and the development of new technologies; increased financing due to government support for the R&D programs; efficient consulting from the academic experts for the problems in R&D activities in the firms; improved reputation and attractiveness as employers and partners; access to the academic networks.

Yeniyurt et al. (2014) pointed to the firm's benefits from networking when finding needed competency, experience, technologies and product elements. Co-operation with suppliers for innovations led to increased productivity, a decrease in time for the development of new products, improvement in the quality of existing products, a decrease in production costs, and access to new markets and technologies. Further, good relations with suppliers increase trust between the partners and encourage continuous cooperation for innovation.

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According to Wang and Hu (Wang, Hu, 2020) the synchronization of the abilities and advantages among the partners led to great practical benefits from the co-innovations. Collaboration through the supply chain (suppliers, producers, distributors, service providers, clients) accelerated the development and quality of new products and services.

Tomlinson (2010) pointed out inter-firm ties as leading to innovation promotion because they complement the firm's internal resources in product and process innovation. Although there is some heterogeneity in the results obtained from the study for different production sectors, it is proven that vertical connections (upward and downward) have a positive and significant impact on the innovation performance of firms. Fostering closer links across a range of activities (from product co-design to marketing and distribution) between firms along the value chain facilitates knowledge transfer and organizational learning and can improve innovation outcomes.

Santoro et al. (2018) found that informal ways were preferred in the collaboration between firms and cultural and creative industries. These industries were a source of innovation for the firms because they provided different/specific knowledge and new creative approaches, methods, and solutions that supported successful competition. Informal networks benefited firms more than formal ones because they enabled faster and more flexible use of knowledge to improve their innovation performance. At the same time, cooperation with companies from other industries benefited the cultural and creative industries, as they lack the necessary resources and opportunities to develop innovative ideas, although they have a large volume of creative knowledge and ideas. Networking enhanced the creativity and innovativeness of firms, which positively impacted their competitiveness. It is noted that the cooperation of companies with the cultural and creative industries increased corporate social responsibility, promoted marketing strategy, the creation of new products and services and, ultimately, innovations. Ochoa, Arranz and Arroyabe (2023) explored innovation networks in relation with the European Mission on Climate-neutral and smart cities (2030). They found that innovation networks with more members and complex yet balanced interconnections had greater success rates, especially when led by research institutions or private enterprises.

Bellavitis and Kamuriwo (2014) examined start-ups in the UK that were funded with venture capital. The enterprise network connects companies from different industries with the same investor. The study results showed that the network in which a company participates strongly impacts its success. External ties were directly and positively related to a firm's probability of successfully exiting the market, while internal ties negatively impacted firm performance. The optimal balance of connections could lead to an increase in the efficiency of the enterprise. Another special case was small and medium-sized enterprises. Lasagni (2012) found that when an enterprise was the active party in its relations with innovative suppliers, users and customers and purposefully used its capabilities and advantages, its innovation performance was higher than in enterprises that just wait to be asked to work together. Due to the limited resources typically available to SMEs, Tomlinson and Fai (2013) highlighted the availability of access to a wide range of technological capabilities. They could be provided through exchanging information and pooling resources thanks to the connections between enterprises within an established network. The research found that close cooperation in production activities between network participants increased the capacity of enterprises for both product and process innovation. At the same time, cooperation with competitors didn't significantly impact innovation activity.

Knowledge sharing was one of the most reported effects for network participants. It was a prerequisite and outcome of collaborative planning and implementation of innovation activity in the network and positively impacted innovation outcomes. The conclusion of Wang and Hu (2020) was that "without a high level of knowledge sharing, the desired level of innovation performance cannot be guaranteed by engaging in joint innovation activities alone." Knowledge sharing has been empirically shown to partially mediate the relationship between collaborative innovation activities and firm innovation performance. According to Tzabbar et al. (2008) the pooling of knowledge of several actors enabled knowledge to be combined and linked and led to greater returns than the aggregate result when each firm acted on its own. Laursen and Salter (2013) discuss the contradiction between openness and commercialization. On the one hand, there is the need for cooperation and the sharing of ideas between different entities in creating and introducing innovations, which is necessary to share information outside the organization. On the other hand, when striving to achieve the maximum return on investment in innovation, the firm must protect its secrets. Lawson et al. (2009) explored the transfer of

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knowledge between buyers and suppliers and the resulting social ties and inter-organizational development through formal mechanisms. Product development managers are encouraged to build teams, increase knowledge flow, and improve both product development outcomes and financial performance.

4. Results

The temporal distribution of all the 66 analysed papers is presented in Table 1. The patterns in the development of the empirical study showed that the interest grew substantially after 2005, and in the later years, research activities remained strong with a continuous increase in level.

Table 1. Temporal structure of empirical research of innovation networks

Time period (years)	Publications included (Number)	Publications included (Number per year)
Before 2005	5	2.50
2005 – 2014	30	3.33
2015 – 2023	31	3.88
Total:	66	2.13

Source: Authors' calculations

Systematization of the empirical research in the aforementioned 66 publications (Table 2) led to formation of 4 major research areas, each with its own subdivisions. The first area (14 papers) covered the creation of innovation networks (5 papers), typology (5 papers) and structure (4 papers). The second area (19 papers) included publications about development, activities and interactions of innovation networks in spatial (3 papers), networks position (2 papers), digitalization (2 papers), performance (3 papers) and knowledge transfer perspective (9 papers). The third area (26 papers) encompassed factor influencing innovation networks performance with four topic – management and knowledge transfer factors (8 papers), spatial factors (5 papers), social capital (10 papers), and institutional factors (3 papers). The fourth area (16 papers) was focused on the outcomes from the innovation networks' activities summarized in three topics – direct economic benefits (8 papers), indirect economic benefits (4 papers), and social effects (4 papers).

The research focus was concentrated on the factors, fact also mentioned by Voorberg et al. (2015), followed by the networks' activities, while the topics of major research interest were knowledge transfer and direct economic benefits. Empirical studies were concerned with the means of knowledge diffusion and the resulting economic gains. Network typology, structure and members' position inside the network received relatively less research attention.

Table 2. Summary of empirical studies of formal and informal innovation networks

Area	Topic	Authors	Interesting Ideas
Innovation network creation and structure	Creation	Pittaway et al. (2004); Goyal (2009); Giuliani (2013); McEvily et al. (2014); Šūmane et al. (2018)	Šūmane et al. (2018)– flexible models. Pittaway et al. (2004)– third parties' contribution. Giuliani (2013)– hierarchical structure.
	Forms and models	Volberda et al. (2010); Bodas Freitas et al. (2013); Ter Wal et al. (2016); Tahi et al. (2022); Hurmelinna-Laukkanen et al. (2021).	Ter Wal et al. (2016) – access and expertise.
	Structure	Cowan & Jonard (2003); Owen-Smith & Powell (2004); Balkundi & Killduff (2006); Li et al. (2023)	Li et al. (2023). – structure heterogeneity and crucial role of linking between sub-networks
Innovation networks development, activities, interactions	Spatial Perspective	Press (2006); Thompson (2018); Wang & Zhang (2022).	

	Network Position Perspective	Giuliani (2013); Goswami et al. (2023)	Cohesion vs. hierarchy.
	Digitization Perspective	Arvidsson & Mønsted (2018); Nambisan et al. (2019)	
	Performance Perspective	Almeida et al. (2003); Swan & Scarbrough (2005); Vicsek et al. (2016)	Vicsek et al. (2016)– communication role. Controversy – networks vs. market forms.
	Knowledge Transfer Perspective	Lawson et al. (2009); Burt et al. (2013); Carnabuci & Operti (2013); Li Mingze et al. (2017); Szilágyi (2017); Chen et al. (2019); Dimitrova & Dakova (2021); Sun et al. (2022); Zhou (2022)	
Factors, influencing innovation networks performance	Management and knowledge transfer factors	Swan & Scarbrough (2005); Gilson et al. (2009); Klerkx et al. (2010); Yeniyurt et al. (2014); Voorberg et al. (2015); Savino et al. (2017); Lungeanu et al. (2022); Liu et al. (2022)	Voorberg et al. (2014) – factors were the primary focus of innovation networks empirical research. Savino et al. (2017); Lungeanu et al. (2022) – the importance of the diversity of knowledge. Gilson et al. (2005) – vertical disintegration and contraction for innovation. Klerkx et al. (2009)– adaptive management.
	Spatial factors	Gittelman (2007); Morrison et al. (2013); Binz et al. (2014); Nambisan et al. (2019); Liu, Fang, & Chi (2022)	Nambisan et al. (2019)– digitalization vs. localization. Liu, Fang, & Chi (2022)– diminishing geography impact
	Social capital factors	Hinrichs et al. (2004); Mu et al. (2008); Kaasa (2009); Cheung et al. (2010); Zheng (2010); Malecki (2012); Barroso-Méndez et al. (2020); Yun et al. (2020); Mukherjee & Jain (2022); Wang & Zhu (2022)	Mukherjee & Jain (2022)– U-shaped impact form
	Institutional factors	Spielman et al. (2011); Schøtt & Jensen (2016); Godlewska et al. (2022)	
Results from innovation networks activities	Direct economic impact	Pittaway et al. (2004); Lawson et al. (2009); Tomlinson (2010); Bellavitis et al. (2014); Laursen & Salter (2014); Yeniyurt et al. (2014); Santoro et al. (2020); Wang & Hu (2020)	Laursen & Salter (2014)– contradiction openness vs. commercialization.
	Indirect economic impact	Tzabbar et al. (2008); Perkmann et al. (2011); Lasagni (2012); Tomlinson & Fai (2013)	
	Social impact	Perkmann et al. (2011); Yeniyurt et al. (2014); Santoro et al. (2020); Ochoa, Arranz, & Arroyabe (2023)	Ochoa, Arranz, & Arroyabe (2023) – transitioning toward climate-neutral urban objectives

Source: Authors' contribution

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With the accumulation of empirical data and the advancement of concomitant theoretical research, the focus of the empirical studies shifted (Table 3). In the first period – before 2005, research was concerned with the establishment and functioning of the innovation networks – 83.3% of the publications were in the areas of innovation network creation and structure, and innovation network development, activities and interactions. In the second period – 2005-2014, the focus moved to the factors influencing the performance of the networks and the outcomes for the participants and third parties – 66.7% of the publications were in the areas of factors influencing innovation networks performance and results from innovation networks activities. In the third period – 2015-2023, the interest in factors continues to be strong, while the focus shifted back from the outcomes to the functioning of the networks – 72.7% of the publications were in the areas of factors influencing innovation network performance, and innovation networks development, activities and interactions. Overall, the factors remained the most explored area, followed by the innovation networks development, activities and interactions.

Table 3. Detailed Temporal & Ares structure of empirical research of innovation networks

Area	Till 2004	2005 – 2014	2015 – 2023	Total
1. Innovation network creation and structure	3	6	5	14
1.1. Creation	1	3	1	5
1.2. Forms and models	0	2	3	5
1.3. Structure	2	1	1	4
2. Innovation networks development, activities, interactions	1	6	12	19
2.1. Spatial Perspective	0	1	2	3
2.2. Network Position Perspective	0	1	1	2
2.3. Digitization Perspective	0	0	2	2
2.4. Performance Perspective	1	1	1	3
2.5. Knowledge Transfer Perspective	0	3	6	9
3. Factors influencing innovation networks' performance	1	13	12	26
3.1. Management and knowledge transfer factors	0	4	4	8
3.2. Spatial factors	0	3	2	5
3.3. Social capital factors	1	5	4	10
3.4. Institutional factors	0	1	2	3
4. Results from innovation network activities	1	11	4	16
4.1. Direct economic impact	1	5	2	8
4.2. Indirect economic impact	0	4	0	4
4.3. Social impact	0	2	2	4

Source: Authors' calculations

The main findings of the empirical studies gravitated around common consolidated topics while in some particular cases were identified interesting and peculiar novelties.

The formation of networks, whether formal or informal, was the result of the participants' desire to share and draw on knowledge and experience, which collectively generated a synergistic effect on their organizational development. From here, it can be concluded that networks were regarded as a means of achieving a multiplier effect in various economic and social systems. Economic and social impacts on network participants were the main motivators for membership, with formal networks being more resilient and informal networks being more flexible. To a large extent, the density of the network and the participants' expertise were the basis of good interaction and rapid knowledge transfer. At the same time, the previous participation of some agents could act as a catalyst for the intensity of transfer and absorption, as well as for the degree of cooperation between them.

The development of both formal and informal networks implied such interaction as to satisfy the participants. Practice has shown that open specialized and closed diverse networks are much more productive than closed specialized and open diverse networks. This fact should be considered when building and developing networks. The factors that influence the success or failure of innovation networks were linked on one side to the internal structure and development of the network itself and on the other – to the network's surroundings and interaction with it. Internal factors outlined by the empirical research were the management of network structure and knowledge sharing, as well as the spatial aspects of innovation networks. External factors consisted of social capital and its cultural elements, as well as institutional role in supporting innovation networks.

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The main outcome of the innovation network functioning was knowledge transfer. Although knowledge was the primary goal of any network and the collaboration between the participants, many of them were also concerned with the application of that knowledge and its consequences – the direct and indirect economic benefits and social impact. The enterprises were interested in the economic effects that included lowering the cost of production and speeding product development, achieving better product quality, developing faster market access, and, as a whole, increasing the firm's competitiveness. Indirect economic benefits included human capital improvement, resource complementation, organizational learning, and higher creativeness. At the same time, social were connected with the development of trust among the participants, increased desire for cooperation, cultivating networking culture, getting access to academic networks and expertise, improved reputation, and formalization of connections.

5. Discussion

Systematization of the research topics and results of empirical studies pointed out several interesting problematic areas where no consensus was achieved. Instead, the results of different authors were contradictory, establishing the peculiarity of the regions, which were influenced by different factors and developed in different conditions.

Goswami et al. (2023) pointed out that innovation networks had no well-established hierarchical structures. On the other side, Giuliani (2013) observed formation of the hierarchical structures in regional clusters. At first glance, there was a contradiction between the results of these two studies, but closer examination revealed that they were, in fact, in consent with each other. The results of Goswami et al. were influenced by the specifics of the firms and networks in the study – they were homogeneous, and there was no prior distribution of power positions among them. In contrast, when networks were to be formed with some already existing connections among the participants, their relative abilities may differ, and their resource abundance and communication experience could lead to asymmetrical relations. Giuliani observed such heterogeneity in regional clusters, where the firms with more capabilities occupied privileged positions within the local network. The hierarchical structure proved beneficial to the network as the stronger companies were able to establish many new connections, which increased both the network's attractiveness and its cohesive effect. That is, the hierarchy is in close relation to the diversity of the participants, their fundamental determinant properties (activities and resources) and interdependency (Hurmelinna-Laukkanen et al., 2021), the heterogeneity and regional specifics (Li et al., 2023). The private actors could benefit from the control of the knowledge transfer flows (Tahi et al., 2022), facilitating network development, resulting in the heterogeneous network developing a hierarchical structure easier than a network with symmetrical relations and equally important participants. Still, a dominating opinion has not been formed on when an informal network should be transformed into a formal one, what the characteristics of this transition are, and what the tools are for its effective management. Formal networks often have an informal hierarchy that has arisen naturally in the context of individual participants' activity and intensity of communication, and the history of ties prior to involvement. At the same time, formal networks often have overlapping hierarchical systems that combine formal and informal, with the informal dominating within network initiatives and interactions. Some latest research revealed that formal networks were better at limiting the hampering behaviour of the public administration (Godlewska et al., 2022).

Another contradiction was the comparison between networks and other organizational forms emerging from market relations. Almeida et al. (2003) found that multinational corporations outperformed innovation networks in successful knowledge transfer and implementation. Swan and Scarbrough (2005) discovered that networks possessed distinct advantages over market-based forms. The contradiction could be attributed, first, to the different scopes of the studies. Almeida et al. (2003) research covered only one particular economic segment – semiconductor companies, while Swan and Scarbrough's (2005) case study concerned only three enterprises. In the second place, while Swan and Scarbrough established that networks outperform due to the knowledge becoming more widely distributed and innovation increasingly occurring at the interstices of collaborating groups and organizations, this was not common in the semiconductor sector where new knowledge was heavily guarded and rarely subject to the open innovation policy. Third, Swan and Scarbrough found that the

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coordination of networks played a particularly crucial role, and that's the place where multinational corporations excelled, with strong abilities to use flexible mechanisms of knowledge transfer and simultaneous movement, integration, and development of technical knowledge. Thus, the relative performance of networks and corporations depends on the knowledge openness and level of coordination, with the regional development level also playing an important role (Wang, Zhang, 2022). When networks were well coordinated and an open innovation policy was present, they could potentially outperform market forms. At the same time, in areas with intense competition and less knowledge sharing, corporations take the lead with their superior abilities to muster and utilize more resources faster and efficiently.

The pivotal role of social capital in the formation, development, and success of innovation networks was well established in different aspects of research. The diversity of members expertise and available knowledge, the complementarity of the resources and the centrality of the networks assisted innovation performance (Barroso-Méndez et al., 2020; Lungeanu et al., 2022; Wang, Zhu, 2022). At the same time, results showed that private enterprises preferred non-diverse, in-depth technical cooperation (Du et al., 2023).

The mechanics of knowledge transfer was the focus of the empirical research in relation to the policy development, supporting factors and organizational forms that facilitated the reliable and successful implementation of the new knowledge. The findings were somewhat controversial and pointed out to the need of further research in the area. The dyads and other subgroups influenced the resilience of the networks and the knowledge transfer (Barroso-Méndez et al., 2020). Social brokerage was beneficial in the extremes – either as well established, that was both logical and expected but – unexpectedly, also when was almost non-existent (Mukherjee, Jain, 2022).

The balanced connections facilitated knowledge sharing in bigger networks led by private enterprises or academic institutions (Ochoa, Arranz, Arroyabe, 2023).

A gap in the studies was that most of them focused on analysing individual cases and processes but did not thoroughly examine the impact of digitalization on the development of networks. In those few, concerning digital innovations (Nambisan et al., 2019), the critical role of digital transformation of the economy at both macro and micro level was emphasized with the benefits of increasing the speed in knowledge transfer, development of new opportunities, removing some restrictions, accelerating innovation implementation, assisting the reengineering, and facilitating the openness and cooperation.

Besides digitalization, interesting areas for empirical and also theoretical research could be derived from the summarized studies, like the psychological peculiarities of the people who engage in network activities more than others and benefit from the contacts in which they are embedded (Burt et al., 2013); the possible relation between business size, stage of its life cycle and motivation to participate in networks (Almeida et al., 2003); the balance between formal and informal contacts and factors influencing it; the relation between the type of network and innovation results (Santoro et al., 2018); the impact of network topologies on industrial and regional development (Owen-Smith, Powell, 2004); the role of universities in innovation hubs (D'este, Perkmann, 2011);

Conclusions

Innovation networks emerged at the intersection of helixes when the participant's desire to share knowledge and experience was combined with pre-existing cooperation. Networks' performance, resilience, and flexibility were studied closely in relation to knowledge transfer. A strong focus was found on the factors influencing innovation networks with social capital as the primary cause for success or failure, followed by the importance of management and the spatial aspects of networks and knowledge sharing. Results from the activities of the innovation networks were considered with emphasis on the economic benefits for the enterprises and the development of networking culture in the society.

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Issues related to the intensity of formal and informal contacts between participants and their influence on the transformation and/or development of the network, as well as the contribution of formal and informal networks to the diffusion of knowledge and innovations, have been poorly researched and are the primary topic for further study. Another interesting problem is the dependence of the network's sustainability on the number of participants and the intensity of the connections between them.

Research Novelty. The research showed that some seemingly opposite views regarding the development of innovation networks complemented each other, suggesting a more in-depth analysis of the prospects for developing formal and informal innovation networks. The structuring of up-to-date scientific knowledge on the subject provides a starting point for the search for solutions for intervening impact on the factors that influence network development, as well as for the search for an appropriate toolkit to increase the direct, indirect and social impact of the functioning of networks. Promising areas for future research have been outlined based on the systematization of the accumulated scientific knowledge. As such, the process of transformation of networks and the influence of the intensity of formal and informal contacts between participants can be indicated, as well as their impact on the sustainability of networks and their impact on innovation potential and the development of an innovation culture.

Research Limitations. The study presents an overview of the author's research in the field of formal and informal innovation networks in four thematic areas: creation of innovation networks, structure and participants; evolution of innovation networks, activities and interactions; factors affecting innovation networks; results of innovation network activities for participants and third parties. Issues related to digital transformation, artificial intelligence, and their place in the functioning of the network and the interaction between network participants remain outside the scope of the article. Tools for intensifying interaction, creating new knowledge and its transfer, as well as approaches to ensure sustainability are also beyond the scope of this analysis. Systematization also showed several inconsistencies in results and gaps in empirical research that outline the need for more research.

Practical Implications. The systematization of already accumulated knowledge showed the multidisciplinary problem in the context of the wide application of innovation networks and outlined similar impacts under different factor conditions. In practical terms, this means that, to a large extent, the lessons learned and good practices can be transferred to different case studies without requiring narrow specifications and practice adaptation. The regional approach should be considered in the context of the dependencies the authors identified in the network's development and sustainability. This implies an analysis of regional differences and degree of cohesion and, on this basis, the application of practically working tools in a similar environment to a specific innovation network.

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MONITORING AND PLANNING OF LOCAL TERRITORIAL DEVELOPMENT AS A MODELABLE BUSINESS PROCESS: THE CASE OF LATVIAN MUNICIPALITIES*

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Abstract. The purpose of this study is to develop a model (using the case of Latvian municipalities), which represents monitoring and planning of local territorial development as a business process. It is hypothetically assumed that business process modeling for monitoring and planning local territorial development is possible and increases the level of this development, but is not widely used in Latvian municipalieties. This hypothesis is tested through a literature analysis, the use of business process modeling tools, action research in Augshdaugava County municipality and statistical analysis of survey data (Latvian municipalities, N = 43, 2024). The evaluation of business process modeling (BPMdl) maturity levels in the context of business process management (BPMng) (in particular, its core elements: strategic alignment, governance, method, information technology, people, culture) is conducted using the Business Process Maturity Model (BPMM). Data were collected through a survey (based on a special 5-score scale of BPMdl maturity levels) of administrative staff responsible for the creation of annual public reports in Latvian municipalities or actively involved in this process. The results of the study indicate a moderate overall level of BPMdl maturity (from 1.91 score for methods to 3.86 score for strategic fit) in Latvian municipalities. Furthermore, BPMdl maturity levels, especially in terms of methods and culture, are statistically significant determinants of local economic development. The results of the discriminant analysis show that, based on BPMdl maturity levels, it is possible to classify Latvian municipalities into groups with a less developed economy and a more developed economy with an accuracy of 95.3%. This study is innovative in the application of BPMdl for local territorial development in Latvia.

Keywords: local territorial development; monitoring; planning; business process; business process modeling (BPMdl); business process management (BPMng); Business Process Maturity Model (BPMM); Latvian municipalities.

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1. Introduction

A business process is a series of tasks or activities that are systematically organized and implemented to achieve a specific organizational goal (Weske, 2012). These processes can vary greatly in complexity and scope, ranging from simple procedures like ordering supplies to intricate workflows like product development and supply chain management (van der Aalst & Hee, 2002). Key characteristics of a business process include (van der Aalst, 2016): (1) defined sequence of steps (a clear sequence of activities that need to be performed), but sometimes a business process includes also parallel acitvities, which are not dependent on each others completion and can

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be done parallel (Ng, 2024); (2) objective or goal (a specific outcome or goal that the process aims to achieve); (3) inputs and outputs (resources or information that are processed to produce a final output); (4) participants (individuals, teams or systems involved in executing the process); (5) rules and policies (guidelines that dictate how tasks should be performed).

In different sources, the definition and key elements of a business process may be defined slightly differently, but the essential component of a business process, which distinguishes it from all other processes, is its repeatability (regularity). In turn, all processes occurring at the stage of formation and initial development of an organization are not business processes, since they have a trial, unsettled nature. As for the key elements of a business process displayed in its model, then, with variations in definitions and terminology from different sources, they always include the four key points used in the older, widely spread and still applicable IDEF0 models (IDEF0, 1993): inputs (in the business process diagram it is always to the left of the block depicting one of the sequential steps of business process), outputs (always to the right), mechanisms (always from below) and controls (always from above) (Figure 1).

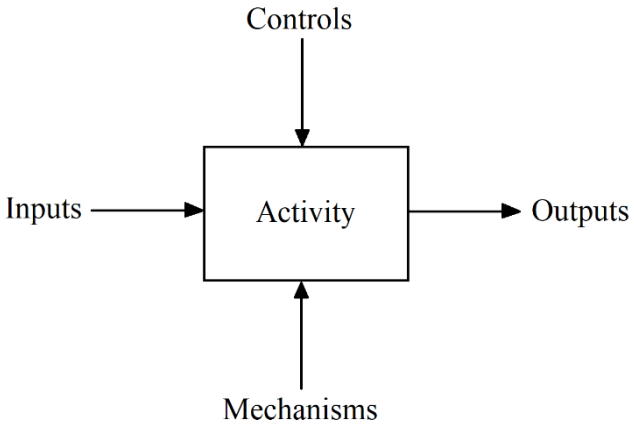


Figure 1. Key functional elements of a business process: the basis of IDEF0 diagram

Note: According to the IDEF0 functional modelling methodology. an input is consumed and transformed by an activity into an output. An activity is triggered when the state of the input and the control allow it, while the mechanism identifies the primary means by which the activity is executed. Thus a control governs when an activity occurs (and is not necessarily consumed) while a mechanism is something that is used (but not consumed) during an activity. In an IDEF0 diagram the boxes represent activities and the connecting arrows represent things (e.g., raw materials, products, documents, and data). It is the location of an arrow relative to the box it connects which determines its role (input, control, output or mechanism). The connecting arrows can split or merge, and a control may also act as an input (i.e., be consumed).

Source: Kalian et al., 2004.

While IDEF0 diagrams are centered around the functional aspects of processes (inputs, outputs, mechanisms, controls), the modern tool for business process modeling, Business Process Model and Notation (BPMN), provides a more dynamic and detailed representation, including (Marlon et al., 2019):

- flow objects – events (something that happens during the process), activities (tasks or work performed in the process), gateways (control the flow of the process, used for splitting and merging paths);
- artifacts – data objects (data required or produced by activities), groups (a visual mechanisms to group related activities), annotations (textual comments to the diagram for clarity);
- connecting objects – sequence flow (the order in which activities are performed), message flow (communication between different process participants), associations (link artifacts and text annotations to flow objects);
- swimlanes – pools (major participants in a process, such as departments or organizations), lanes (sub-divide pools to show roles, responsibilities, or other categorizations).

Thus, IDEF0's focus is on the functional modeling, emphasizing the transformation of inputs into outputs controlled and facilitated by mechanisms and controls, but BPMN's focus is broader, covering not just the transformation of inputs into outputs, but also the sequence and flow of activities, communication between

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participants, and the organizational structure within the process (Garcia-Dominguez et al., 2012). There are also another business process modeling notations such as EPC, YAWL, BPEL as well as analytic tools such as WOPED, WOFLAN, PROM (Weske, 2012), with their own specifics and focus useful for business process modeling.

When applied to the context of local territorial development, a business process encompasses the systematic approach taken to assess, plan and implement strategies for the improvement and growth of a specific geographic area. This involves a series of interrelated activities aimed at diagnosing current conditions and planning future developments (Mickevičius et al., 2022). While commercial organizations apply process management methods, because they accept it as necessity in light of long-term high performance achievements, services of public administration are not yet process managed (Simonova & Sykora, 2011). That is not because public administration organizations would not be interested in application of methods of monitoring and managing quality. The reason is that the services they provide have specific characteristics (for example, legal framework) (Simonova & Sykora, 2011; Maksin, 2014), which determine processes efficiency in the local municipalities (Marks-Bielska & Kurowska, 2017; Marks-Bielska et al., 2020). Our study focuses on possibilities of usage of process modeling for monitoring and planning local territorial development, so that these services in Latvia could be more process managed and monitored.

The paper aims to develop a model representting monitoring and planning of local territorial development as a business process. We are planning to achieve this aim based on the case of Latvian municipalities and technical capacity of available business process modeling notations (widely used BPMN is preferable, but not required). The model itself is primary, but notations are secondary. Our hypothesis is that business process modeling for monitoring and planning local territorial development is possible and increases the level of this development, but is not widely used in Latvian municipalieties. This hypothesis is tested through a literature analysis, the use of business process modeling tools, action research in Augshdaugava County municipality and statistical analysis of survey data (Latvian municipalities, N = 43, 2024).

The next section will provide the review of scientific studies on business process modeling in the context of local territorial development, then I will provide the conceptual framework of my own study and research methodology. The research results and discussion section will present monitoring and planning of local territorial development in Latvian municipalties as a modelable business process, as well as the resulting model. The final section will provide conclusions, study lmitations and recommendations for further research in this area.

2. Literature review

In the context of local territorial development and public administration authorities, the process approach is often declared within various strategic documents that outline the goals, principles and methods for improving public sector efficiency, transparency and service quality. Some of the key strategic documents that typically emphasize the process approach include National e-Government Strategies, Public Administration Reform Plans, Quality Management Systems in Public Administration, Strategic Frameworks for Public Sector Modernization, National Development Plans and other strategic documents (Adeniran et al., 2023). However, in reality the role of process management is often underrated (Bures, 2004; Simonova & Sykora, 2011), and business process modeling in the context of local territorial development is a rather specific and rare issue for scientific research. Although, there are some deep and interesting studies in this area too.

For example, the study “Process Modeling for Regional Territorial Planning” (Simonova & Sykora, 2011) investigates the application of process modeling methods to public administration services, specifically focusing on regional territorial planning. The primary goal of the study is to explore how process modeling can improve the management and monitoring of territorial planning services, which traditionally have not utilized such methods due to the specific characteristics of these services. Key points of the study (Simonova & Sykora, 2011) applicable in our further research are as follows:

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- the study focuses on the creation of territorial analytic data, which are essential inputs for further territorial planning tools like the "Principles of Territorial Development" (act as a cornerstone in regional territorial planning, providing a structured approach to manage, protect and develop the region in a sustainable and coordinated manner. They influence the creation of essential planning documents, support private investments and ensure that all development activities are in harmony with the overall goals of territorial planning). It distinguishes between regular (biannual) and irregular (continuous updates) processes of creating and updating these data;
- a detailed model of the process context for creating territorial analytic data is provided. This includes various actors such as data providers, regional authorities, and the tools and applications used in the process;
- using BPMN tools like Bizagi and Lucidchart the study maps the process flow for both regular and continuous updates of territorial analytic data. It identifies key activities, risks and areas for improvement, particularly focusing on the quality and standardization of input data from various providers;
- to evaluate and improve the process, the study proposes a set of indicators to measure performance. These include format standardization, reception of data, additional communication needs, time required for data model study and conversion of attributes.

Overall, the study "Process Modeling for Regional Territorial Planning" concludes that process and data modeling are effective tools for managing regional territorial planning. It suggests that continuous measurement and refinement of processes based on the proposed indicators can lead to significant improvements in efficiency and quality (Simonova & Sykora, 2011). Thus, the study underscores the potential benefits of applying process management techniques to regional territorial planning, advocating for a more structured and standardized approach to handling spatial data and decision-making processes. This approach aims to enhance the efficiency, transparency and overall quality of public administration services in the context of territorial development.

Within the study "The Impact of the Efficiency of Administration of Territorial Planning Processes on the Development of Territories: Case Study of Pagegiai Municipality, Lithuania" (Mickevičius et al., 2022) the opinion has been expressed that the phasing of the processes of preparation of territorial planning documents, depending on the institution that administers it, hinders the processes of preparation of territorial planning documents by established procedural actions. The object of the research was the complex and special territorial planning documents prepared in the territory of Pagėgiai municipality, which was chosen because the preparation of planning documents in the municipality has slowed down recently. The use of multi-criteria analysis (PROMETHEE software) to evaluate the efficiency of prepared territorial planning documents was a crucial aspect of the study. Criteria included preparation duration, public involvement, ecological and economic considerations, infrastructure development and size of the territory of planning (Mickevičius et al., 2022). The analysis of the processes of the prepared planning documents and the interviews of experts revealed that the planning procedures performed by the administering authorities are inefficient: not all the administering authorities consistently carry out the assigned procedures, delay (in relation to the legal deadline) the planned decisions. According to experts, the reason for the inefficient performance of procedures is the lack of human resources in the administering institutions or their inadequate competence. The inefficiencies in the administrative processes, such as delays and inconsistent execution of assigned procedures, were identified as significant barriers to effective territorial planning and development in Pagegiai municipality (Mickevičius et al., 2022). In our opinion, finding out the reasons for the inefficient performance of procedures using the purely cientific method (expert survey) is a competitive advantage of this tudy, which is applicable in our further research.

In Larvia, the project "Development of Territorial Development Planning Processes and Information System" (*TAPIS* 3rd round, 2017–2020) has been realized by the Central Finance and Contracts Agency with cooperation partners. The project was implemented with the support of the European Regional Development Fund (ERDF) and its total amount of funding was 1,000,000 EUR (Putniņš, 2020). The project ensured the development of the already functioning Territorial Development Planning Information System (Latvian: *Teritorijas attīstības plānošanas informācijas sistēma, TAPIS,* https://tapis.gov.lv). The overarching goal of the project was the

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development of spatial planning, real estate management and construction data flow and the creation of an integrated data environment (Putniņš, 2020). To achieve this, a subordinate goal was set – to ensure further functional development of *TAPIS* and Regional Development Indicators Module (Latvian: *Reģionālās attīstības indikatoru modulis, RAIM*), improvement of public administration efficiency and interoperability in real estate and construction management (Putniņš, 2020).

While the above project is not scientific, but rather applied, the necessity for special structured integrated data for process modeling in the context of territorial development in Latvia is well-supported by scientific studies. For example, the study on smart territorial development in Latvia, particularly focusing on the Zemgale Planning Region (Gemma & Vītoliņa, 2018), underlines the role of data systems in innovation capacity building, regional development monitoring and addressing monocentric development challenges, all of which are core objectives of the TAPIS project. The *RAIM* is highlighted as a crucial tool for monitoring regional development, supporting decision-making and evaluating trends in municipal territories (Gemma & Vītoliņa, 2018). This aligns with *TAPIS'*s goal of creating a structured spatial and textual data environment for better planning and public administration efficiency. One more study (Nipers et al., 2017) highlights several aspects that indicate the importance and relevance of structured integrated data, such as that provided by *TAPIS*, in the context of smart territorial development. The study discusses the importance of data in supporting regional policy and planning, especially in the context of EU funding and regional development strategies. This further emphasizes the need for integrated data systems to inform policy decisions and promote balanced territorial development (Nipers et al., 2017). Thus, Latvian scientific studies support the necessity of special structured integrated data, such as that provided by *TAPIS*, for effective process modeling and smart territorial development in Latvia.

The question arises: are such important integrated data (provided by *TAPIS* project for effective process modeling) used for scientific research and real monitoring and planning of local territorial development? For example, the recently defended Latvian doctoral thesis "Municipal Environmental Governance Development Preconditions" (Lagzdiņa, 2023) does not mention the use of data or results from the *TAPIS* project or the *RAIM*, while emphasizes that successful governance requires an adequate flow of information between science and policy. This includes providing locally specific environmental information that is accessible and usable in decision-making processes. Currently, there is a lack of such information, which hampers effective environmental governance (Lagzdiņa, 2023). At the same time, Latvian municipalities use *TAPIS* and *RAIM* data in their annual public reports – for example, the Public Report 2022 of Augshdaugava County (Latvian: *Augšdaugavas novads*) Municipality uses *TAPIS* and *RAIM* data to assist in the planning and management of real estate projects (including details on infrastructure developments and construction projects that are part of the local government's initiatives), to monitor and evaluate the progress of various environmental and cultural heritage projects, to analyze economic trends and demographic changes in the municipality (including statistics on registered and liquidated businesses, employment rates, and population dynamics), to provide a comprehensive view of the ongoing and planned development projects (Municipal Council of Augshdaugava County (Latvia), 2023a).

There are also some technical scientific studies, the concepts and methods of which can be applied in process modeling for monitoring and planning local territorial development. For example, two key aspects of aggregating business processes and web services (Bruni et al., 2005b): compensations, i.e. ad hoc activities that can undo the effects of a process that fails to complete, and transactional boundaries to delimit the scope of a transactional flow. In our opinion, in the context of local territorial development, compensations can be used to handle unexpected changes or failures in monitoring and planning processes. For example, if these processes encounter delays or fails, compensatory actions can be predefined to mitigate the impact (reallocating funds to other ongoing processes, initiating temporary solutions to address immediate needs, etc.). In turn, transactional boundaries define the scope within which a series of activities are treated as a single unit. Within monitoring and planning of local territorial development, these boundaries can help manage complex processes involving multiple interdependent tasks and stakeholders. For example, each phase of monitoring and planningt can be treated as a transactional boundary. This ensures that all tasks within a phase are completed successfully before moving on to the next phase (for example, data collection, data processing and analysis, writing report can be separated with transactional boundaries). In turn, for the integration of long-term business processes, technical research proposes a paradigm of web services composition (including orchestration of workflows, choreography

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of exchanged messages, fault handling and transactional integrity with compensation mechanisms) (Bruni et al., 2005a), that also can be applied in process modeling for monitoring and planning local territorial development: to utilize orchestration for centralized management of monitoring and planning workflows and choreography for decentralized interactions among responsible actors, as well as to implement automated systems for monitoring the process itself, detecting faults, and triggering compensatory actions.

Overall, the results of the analysis of scientific research on business process modeling in the context of local territorial development are consistent with the first part of our research hypothesis that business process modeling for monitoring and planning local territorial development is possible and increases the level of this development (indirectly, by increasing the efficiency of its monitoring and planning, or 'institutional efficiency' (Marks-Bielska & Kurowska, 2017). From a practical point of view the only scientific research we found that tried to directly adapt the principles of business process modeling to territorial development within real models (using BPMN) of processes and their context was the study "Process Modeling for Regional Territorial Planning" (Simonova & Sykora, 2011) (see Figure 2 below).

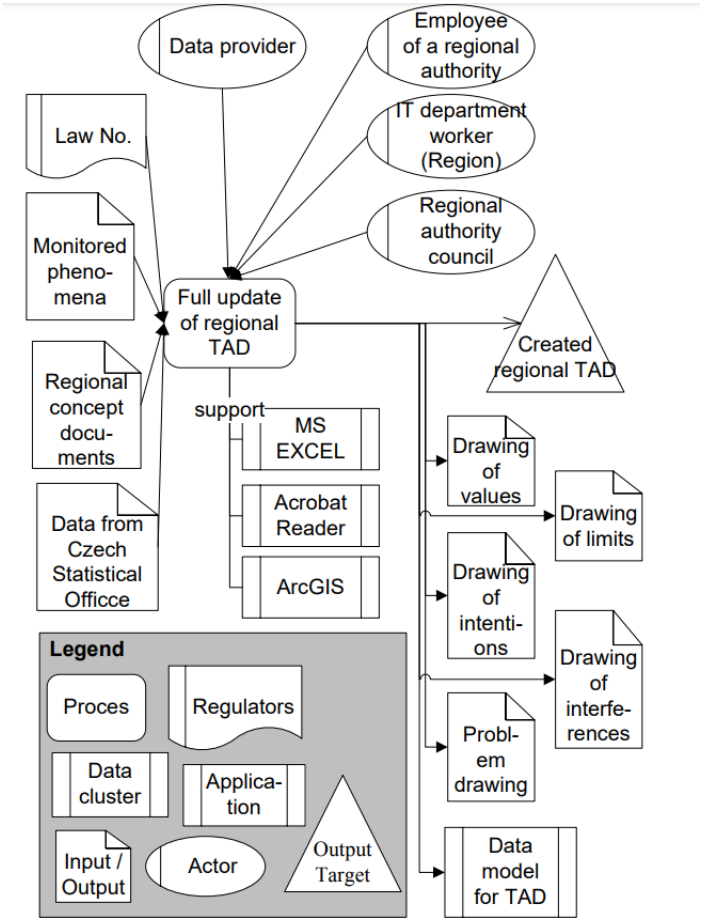


Figure 2. Model of process context (territorial analytical data, TAD)
Source: Simonova & Sykora, 2011.

3. Conceptual framework and research methodology

Within our study (as in almost all analyzed literature on business process modeling), modeling is conceptually understood as a thought abstraction, a reproduction of really existing system (including process) via specially constructed models (Polak et al., 2003). Business process models were designed to help describe, document, communicate and improve organization's business processes (Simonova & Sykora, 2011). One key factor reported for obtaining a high quality business process models is the active participation of all the stakeholders

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that ensures the development of a shared vision of business processes (Monsalve et al., 2011). The graphical tools of business process modeling are for example (Scheer, 1999; van der Aalst & Hee, 2002; Weske, 2012): hierarchical diagram (top-down decomposition of model domain from higher levels to lower ones), diagram of process context (interception of all the significant process contexts) and process map (event-driven process chain diagram; overview of activities induced by events) (Figure 3).

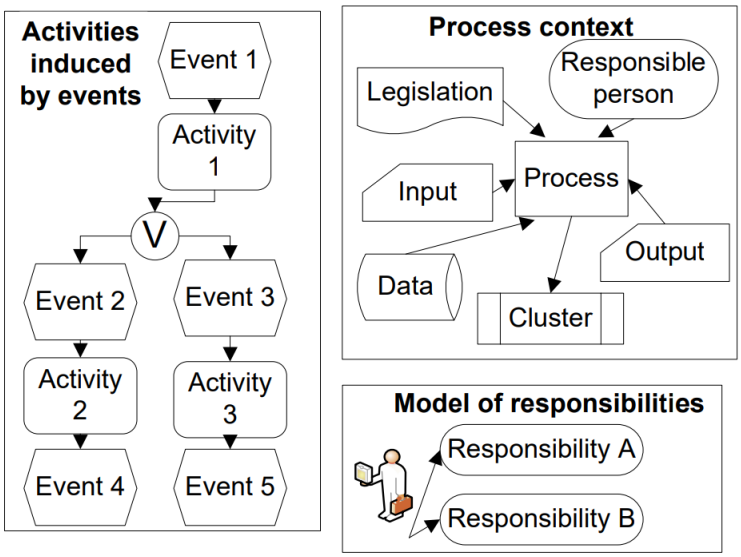


Figure 3. Graphical tools of business process modeling*****
***** We found a bug here: the arrow 'output' should be outgoing the process, not entering.
*Source***:** Simonova & Sykora, 2011.

From a metgodological point of view, we must distinguish business process modeling from the widely used concept of business process management (with the same acronym BPM as business process modeling (in this regard, we will use further the acronym BPMdl for business process modeling and BPMng for business process management)) (Weske, 2012; van der Aalst & Hee, 2002; Rosemann & Brocke, 2010; Marlon et al., 2019), as well as the concepts of process diagnosing (Verbeek et al., 1999), process mining (van der Aalst, 2016) and many others. Business process modeling (BPMdl) is necessary for an enterprise / organization that wants to evaluate, improve, migrate to a different technological platform, automate and / or document its business processes (Bata, 2009; Khlif et al., 2009). In turn, business process management (BPMng) has become a holistic management discipline with suggested six core elements of BPMng: strategic alignment, governance, methods, information technology, people and culture (Rosemann & Brocke, 2010). The book "Process Mining: Data Science in Action" (van der Aalst, 2016) bridged the gap between business process modeling and business intelligence and put process mining within the rapidly growing data science discipline. Another publication, the study "Diagnosing Workflow Processes Using WOFLAN" (Verbeek et al., 1999) refered to process diagnosing as identifying and rectifying errors in workflow process definitions (detailed descriptions of how specific business processes are structured, executed (Weske, 2012)) using the WOFLAN tool – workflow management technology promises a flexible solution for business process support facilitating the easy creation of new business processes and modification of existing processes. In modern computer science terminology, this could be called business process testing (BPT) (ALM Help Center, 2024). Applied literature also mentions such concepts as business process developing, as well as designing, executing, deploying, monitoring (Red Hat Inc., 2024). The question is, what is the conceptual position of business process modeling (BPMdl) among all these activities related to business processes, i.e. what does it mean to 'develop a model of business process' in the context of wider concept – business process management (BPMng)?

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Table 1. Conceptual position and evaluation methodology of business process modeling (BPMdl) in the context of business process management (BPMng)

Process-related activities	Core elements of business process management (BPMng)					
	Strategic alignment*	Gover-nance	Methods	Information technology	People	Culture
Process modekng (developing and designing)**	Maturity level according to Business Process Maturity Model (BPMM): 1 (initiesl),*** 2 (managed), 3 (defined), 4 (quantitatively managed), 5 (optimizing)					
Process diagnosing / testing	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)
Process mining	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)
Process executing and deploying	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)
Process monitoring and improving	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)	Maturity level (1–5)

* Strategic alignment – ensures processes align with organizational strategy;
Governance – establishes accountability and decision-making structures;
Methods – tools and techniques supporting BPMdl activities;
Information technology – IT solutions supporting process activities;
People – skills and knowledge of individuals managing processes;
Culture – process-related collective values and beliefs.
** Process modeling (developing and designing) – creating detailed and effective process models;
Process diagnosing / testing – identifying and rectifying errors in process definitions;
Process mining – analyzing process data with advanced process mining techniques;
Process executing and deploying – implementing processes efficiently and ensuring they are properly deployed;
Process monitoring and improving – **c**ontinuously observing process performance and making ongoing enhancements based on monitoring data.
*** Maturity levels scale for process-related activities:
1 (initiesl) – processes are unstructured and unpredictable; success depends on individual effort and heroics;
2 (managed) – **p**rocesses are defined and documented but might not be standardized, practices are repeatable;
3 (defined) – processes are standardized, documented and communicated across the organization, there are established standards and guidelines;
4 (quantitatively managed) – processes are measured and controlled, there is a focus on quantitative performance management;
5 (optimizing) – continuous process improvement is enabled by quantitative feedback and innovative ideas.

Source: elaborated based on Verbeek et al., 1999; Lee et al., 2007; Rosemann & Brocke, 2010; Simonova & Sykora, 2011; Weske, 2012; van der Aalst, 2016; Bridges, 2024; Red Hat Inc., 2024.

Business process modeling (BPMdl) is the base for business process management (BPMng) (Simonova & Sykora, 2011). Furthermore, we can interpret business process developing and designing as the synonyms of business process modeling (Table 1). All other activities such as process diagnosing / testing, mining, executing, deploying, monitoring, improving can be considered as subsequent activities following process modeling (developing and designing).

Evaluating business process modeling (developing and designing) in relation to each element of business process management (strategic alignment, governance, methods, information technology, people and culture – Table 1) can be effectively realized using a maturity model framework (Lee et al., 2007). A maturity model helps evaluate the current state and guides the improvement by providing a structured approach to measure various aspects of processes and their management. One of the well-known frameworks for this purpose is the maturity model tailored for business process management, such as the Business Process Maturity Model (BPMM) (Lee et al., 2007; Bridges, 2024). Table 1 outlines a suitable scale and measurement tool for evaluating the process-related activities according to all elements of business process management.

The following Table 2 shows methodology of evaluating business process modeling (developing and designing) in relation to each element of business process management using a maturity model framework.

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Table 2. Methodology of evaluating business process modeling (BPMdl) (developing and designing) in the context of business process management (BPMng)

BPMdl maturity levels	Core elements of business process management (BPMng)					
	Strategic alignment*	Governance	Methods	Information technology	People	Culture
Business process modeling (BPMdl) maturity levels and evaluations						
1 (initiesl)**	No alignment between BPMdl and organization's strategy	No governance structure for BPMdl	Ad hoc methods used for BPMdl	Basic or no IT support for BPMdl	Limited knowledge and skills in BPMdl	No established culture for BPMdl.
2 (managed)	Some processes are aligned with organization's strategy	Informal governance structures in place	Docu-mented but incon-sistent methods	Specific tools are used incon-sistently	Specific roles are assigned but training is inconsistent	Awareness of the importance of BPMdl in certain areas
3 (defined)	BPMdl consistently aligned with strategic goals	Defined roles and responsibi-lities for overseeing BPMdl	Standar-dized methods and tools for BPMdl	Standar-dized IT tools and infrastruc-ture support BPMdl.	Standardized training programs and knowledge-sharing practices	Organization-wide cultural practices supporting BPMdl
4 (quantitative-ly managed)	Quantitative metrics to ensure alignment between processes and strategic objectives	Performance-based governance structures with clear accountabi-lity	Regular evaluation and improve-ment of BPMdl methods	Integrated IT solutions with performan-ce metrics for BPMdl	Quantitative metrics to evaluate the skills and performance of individuals involved in BPMdl	Quantitative cultural assessments to measure engagement and attitudes towards BPMdl
5 (optimizing)	Continuous review and adjustment of processes to maintain strategic alignment	Adaptive governance practices that evolve based on performance feedback	improving methods based on best practices and feedback	Continuous IT innovation to support and enhance BPMdl	Continuous skills improvement and innovation in BPMdl practices	A culture of continuous improvement and innovation in BPMdl

* Strategic alignment – ensures processes align with organizational strategy;
Governance – establishes accountability and decision-making structures;
Methods – tools and techniques supporting BPMdl activities;
Information technology – IT solutions supporting process activities;
People – skills and knowledge of individuals managing processes;
Culture – process-related collective values and beliefs.
** BPMdl maturity levels scale:
1 (initiesl) – processes are unstructured and unpredictable; success depends on individual effort and heroics;
2 (managed) – **p**rocesses are defined and documented but might not be standardized, practices are repeatable;
3 (defined) – processes are standardized, documented and communicated across the organization, there are established standards and guidelines;
4 (quantitatively managed) – processes are measured and controlled, there is a focus on quantitative performance management;
5 (optimizing) – continuous process improvement is enabled by quantitative feedback and innovative ideas.

Source: elaborated based on Table 1, Lee et al., 2007; Bridges, 2024.

The sequence and methodology of conducting the evaluation of business process modeling (developing and designing) in relation to each element of business process management for some particular organization is the following (based on Lee et al., 2007; Bridges, 2024):

1) survey and interviews: distribution of the evaluation table (in this study – Table 2) to relevant stakeholders and conduct interviews to gather detailed information;
2) document review: review of the existing process documentation, governance structures, training programs and IT tools;
3) data analysis: analysis of the collected data to determine the maturity level of business process modeling (developing and designing) in relation to each element of business process management;

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4) reporting: compilation of the findings highlighting current maturity levels and providing recommendations for improvement.

The object of this study is Latvian municipalities (36 counties and 7 cities of national importance that are not part of the counties (Saeima (Latvia), 2020); such a relatively small sample can be analyzed by statistical methods (Kish, 1965), but requires increased attention to the statistical significance of the results obtained) and their amual public reports (*Latvian: pašvaldību publiskie pārskati*) submited to the Ministry of Smart Administration and Regional Development (Latvian: *Viedās administrācijas un reģionālās attīstības ministrija*) (Ministry of Smart Administration and Regional Development (Latvia), 2024) as regular outputs of a business process of monitoring and planning local territorial development. In turn, the real process of creation of the Public Report 2023 of Augshdaugava County Municipality (Municipal Council of Augshdaugava County (Latvia), 2024) will be the empirical basis for the example of a modelable business process of monitoring and planning local territorial development. A model representting monitoring and planning of local territorial development at Augshdaugava County (i.e., creation of the Public Report 2023 of Augshdaugava County Municipality) as a business process will be developed using IDEF0 and BPMN.

Statistical analysis of the survey data (May–June 2024) from 43 Latvian municipalities used to test the hypothesis that business process modeling for monitoring and planning local territorial development (empirically, business process modeling maturity levels – Table 2) increases the level of this development. Two levels of local territorial (in particular, economic) development of Latvian municipalities (municipalities with a less developed economy and municipalities with a more developed economy) are defined as in the study "Latvian Municipal Budget Expenditures on Transport Infrastructure and Production in the Context of Improving the Local Economy" (Komarova et al., 2024): the economy of a municipality can be empirically interpreted as a less developed if it has the average annual income tax per capita below the mean, and as a more developed if it has the average annual income tax per capita above the mean. These two groups of municipalities are target groups (variables) in statistical analysis, but BPMdl maturity level in relation to each element of BPMng (strategic alignment, governance, methods, information technology, people and culture – Table 2) served as potential determinants. The methods of statistical analysis include comparison of means, correlation and regression analysis, and discriminant analysis to identify statistically significant aspects of business process modeling that influence local economic development.

The study of the real process of creation of the Public Report 2023 of Augshdaugava County Municipality conducted on May–June 2024 at Augshdaugava County Municipality (Latvia) within internship project "Algorithm of Data-Driven Machine Diagnostics and Planning of Local Territorial Development: The Case of Latvian Municipalities" (supervisors: Professor Frangioni from the University of Pisa, Executive Director Dzalbe from Augshdaugava County Municipality) of the one of co-auhors. The empirical research followed an action research methodology (Baskerville & Myers, 2004), with active participation of the above fellow in business process of creating the annual public report of Augshdaugava County Municipality. The action research methodology aims at acquiring new knowledge but providing, at the same time, value to the participant organization (in this case – Augshdaugava County Municipality). This approach has been extensively used for information systems research (Baskerville & Myers, 2004; Davison et al., 2004).

4. Research results and discussion

The analyzed empirical outputs of monitoring and planning local territorial development in Latvian municipalities are their annual public reports. Annual public reports of Latvian municipalities are comprehensive documents that provide detailed information about the municipality's activities, financial status, strategic developments and community engagement over the past year. These reports are essential for ensuring transparency, accountability and informing the society about the municipality's performance and future plans (Cabinet of Ministers (Latvia), 2010). According to the Regulations No. 413 "On annual public reports" issued by the Cabinet of Ministers (Latvia) in 2010, the general structure of these reports must include:

(1) Introduction: overview of the municipality's mission, vision, and strategic goals;
(2) Financial Summary: detailed financial statements including revenue, expenditures and budget allocations;

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(3) Key Achievements: highlights of major projects, initiatives, and accomplishments over the past year;
(4) Performance Metrics: analysis of key performance indicators and metrics that measure the municipality's effectiveness and efficiency;
(5) Public Participation: information on public involvement in municipal decision-making processes;
(6) Future Plans: strategic plans and objectives for the upcoming year;
(7) Compliance and Governance: details on compliance with regulations, governance practices and internal controls;
(8) Additional Sections: any other relevant sections specific to the municipality's unique activities or challenges.

The following Figure 4 shows the generally modeled business process of the creation of annual public reports in Latvian municipalities.

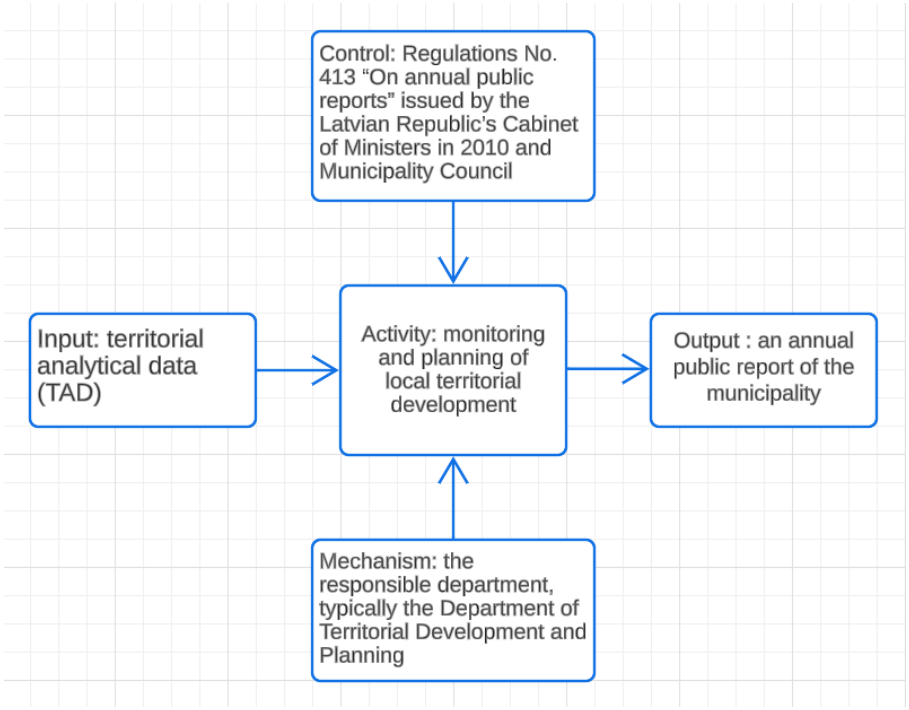


Figure 4. Common IDEF0 diagram of the creation of annual public reports in Latvian municipalities

Note:

- Activity: the main activity is "Monitoring and planning of local territorial development";
- Control: the activity is governed by Regulations No. 413 "On annual public reports" issued by the Cabinet of Ministers (Latvia) in 2010 and Municipal Council;
- Mechanism: the activity is carried out by the responsible department, typically the Department of Territorial Development and Planning;
- Input: the process uses territorial analytical data (TAD) as input;
- Output: the result of the process is an annual public report of the municipality.

Source: elaborated using IDEF0 software.

As for Augshdaugava County Municipality, its Municipal Council (15 members) is managed by the Chairman, 1st Deputy Chairman, Deputy Chairmen (2 persons). The activity of the Municipal Council is ensured by five standing committees: (1) Finance Committee (9 members); (2) Committee on Social and Health Issues (7 members); (3) Economic Committee (7 members); (4) Committee on Education, Culture and Sports (9 members); (5) Development Committee (coordinates the creation of annual public reports) (9 members). In turn, administration of Augshdaugava County Municipality consists of the Executive Director, his 1st Deputy (she signs the annual public reports – Municipal Council of Augshdaugava County (Latvia), 2023a, 2024) and Technical Director (Municipal Council of Augshdaugava County (Latvia), 2023b). There is no documented hierarchy of this structure. However, there is a documented territorial structure of Augshdaugava County, which

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consists of 10 sub-counties, including 2 towns and 25 rural comunes (Municipal Council of Augshdaugava County (Latvia), 2023b).

In reality, the process of the creation of annual public reports in Augshdaugava County Municipality is not formally modeled, described and documented neither within "By-laws of Augshdaugava County Municipality" (Municipal Council of Augshdaugava County (Latvia), 2023b), nor by the Work Regulations of Augshdaugava County Municipality (Municipal Council of Augshdaugava County (Latvia), 2023c). However, this process is organized annually, resulting in the adoption of an annual public report (29 May in 2023 (Municipal Council h Augshdaugava County (Latvia), 2023a) and 27 June in 2024 (Municipal Council of Augshdaugava County (Latvia), 2024)) and its submission to the Ministry of Smart Administration and Regional Development. This process is managed by the 1st Deputy Executive Director and coordinated by the Development Committee, but all other committees provide data on their areas of competence. Sometimes this process is delayed due to unsubmitted data, and then the extremely intense work of the Development Committee remains in the last days before the adoption and submission of the annual public report. Thus, modeling the process of the creation of annual public reports in Augshdaugava County Municipality (as in many other Latvian municipalities) is necessary for more efficient monitoring and planning of local territorial development.

When modeling the process of creation of annual public reports in Augshdaugava County Municipality, there is a large gap between the situation 'as ir' and the situation 'to be' (Weske, 2012), which can be reduced by introducing the principles of BPMdl into the actual working practice of the municipality. The following Table 3 provides a description of the successive stages of the process (with a schedule starting after March 31 – the deadline of submitting budget reports of Latvian municipalities to the State Treasure) of the creation of annual public reports in Augshdaugava County Municipality, considering the functional aspects of the business process covered by IDEF0 diagram (Figures 1 and 4): activity, inputs, mechanisms, controls, outputs (and according to IDEF0 logic, the output of the previous subprocess is the input to the next one). The process of the creation of the annual public report in Augshdaugava County Municipality begins with an analysis of the public report for the previous uear (Table 3), and each subsequent report shows some evolution. For example, the Public Report 2022 of Augshdaugava County Municipality had no table of contents and ended with an unfounded emotional verdict: "The municipality expresses the hope that a lot of children will be born in Augshdaugava County, strong families will be created, and the older people will live long and beautiful lives" (Municipal Council of Augshdaugava County (Latvia), 2023a). In turn, the Public Report 2023 of Augshdaugava County Municipality is better structured (at least has clear table of contents) and more analytical, without unreasonable hopes (Municipal Council of Augshdaugava County (Latvia), 2024).

Table 3. The process of the creation of annual public report of Augshdaugava County Municipality based on IDEF0 diagram

Activity	Input	Mechanism	Control	Output
Analyzing the public report for the previous year (the first week of April)	The text of public report for previous year	Members of the Development Committee	Municial Council, including all its Committees	Guidelines for collecting data from various external and internal sources and worjing out sub-reports
Collecting and visualizing data (the further April)	Guidelines for collecting data from various external and internal sources and worjing out sub-reports	Personnel of the structural unit managed by Development Committee	Article 13 of the Regulations No. 413 "On annual public reports" (Cabinet of Ministers (Latvia) 2010): The information to be included in the report is prepared on the basis of measurable, reliable (verified) and analyzable indicators. Indicators are included in the text of the report and are used to substantiate statements that describe the scope, result, effectiveness or impact of the work done (Cabinet of Ministers (Latvia), 2010). * Article 12: The report of the municipality provides information on the activities of the relevant municipality in the reporting year, as well as the results of the implementation of	The set of collected and visualized data

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			indicators of investment projects included in the planning documents of the municipality. The municipal report contains the following information...	
Presenting collected and visualized data (the last days of April)	The set of collected and visualized data	Members of the Development Committee	Municial Council, including all its Committees	The accepted set of data ready for further analysis
Analyzing and describing data (the first part of MAy)	The accepted set of data ready for further analysis	Personnel of the structiral units managed by all Committees of the Municipal Council	Article 12 of the Regulations No. 413 "On annual public reports" (Cabinet of Ministers (Latvia) 2010): The report of the municipality provides information on the activities of the relevant municipality in the reporting year, as well as the results of the implementation of indicators of investment projects included in the planning documents of the municipality. The municipal report contains the following information...	Created five sub-reports about competence areas of Committees
Working out the draft final version of annual public report (the second part of May)	Created five sub-reports about competence areas of Committees	Personnel of the structural unit managed by the Development Committee	Municial Council, including all its Committees	The draft final version of annual public report with comments from the Municipal Council
Working out the final version of annual public report (the first part of June)	The draft final version of annual public report with comments from the Municipal Council	Personnel of the structural unit managed by the Development Committee	1st Deputy Executive Director of Augshdaugava County Municipality	The final version of the annual public report
Presenting the annual public report (mid-June)	The final version of the annual public report	Members of the Development Committee	Municial Council, including all its Committees	The accepted annual public report ready for submission to the Ministry of Smart Administration and Regional Development

Source: elaborated based on Figures 1 and 4 and results of the action research.

The following Figure 5 shows part of the business process model of the creation of the the annual public report in Augshdaugava County Municipality (in particular, the parallel activity – collecting and visulizing data).

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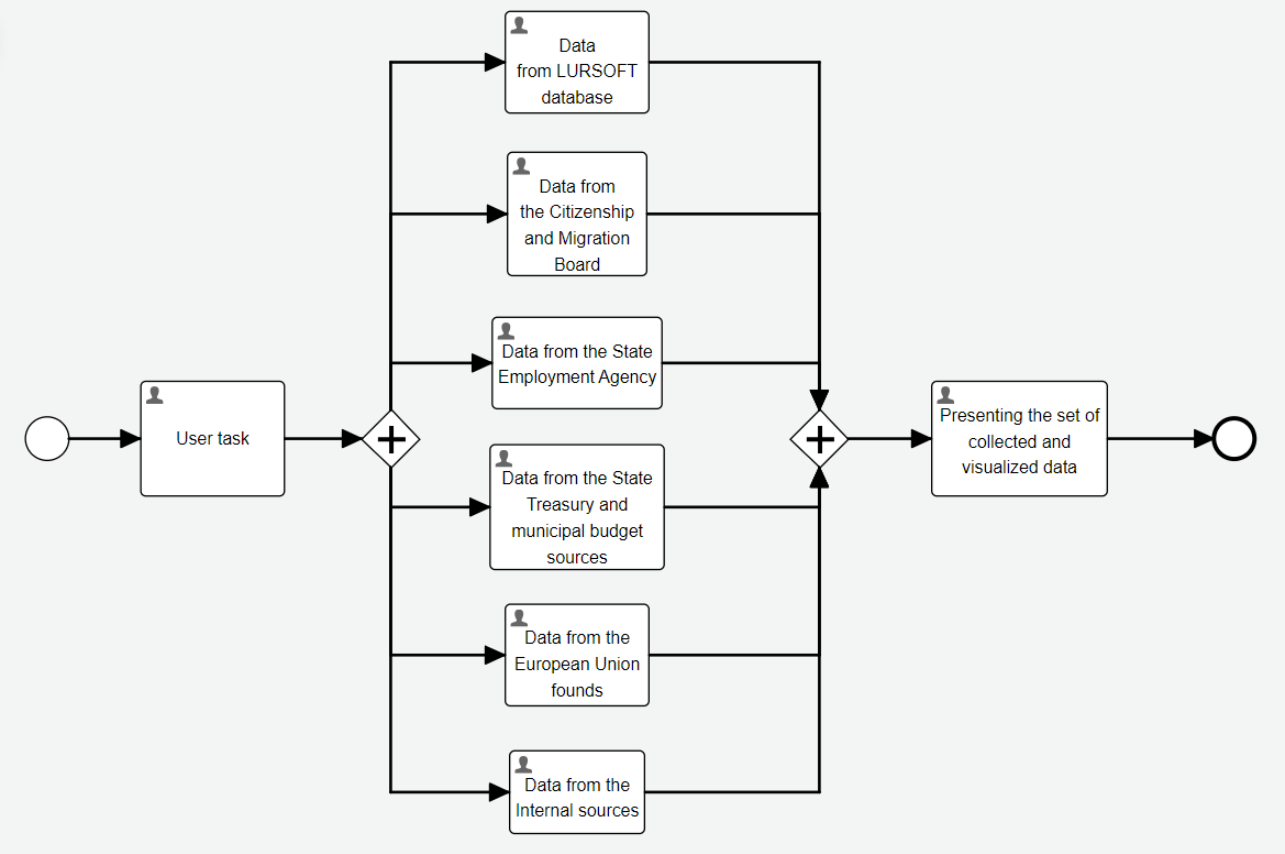


Figure 5. The subprocess of the creation of the annual public report in Augshdaugava County Municipality: BPMN diagram

Note:
Terrtorial analytical data (TAD) is collected and visualized by the Development Committee from the following sources:
- LURSOFT database (information about companies and their operations);
- Citizenship and Migration Board (demographic data such as pation anopuld age);
- State Employment Agency (employment and unemployment level statistics);
- State Treasury and municipal budget sources (financial data);
- European Union funds (income from various projects);
- Internal sources (internal data from all structural units of Augshdaugava County Municipality)

Collected and visualized data set is presented by the Development Committee to all other committees of the Municipal Council.
Source: elaborated using Flowable Work BPMN software.

As already mentioned, in fact there is a large gap between the situation 'as is' and the situation 'to be', and the process of the creation of the annual public report in Augshdaugava County Municipality is not modeled, but is implemented in accordance with more or less intuitive practice, and success is often depends on individual, sometimes almost heroic, efforts rather than on systematic processes. The situation with business process modeling in all Latvian municipalities (considering their division into two groups: with a less developed economy (including Augshdaugava County) and with a more developed economy (Komarova et al., 2024)) was investigated using statistical analysis of survey data presented in Annex 1.

Survey data collection from the entire set of Latvian municipalities (N = 43), conducted on May–June 2024, is based on the methodology of evaluating business process modeling (BPMdl) (developing and designing) in the context of business process management (BPMng) (Table 2). The maturity levels scale with a description was sent to the administrative staff responsible for the creation of annual public reports in Latvian municipalities or actively involved in this process and was further explained by us during interviews with them. They then subjectively (based on a review of the existing process documentation, governance structures, training programs and IT tools (Lee et al., 2007)) evaluated the maturity level of BPMdl in their municipalities in relation to each of the core elements of BPMng (strategic alignment, governance, methods, information technology, people and culture) on a maturity levels scale from 1 (initial) to 5 (optimizing) (Table 2).

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To obtain more stable results, statistical analysis of the survey data (Annex 1) was implemented using four methods of quantitative data analysis: comparison of means (to test the statistical significance of the difference in BPMdl maturity levels between two groups of Latvian municipalities), correlation and regression analysis (to identify the relationships between BPMdl maturity levels and the level of local economic development in Latvian municipalities), discriminant analysis (to find those 'discriminating' BPMdl factors and their 'discriminant power' that determine the level of local economic development in Latvian municipalities).

The means of BPMdl maturity levels in relation to the core elements of BPMng and the results of its comparison between groups of Latvian municipalities with different levels of local economic development are presented in the following table.

Table 4. Means of buainwaa peocess modeling (BPMdl) maturity levels in relation to the core elements of business process management (BPMng) in Latvian municipalities, scale from 1 to 5,* 2024

BPMdl maturity levels in relation to the core elements of BPMng**	The entire set of Latvian municipalities, N = 43***	Latvian municipalities with a less developed economy, n = 26****	Latvian municipalities with a more developed economy, n = 17	Statistical significance of difference, p*****
Strategic alignment	3.86	3.77	4.00	0.289 (statistically insignificant difference)
Governance	3.05	2.85	3.35	0.041 (statistically significant difference)
Methods	1.91	1.42	2.65	<0.001 (statistically significant difference)
Information technology	3.33	3.23	3.47	0.207 (statistically insignificant difference)
People	2.23	1.69	3.06	<0.001 (statistically significant difference)
Culture	2.07	1.35	3.18	<0.001 (statistically significant difference))

* BPMdl maturity levels scale:
1 (initiesl) – processes are unstructured and unpredictable; success depends on individual effort and heroics;
2 (managed) – **p**rocesses are defined and documented but might not be standardized, practices are repeatable;
3 (defined) – processes are standardized, documented and communicated across the organization, there are established standards and guidelines;
4 (quantitatively managed) – processes are measured and controlled, there is a focus on quantitative performance management;
5 (optimizing) – continuous process improvement is enabled by quantitative feedback and innovative ideas.
** Strategic alignment – ensures processes align with organizational strategy;
Governance – establishes accountability and decision-making structures;
Methods – tools and techniques supporting BPMdl activities;
Information technology – IT solutions supporting process activities;
People – skills and knowledge of individuals managing processes;
Culture – process-related collective values and beliefs.
*** The estimates were provided by the administrative staff responsible for creating the annual public reports of Latvian municipalities or actively involved in this process.
******** The municipality with a less developed economy has the average annual income tax per capita below the mean; the municipality with a more developed economy has the average annual income tax per capita above the mean (Komarova et al. 2024).
***** To identify the statistical significance of difference in BPMdl maturity levels in relation to the core elements of BPMng, independent sample means were compared with a t-criterion for means equity (2-tailed significance).
Source: calculated using IBM SPSS Statistics software and survey data from Annex 1.

The means of BPMdl maturity levels in relation to the core elements of BPMng presented in Table 4 demonstrate a moderate overall level of BPMdl maturity (from 1.91 score for methods to 3.86 score for strategic alihnment) in Latvian municipalities. However, municipalities with a more developed economy have significantly higher BPMdl scores in relation to the four elements of BPMng: governance, methods, people and culture. In turn, processes' alignment with organizational strategy (strategic alignment) and IT solutions supporting process activities (information technology), respectively, have quantitatively managed and defined maturity levels (3–4 score) in both groups of Latvian municipalities. It means that declaratively in strategies and in terms of IT infrastructure, BPMdl is equally developed in Latvian municipalities with different levels of local economic development, but BPMdl governance, methods supporting BPMdl activities, skills and knowledge of people, as well as process-related culture have statistically significant differences between municipaliies with a less developed economy and municipalities with a more developed economy.

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Table 5. Correlation between business process modeling (BPMdl) maturity levels and the level of local economic development in Latvian municipalities, N = 43, Kendall coefficient,* 2024

BPMdl maturity levels in relation to the core elements of BPMng**	Level of local economic development, 1 or 2***	Statistical significance of difference, p
Strategic alignment, 1–5***	0.158	0.283 (statistically insignificant correlation)
Governance, 1–5	0.319 (correlation is significant with 95% probability)	0.028 (statistically significant correlation)
Methods, 1–5	0.670 (correlation is significant with 99% probability)	<0.001 (statistically significant correlation)
Information technology, 1–5	0.152	0.307 (statistically insignificant correlation)
People, 1–5	0.560 (correlation is significant with 99% probability)	<0.001 (statistically significant correlation)
Culture, 1–5	0.793 (correlation is significant with 99% probability)	<0.001 (statistically significant correlation)

* The Kendall coefficient for calculating the correlation was chosen due to the dichotomous variable of the level of local economic development (Sweet, Grace-Martin 2012) .

** Strategic alignment – ensures processes align with organizational strategy;
Governance – establishes accountability and decision-making structures;
Methods – tools and techniques supporting BPMdl activities;
Information technology – IT solutions supporting process activities;
People – skills and knowledge of individuals managing processes;
Culture – process-related collective values and beliefs.

******* 1 – less developed municipality (has the average annual income tax per capita below the mean); 2 – more developed municipality (has the average annual income tax per capita above the mean.

**** BPMdl maturity levels scale:
1 (initiesl) – processes are unstructured and unpredictable; success depends on individual effort and heroics;
2 (managed) – **p**rocesses are defined and documented but might not be standardized, practices are repeatable;
3 (defined) – processes are standardized, documented and communicated across the organization, there are established standards and guidelines;
4 (quantitatively managed) – processes are measured and controlled, there is a focus on quantitative performance management;
5 (optimizing) – continuous process improvement is enabled by quantitative feedback and innovative ideas.

Source: calculated using IBM SPSS Statistics software and survey data from Annex 1.

The results of the correlation analysis presented in Tanle 5 show that there are some statistically significant and strong relationships between business process modeling (BPMdl) maturity levels and the level of local economic development in Latvian municipalities. For example, the strongest correlations are observed between process-related culture and the level of local economic development ($r = 0.793$, $p < 0.001$) and between methods supporting BPMdl activities and the level of local economic development ($r = 0.670$, $p < 0.001$). However, correlation analysis does not allow us to identify the direction of these connections, i.e. whether BPMdl maturity levels are driving local economic development and not vice versa. To find out, we conducted a regression analysis in which the resulting variable was a quantified measure of local economic development, average annual income tax per capita, and the factor variables were BPMdl maturity levels in relation to the six core elements of BPMng. Using the stepwise method of inclusion of variables, the following linear regression equation was obtained:

$$y = 316.52 + 113{,}63x_2 + 112.64x_6, \quad (1)$$

where:

y – the average annual income tax percapita, eur;
x_2 – BPMdl maturity level in relation to governance (establishes accountability and decision-making structures), 1–5;
x_6 – BPMdl maturity level in relation to culture (process-related collective values and beliefs), 1–5.

Excluded variables:
x_1 – BPMdl maturity level in relation to strategic alignment (ensures processes align with organizational strategy), 1–5;
x_3 – BPMdl maturity level in relation to methods (tools and techniques supporting BPMdl activities), 1–5;
x_4 – BPMdl maturity level in relation to information technology (IT solutions supporting process activities), 1–5;
x_5 – BPMdl maturity level in relation to people (skills and knowledge of individuals managing processes)), 1–5.

Source: calculated using IBM SPSS Statistics software and survey data from Annex 1.

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The results of the regression analysis show that BPMdl maturity levels (in particular in relation to its methods and culture) is a driving force for local economic development in Latvian municipalities. Specifically, each additional score of process-related methods increases the average annual income tax per capita by 113.63 euros, and the additional score of process-related culture – by 112.64 euros. All other correlating factors of BPMdl (governance and people – Table 5) are not the driving force of local economic development in Latvian municipalities, but rather are themselves driven by it.

To obtain even more stable results of the empirical study of business process modeling (BPMdl) in the context of business process management (BPMng), discriminant analysis was carried out in order to find among the BPMdl factors those 'discriminating' variables, which determine statistically significantly those group, into which a particular municipality will included – the group with a less developed economy or the group with a more developed economy.

The first two results of discriminant analysis presented in Tables 6 and 7 are test results and indicate the possibility of carrying out discriminant analysis as such on this particular sample, consisting of 43 municipalities. Table 6 presents the coefficients of the discriminant function.

Table 6. Test result of discriminant analysis: eigenvalues, Latvian municipalities, N = 43, 2024

Function	Eigenvalue	% of variance	Cumulative %	Canonical correlation
1	5.326	100.0	100.0	0.918

Source: calculated using IBM SPSS Statistics software and survey data from Annex 1.

The correlation coefficient between the calculated values of the discriminant function and actual group membership, equal to 0.918 (Table 6), is satisfactory (Sweet & Grace-Martin, 2012).

Table 7. Test result of discriminant analysis: Wilks' Lambda, Latvian municipalities, N = 43, 2024

Test of function(s)	Wilks' Lambda	Chi-square	df	Statistical significance, p
1	0.158	70.095	6	,<0.001

Source: calculated using IBM SPSS Statistics software and survey data from Annex 1.

The test conducted using the Wilks' Lambda criteria for whether the mean values of the discriminant function differ significantly among themselves in both groups of municipalities – with a less developed economy and with a more developed economy, shows a very significant result ($p < 0.001$) (Table 7).

The main result of the discriminant analysis is a classification table showing the accuracy of the predictions hit (Table 8), as well as test results indicating the statistical significance (i.e., real 'discriminant power') of all potentially 'discriminating' variables included in the analysis (Table 9).

Table 8. Classification results of discriminant analysis, Latvian municipalities, N = 43, 2024

Period of measurement	Units	Groups of municipalities	Predicted group membership		Total
			Municipalities with a less developed economy	Municipalities with a more developed economy	
Origina	Count	Municipalities with a less developed economy	25	1	26
		Municipalities with a more developed economy	1	16	17
	%	Municipalities with a less developed economy	96.2	3.8	100.0
		Municipalities with a more developed economy	5.9	94.1	100.0

Note: 95.3% of original grouped observations classified correctly.
Source: calculated using IBM SPSS Statistics software and survey data from Annex 1.

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The classification results obtained in the course of discriminant analysis and presented in Table 8 indicate that out of 26 cases of municipalities with a less developed economy, using discriminant analysis model, 25 municipalities were correctly predicted to fall precisely into this group, i.e. in 96.2% of cases. One case out of 26 (3.8%) was mistakenly attributed to the group of municipalities with a more developed economy. In turn, in the group of municipalities with a more developed economy, 1 case (5.9%) was erroneously assigned to the 'wrong' group, but it was correctly predicted that they would fall into the group with of municipalities with a more developed economy for 16 cases, i.e., for 94.1% of municipalities.

The main result of applying discriminant analysis is the average level of correctness of predictions of cases falling into the corresponding group of municipalities: with a less developed economy and with a more developed economy. In our analysis, 25 + 16 = 41 cases correctly predicted to fall into the corresponding group, which is 95.3% (Table 8). This is a very high indicator of correctness of predictions (Sweet & Grace-Martin, 2012), showing that in 95% of cases it is possible to know what level of local economic development in a municipality is, looking only at BPMdl maturity levels in this municipality.

The answer to the question of which of the six analyzed variables (BPMdl maturity levels in relation to the core elements of BPMng) have to be looked at in order to immediately say (with an 95% of correctness) which of the two groups a particular munivipality will fall into can be found in the following table. Data of Table 9 shows the statistical significance (i.e. real 'discriminant power') of the potentially 'discriminating' BPMdl factors participated in the discriminant analysis.

Table 9. Statistical significance of the potentially 'discriminating' BPMdl factors participated in the discriminant analysis, Latvian municipalities, N = 43, 2024

BPMdl maturity levels in relation to the core elements of BPMng*	Wilks' Lambda	F	Statistical significance, p
Strategic alignment, 1–5**	0.971	1.206	0.279
Governance, 1–5	0.898	4.652	0.037
Methods, 1–5	0.480	44.374	< 0.001
Information technology, 1–5	0.966	1.438	0.237
People, 1–5	0.614	25.820	< 0.001
Culture, 1–5	0.264	114.272	< 0.001

* Strategic alignment – ensures processes align with organizational strategy;
Governance – establishes accountability and decision-making structures;
Methods – tools and techniques supporting BPMdl activities;
Information technology – IT solutions supporting process activities;
People – skills and knowledge of individuals managing processes;
Culture – process-related collective values and beliefs.
** BPMdl maturity levels scale:
1 (initiesl) – processes are unstructured and unpredictable; success depends on individual effort and heroics;
2 (managed) – **p**rocesses are defined and documented but might not be standardized, practices are repeatable;
3 (defined) – processes are standardized, documented and communicated across the organization, there are established standards and guidelines;
4 (quantitatively managed) – processes are measured and controlled, there is a focus on quantitative performance management;
5 (optimizing) – continuous process improvement is enabled by quantitative feedback and innovative ideas.
Note: the grouping variable is the level of local economic development in Latvian municipalities.

Source: calculated using IBM SPSS Statistics software and survey data from Annex 1.

The data presented in Table 9 indicates that, as in the comparison of means and in correlation and regression analysis, BPMdl maturity levels in relation to the two core elements of BPMng (strategic alignment and information technology) are not statistically significant also for predicting the level of local wconomic development in a particular municipality. In turn, BPMdl maturity levels in relation to its [BPMdl] governance ($p = 0.037$), and especially methods, people and culture ($p < 0.001$) are those 'discriminating' variables that determine the level of local economic development in Latvian municipalities.

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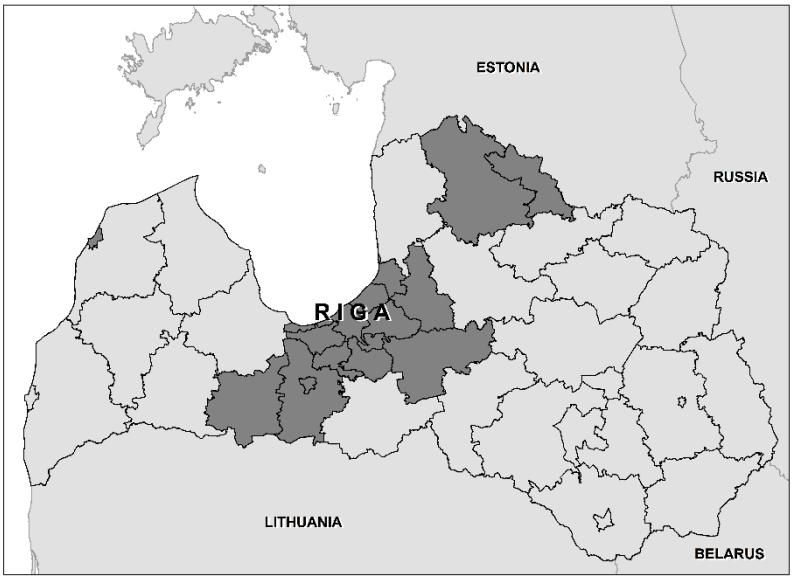


Figure 6. Geographical concentration of the group of Latvian municipalities with a more developed economy, n = 17, 2024
Source: compiled using ArcGIS software and the data from Annex 1.

Geographically, the group of Latvian municipalities with a more developed economy and a more mature BPMdl is concentrated around the capital of Latvia, as well as near the border with Estonia (Estonia is the most economically developed country among Latvia's neighboring countries – Kochetkov & Masharskiy, 2023) (Figure 6).

5. Conclusions

The study investigated the application of business process modeling (BPMdl) to the monitoring and planning of local territorial development in Latvian municipalities. The key findings and conclusions are as follows:

(1) the research confirmed that BPMdl could be effectively applied in municipalities. This approach enables systematic data collection, detailed analysis, strategic planning, effective implementation and continuous monitoring, leading to more informed decision-making and optimized development outcomes. By adopting a structured approach to BPMdl, municipalities can significantly enhance their efficiency and effectiveness in monitoring and planning of local territorial development;
(2) statistical analysis (comparison of means, correlation and regression analysis, discriminant analysis) of survey data from all 43 Latvian municipalities revealed significant differences in BPMdl maturity levels between municipalities with a less developed economy and municipalities with a more developed economy. Latvian municipalities with a less developed economy exhibited statistically lower BPMdl maturity levels in relation to such core elements of business process management (BPMng) as governance, methods, people and culture;
(3) a significant barrier identified was the lack of specialists in BPMdl. In Latvian municipalities, business processes are intuitive, unstructured and unpredictable, and success often depends on individual efforts rather than systematic processes. To improve BPMdl practices, municipalities should invest in training and developing BPMdl specialists, standardize and document processes, and utilize integrated IT solutions to support BPMdl activities. Continuous improvement should be encouraged through feedback and innovative practices;
(4) the research hypothesis that BPMdl for monitoring and planning local territorial development is possible and increases the level of this development, but is not widely used in Latvian municipalities, was confirmed by a review of scientific research on business process modeling applied to local territorial development, statistical analysis of survey data from all Latvian municipalities and the action

research in Augshdaugava County Municipality (a Latvian municipality with a less developed economy);

(5) for the first time in Latvia, the study tried to model the business process of the creation of annual public reports in Latvian municipalities using BPMdl tools such as IDEF0 and BPMN. This modeling proved that monitoring and planning of local territorial development is a modelable business process. For the further research is recommended to explore the long-term impacts of BPMdl implementation on local territorial development and to refine the models and methodologies used in this study.

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Annex 1. Survey data on the maturity level of business process modeling (NPMdl) **(developing and designing)** in relation to each element of business process management (BPMng), Latvian municipalities, N = 43,* 2024

Latvian municipalities	Core elements of Business Process Management (BPMng)						Average annual income tax per capita, eur	Level of economic development
	Strategic Align-ment**	Governan-ce	Methods	Infor-mation Tech-nology	People	Cul-ture		
Adazhi County	4	2	3	4	3	3	1248,18	2
Aizkraukle County	4	3	2	3	2	1	707,41	1
Aluksne County	3	3	1	3	1	2	594,00	1
Augshdaugava County	4	2	1	4	2	2	457,23	1
Balvi County	4	3	1	3	1	1	526,55	1
Bauska County	4	3	2	3	1	1	704,75	1
Cesis County	3	2	2	4	1	1	758,44	1
Daugavpils City	5	4	1	4	2	2	575,53	1
Dienvidkur-zeme County	3	3	1	3	2	1	633,14	1
Dobele County	3	2	2	4	4	3	794,48	2
Gulbene County	4	3	1	3	2	3	651,75	1
Kekava County	3	3	3	3	1	4	1161,31	2
Kraslava County	4	2	2	4	3	1	426,00	1
Kuldiga County	4	3	2	4	3	1	632,19	1
Liepaya City	5	3	1	4	2	1	724,85	1
Limbazhi County	4	5	1	3	1	2	677,47	1
Livani County	4	2	1	3	1	1	547,19	1
Ludza County	3	3	1	4	2	2	478,84	1
Madona County	4	3	2	3	1	1	629,77	1
Marupe County	4	4	2	4	1	3	1384,93	2
Ogre County	5	3	3	3	3	3	940,14	2
Olaine County	4	3	3	3	4	3	923,84	2
Preili County	4	2	1	4	4	1	516,07	1
Rezekne City	5	4	2	4	2	2	636,60	1
Rezekne County	3	3	2	3	1	1	451,93	1
Ropazhi County	4	4	3	3	3	4	1167,05	2
Riga City	5	5	4	4	3	4	1159,68	2
Salaspils County	4	4	3	4	4	3	962,38	2
Saldus County	3	2	2	2	1	1	693,59	1
Saulkrasti County	3	3	2	3	3	3	986,02	2
Sigulda County	4	3	3	3	3	3	973,87	2
Smiltene County	3	2	1	2	2	1	676,77	1

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Talsi County	4	3	2	4	1	2	636,25	1
Tukums County	4	3	1	3	2	1	719,24	1
Valka County	4	3	1	4	4	3	818,88	2
Valmiera County	4	3	3	4	2	2	822,96	2
Varaklani County	3	3	1	2	1	1	489,52	1
Ventspils City	3	4	3	4	3	4	907,74	2
Ventspils County	3	3	2	2	2	1	674,94	1
Yekabpils County	4	2	1	3	1	1	615,12	1
Yelgava City	5	4	2	3	4	3	870,13	2
Yelgava County	4	3	2	3	3	3	797,35	2
Yurmala City	5	4	3	3	4	3	1198,65	2

* The estimates were provided by the administrative staff responsible for cre3ating the annual public reports of Latvian municipalities or actively involved in this process.
** Strategic Alignment – ensures processes align with organizational strategy;
Governance – establishes accountability and decision-making structures;
Methods – tools and techniques supporting BPMdl activities;
Information Technology – IT solutions supporting process activities;
People – skills and knowledge of individuals managing processes;
Culture – process-related collective values and beliefs.
*** Maturity levels scale:
1 (initiesl) – processes are unstructured and unpredictable; success depends on individual effort and heroics;
2 (managed) – **p**rocesses are defined and documented but might not be standardized, practices are repeatable;
3 (defined) – processes are standardized, documented and communicated across the organization, there are established standards and guidelines;
4 (quantitatively managed) – processes are measured and controlled, there is a focus on quantitative performance management;
5 (optimizing) – continuous process improvement is enabled by quantitative feedback and innovative ideas.
******** 1 – less developed municipality (has the average annual income tax per capita below the mean); 2 – more developed municipality (has the average annual income tax per capita above the mean.
Source: own collected data (May–June 2024), calculated based on the methodology from Komarova et al. 2024 and data from State Treasury (Latvia) 2024; the research methodology for evaluating the maturity level of business process modeling (BPMdl) is presented in Table 2.

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METHODOLOGY FOR EVALUATING THE AGILITY LEVEL IN ENTERPRISES*

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Abstract. Agility is an important part of modern business management, enabling the company to effectively adapt to the changing external and internal demands of the market and customers. Therefore, companies must constantly implement agile methodologies and approaches that support quick decision-making, transparent communication and continuous innovation. This research aimed to create a methodology for evaluating the achieved level of agility in the company, which represents a self-assessment guide with verification of whether it is manageable and usable by managers in practice through an application in a selected company. To achieve this goal, an analysis of secondary sources was used, which provided the basis for creating a maturity model and the assessment framework. Several versions of the questionnaires for collecting input data were tested in companies to find the most accurate and applicable. The obtained results were suggested to be processed by the Scorecard method, the Euclidean distance method and the Standard Deviation. From the results, we observe that the respondents were more inclined to the possibility of using a quick but less accurate questionnaire, which enabled them to obtain the necessary data in a shorter time frame. At the same time, we managed to determine that the level of agility in the company we tested is at the level of 2.50, which speaks of achieving a medium and moving towards a high level of agility.

Keywords: agility; maturity model; agile elements; assessment; enterprise; scorecard

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JEL Classifications: L21, L25, M11, M14, O32

1. Introduction

The current global situation affected by war and other influences is ranked among the factors that negatively affect the economy and the efficient functioning of businesses (Saputra et al., 2022). Due to the new situation, it becomes inevitable for manufacturing enterprises to gradually shift to flexible, dynamic management in conjunction with new operation models (Abdelilah, Korchi, and Balambo, 2018; Christofi et al., 2021). Elali (2021) highlights that in today's world full of uncertainty, it is more than necessary to build agile businesses that are characterised by their ability to thrive in the face of unpredictable changes in the corporate environment. Businesses that fail to spot changing situations early on and respond adequately to them may have major problems in their future operations (Troise et al., 2022). The changes induced by customers themselves in the

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context of new needs and more demanding requirements are factors that characterize the increased pressure on businesses and their need to respond in a timely and flexible manner to the constant changes that take place in the business environment (Agag et al., 2024). In the early days of agility, agility was primarily introduced in the IT sector, building it to help business processes that have been and are impacted by digitization, variability, rapidly changing technologies, and increasing uncertainty (Hidalgo, 2019; Perkin, 2020). Important insights on the application of agile principles were provided by Pope-Ruark (2017), who highlighted the importance of agility and its benefits. The importance of agility lies in creating opportunities for businesses to respond effectively to market changes, improve the quality of their products and processes, and, at the same time, be more competitive (Clauss et al., 2021).

The results of many studies have indicated that building enterprise agility has a significant impact on an organization's performance and innovation capabilities and brings it a certain competitive advantage (Salih and Alnaji, 2014; Teoh et al., 2017; Altaweel, Al-Hawary, 2021). Knowing the current state of agility in the enterprise allows maturity models to show the completeness of a given object, which is enterprise agility. The progress that the maturity model achieves can be observed and managed by defining individual levels of agility that can assess the completeness of agility in the context of the level achieved by the enterprise (Wendler, 2014). Multidimensional criteria become important, which can help an enterprise to improve and move forward in concert with its demonstrated level of agility. Authors who have addressed the issue of enterprise agility maturity models include Schweigert et al. (2013), Carvalho et al. (2019), Cimini et al. (2024), Ferdinansyah and Purwandari (2021). The need for creating validated tools to measure agility was highlighted by Grena et al. (2019), who created and tested tools to help enterprises in their journey of building agility. Authors Linkevics and Sukovskis (2015), Joiner (2019), Lee and Song (2022) also address this issue in their publications and describe it as a critical process to measure how successfully an enterprise can respond to changes. Establishing an assessment methodology for an enterprise provides valuable information on the current state of agility levels achieved, highlighting salient areas for possible improvement.

There are several models of agility maturity in the literature, but their interpretation is not uniform, and the methodologies for assessing agility levels are based on different foundations. Therefore, the paper fills this knowledge gap by creating a methodology for evaluating agility based on the maturity model. It also brings new empirical knowledge from enterprises in Slovakia, where this issue has not yet been addressed. Its thorough investigation and subsequent implementation could bring considerable benefits to enterprises, such as improving production processes, increasing product quality and strengthening competitive position in the market (Lesníková and Janáková Sujová, 2023).

The paper aims to develop a methodology for assessing the level of agility achieved in an enterprise, verifying that it will be manageable and usable by managers in practice through application in a selected enterprise. The starting point is the definition of an agile maturity model that captures the different levels of agility and their characteristics, including creating an evaluation framework. The proposed methodology applies the scorecard evaluation method, which is understandable and manageable for managers in practice.

2. Theoretical background

To assess the current state of agility in the enterprise, it is necessary to start from the defined agility stages in the maturity models. It is a structured framework for assessing the work and processes of an organisation in the context of agile principles, where we compare the current state of the company with the defined agility stages, thus being able to define the current level of agility and opportunities for improvement. Maturity models can be divided between descriptive, prescriptive and comparative (de Bruin et al., 2005).

A further division focuses on individual domains in the enterprise - process, object and people maturity models (Mettler and Rohner, 2009). In 2013, Pooley et al. produced an overview of available agile maturity models (Table 1).

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Table 1. List of Agile Maturity Models

Creator of the model	Model name	Levels
Ambler	AMM	1 - 5
Lui and Chan	Road map	1 - 4
Nawrocki et al.	XPMM	1 - 4
Packlick	Agility maturity map	1 - 5
Patel and Ramachandran	AMM	1 - 5
Petit	Agile maturity model	-
Sidky et al.	Agile adoption framework	1 - 5
Qumer and Henderson	AIIM	1 - 3 (blocks), 1 - 6 (levels)

Source: adapted from Pooley et al. (2013)

At their core, each model differs depending on the understanding of agility, with each model offering its own unique take on the different levels of agility and its understanding, allowing the business to determine the level of agility achieved. Ozcan-top and Demirörs (2013) developed evaluation criteria that are compatible with the models mentioned above and can reveal potential strengths and weaknesses of the models as well as their applicability or applicability in practice. These criteria include fitness for purpose, completeness, definition of levels of agility, objectivity, correctness, and consistency.

We include the HISMM (Hospital Information System Maturity Model) among the new maturity models. It is authored by Carvalho et al. (2019). The model contains the conventional structure of a maturity model, which means it is composed of a matrix containing different maturity levels and factors affecting maturity. Each of the factors identifies traits that are characteristic of a given maturity stage.

In practical applications, the Capability Maturity Model Integration (CMMI) is often used, which offers the basic most common division of agility levels. This model divides the different levels of agility as follows (Ferdinansyah, Purwandari, 2021):

- ***Level 1: Initial*** **-** The organization uses very limited or no agile practices that are not standardized. Low emphasis on applying agile practices prevails.
- ***Level 2: Managed*** **-** Basic agile practices are in place, and the organization is beginning to develop standardized processes. This tier involves some level of retrospection and planning.
- ***Level 3: Defined*** **-** Agile methods and practices are well-defined, documented and implemented in the enterprise. The organization has a clearly defined agile policy and standards to follow.
- ***Level 4: Quantitatively managed*** **-** The level is described by agile processes that are well-managed and measurable. The organization uses various metrics and KPIs to track performance and continuously improve agile practices.
- ***Level 5: Optimising*** **-** The organisation continuously improves and optimises its agile processes based on data and feedback. Agile is deeply embedded in the company's culture and is regularly re-evaluated and adapted to new challenges.

The distribution of each level indicates how and to what extent the business maintains a certain level of agility, while the levels applied in the maturity model reveal the critical space for moving forward (Baker, 2006; Lukasiewicz and Miler, 2012). Based on these, the enterprise can decide where and to what extent to apply particular agile approaches and principles for achieving the management's desired level of agility (Baker, 2005; Brecka and Koraus, 2016).

Cimini, Lagario and Cavalieri (2024) developed a maturity model based on the SCRUM method and the AMM maturity model by Patel and Ramachandran with 5 levels: initial, explored, defined, refined, sustained. The model also defined its own dimensions grouped into 3 groups: roles, culture and processes. Thus, each maturity model has its predetermined levels, a description of each of the levels that speak to the characteristics specific to that level, a certain number of dimensions, with the dimensions further described by certain elements or activities, and a description of each element (Fraser et al., 2002). Fundamental foundations for proper agility functionality are agile principles, which include adaptability and flexibility, speed and agility, high customer

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orientation, teamwork, innovation, and learning (Conboy, 2009; Gong and Janssen, 2012; Wade et al., 2021; Mihalčová et al., 2021; Kollmann et al., 2023; Vagaská et al., 2022). They enable the application of rapid change and response in the context of business agility (Aguirre, 2023; Gombár et al., 2024). Baker (2017) argues that agility is not a technique, a fashion or a process; it is not the quantity of what an organisation does; it is primarily about how the members of the organisation think about what they do. He lists seven dimensions in the form of principles an agile enterprise should build: innovation, processing, recovery, improvement, customer responsiveness, problem-solving, and change of direction.

The principles of agility are applied within the individual elements of agility. A 2019 publication from McKinsey & Company, authored by Brosseau, Ebrahim, Handcomb, and Thaker, defines and describes eight key elements on which an agile organization should build: Decision-making and governance setup, Business planning and budgeting, Financing and decision-making, Performance management, Roles and career paths, Risk management and assurance, Workforce deployment and workspace, Technology. The dimensions of agility form key areas of the enterprise that help organizations respond quickly and effectively to change, improving collaboration, innovation and customer satisfaction (Gagnon and Hadaya, 2018). Authors Siegel and Booth (2020) state that agile planning, performance management, and talent management are considered the most important dimensions of agility. In addition to these two dimensions, according to them, four more dimensions are present, which are: organizational model, ways of working, risk and compliance, technology enablers. 3DSE, a business management consultancy, offers five dimensions that a successful organisation looking to transform into an agile organisation should apply. These dimensions are: strategy, product, process, organization, and culture (Kloibhofer, 2018). Similar to Kloibhofer (2018), Linkevics and Sukovskis (2015) and Wendler (2014) have also created a framework of agility through dimensions and elements.

It becomes important for an enterprise to know the methods and practices that can determine the level of agility achieved and apply them effectively to various aspects of its operations. Vinodh and Aravindraj (2011) developed their unique approach to measuring agility levels called IF - THEN. Their theory builds on the principle that an agile environment should be highly interactive, and the primary concept of this approach builds on the integration of all triggers and their criteria into the creation of an agile index. The triggers include: responsibility management agility, production management agility, labor management agility, technology agility, and manufacturing strategic agility. Based on these triggers, the model can evaluate agile concepts. According to Linkevics and Sukovskis (2015), it is possible to measure an enterprise's agility level using the ODA method. The authors describe that there are two ways an enterprise can go, provided it is aware of its level of agility. Thus, an enterprise can follow the "Change" or "Improve" paths. Patel, Samuel and Sharma (2017) used a similar approach to Linkevics and Sukovskis to develop a methodology for assessing agility levels. This involved creating a model for measuring supply chain agility that consisted of 7 triggers, 25 attributes and 101 subattributes. The application of agility in the enterprise depends primarily on the right choice of a maturity model that allows the enterprise to identify its current level of agility and provides a clear roadmap for its gradual improvement. The maturity model should be tailored to the specificities and needs of the particular enterprise, considering its organisational structure, business strategy and culture.

3. Research objective and methodology

Establishing a methodology for evaluating the level of agility in enterprises requires a comprehensive approach that integrates different tools, methods, and procedures to provide a holistic view of the capabilities and competencies of the enterprise. The starting point for developing the agility assessment methodology is the findings from scientific publications and the results of primary research in Slovak enterprises, which show the specifics of the elements of agility, the level of knowledge of managers and their perception of agility. Proposing the methodology addresses two research questions:

1. How the achieved agility level should be found out and evaluated?
2. How should the best agility level be determined to develop actions toward its achievement?

The first step was to define an agility maturity model, i.e., agility levels and an assessment framework. Starting points from many authors were taken into consideration, using the criteria for model development according to Ozcan-top and Demirörs (2013). The constructed maturity model is a modification of existing models with

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emphasis on completeness of possible agility levels, clarity for practising managers, and level of understanding of agility issues in companies. After defining the different levels of agility in the maturity model, an evaluation framework was developed by identifying the dimensions and elements of agility in each dimension while respecting the basic agile principles. This framework allows for assessing the level of agility in the different areas of the enterprise.

The second part of the study focused on determining the scope and method of collecting information and data that represent the input data for assessing agility levels. The data set corresponds to the characteristics of the agility levels in the maturity model and the agility elements in the assessment framework. An inquiry method was primarily used to create a list of defined agility elements and describe them. Based on the theoretical framework, we formulated multiple versions of the questionnaires. The first one was tested and agreed to be the most understandable. It contains a list of elements with brief descriptions without the attribute of agility level and a range of responses representing the different levels of agility. A simple scoring method was used to do so. In designing the questionnaires, care was taken to ensure that they were formulated in a clear and comprehensible manner to prevent possible misunderstandings and to ensure a high level of reliability and validity of the answers.

The required range - the frequency of responses is determined by the number of senior and middle managers in the enterprise who are relevant respondents. The reliability of the data obtained from the questionnaires is assessed through the statistical standard deviation, which measures the dispersion of the data set in relation to its mean. If the value is high, the data is scattered further away from the mean, indicating high variability in the respondents' ratings and lower data reliability. Its formula is as follows (Livingston, 2004):

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2} \quad (1)$$

Where **"σ"** is the standard deviation, **"N"** is the number of observations (respondents), **"x_i"** is the value of each observation, **"μ"** is the average of all values of x_i. The level of agility of the individual elements in the dimensions can be evaluated by the arithmetic mean or median of the respondents' answers. In our application, median values were used to represent the achieved level of agility in the enterprise for a given element. The level of agility dimensions was evaluated using the Euclidean distance method. This method is primarily used to measure distances between two points in n-dimensional space. In our understanding, the method was used to determine the distance of the respondents' evaluation of a dimension from the ideal state, i.e., the highest level of agility. Lower values indicate that a given respondent perceives the dimension as closer to the ideal "agile" state, while higher values indicate a gap and more room for improvement in the domain. For the calculation, we used the following relationship (Liberti, Lavor, 2017):

$$d_i = \sqrt{\sum_{j=1}^{n}(x_{ij} - x_{0j})^2} \quad (2)$$

Where **"d_i"** is the Euclidean distance of respondent i, **"x_{ij}"** is the element value for respondent i and element j, **"x_{0j}"** is the ideal value of element j, **"n"** is the number of elements (dimensions).

The scorecard method was chosen as the main method for the final evaluation of the achieved level of total agility due to its reasonable difficulty and manageability when used by the managers of the enterprise. The scorecard method is a flexible tool designed to measure the performance or results achieved by organisations in specific, selected areas, which enables the setting and tracking of specific indicators and targets reflecting priority aspects of the organisation's activities and provides a framework for measuring progress. To determine the final score of the overall level of agility in the enterprise, the arithmetic mean of the median values of all the dimensions predefined by us and marked by the respondents according to the respective questionnaires was used. For the correct interpretation of the scorecard method, it is necessary to use various graphical display options in the form of dashboards, reports, heat maps or classic graphs and charts.

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The result is the determination of the achieved level of agility in each dimension and its elements according to the proposed key, the discovery of reserves, and the necessary steps to move to a higher level of agility. The applicability of the proposed methodology was verified by application in a selected enterprise; in this study, it is a Slovak enterprise in the wood processing industry.

4. Results and discussion

Based on a detailed review of the available agile maturity models and approaches of different authors, taking into account the already existing maturity models, we developed a modified concept of a maturity model. The maturity model was divided into 5 different levels. Each level is narrowly specified (see Table 2).

Table 2. New concept of Agility Maturity Model

Level:	Title:	Description:
0.	No Agility	No agile principles or methods apply. There is no understanding of the benefits of enterprise agility, and processes are ad hoc and unsystematic.
1.	Low Agility	The organization is becoming aware of agile principles, but the processes are still chaotic. Project success depends on the individual efforts of individuals, teams, and the organization as a whole.
2.	Medium Agility	Organizations implement basic agile practices at the project level. These are basic attempts to plan, execute, monitor and control according to agile principles.
3.	High Agility	Agile methods and principles are fully integrated into the organisation's processes. There is a standardised framework of agile practices accepted by the organisation.
4.	Excellent Agility	Use of quantitative data for continuous improvement and optimization, proactivity in anticipating change and implementing change, and rapid implementation of changes and decisions.

The proposed evaluation framework in the form of dimensions and agility elements is presented in Table 3. After studying the existing knowledge, we have chosen as dimensions the areas of the enterprise that allow us to assess the extent to which teams or enterprises are able to respond effectively to dynamic and uncertain situations within them. Within each dimension, elements (presented in Table 3.) representing specific, measurable attributes are included that allow the agility of individuals, teams or parts of enterprises to be assessed and compared.

Table 3. New concept of Dimensions and Elements of Agility

Dimension	Elements
Organisation	Organisational structure, Decision making, Leadership, Transparency, Knowledge transfer, Communication
Customers	Feedback tracking, Customer needs and requirements tracking, Customer satisfaction rate, Customer value orientation
Strategy	Management of continuity and change at the same time, Relationships with external actors, Commitment, Resource mobility, Responses to environmental change with objectives and strategy, Scope of planning
Processes, technologies, systems	Process management level, Process automation, Information system, Process digitalization, Change time and process optimization, Process adaptability
Products, services	Speed of delivery, Innovation, Improvement, Portfolio management, New product and service development
Culture of change	Openness to change, Ability and willingness to take risks, Continuous improvement, Readiness for change
Human Resources	Teamwork and autonomy, Cooperation and trust, Communication, Creativity and innovation, Learning and improvement

The input data collection and subsequent assessment of the individual elements of each dimension were designed in two ways, including the same agility elements and dimensions (7 dimensions and 35 agility elements). Still, they differed in how they were implemented and how the data was collected. After pilot testing

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with the respondents, we selected the first way, including a list of all agility elements, a brief description, and a range of possible responses. The respondent was asked to tick the appropriate box to assign the corresponding agility level (0 to 4) to the element, according to the maturity model we developed. At the same time, the agility maturity model was presented at the beginning of the questionnaire with the characteristics of the respective agility levels. The data were collected using a simple scoring method, where individual elements are rated on a scale of 0-4, where 0 means no agility of the element and 4 means excellent, i.e. the highest level of agility. A sample of one dimension selected by Customers is presented in Table 4.

Table 4. Data collection questionnaire

Dimension - Customers		Agility level				
Element	**Description:**	0.	1.	2.	3.	4.
Feedback monitoring	*Frequency of monitoring, customer satisfaction rating*					
Monitoring customer needs and requirements	*Response time to changed or new customer requirements*					
Customer satisfaction rate	*Frequency of assessment, speed and method of complaint resolution.*					
Customer value orientation	*Business success measured against customer objectives*					

The level of agility of individual elements, dimensions and overall enterprise agility was evaluated using the arithmetic mean, median, and Euclidean distance described in the previous chapter.
The methodology was verified by its application in a selected enterprise operating in the timber industry, the size of which belongs to small enterprises with up to 50 employees. In this enterprise, we involved 10 respondents in completing the questionnaires, representing the owners of the company and all top and middle managers. The results of the assessment of the level of agility of the individual elements in the dimensions based on the median values of the respondents are shown in Figures 1-7.

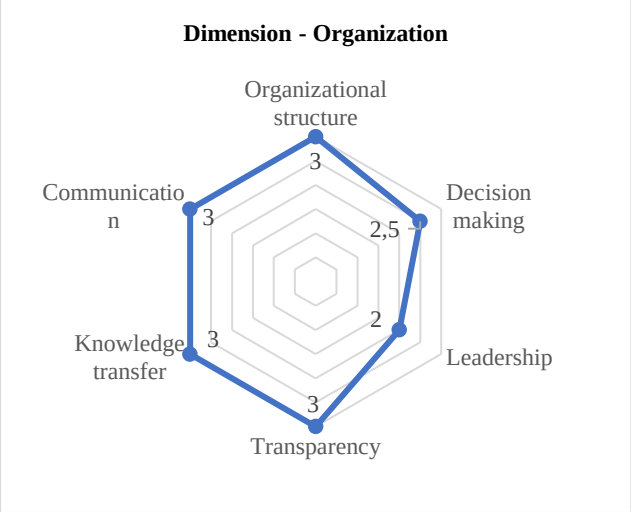


Figure 1. Dimension – Organization
Source: own elaboration

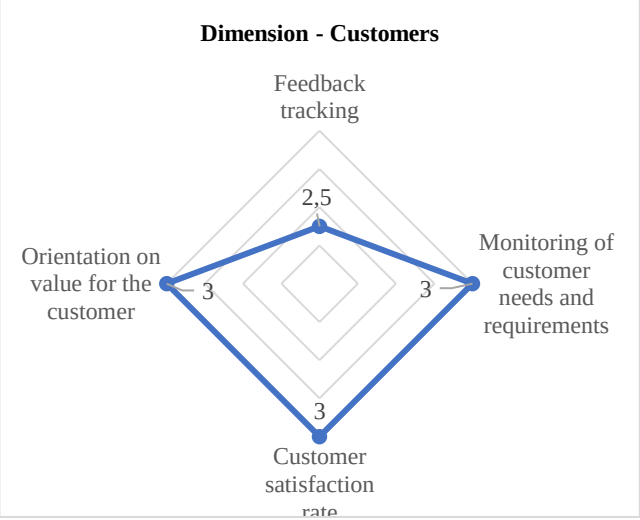


Figure 2. Dimension – Customers
Source: own elaboration

In Figure 1 we can observe that the majority of respondents perceive the different elements of the Organization dimension in their enterprise as agile and at a high level, where full integration of agile principles and methods is prevalent. We see a change in the element of Decision Making, and Leadership, which is perceived as moderately agile by a portion of the respondents. Figure 2 shows us a similar situation where we see consistency across all elements except for the element of feedback monitoring, which is perceived by a portion of respondents as moderate to high agile with integration of agility across all areas of that element.

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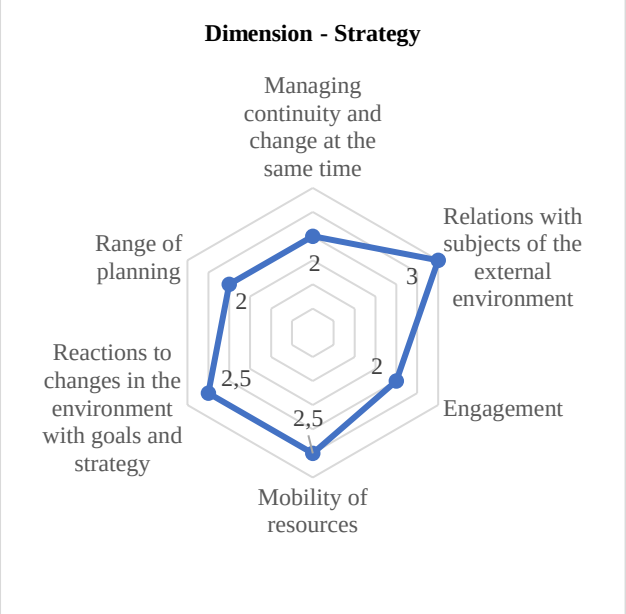


Figure 3. Dimension – Strategy
Source: own elaboration

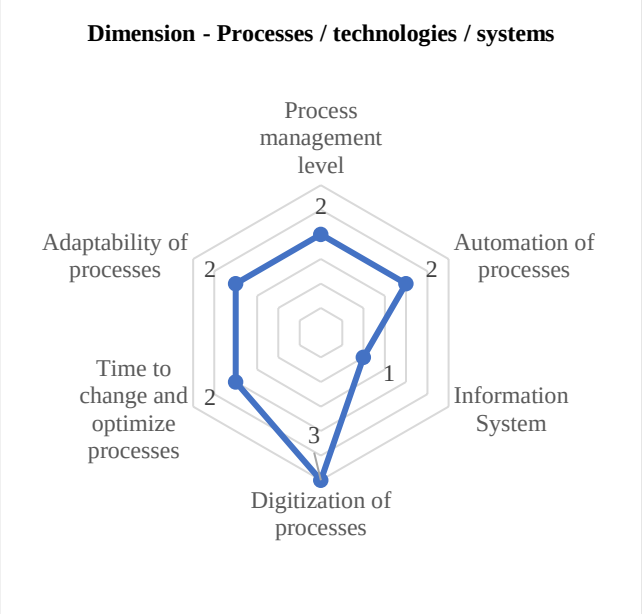


Figure 4. Dimension – Processes / technologies / systems
Source: own elaboration

Figure 3 shows in the Strategy dimension that respondents were mainly inclined to define the elements according to a medium level of agility to a high level for the element of relationships with external environment actors. Figure 4, characterizing the Processes / Technologies / Systems (PTS) dimension, shows high volatility in the median data of the individual questionnaires. The elements are predominantly skewed towards the median level of agility, where basic agile practices and methods are applied. The only change occurs in the information system case, where respondents indicated that it achieves low agility, and thus, only awareness of agile practices and principles is prevalent. In the digitization of processes, respondents indicated high levels of agility.

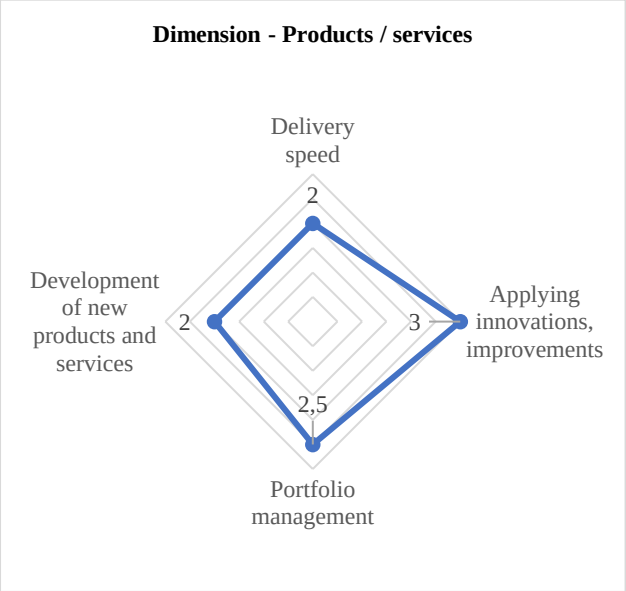


Figure 5. Dimension – Products/services
Source: own elaboration

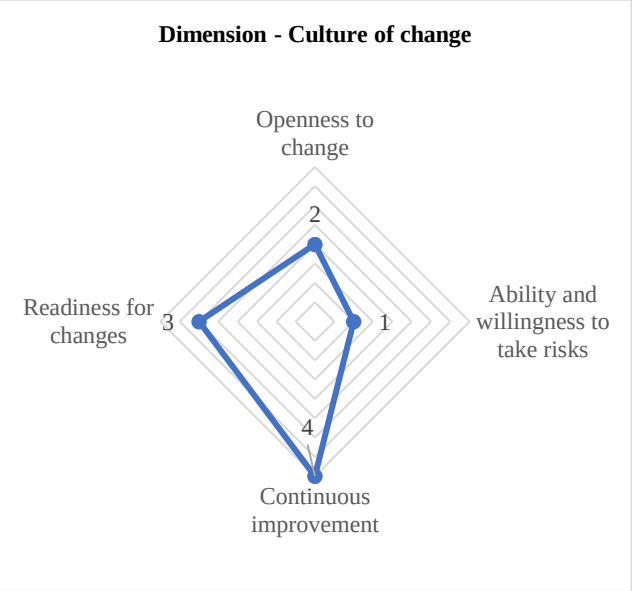


Figure 6. Dimension – Culture of change
Source: own elaboration

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Figure 5 shows that the elements of the Products and Services dimension are perceived mostly towards medium to high agility in applying innovation and improvement. In Chart 6, we observe a greater variation in the values, where we see ratings at almost all levels for each element, ranging from a low level of agility for the Capability and Willingness to Take Risks element to an excellent level of agility for the Continuous Improvement element.

Figure 7 shows us the values of the individual elements of the last dimension Human Resources. The most common levels that respondents assigned to the elements are medium to high levels of agility.

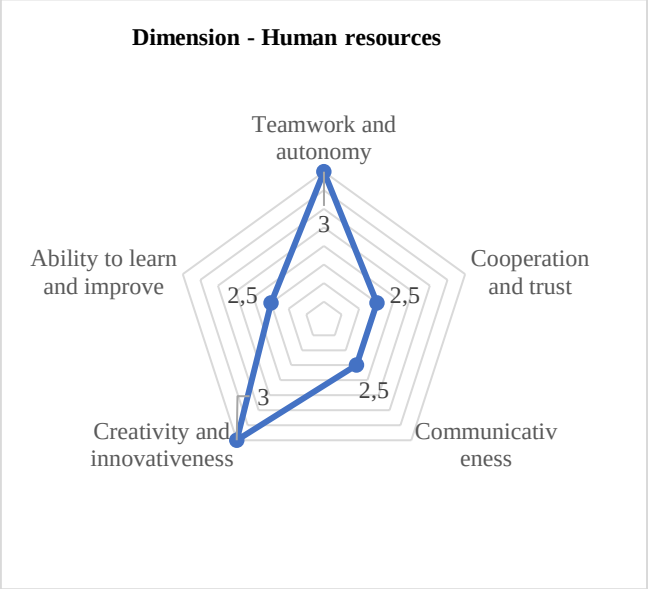


Figure 7. Dimension – Human Resources
Source: own elaboration

The assessment of the level of agility for the defined dimensions is presented in Table 5. This assessment was performed using the Euclidean distance method.

Table 5. Euclidean distances of agility dimensions

Dimension	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Organisation	4.47	4.16	4.32	4.58	4.68	4.57	4.31	4.42	4.53	4.37
Customers	2.24	2.05	2.42	2.19	2.46	2.33	2.11	2.27	2.30	2.50
Strategy	5.10	4.81	5.55	4.91	5.25	5.14	4.85	5.40	5.18	5.34
Processes, technologies, systems	6.16	5.68	6.40	5.76	6.22	5.99	5.72	6.35	6.20	6.12
Products, services	4.00	3.86	4.12	4.04	3.97	4.06	4.10	3.94	4.03	4.07
Culture of change	3.46	3.60	3.31	3.55	3.72	3.59	3.50	3.42	3.65	3.48
Human Resources	3.46	3.61	3.29	3.57	3.50	3.49	3.40	3.38	3.55	3.52

Table 5 presents us the individual values of the Euclidean distances for the given dimensions calculated based on the elements belonging to these dimensions. In the Organization dimension, we observe that the respondents' ratings show medium variability. Respondent 2 perceives this dimension most positively (closest to the ideal "agile" state) with an Euclidean distance value of 4.16, while respondent 10 perceives the most room for improvement. The Customer's dimension is perceived as highly agile by respondents, observing consistent responses with Euclidean distance values ranging from 2.27 for respondent 8 to 2.50 for respondent 10. The Strategy dimension is perceived most positively by respondent 2 with a value of 4.81 and least positively by respondent 7 with a value of 4.85. In the Processes, Technology and Systems dimension, the most positive perception was measured for respondent 2 with a Euclidean distance value of 5.68 and the most room for

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improvement was perceived by respondent 7 with a Euclidean distance value of 5.72. Respondents 2 and 8 perceive the Products and Services dimension as the most positive with values of 3.86 and 3.94 respectively, while respondent 7 perceives it as suitable for improvement, however, where the Euclidean distance value does not differ much and is at 4.10. In the Culture of Change dimension, we observe that the closest to the ideal state would be compared by respondents 3 and 8 with values of 3.31 and 3.42 respectively, while respondent 5 perceives it as an area for improvement with a value of 3.72. The last dimension which is the human resource dimension is seen most positively by respondent 3 where a Euclidean distance value of 3.29 was recorded. In contrast, respondent 2 sees it as the most suitable for improvement with a value of 3.61. Overall, we observe a very low level of variation in the individual Euclidean distances, which underlines the fact that respondents agree on the different areas that are suitable for improvement in the enterprise.

Table 6. Standard deviation of Euclidean distances

Dimension	**Standard deviation**
Organisation	0.27
Customers	0.22
Strategy	0.31
Processes, technologies, systems	0.40
Products, services	0.17
Culture of change	0.24
Human Resources	0.20

In Table 6 we can observe that the Processes, Technologies and Systems dimension shows the greatest variability in the individual Euclidean distance values. Thus, from the results we can conclude that managers in the enterprise are not similar in their opinions on processes, applied technology and the overall level of technology in the enterprise and the systems that are in place (level of process management, process automation, information system, digitalization of processes, time of change and optimization of processes, adaptability of processes), where the standard deviation reaches a visibly higher value of 0.40 compared to the other dimensions. A similarly higher value is achieved by the Strategy dimension (management of continuity and change at the same time, relations with external actors, commitment, mobility of resources, reactions to environmental changes by objectives and strategy, scope of planning), where the standard deviation value is 0.31. On the other hand, the least variability is shown by the Products, services dimension with a standard deviation value of 0.17.

Table 7 below summarizes the median Euclidean distance values for each dimension, and we also constructed the arithmetic mean of the median values for each dimension according to the specific responses of the respondents for each item.

Table 7. Resulting dimension scores

Dimension:	**Euclidean distance (Median)**	**Assessment by the median values of the elements**
Organisation	4.44	2.75
Customers	2.31	2.87
Strategy	5.16	2.33
Processes, technologies, systems	6.14	2.00
Products, services	4.11	2.37
Culture of change	3.52	2.5
Human Resources	3.49	2.7

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From Table 7, we observe that in terms of Euclidean distance, the Customers dimension is closest to the ideal state, the Organization, Products and Services, Culture of Change and Human Resources dimensions have a high homogeneity in responses and a medium distance from the ideal. Conversely, slightly higher variability was noted for the Strategy and Processes, Technology, Systems dimensions, indicating a diversity of opinion in these areas, and the highest values represent a large room for improvement for these dimensions and their elements. In order to determine the overall level of enterprise agility in our study enterprise, we used the measured median values of the individual agility elements and created an average value for each dimension. For each dimension, respondents were most likely to lean towards medium (Strategy; Processes, Technology, Systems; Products and Services) to high levels of agility (Organization, Customers).

The average value provided us with a final view of the individual dimensions regarding the level of agility achieved. Also, it allowed us to determine the overall level of enterprise agility achieved in the enterprise we studied. Based on the data in Table 7, the resulting value of overall enterprise agility is 2.5, representing a degree between medium and high levels of agility. The resulting scores can be displayed using the scorecard method presented in the graph in Figure 8.

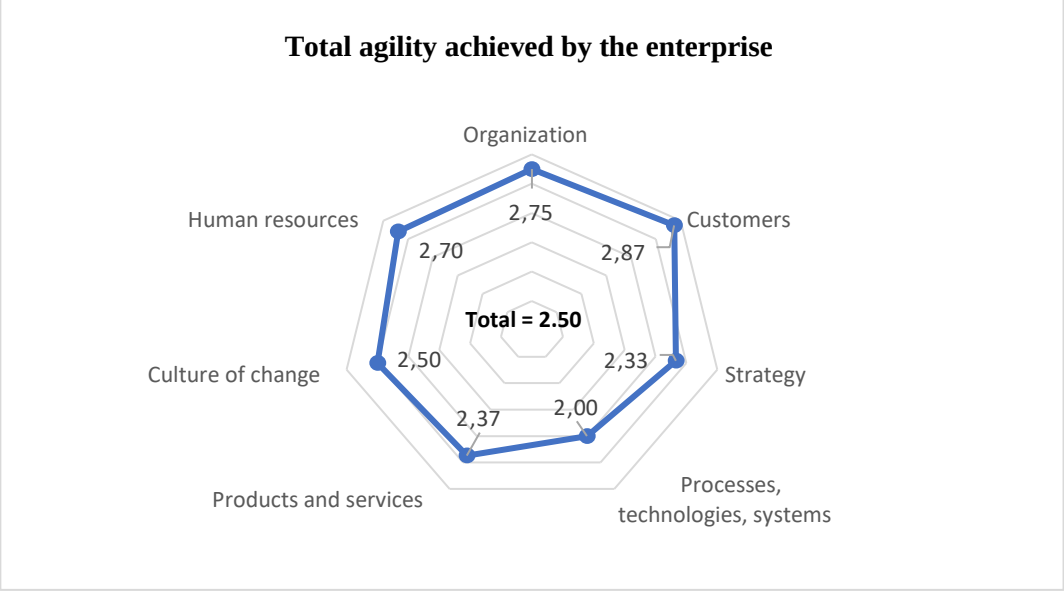


Figure 8. Overall level of agility achieved by the enterprise

Figure 8 shows that all values are between medium to high agility levels, with an overall agility level of 2.50. Thus, we can conclude that the enterprise has at least the basics of agile practices in place in all its dimensions, with the ability to adapt and respond to change being present, with full integration of agile methods and principles prevalent in most areas where agile processes are being measured. The enterprise can adapt at any time, in any way and in anything, as evidenced by the overall level of agility, which we also call high flexibility.

From the results obtained, whether it is the business owners or individual managers (respondents), their answers are similar to the questions of the different dimensions and elements. The prevailing high homogeneity of the answers could be due to the uniform understanding of the agile concept within the enterprise, similar experiences and equally similar perceptions of the different business processes based on internal communication and information-sharing culture.

By evaluation, we observe that the most significant reserves where the process of amplification of individual dimensions and, consequently, their elements can be realized are mainly in the dimensions of Strategy, Processes, Technologies and Systems and Products/Services. The dimensions in question can be seen as some of the most important components of the enterprise, forming the core from which all other areas are derived.

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Therefore, the enterprise should focus more on the elements of these dimensions and look for opportunities in the form of different agile principles and techniques that would help it increase the level of agility in these areas. Increased application of agile principles is needed, especially in process management, information systems, product delivery and development, and product portfolio innovation. In the area of strategy, the main focus needs to be on increasing motivation and commitment to implementing change. Respondents agreed fairly accurately on the other dimensions that achieve a higher level of agility, namely Organization, Customers, and Human Resources. From the above, we can conclude that despite the three dimensions that fall far short of the "perfect, ideal state", all dimensions are very close to high agility, creating a prerequisite for creating the appropriate agile awareness in the enterprise and its further growth. At the same time, we argue that by combining the individual dimensions into a whole, which can be called the enterprise itself, the enterprise achieves a medium to high level of agility, characterized by the application of basic agile practices but also by the full integration of agile principles and methods in most cases.

At the end of the research, we found that the final score of the overall agility level of the enterprise is 2.50, which is the upper middle level of agility that the enterprise achieves. Therefore, the enterprise knows agility well, is flexible, measures its agile processes, and can adapt quickly and effectively to different aspects. The most significant area identified where it would be necessary to start improving the level of agility achieved is the Processes/Technology/Systems dimension, which, throughout the research, was characterised by its lower level of agility compared to the other dimensions. For this dimension, it would be appropriate to strengthen and then apply agile techniques and methods such as Agile Modeling (use of iterative techniques for documentation and systems design), Value Stream Mapping (analysis and visualization of value stream in processes), DevOps (integration of development and operations teams).

It should be added that the dimensions and elements of agility proposed and assessed by us are fully flexible, and the enterprise should be able to adapt them according to its needs and capabilities to identify its level of agility as accurately as possible. The Scorecard approach to assessing enterprise agility is simpler and more manageable for managers than the Reachability Matrix, which provides a formal and systematic analysis of the relationships and interactions between different system elements but is complex and time-consuming in its execution yet requires advanced knowledge and specialized tools. The scorecard approach has the disadvantage of the subjectivity of individual views, and the results can also be influenced by the current understanding of the enterprise as a whole, along with the understanding and interpretation of the agile concept. However, it is a flexible, adaptable solution that allows changes to be implemented quickly and their impact on the agility of the enterprise to be tracked, making it an ideal approach for managers seeking effective solutions.

Conclusions

The ability to build and maintain a certain level of agility in the enterprise is becoming an essential part of a competitive enterprise today. Building this capability requires the application of the right methodology to enable the business to take these steps. Our proposed methodology provides a structured and comprehensive approach to identify and assess key areas of agility specific to manufacturing and industrial enterprises. The application of the agility assessment methodology offers an opportunity for enterprises to identify their agility strengths and weaknesses, focus on targeted improvement of agility-enabling elements, measure their progress, and be better prepared for the future. Based on the presented application of the methodology for assessing the level of agility achieved, we conclude that the overall agility in the enterprise is at a high level. The enterprise is thus applying agile principles and methods that it can measure and work with to adapt to change effectively. We have also identified the Processes/Technologies/Systems dimension as the most important dimension most needed for further improvement in agility and developing the ability to respond quickly and effectively to change, thereby ensuring the long-term competitiveness and success of the enterprise.

We consider the presented approach original and workable in manufacturing companies as it fills a gap in this area and offers a new, unique solution to the agile problem. The results of this research can help small and medium-sized industrial enterprises, especially, to be prepared for unexpected changes from the external and internal corporate environment, which we consider to be a key factor for their long-term sustainability and improvement of their position in the market.

A limitation of this research is the focus on manufacturing enterprises only, which is a limiting factor that could be eliminated in the future by modifying or generalizing the individual dimensions and barriers. Further direction of the research will be carried out in terms of creating a management model for building agility, which will serve as a concept of agility at the strategic level, allowing to acquire or improve the ability to respond to any changes in the company's environment or to make the necessary changes in a timely manner.

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FINANCING OF WOOD-PROCESSING FAMILY BUSINESSES: A SURVEY IN SLOVAKIA*

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Abstract. In the current global economy, family businesses play an important role as one of the main driving forces of economic growth and employment. Their unique nature and approach to financial decisions sets them apart from non-family businesses. This study identifies the critical forms of financing in the family business segment in the wood-processing industry in Slovakia. The introduction to the issue addresses the importance of the business community. It highlights that family businesses often consider not only economic factors but also emotional and cultural aspects in their financial decisions. Various factors that influence the financial decision-making processes of family businesses are examined, including their tendency to prefer their funding sources and their risk aversion. The available literature focuses on the importance of family businesses in the global context and their recent legislative support in Slovakia. It also analyses the status and challenges of the Slovak wood-processing industry and its link to the support of family businesses.

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The methodological aspects of this study combine the analysis of secondary sources with primary research conducted through questionnaire methods. Up to 491 enterprises participated in the survey, of which 392 were family businesses in the wood-processing industry in Slovakia. The survey results show that family businesses prefer internal funding sources and only use external sources to a limited extent. In contrast, a significant number of companies like a combination of both. There has yet to be a predominance of credit use in the form of working capital loans. Recommendations for future research include a more detailed examination of why family businesses prefer internal funding sources and how external sources could be used more effectively.

Keywords: family business, funding sources, financing, wood-processing enterprises

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JEL Classifications: D91, L20, M21, M29

1. Introduction

The business community is one of the main drivers of economic growth and employment (Doucet & Requejo, 2021). Unlike non-family businesses, family businesses consider both monetary and largely non-economic factors in their financial decisions. They consider their identity, the survival of the family dynasty, the family's influence and control in the business, their emotions and preferred values (Micheils et al., 2017; Jansen et al., 2023). For this reason, family businesses often tend to prioritise the long-term goals and impacts of their financial decisions to ensure the sustainability of their family business (Schepers et al., 2020). Behavioural factors such as family norms, socio-cultural influences, and others can play an essential role in financial decision-making processes, especially for micro, small, and medium-sized enterprises (Boateng et al., 2019). Family businesses can be understood as a complex system partly conditioned by emotional relationships that involve elements and decisions that do not conform to the logic of the market (Dobrovič et al., 2018). There is a consensus in the literature on family businesses that financial motivations do not solely drive financial decisions in these enterprises. Instead, they are influenced by a diverse set of non-financial motives of the family owners.

For this reason, family businesses may likely use their capital rather than foreign capital when making financing decisions (Ramirez et al., 2017; Korauš et al., 2019). Gonzáles et al. (2013) refer to the risk aversion of family businesses, which generally results in a lower debt ratio. In the context of private companies, capital structure decisions often depend on the preferences and objectives of the owner, as they usually have the final word. In fact, financing decisions in these companies integrate two competing perspectives. The economic view is based on the advantage of choosing a particular form of capital based on its economic costs, such as the interest rate, fiscal benefits and the impact on the financial structure. The non-economic perspective considers non-financial aspects such as multi-generational orientation, inclination to risk and retention of ownership (Rajnoha et al., 2016; Michiels et al., 2021). The range of factors that influence the financial decision-making process of family businesses goes beyond the rational and includes behaviorally driven economic goals that differ from those of non-family enterprises (Boateng et al., 2019; Mihalčová et al., 2021). Family businesses face not only the usual challenges afflicting non-family companies but also the difficulties associated with the fact that the whole family usually depends on the income from one business. If profits are significantly reduced, this can threaten the entire family's financial stability. In the present paper, the financing of family businesses is examined in the wood processing industry, as this issue is currently very topical in this industry in relation to the changing prices of the raw material, namely wood. For this reason, the presented paper aims to identify the decisive forms of financing in the wood-processing family business segment in Slovakia. Despite the assumed lower rate of use of foreign funding sources, an important objective is also to identify the nature of the use of foreign funding sources (Straková et al., 2021; Šimberová et al., 2022).

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The issue of supporting the development and growth of family businesses as a fundamental pillar of national economies is coming to the fore. It is, therefore, essential to understand the financing of family businesses, their access to alternative funding sources and loans and the use of state support or other benefits. Research by Yeh and Liao (2021) found that family businesses exhibit higher risk levels than non-family businesses. Their limited access to collateral, short credit history, and lack of expertise or financial literacy make acquiring a loan challenging (Yeh and Liao, 2021). For this reason, family businesses prefer to use their resources to finance business activities. The credit risk associated with small and medium-sized enterprises is generally higher than larger and more established firms. From the point of view of manufacturing efficiency, the size of an enterprise is also irrelevant because, typically, resource utilisation efficiency is essential (Parkitna and Gadek, 2023). The risk associated with providing loans to smaller companies forces family businesses to combine the household's resources and the business (Sedliačiková et al., 2021).

2. Material and methods

The methodological approach of this paper was structured into several logically organised parts. In the first stage, an analysis of secondary sources was carried out, which focused on the issue of family business in the context of their financing and the wood-processing sector in which the research was conducted. This part used the methods of analysis, synthesis, summarisation, description, comparison, deduction and analogy.

The next part of the research mapped the examined problems in the practice of wood-processing family enterprises in Slovakia using a questionnaire based on the theoretical knowledge obtained so far. The uniform form of the questionnaire contained 17 questions divided into two main sections.

The first section of the questionnaire focused on the identification and characteristics of family businesses operating in the wood-processing industry. Family businesses were identified using the new definition enshrined in the 2018 amendment to Law 112.

The second part of the questionnaire focused on a more detailed identification of the funding methods and the origin of the capital.

Primary data were obtained by conducting a questionnaire survey among family businesses operating in the wood-processing industry in Slovakia. A total of 5,343 wood-processing enterprises operating in Slovakia were addressed. A contacts database was created according to data reported by Finstat (2022).

The inner consistency of a questionnaire was evaluated by the Cronbach alpha coefficient (Cronbach, 1951):

$$\alpha = \frac{k}{k-1} \times \left(1 - \frac{\sum_{i=1}^{k} s_i^2}{s^2} \right) \quad (1)$$

where: k – is the number of test items; – is the sum of the item variance; s2 – is the variance of the total score

The questionnaire was hosted on the Google Questionnaires platform and distributed through emails between February 2023 and May 2023. According to Finstat (2022), 5,343 enterprises were in the wood-processing

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industry. Our research sample consisted of 2,300 family businesses randomly selected and operated in the wood-processing sector based on SK NACE.

The size of the examined sample was determined according to the following mathematical relation, which is intended for the calculation of the minimum number of respondents (Hong, 2017):

$$n = \frac{p(1-p)}{\frac{e^2}{z^2} + \frac{p(1-p)}{N}} \quad (2)$$

where:
n – minimum number of respondents,
z – reliability coefficient (at confidence level of 95% the variable z = 1.96),
p – the proportion of the character (for unknown values it is substituted for p = 0.5),
e – acceptable margin of error (significance level was set at 5%),
N – size of the basic set (N=3,573).

Three hypotheses were formulated based on the available literary sources:

H1: It is assumed that family businesses prefer internal sources to external sources to finance their business activities.

According to Michiels et al. (2021), family businesses tend to shun foreign sources of financing due to the loss of freedom or partial loss of control over the family, given the increase in the power of new non-family shareholders. For this reason, it is assumed that most family businesses would refrain from using external funding sources. The root cause is expected to be emotional and moral over financial.

H2: It is assumed that most family businesses use their resources to finance their business.

Family businesses are specific in several aspects of financial behaviour and decision-making. Using explicitly owned resources to run the business is, , more costly and reduces the business's profitability. According to Michiels et al. (2017), this distinct perspective regarding financial behaviour is unique. Jia (2013) argues that family businesses need help raising long-term external funds. Based on research by several authors, including Michiels, family businesses predominantly use only their resources to run their business.

H3: It is assumed that in case family businesses draw credit, it is mainly a working capital loan.

Block et al. (2013) state that family businesses tend to innovate and expand. Growing a business can be very costly at first, which may force businesses to use working capital loans for their expansion if they cannot obtain credit for their investment needs. Jia (2013), in his research, suggests the economic growth of family businesses after utilising a working capital loan, but there are more suitable solutions in optimising the enterprise's capital structure.

3. Results and discussion

The presented research worked with a margin of error of 5% (e=0.05) along with a confidence level of 95% (z=1.96), while the sample size (N=3,573) was known. Based on the previous data, the minimum research sample was calculated to be 384 Slovak family businesses operating in the wood-processing sector. A total of 392 respondents participated in the survey, thus, the condition of the minimum research sample was met, and the results can be generalised to the entire base set, i.e., for the whole population of family businesses operating in the

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wood-processing industry. The high internal consistency of the scale used for the scaled items of the questionnaire is evidenced by the calculation of Cronbach's alpha with a value of 0.89.

Most respondents indicated that their family business was classified as either a micro-enterprise (76%) or a small enterprise (21%). Medium-sized enterprises make up 2% of the research sample, and only 1% of family businesses fit under large enterprises. Most of them operate as a limited liability company (64.5%) or in the form of a sole proprietorship (36.5%). The age of the enterprise, i.e., the length of operating on the market, is significant in terms of financing family businesses. The most common age of enterprises is between 6 to 11 years (39%), 15 % between 11 to 15 years (20%), 15% of enterprises reported a length of operation between 6 and 10 years, 14% between 16 and 20 years, 11% between 1 and 5 years and only 1% of respondents had been in business for less than one year.

According to Boateng et al. (2019), family businesses prefer to invest from their sources, especially in the initial phase of the business and become more open to financing from external sources only after a more extended period. The most significant representation in the research sample is family businesses operating in the Banská Bystrica region (36%), the Bratislava region is represented 15%, the Trenčín region has 13% representation, followed by the Nitra region with 11%. The Žilina region has a slightly smaller representation (9%), the Košice region has a similar representation (8%), followed by the Trnava region with 6% representation, and the least, only 2%, responded from the Prešov region. 58% of the respondents were family business owners, 16% were co-owners, 12% were employees, 8% were technical and economic employees, and 6% were managers. Thus, the expected intention of prioritising the questionnaire to be filled out by owners or managers was fulfilled. This was primarily to ensure the completed data's highest accuracy and ascertain family ties within the business. It is assumed that a rank-and-file employee may not have sufficient information about family ties in their company.

The hypotheses were evaluated by hypothesis testing on relative frequency (Table 1). The survey results show that family businesses use external sources only in 13% (52 enterprises) and prefer internal funding sources in 47% (184 enterprises). A combination of both was chosen by 40% (156 enterprises).

Table 1. Hypothesis H1 test

n	**p**	**p_0**	**u**	**p**
392	0.668	0.5	7.06	0.000

Source: developed by the authors

At the 5% significance level, the null hypothesis is rejected in favour of the alternative, i.e., family businesses prefer internal sources over external sources in financing their business activities. Family businesses often prefer internal financing to maintain control over the company and minimise the influence of external investors (Thiele, 2017). Another reason is quicker access to finance since raising external funds can often be time-consuming.

Hypothesis H2 assumes that most family businesses use their resources to finance their business. As many as 55%, which accounts for 216 family businesses, responded that they do not use foreign resources in their business activities. On the contrary, 45%, representing 176 family businesses, said they used foreign resources. The results of the test of the hypothesis of relative frequency are presented in Table 2.

Table 2. Hypothesis H2 test

n	**p**	**p_0**	**u**	**p**
392	0.55	0.5	2.03	0.021

Source: developed by the authors.

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At the 5% significance level, the null hypothesis is rejected in favour of the alternative, i.e., family businesses use their own resources to finance the business. According to Michiels et al. (2017) and Michiels and Molly (2017), this different perspective is unique regarding financial behaviour. Michiels et al. (2021) concur with the result of this research, as there is an inconsistency in the financing method of family businesses compared to non-family businesses.

Hypothesis H3 assumes that if family businesses take out credit, it is primarily a working capital loan. For this hypothesis, the sample of respondents was narrowed down to only those enterprises that used foreign funding sources, i.e. 176 enterprises. As the reason for taking credit, 44.3% of the 176 family enterprises that use foreign funding sources chose operational purposes. The results of the test of the hypothesis of relative frequency are presented in Table 3.

Table 3. Hypothesis H3 test

n	**p**	**p_0**	**u**	**p**
176	0.44	0.5	-1.52	0.064

Source: developed by the authors

At the 5% significance level of the test, it cannot be argued that family businesses prefer working capital loans. More information is needed to support this finding. Most of the research (Esonbaeva, 2023; Rossi and Mule, 2022; Brülhart et al., 2020) focuses mainly on examining the use of credit by family businesses in terms of time instead of its purpose.

Conclusions

Family businesses in Slovakia primarily use purely internal sources of financing for their business activities (47%), only 13% use exclusively external sources, and 47% use a combination of both. This confirms hypothesis H1, which claims that family businesses prefer internal sources to external sources of financing for their business activities. As a result, a relative aversion of family businesses to incur debt is perceived. This may result in a lower return on equity than external capital. Family businesses in Slovakia use mainly their own resources to finance their business (55%), and only 45% of family businesses use foreign resources to finance their business. This confirmed hypothesis H2, which claimed that most family businesses finance their business mainly from their own resources. This demonstrated the different behaviour of family businesses compared to non-family businesses. Family businesses in Slovakia that use foreign sources of financing were also examined in more detail. Hypothesis H3 suggested that family businesses that take advantage of credit use it as a working capital loan, i.e., associated with the day-to-day running of the business. Family businesses in Slovakia use working capital loans only in 44.3% of cases. This demonstrated a lesser need for family businesses to use foreign funds for the day-to-day running of the business.

The orientation of future research should be focused on the classification of family businesses according to the current amendment to Act No. 112/2018 Coll, on Social Economy and Social Enterprises, which clearly defines a family business in the conditions of the Slovak Republic from July 1, 2023, according to the current legislative. It would also be necessary to examine the specific causes of the aversion of family businesses to credit and other foreign sources of financing.

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DEVELOPMENT OF START-UP ECOSYSTEMS IN SELECTED COUNTRIES WITH A FOCUS ON THE CASES*

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Abstract. A study of start-up ecosystems in Latvia and Georgia provides unique insight into the development of innovations in different cultural and economic contexts. The present article aims to analyse how start-ups adapt and thrive, using case studies of three start-ups from each country. The research is based on a case study approach, which allows for a deep and multidimensional analysis of specific start-ups in Georgia and Latvia. Criteria such as innovativeness, impact on local ecosystems, and scaling potential were used to select start-ups. Various data sources were used, including interviews with founders, document analysis, and observations. Data analysis used qualitative methods, including thematic analysis, to identify key themes and relationships. The stated approach made it possible to consider each country's contextual factors and draw informed conclusions about how environmental factors influence the development and sustainability of start-ups. The results identified the main challenges the start-ups face and the opportunities they can exploit for their growth and development. Particular attention is paid to the impact of political stability, availability of funding, and the level of support from public and private entities. The study results may help develop policies to support start-ups and international investors interested in investing in new markets.

Keywords: start-up ecosystems; cases

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1. Introduction

Studying start-up ecosystems in countries with different political, geographic, and cultural contexts is essential for several reasons. Understanding how start-ups evolve in different regions helps to identify unique challenges and opportunities that may arise due to specific economic, political, or cultural conditions. This makes it possible to develop more effective strategies for supporting and developing innovation adapted to particular situations. Exploring diverse ecosystems allows countries to learn from each other. For example, the successes and failures of start-ups in one country can provide valuable lessons for other countries with similar conditions or ambitions. Start-ups often operate in a global context, and understanding different ecosystems can help companies better navigate at the international level, find partners, expand markets, and adapt to global trends (Abdelkafi & Tauscher, 2016; Geissdoerfer et al., 2018; Perdomo-Charry et al., 2023).

A detailed study and understanding of start-up ecosystems can increase the visibility and attractiveness of these countries to international investors. This can lead to an influx of investment, promoting economic growth and technological development. Start-ups can contribute to job creation and stimulate economic development. Understanding how ecosystems influence the growth and sustainability of start-ups can help to formulate policies aimed at improving the quality of life of communities (Adner, 2017; Ferreira et al., 2024; Ávila-Robinson et al., 2022; Arora & Dhiman, 2024).



Figure 1. Start-up ecosystems
Source: elaborated by the authors

Ecosystems can ensure the success of start-ups, reducing the current failure rate by approximately 90%. Even though there are significant differences between countries such as Latvia and Georgia, exploring their start-up ecosystems can offer valuable lessons and opportunities for local and international stakeholders. Analysing start-ups from these countries can effectively study start-up ecosystems, mainly if a case study analysis approach is used. Indeed, like any other method, a case study has its strengths and weaknesses. This method is widely used in the social sciences to gain an in-depth understanding of specific situations. It is a powerful tool for studying

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complex phenomena in their real-world context. A case study allows for a thorough analysis of a particular case, which provides a detailed understanding of the object or phenomenon being studied. This method considers the context of the situation, which is vital for understanding the social and cultural aspects influencing the subjects' behaviour. The researcher can use multiple data sources (interviews, observations, documents), which facilitates a multidimensional understanding of the case (Cockayne, 2019; Bărbulescu et al., 2021; Bouncken et al., 2021; Corvello et al., 2023).

By analysing unique or extreme cases, theoretical propositions can be developed or refined, which can be tested in other studies. The results of case studies often provide specific recommendations that can be useful for practitioners or policymakers. However, due to the uniqueness of each case, the study results are difficult to generalise to a broader population. Case selection, data interpretation, and the researcher's personal beliefs can influence the study's objectivity. The quality and availability of data can significantly affect the conclusions of a study. If there is insufficient data, the analysis may be superficial. An in-depth analysis of one or more cases requires significant time and resource investments. The researcher may miss essential elements or fail to consider all possible variables that influence the phenomenon being studied. Using a case study requires careful planning and clearly understanding its limitations. When combined with other research methods, a case study can significantly enhance understanding of complex social phenomena (Eisenhardt & Graebner, 2007; Geissdoerfer et al., 2018; Skawińska & Zalewski, 2020; Ferreira et al., 2024).

2. Literature review

Let us analyse the reflection of the concerns regarding the "start-up ecosystem" in the authoritative Scopus and Web of Science database. The number of publications reflecting this issue in scientific editions indexed in the Scopus scientometric database amounted to 223 articles, Web of Science – 104 articles. The number of publications increases every year.

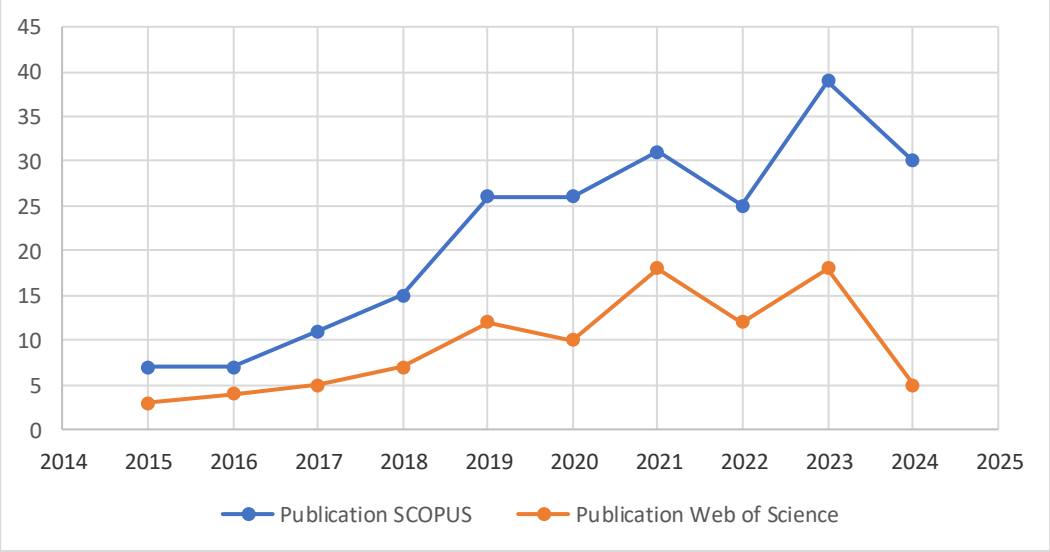


Figure 2. Documents by year, which contain the words "start-up ecosystems a case study" in the title, abstract or keywords within the Scopus and Web of Science database from 2015 to 2024.
Source: elaborated by the authors based on the SCOPUS and Web of Science database

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According to the Scopus database, researchers from the United States (30 publications), Italy (24) and Brazil (22) and the Web of Science, researchers from the United States (12 publications), England (10) and Italy (10) were the most active ones in their consideration of the issues that are of interest (See Figure 1). There are no studies on start-up ecosystems in Latvia, Georgia, or Ukraine, a case study in the SCOPUS database. In the Web of Science database, there is 1 study in Ukraine.

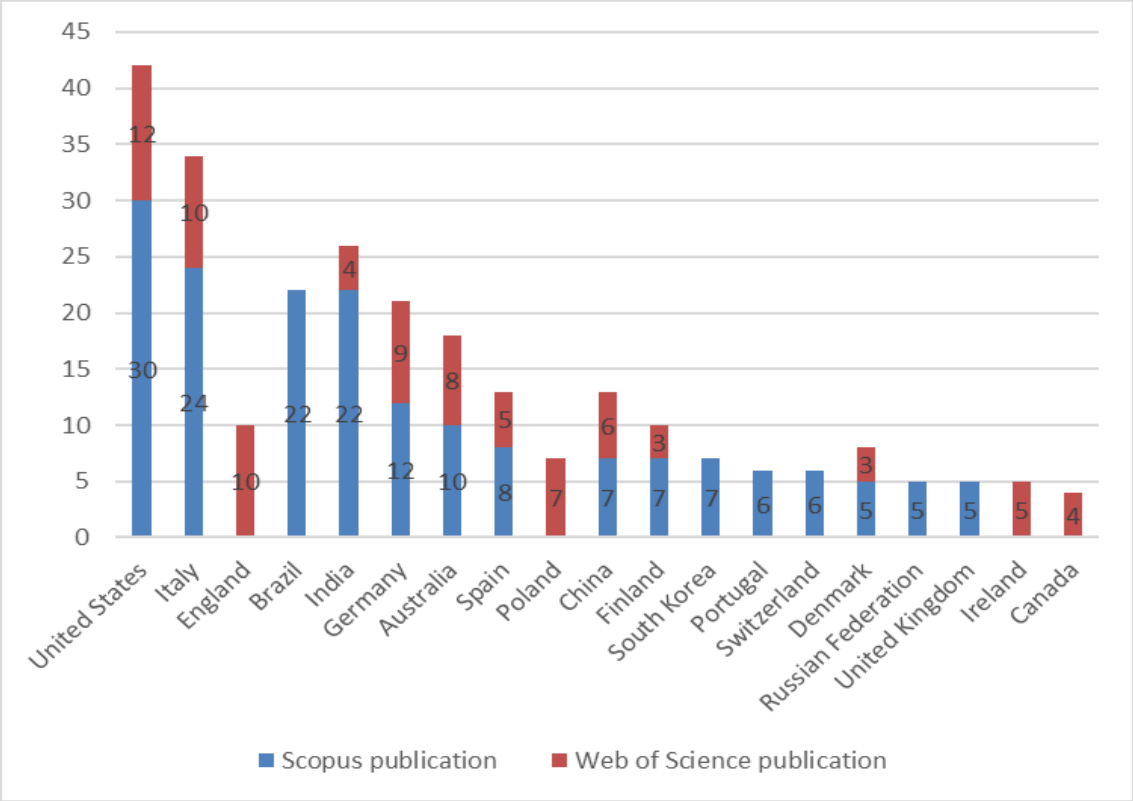


Figure 3. Documents by country, which contain the words "start-up ecosystems a case study" in the title, abstract or keywords within the Scopus and Web of Science database from 2015 to 2024.
Source: elaborated by the authors based on the SCOPUS database

The results displayed in Figure 2 confirm the high interest of scientists from various fields of science in this particular topic.

On the SCOPUS database, many publications deal with business, management and accounting (28%), followed by computer science (18%). At the same time, 11% of the total number of publications are represented by economics and other social sciences. On the Web of Science database, a lot of publications deal with business economics (41%), Environmental Sciences Ecology (9,49%), and Science Technology Other Topics (8,86%).

The analysis of publications related to "Start-up Ecosystems: A Case Study" showed that most often, researchers of this topic cite the paper of Motoyama & Knowlton (2016) "Examining the Connections within the Start-up Ecosystem: A Case Study of St. Louis". This study explores how an entrepreneurial ecosystem is structured using an exploratory and bottom-up approach. The authors apply a social network approach by analysing the connections of the ecosystem at multiple layers: (1) among entrepreneurs, (2) among support organisations, and (3) among entrepreneurs and key support organisations. Through a series of interviews with entrepreneurs and

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support organisations in St. Louis, the study discusses how support organisations in the region interacted with each other and with entrepreneurs, including explicit cross-organisational collaboration and strategic structuring of resources, significantly impacted the way that entrepreneurs interacted with one another and with organisations, thus deepening our understanding of these connections and identifying intervening points within the ecosystem (Motoyama & Knowlton, 2016).

The research paper of Leong et al. (2017), Nurturing a FinTech Ecosystem: The Case of Youth Microloan Start-up in China, describes a case study exploring the development of a FinTech company in China that offers micro-loans to college students. Five lessons learned are presented for organisations to manage the challenges better and leverage the opportunities amidst the disruption of the financial sector. The findings also shed light on how digital technology 1) offers the strategic capability for a firm to occupy a market niche in the financial sector, 2) enables the generation of alternative credit scores based on non-traditional data, and 3) improves the financial inclusion of previously excluded market segments. (Leong et al., 2017).

Ghezzi (2019) describes Digital start-ups launching original value propositions can test out and validate their business model using a recent and emerging set of practices known as Lean Start-up Approaches (LSAs), which consist of Customer Development and the Lean Start-up. While LSAs are gaining momentum in the digital start-up ecosystem, they still need better theoretical foundations and operational issues that hinder their adoption and implementation. This study aims to go beyond recalling anecdotal and single-case examples and, through mixed-methods research involving 227 digital start-ups, provide a first large-scale analysis of (i) if and how digital start-ups apply Lean Start-ups Approaches; (ii) the ensuing results; (iii) the main advantages and disadvantages that stem from adopting and implementing LSAs; and (iv) how digital start-ups connect and combine the LSAs with other entrepreneurial approaches and tools for launching start-ups. The findings reveal that most of the sample has adopted LSAs and obtained several benefits. A list of practical guidelines for solving the existing drawbacks and enhancing the effectiveness of adopting and implementing LSAs is proposed. To conclude, a framework for organising the empirical findings is put forward, where LSAs are inserted into the entrepreneurship theory debate on Effectuation, Entrepreneurial Bricolage and Opportunity Creation. Suggestions are then provided on how to sequence and bridge effectuation and causation logics and decision-making tools in an "entrepreneurial opportunity space" (Ghezzi, 2019)

In a literature review focused on start-up ecosystems, it is essential to analyse what various scholars have contributed to understanding the concept and highlight the gaps in existing research.

An ecosystem, particularly in the entrepreneurial context, refers to a network of interconnected entities interacting within a specific geographical or industry-based setting, including entrepreneurs, investors, support organisations, government bodies, and academic institutions. The key objective of the ecosystem is to foster innovation, resource-sharing, and collaboration to enable start-ups' successful emergence and growth.

Motoyama and Knowlton (2016) defined ecosystems as dynamic networks of entrepreneurs and support organisations, emphasising the critical role of cross-organisational collaboration and resource structuring. Their work provides a social network perspective that reveals how interactions between various entities shape the overall structure of the ecosystem.

In contrast, Leong et al. (2017) focused on the FinTech ecosystem, stressing how digital technology and alternative data foster inclusivity in the financial sector. This perspective highlights the ecosystem's ability to innovate and adapt through technology, driving financial inclusion for previously underserved market segments.

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Ghezzi (2019) brought up the concept of Lean Start-up Approaches (LSAs) and their relevance in digital start-ups, showing how ecosystems support methodological experimentation. The author focused on how LSAs fit into the broader entrepreneurship theory and connect with other frameworks like Effectuation and Bricolage.

Despite numerous authors studying ecosystems, gaps still require further research. Hence, there is a lack of integration between digital and traditional start-up ecosystems: while the studies emphasise traditional ecosystems (e.g., St. Louis) and digital ecosystems (e.g., FinTech), there's a gap in understanding how digital and traditional ecosystems interact, particularly in cities where technology plays a crucial role in driving business.

More exploration of cross-sector ecosystem interactions still needs to be done. Most studies focused on specific sectors like FinTech or geographic areas like St. Louis. However, comprehensive research needs more insight into how ecosystems from different industries or regions interact and the synergies that may emerge from such interactions.

Focus on the role of policy and government intervention still needs to be increased. More research is needed on how policies and government initiatives actively shape and influence the ecosystem's structure, particularly in fostering collaboration and breaking down barriers between public and private sector stakeholders.

Empirical analysis of lean start-up approaches in practice has to be deepened. While Ghezzi explores LSAs in a broad sense, there's limited empirical work on how LSAs are adopted explicitly by start-ups across diverse industries and cultural contexts and how this adoption varies by ecosystem maturity.

Building on the literature, we can define an entrepreneurial ecosystem as a dynamic network of interconnected entities - entrepreneurs, support organisations, government agencies, and investors - within a geographical or industry-specific setting, where resources, knowledge, and technology flow to support the emergence and scaling of start-ups. The ecosystem's success depends on fostering collaboration, innovation, and inclusivity through digital tools, policy frameworks, and structured entrepreneurial methodologies.

3. Theoretical basis and methodology of the research

The study used general and special methods: historical – to study the degree of knowledge of the problem; analytical-synthetic, comparative – to identify trends in start-up ecosystems based on the collected empirical material; inductive – for generalisation and systematisation of the conclusions. The typological analysis method was used to differentiate the number of international studies, and the content analysis method was used to study documents. Particular attention is paid to the study of ecosystem factors that influence the success of start-ups. Knowing these factors helps one understand the context in which start-ups develop and determine the aspects of the ecosystem that need to be improved. Ecosystem benchmarking allows one to compare start-up ecosystems in different countries or regions. Studying differences in connections, structure, and dynamics between ecosystems helps identify the strong and weak points of each ecosystem (Zaidi et al., 2023), learn from best practices (Audretsch et al., 2018), and facilitate the sharing of best practices (Lee & Shin, 2017).

Latvia is experiencing a slight decline of 8 points and ranks 47th in the Global Ranking. In Eastern Europe, Latvia dropped three positions and now ranks 10th. Riga, the capital, remains in the world's top 200 but drops 13 positions. In Eastern Europe, Riga dropped one place and took the 14th position. Riga is ranked 15th in the 3D printing industry.

Georgia has continued its positive momentum since 2022, completing a 10-point climb. Georgia continues its positive momentum for the third consecutive year. Georgia jumps one point to rank the 38th in Europe. The

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country maintains the 2nd position in the Central Asia Regional Economic Corporation (CAREC), up from the 4th in 2021. Tbilisi lost its positive momentum, declining by 12 points to rank 371st, and now ranks 5 points lower in the CAREC region at 27th place. Tbilisi excels in the cryptocurrency industry, standing 10th in Europe. (StartupBlink, 2024).

The sources of material for the empirical analysis were a wide range of official databases: international organisations (Global Competitiveness Index), Business Doing, Eurostat, Global Entrepreneurship Monitor (GEM), Global Entrepreneurship Index (GEI), Business Register; other secondary information sources, as well as personal knowledge and experience of the authors as witnesses to the transformation of the Latvian and Georgian ecosystem. Case studies are also carried out, with particular attention to the role of the entrepreneurial ecosystem in identifying and transforming opportunities and the dynamic nature of its development.

The growth trajectories of the analysed companies differ significantly, including the degree of contribution to the entrepreneurial system of Latvia and Georgia. The subject of the study was mostly ICT companies, which is primarily due to the practical significance of studying one of the fastest growing sectors, generating the main flow of innovative ideas for start-ups (including "unicorns") and transforming consumer behaviour (Venkataraman, 2004). The information and communication technologies (ICT) market includes communication services and information technologies (computers, network equipment, software, IT services). In addition, "the ICT sector has the greatest potential" (EDF, 2013), since it is home to a significant number of fast-growing companies (Mason & Brown, 2014, p. 2). The study is devoted to the analysis of cases, the selection of which used the following criteria: 1) the idea that gave impetus to the creation of the enterprise is of Latvian and Georgian origin; 2) the company provides an example of a "success story" in the ICT sector; 3) the company is among 30 start-ups that managed to attract maximum investment. The activities of start-ups were mainly analysed based on publications in the media, the websites of the companies themselves, official databases of the Register of Business Enterprises and annual corporate reports. Start-ups were analysed in the context of realising opportunities within the entrepreneurship ecosystem.

4. Analysis of start-up ecosystems by country

The article mentions various metrics and indices used to analyse start-up ecosystems. Here are some of the most important and relevant metrics that help evaluate and compare start-up ecosystems across countries:

The Global Start-up Ecosystem Index is constructed using hundreds of thousands of data points, processed through a sophisticated algorithm that considers several dozen parameters across various dimensions. The algorithm processes data from multiple sources, both public and proprietary, across different dimensions of the ecosystem. These include Start-up metrics: Number of active start-ups, success stories, unicorns, and exits; Funding and investment: Volume of venture capital, angel investments, crowdfunding activities, and public funding; Talent pool: Availability of skilled workers, particularly in technical fields like software engineering, data science, and product development; Infrastructure: Number of accelerators, incubators, co-working spaces, and innovation hubs; Regulatory environment: Ease of business formation, legal frameworks, intellectual property laws, and taxation policies; Research and innovation: Number of research institutions, R&D investments, and collaboration between academia and the private sector; Global connectivity: International reach of local start-ups, cross-border collaborations, and market access; Start-up culture and events: Frequency and scale of start-up events, hackathons, and meet-ups that foster community engagement.

The Ease of Doing Business Index, developed by the World Bank, provides a comparative analysis of the regulatory environment for business operations across various countries. It assesses how conducive or restrictive local regulatory frameworks are for business activities, measuring economies' ease of starting, operating, and closing businesses. Below is a detailed description of the methodology used to construct the index. The Ease of

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Doing Business Index data is primarily gathered from two sources: Surveys conducted with over 12,500 business practitioners, lawyers, accountants, and government officials globally. Secondary data was collected from governments, regulatory agencies, and legal texts. The World Bank's team works with local experts in each country to ensure accuracy and relevance. The index is based on ten key indicators that capture the lifecycle of a typical business, from its establishment to its closure. Each indicator is designed to assess a specific aspect of regulatory efficiency or complexity:

Global Innovation Index This index assesses the level of innovation in a count, indirectly indicating the startup ecosystem's quality and innovative photosystem. It includes indicators related to technical innovation, research and development.

Global Competitiveness Report provides data on the competitiveness of a country, including infrastructure, the stability of the macroeconomic environment, and the health of education, which are essential for supporting start-ups.

Latvia and Georgia have come a long way towards creating a favourable business environment, achieving low levels of corruption, and significantly simplifying bureaucratic procedures. In 2020, Georgia ranked 7th in the Ease of Doing Business Index, and Latvia ranked 19th (Ease of Doing Business), (World Bank, 2020).

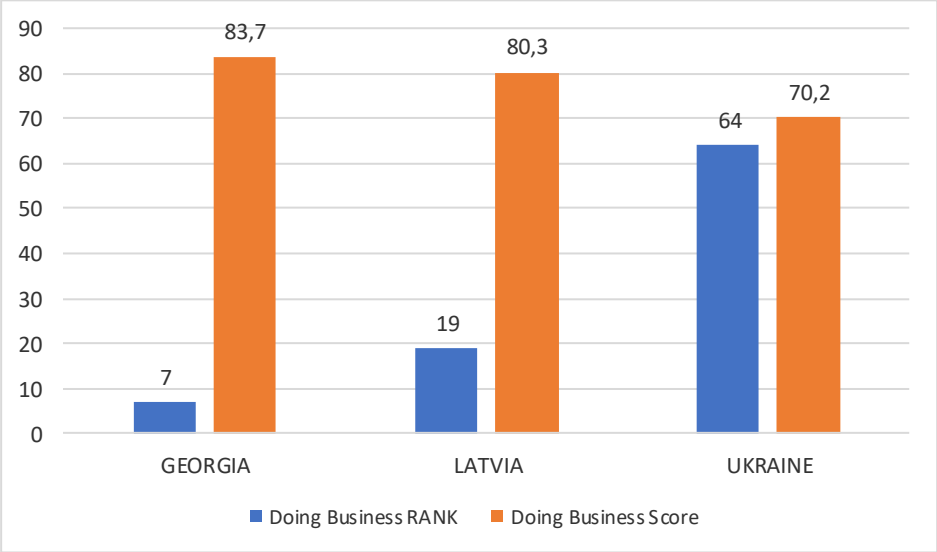


Figure 4. Ease of Doing Business rankings.
Note: Initially, the authors intended to study Ukraine's ecosystem; alas, due to the invasion of Russia, such analysis becomes not relevant
Source: elaborated by the authors based on (World Bank, 2020)

Today, 99% of government services can be obtained online. Administrative procedures are kept to a minimum. For example, as part of the Start-up Visa program, foreigners are given equal opportunities as Latvian citizens to create their businesses online, which has been used by about 21,000 e-residents (Freedomhouse, 2017). In Latvia – Getting Electricity, Dealing with Construction Permits, Resolving Insolvency. In Georgia – Resolving Insolvency, Trading across Borders, Getting Electricity (WEF, 2018).

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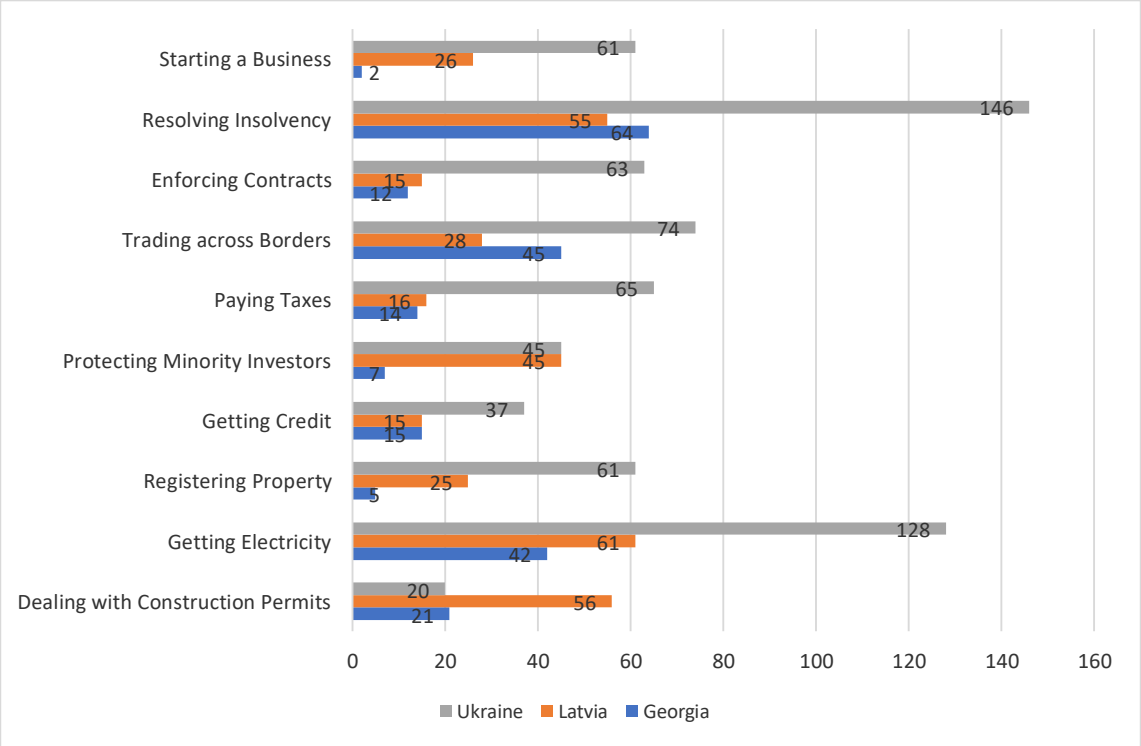


Figure 5. Doing Business rank, 2020*
Note: Initially, the authors intended to study Ukraine's ecosystem; alas, due to the invasion of Russia, such analysis becomes not relevant
Source: elaborated by the authors based on World Bank, 2017

The experience of three countries can serve as a successful example of moving away from the typical development trajectory of a small market through government support for globally oriented sectors of the national economy.

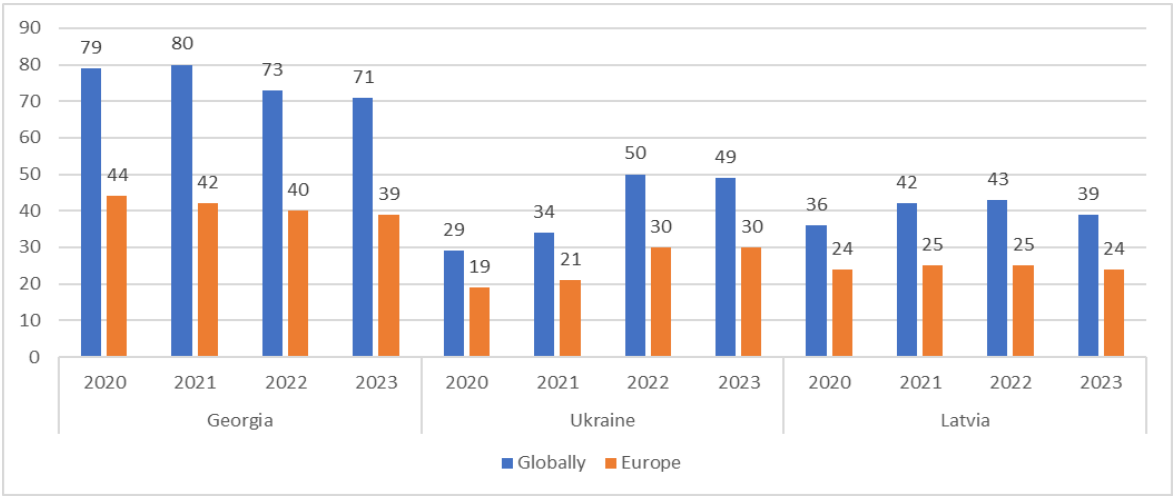


Figure 6. Global Start-up Ecosystem Index 2023
Note: Initially, the authors intended to study Ukraine's ecosystem; alas, due to the invasion of Russia, such analysis becomes not relevant
Source: elaborated by the authors

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The Global Start-up Ecosystem Index report evaluates start-up ecosystems of 1000 cities and 100 countries. Among the countries in the report, start-up ecosystems are presented: Latvia and Georgia. At the same time, all countries entered the top hundred ecosystems of the world.

Table 1. Innovation economies by income group

GII rank	Economy	Score	Income group rank	Region rank
37	Latvia (High-income)	39,7	35	24
65	Georgia (Upper middle-income)	29,9	14	8

Source: elaborated by the authors on Global Innovation Index 2023

However, for a deeper understanding of the dynamics of the ecosystem, it is essential to analyse several specific cases that demonstrate the main trends and changes in the entrepreneurial ecosystem and the behaviour of its direct participants – ICT companies.

Printify: a revolution in the Printing Industry in dropshipping.

Printify was founded in 2015 Riga, Latvia, by A. Kehris, G. Dukurs, and J. Berdigans.(Dienas Bizness, 2020, 2022). Later, it established its headquarters in San Francisco, California. (THE BUSINESS JOURNALS, 2019) It is headed by J. Berdigans (IR, 2021) In May 2018, Printify received an investment of $1 million to expand its services to the United States. (Start-ups, 2018). The following year, it received an additional investment of $3 million, including from H&M. (ProQuest, 2019). (Delfi Bizness, 2019). In November 2020, Printify relocated its headquarters to Spikeri, Riga. It was also included in the “Financial Times” list in 2020. In October 2021, Printify received an investment of $45 million in Series A funding (ENG.LSM.lv., 2021; (Management Today, 2022).

Printify is a print-on-demand platform that allows anyone to create and sell customised products with their designs. It integrates with various e-commerce platforms such as Shopify, Etsy, and WooCommerce and offers a wide range of products, including t-shirts, mugs, phone cases, and more. In the 2020 "Financial Times" list of the fastest-growing technology companies in the US, "Printify” was ranked 15th, according to Labs of Latvia. On the other hand, in the US business magazine "Inc." in the top of 5000 fastest growing companies published last August, the company was ranked 24th. The top was created based on the turnover data of companies from 2015 to 2018, wrote Labs of Latvia. Printify is a Latvian start-up that is changing the e-commerce industry.

Printify was created to disrupt the overly complex printing and gift industry so creative minds, time-strapped entrepreneurs, and everyone can do what they do best: create great products, drive sales, and run their businesses.

Printify operates on a drop shipping model, i.e., the company does not manufacture or stock products. Instead, it partners with suppliers who print and ship products to customers on demand. Printify profits from the difference between the price customers pay and the price it pays its suppliers.

The Latvian start-up has raised $45 million in Series A funding*. The round was led by "Index Ventures", with participation from "H&M Group", "Virgin Group", and several angel investors from the tech and entertainment sectors. It is one of the largest Series A funding rounds in the Baltics this year. The company plans to use the funds to expand into global markets.

Dino Becirovic, CEO of “Index Ventures”, points out that the start-up has removed all barriers to product creation and enabled more than two million content creators to start successful product businesses. “Over time, as more

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producers join the network and new technologies and production methods become available, Printify will enable everyone to realise their boldest product ideas." In January 2021, “Index Ventures” named Latvia the most start-up-friendly country in Europe (LIAA, 2021).

“Printify” headquarters is located in Latvia. Still, it employs almost 500 specialists worldwide, doubling the number of employees in the last year and planning to continue expanding the team. Last year, the company’s team grew from 100 to 300 employees within a year. (LIAA, 2020). At that time, J. Berdigans admitted that rapid growth is a big challenge, primarily related to the pandemic caused by COVID-19 and one of its consequences – the e-commerce boom. Currently, 500 people are working in the “Printify” team. The start-up has over 70 open positions in product management, programming, marketing and design. Almost every one of these positions provides opportunities for remote work. Printify is available in over 150 countries and supports multiple languages. The company has offices in the US, Latvia and China. One priority area is expanding its presence in the European market. Although most entrepreneurs use the Printify platform in the US, the partner base continues to expand geographically. It aims to cover new regions, providing customers with even more high-quality products. There are currently 67 suppliers of printing products in more than 100 locations worldwide.

Printify has become a unicorn and has received numerous awards and recognitions. In 2023, the company was named a finalist in several categories at the Latvian Start-up Awards, highlighting its importance and success in the startup ecosystem. This recognition comes from their innovative approach to print-on-demand, which has significantly impacted the e-commerce space by providing powerful tools for small businesses and solopreneurs worldwide.

Printify, as a well-known Latvian unicorn start-up, has attracted the attention of many researchers and analysts, especially regarding its impact on the e-commerce industry and innovation in print-on-demand. This interest is due to several factors:

1. Innovative model: Printify is changing how manufacturing and distribution are done, making it an interesting case study in business models and start-up ecosystems.
2. Impact on the economy: As a unicorn start-up, Printify significantly impacts the Latvian economy and the global market, making it essential for economic research.
3. Role in the start-up ecosystem: Printify is an example of a successful start-up from a small country, making it a valuable case study for international entrepreneurship and innovation research.

Optio.AI: a revolution in the sales industry

Optio.AI is a Georgian fintech start-up that develops AI-powered products to automate sales and customer service through virtual assistants known as chatbots. The start-up was founded by Giorgi Mirzikashvili and Shota Giorgobiani in 2016 and has received significant support, including legal support from leading Georgian law firm McGill. Optio.AI was also the first fintech start-up in Georgia to receive the international ISO/IEC 27001 certification, which confirms the company's high level of information security management. Optio.AI offers two key products: the Optio Insight sales growth and automation platform and Optio Conversation, a virtual automated customer service assistant. These products are used by banks and other institutions for which information security is critical.

Optio.AI provides digital banking solutions using analytics and artificial intelligence to improve customers' banking experience. The company's core product is chatbots that analyse bank accounts, customer spending habits, and goals and offer budget plans and recommendations to maintain healthy financial discipline. These tools help bank customers make informed financial decisions, which creates value for both the customers and the banks by improving their service and increasing customer satisfaction. Optio.AI monetises by selling

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subscriptions to its products to financial institutions, including banks and other lending institutions. In addition, the company generates revenue by licensing its technology and providing consulting services in data management and artificial intelligence.

Thus, Optio.AI not only creates unique solutions for the fintech sector but is also actively expanding its capabilities by attracting investments and expanding its presence in the market. (Valuer, 2022). Optio.Ai is one of the leading fintech companies in the region. The company is based in the capital of Georgia, Tbilisi, and, so far, has received over $116,000 in funding. The company's developments include chatbots that analyse customers' bank accounts, spending habits, and financial goals, offering optimised budget plans and recommendations for maintaining a healthy financial state. Optio.AI is focused on providing financial technology solutions, especially through its chatbots that help users manage their finances. Their initial market focus is Georgia, but they also plan to expand to the US and European markets. The primary target audience is consumers looking to manage their finances through digital platforms better. Over time, the company aims to offer its products to a wider range of users outside of Georgia, with plans to scale to other countries.

Optio.Ai received the "Best Digital Transformation Project of the Year" award at the 13th awards ceremony in Cybersecurity and IT Innovations. This prestigious recognition highlights the commitment of Optio.AI to innovation and its success in delivering transformative solutions that enable businesses to achieve their goals Forbes Georgia. (Forbes, 2017). Through its product development, Optio.AI continues to innovate in the marketing space, focusing on solutions that improve efficiency, optimisation, and customer satisfaction.

Grammarly: a revolution in education

Ukraine now suffers an invasion of Russia. There are several start-up companies in Ukraine that are unicorns. We will describe the case of one of them, the first Ukrainian unicorn – Grammarly (Grammarly, 2024). The company was created in 2009 by three Ukrainians – Maksym Lytvyn, Oleksiy Shevchenko and Dmytro Lider. (UCLUSTER, 2020) At first, the start-up was called MyDropbox. Its idea was to prevent plagiarism in academic works. Therefore, after some time, the company Blackboard, which provides educational services, acquired this start-up. To date, the given start-up has developed an online service that helps users improve texts in English using artificial intelligence. The service checks and corrects grammar and style and provides advice to help avoid these mistakes. It was valued at over $1 billion in investor circles in 2019. Over 500 employees work in the company's four offices – Kyiv, San Francisco, New York and Vancouver. (Grammarly, 2024).

Grammarly is a popular writing assistant that uses artificial intelligence to help people improve their writing skills. Grammarly operates on a freemium subscription-based SAAS business model (basic features are free, and premium features require payment) (https://businessmodelanalyst.com/grammarly-business-model/). Premium Subscriptions: individual users can access the basic features provided by Grammarly for free. However, they can upgrade to a premium version to get more advanced features, such as plagiarism detection, vocabulary suggestions, and writing style checks based on genre. In addition to subscriptions, Grammarly also makes money by licensing its software to universities and offering expert writing services. These services include professional proofreading, editing, and writing support for businesses and individuals. Grammarly also makes money from professional writing services provided by real people. In mid-November 2021, the popular automated text editing tool Grammarly raised $200 million in funding, valuing the start-up at $13 billion (TADVISER, 2024). New investors included Baillie Gifford and BlackRock. The company plans to use the raised funds to accelerate the introduction of innovative products and grow the team in general. (TADVISER, 2024. BlackRock.)

According to Forbes, the company's estimated capitalisation in 2024 is $8.1 billion; in 2023, it will be $9.8 billion (FORBES, 2024). AI technologies are used to write texts. The service has gone beyond correcting grammar and

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helps improve the clarity, interest and tone of writing. Grammarly is based on artificial intelligence and can analyse complex aspects of language and communication. The start-up serves more than 30 million customers worldwide. (MKS GUIDE, 2023) The company has about 700 corporate clients, including Cisco, Boeing, Dow Jones, Dell, Expedia, Salesforce and leading US universities. Grammarly plans to use the investment to improve its technologies further to solve language and communication problems. In particular, it will continue to work on the tone detector and further product development for business clients.

Some of Grammarly's most significant competitors include:
ProWritingAid is one of Grammarly's biggest competitors, offering similar features and tools for grammar checking, writing style analysis, and more. ProWritingAid is best suited for long-form content. However, it is an excellent option for shorter formats as well;
Microsoft Word and Apple Pages – built-in grammar checkers that offer many of the same tools as Grammarly. However, they are not as comprehensive as Grammarly and do not offer as many additional features;
WhiteSmoke – a grammar checker that offers a range of features, including grammar checking, plagiarism detection, and more. However, it is not as user-friendly as Grammarly and can be challenging to navigate;
Ginger – a grammar checker that offers features similar to Grammarly, including grammar checking, spelling correction, and more. However, it is not as comprehensive as Grammarly and does not offer as many additional features. (PAYSPACE, 2022):

The rationale for case selection: The selected start-ups (Printify, Optio.AI, Grammarly) are chosen based on their success and recognition in their respective ecosystems. These start-ups exemplify how a well-developed ecosystem can help grow and propel start-ups to success.

Lessons and recommendations from Latvia (using Printify as an example) – dropshipping model: Printify successfully uses the drop-shipping model, minimising the risks and costs associated with producing and storing goods. This allows the company to focus on design and marketing. Global scaling – Printify has started operations in a small country and has successfully entered international markets, emphasising the importance of a worldwide orientation even for start-ups from small countries.

5. Research results and discussion

In this study, the research aimed to uncover the relationship between a country’s entrepreneurial ecosystem and the success of individual start-ups. While the ecosystems of the countries under study (Latvia and Georgia) were not the direct focus of the research results, the findings reveal significant insights into how these ecosystems indirectly contribute to the success of start-ups.

Latvia’s start-up ecosystem can become one of the country's core economic engines. With easy access to Europe, availability of skilled IT talent, a multilingual population, and an affordable cost of living, the potential of Latvia's start-up ecosystem is clear.

Ukraine is experiencing an invasion now. Before the war, the country managed to create a start-up ecosystem that was both scalable and global. Some examples of impressive start-ups originating in Ukraine are People.ai, Grammarly, Gitlab, and Ahrefs, all with massive global member bases. A primary reason for Ukraine's previous success is the talent of its developers, who are sought after by many foreign companies, either remotely or in local development centres.

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Georgia provides a good model for Central Asia's open and transparent economy. The Ministry of Economy and Sustainable Development is focused on supporting start-up ecosystem development, primarily through its subdivision, Georgia's Innovation and Technology Agency (GITA). Some of the organisation's initiatives include pre-acceleration and acceleration programs, boot camps, and community events for start-ups and investors. Furthermore, Start-up Georgia continuously gathers data about investments, funding, failures and exits of Georgian tech start-ups to showcase the state of the ecosystem reliably.

With a high-income economy, Latvia ranks 24th in the Global Start-up Ecosystem Index 2023, and Georgia, with an upper middle–income – 39th place.

The study contributes to the existing literature by contextualising how entrepreneurial ecosystems in small markets, such as Latvia and Georgia, can produce globally successful start-ups. It challenges the notion that large, well-established ecosystems are the only environments conducive to producing unicorns and highlights the potential of emerging markets.

One of the novel insights is the importance of global connectivity. The research shows that start-ups in small countries can succeed globally by leveraging international networks of investors, customers, and partners. This finding suggests that global outreach can compensate and enable success even with limited local resources.
Impact of Ecosystem Evolution: The research also highlights how ecosystems evolve and how this evolution impacts start-up success.

Having studied the presented cases of start-ups from Latvia and Georgia, the following similarities and differences in their approaches and development conditions can be highlighted:

Similarities of all three start-ups. All three start-ups actively use the latest technologies (e.g., print-on-demand at Printify, artificial intelligence at Optio.AI, and artificial intelligence for text checking at Grammarly) to solve specific problems or improve service quality. Even though the start-ups are based in different countries, they are all focused on the international market, emphasising the start-up ecosystem's global nature. Each of the start-ups successfully attracted investments to provide the companies with the capital necessary for developing their projects, which indicates a high level of investor confidence in innovative projects from different countries.

Differences of the studied start-ups lie in the following areas.
Fields of activity and products – Printify is engaged in on-demand printing, Optio.AI focuses on AI-powered fintech solutions for the banking sector, and Grammarly offers tools for checking the grammar and style of texts. This diversity shows the specifics of each country's ecosystem and the different directions of the development of tech start-ups.
Scope of growth and development – Printify has reached the status of a "unicorn" and is expanding into international markets; Grammarly has also achieved significant global influence, while Optio.AI, although successfully developing and attracting investments, has a more limited presence in the market.
Influence on local ecosystems – each start-up contributes to the development of the start-up ecosystem of its country in different ways. For example, Printify stimulates the development of the e-commerce industry in Latvia,

Optio.AI actively contributes to developing the fintech sector in Georgia, and Grammarly contributes to improving technological literacy and communication skills at the international level. These differences and similarities highlight the unique opportunities and challenges of different geographic and cultural contexts and trends in the global start-up ecosystem.

Studying the start-up ecosystems of Latvia and Georgia allows us to identify several lessons and recommendations that can be useful for the development of start-ups in other countries and regions.

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Conclusions

Different stages of ecosystem evolution generate different entrepreneurial opportunities. The integration of industry ecosystems has become closer — educational, entrepreneurial, engineering, design, etc. — through the establishment and implementation of long-term programmes for the development of the ecosystem as a whole (digital telecommunications), the education system (ICT) and entrepreneurial skills at all levels, the use of a long-term approach and stimulation of human capital development. The role of integration of local and global entrepreneurial ecosystems has increased. The growth of foreign investment, including in start-ups, indicates increased trust. In addition to the combination and maturity of factors that determine the emergence of windows of opportunity, the interaction of all components of the entrepreneurial and other ecosystems is of decisive importance.

The study of start-up ecosystems in Latvia and Georgia, based on the analysis of the cases of Printify, Optio.AI and Grammarly, allows us to draw the following key findings and determine their significance for understanding the development of start-up ecosystems in these countries:
Adaptability and Innovation: All three start-ups demonstrate high innovation and adaptation to changes in the global economic environment. Using cutting-edge technologies, such as artificial intelligence and e-commerce platforms, highlights their ability to develop technologies and adapt products to market needs rapidly.
Globalisation and Scaling: Despite their geographical and economic differences, start-ups from Latvia and Georgia have successfully entered international markets, demonstrating the global potential and international competitiveness of start-ups from these countries.
Attracting Investments: All three companies have attracted significant investments, indicating the trust of international and local investors in start-ups from these regions. It also reflects the founders' ability to convince investors of the potential of their business models and growth strategies.
Social and economic impact: The start-ups significantly impact local economies through job creation, attracting foreign investment and promoting technological development. They also improve the quality of life and access to innovative services.

By analysing the described cases, other start-ups and policymakers can learn from successful projects and understand potential challenges and barriers to scaling and international success. Support Strategies: Provides evidence of the effectiveness of specific start-up support policies, such as tax incentives, grants for research and development, and simplification of the process of obtaining international certifications. Cultural and Economic Adaptations: Highlights the importance of considering cultural and economic specificities when developing and adapting products for different markets, which is critical for start-ups seeking to globalise. Overall, this analysis confirms that start-ups from Latvia and Georgia are actively shaping the tech landscape of their countries and making a significant contribution to the global start-up community through their innovation, adaptability, and strategic approach to scaling and international growth.

The findings from the analysis of the start-up ecosystems in Latvia and Georgia provide valuable information that can be used to shape and improve start-up support policies. Here are some key areas where this data can be applied:

Formation of targeted support programmes. Investment incentives: The successful attraction of investments by start-ups such as Printify and Grammarly highlights the need to create attractive conditions for investors, including tax incentives, grants and subsidies that can stimulate venture financing. Innovation grants: Developing new technologies requires significant research and development expenditures. Providing grants and funding for research and development can help start-ups survive the initial stages of innovation development and commercialisation.

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Improving the regulatory environment. Simplifying procedures: Reducing the bureaucracy of company registration, obtaining patents, and certifying products can make it much easier for start-ups to launch and expand. International standards: Supporting start-ups in obtaining international certifications, as Optio.AI has done, can increase their competitiveness and credibility in the global market.

Human capital development. Educational programmes: Investing in academic programmes focusing on developing technology, entrepreneurship, and innovation skills can prepare the talent base needed to grow the start-up ecosystem.
University partnerships: Encouraging collaboration between start-ups and academic institutions to conduct joint research and develop new technologies.
Facilitating international expansion. Export support: Creating programs that help start-ups find partners abroad and adapt products to new markets. International partnership networks: Developing networks with international accelerators and incubators to share knowledge and resources.

Suggested directions for further research:
Analysis of support effectiveness: Regularly analyse the results of the application of support policies to determine their efficiency and possible improvements.
Comparative studies: Research of successful international practices and their adaptation to local conditions.
Long-term market research: Monitoring and analysing trends in developing global start-up ecosystems to anticipate changes in the industries where local start-ups are active.
Applying these approaches and directions in start-up support policy can significantly improve the conditions for developing innovative entrepreneurship and promote economic growth and technological progress in the country.

The research has provided a nuanced understanding of how entrepreneurial ecosystems in smaller markets contribute to start-up success. The novelty of the findings lies in the contextual analysis of these ecosystems and their ability to produce globally competitive start-ups despite the inherent challenges of smaller markets. However, the study's limitations highlight the need for further research to explore these ecosystems more broadly and understand other start-ups' diverse experiences within these environments. This study is a foundation for future research and offers valuable insights for policymakers and entrepreneurs looking to foster thriving start-up ecosystems in similar contexts.

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DYNAMICS OF HUMAN CAPITAL DEVELOPMENT AND COMPETITIVENESS IN SELECTED EUROPEAN COUNTRIES

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Abstract. Human capital is currently considered one of the fundamental factors determining countries' competitiveness and economic prosperity. Interest in this category has arisen due to globalization and permanent technological changes that emphasise the knowledge and skills of the workforce. Most countries invest in education, health care, research and development, or support cultural development to increase human capital in society and thus contribute to improving their competitiveness in the world market. This article focuses on identifying the level of human capital in seven European countries (the Czech Republic, Germany, Hungary, Poland, Romania, Slovakia, and Sweden), comparing it with the level of competitiveness within them, as well as identifying changes in the development of the mentioned variables in the monitored countries. The research was carried out during the period of 2013 - 2022, based on statistical data from Eurostat and data reported by the World Competitiveness Center. The level of human capital and competitiveness, as well as the dynamics of their development, was assessed using standardized variable method, comparison method, one-factor analysis of variance, and convergence method. The findings show that countries with above-average levels of human capital also show above-average levels of competitiveness. At the same time, those with below-average levels of human capital also show below-average levels of competitiveness. One-factor analysis of variance, however, indicates that there is no statistically significant change in the level of human capital or in the level of competitiveness in the monitored countries in the period of 2013 - 2022, which was also confirmed in the area of competitiveness by using the convergence method. On the one hand, the observed stability in development can be perceived positively, especially in highly developed countries. On the other hand, the lagging countries should try to keep the current development level and look for improvement opportunities to approach the most developed countries gradually.

Keywords: competitiveness; Germany; human capital; Romania; Sweden; V4

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1. Introduction

The competitiveness of economies is an essential indicator of the position of countries on a global scale. Globalization and technological progress have brought increasing interest in this category. As a result, the tendency to compare the status of individual economies is growing stronger. Despite the lack of a uniform definition of competitiveness, several factors that are considered relevant from the point of view of its evaluation have been established. In addition to economic performance, prosperity, social or political stability, and many others, one of the key determinants that affect the competitiveness of any economy is human capital, which depends on the ability of society to adapt to changes flexibly. Human capital, like competitiveness, is a very complex concept. Increasing its level is achieved by investing in areas that have a greater or lesser impact on its creation, maintenance and use, which implies that it, in turn, has a negative impact on economic performance.

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For this reason, the issue of human capital and its impact on competitiveness is constantly relevant, and increasing its level becomes one of the main priorities for all countries whose goal is to improve their competitiveness and ensure consistent, sustainable economic growth. In this context, it is therefore important to analyze the interrelationships between human capital and competitiveness, as well as the dynamics of the development of these variables in individual countries. At the same time, it is essential to bear in mind that the concept of competitiveness cannot be understood in an absolute sense; therefore, to label a country as competitive or uncompetitive can only be done in comparison with other countries.

Based on the mentioned facts, the main goal of this article was determined: to identify the level of human capital of seven European countries (the Czech Republic, Germany, Hungary, Poland, Romania, Slovakia, and Sweden) and to compare it with the competitiveness of the mentioned countries through the evaluation of normalized indicators. Subsequently, an analysis of the dynamics of the development of these variables in the monitored countries was carried out. To fulfil the set goal, the standardized variable method was used, which offered the possibility to evaluate data that were expressed in different units equally. In addition, the comparison method was used to compare the situation in individual countries and, finally, one-factor analysis of variance was used, by which it was possible to compare the average values of indicators in particular years in the monitored countries and assess whether there were statistically significant differences between them. The results of the one-factor analysis of variance were further verified in the field of competitiveness by the convergence method. The literature review in this article covers various theoretical approaches to the issue of competitiveness and human capital. Further, it specifies these concepts, discussing the sub-factors that affect competitiveness and human capital. The methodological part describes the choice of methods used to process data taken from Eurostat and the World Competitiveness Centre, as well as the reasons that led the researcher to choose the chosen methods. In the results section, the positions of the countries are compared in terms of the achieved level of human capital and competitiveness, and an analysis of the dynamics of the development of these investigated variables is offered. Subsequently, in the discussion, the results are compared with the studies of other authors. The conclusion states the limitations of the conducted research and the future possibilities of its direction.

2. Theoretical background

In the 21st century, when globalization and technological progress constantly influence the economic environment, the question of the competitiveness of individual countries is increasingly coming to the fore. Although the concept of competitiveness is very complex and there is no uniform definition of it, several factors have been established that are most often taken into account as determinants of competitiveness. According to Syromyatnikov et al. (2021), national competitiveness is widely seen as a set of institutions, management trajectories and other factors, including investment growth, progress in integration, development of innovation in production with a low level of productivity, etc., which largely influence the level of productivity of a country. However, the IMD World Competitiveness Centre (2023) draws attention to the fact that competitiveness cannot be assessed only based on economic performance and productivity. Although these are undoubtedly its important determinants, in addition to them, it is also necessary to take into account the political, cultural and social dimensions, so that the compiled competitiveness rankings reflect not only the economic performance of countries but also their ability to manage their competences to achieve long-term value creation. Competitiveness is perceived similarly by Vîrjan et al. (2023), who claim that although economic performance affects competitiveness, the relationship between these units is complex and dependent on a number of other factors. Therefore, if the goal of individual countries is to increase competitiveness, they must adopt a comprehensive strategy that will take into account not only economic performance but also a number of other social and environmental determinants. Despite the fact that competitiveness is not recommended to be assessed only on the basis of economic performance, as stated by Merdic and Hodzic (2021), its increase directly contributes to the support of economic growth. The same opinion is shared by Minhaj and Ahmed (2023), who claim that sustainable economic growth is essentially the driving force of success, as various factors that contribute to a country's competitiveness on a global scale depend on the rate of economic growth. Based on the above, the competitiveness of economies can be simply interpreted as a key factor on which the country's ability to attract investments, support and develop innovations or ensure sustainable economic growth depends. One of the decisive elements that currently affect the competitiveness of countries is the level of human capital. According to Bąk et al. (2022), human capital as an element of intellectual capital enables better adaptation of

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society to changing economic conditions at a reasonable level. The increase in human capital is the factor that most reduce inequality and most increases economic growth, thus contributing to the promotion of competitiveness. For this reason, it is recommended that public policies focus more on the development of human capital (Gaona & Vásquez, 2021). Titanic and Obadic (2015), who deal with the relationship between human capital and competitiveness in EU countries, find out that most of the new EU member countries have lower competitiveness than the old member countries. The reason is that they invest much more in infrastructure and the environment than in human capital. At the same time, most old member countries know the importance of investing in human capital. Human capital is defined as the combination of an individual's natural talent and abilities and the skills that an individual acquires during life through upbringing and education. This combination is completed by the individual's state of health (OECD, 2007), and thus, it plays a vital role in the economic development of countries. Education, health, and other factors that contribute to human capital development are often considered high-return investments.

Regarding human capital, attention is most often focused on education, especially tertiary education. According to Alam (2023), education promotes economic growth. This statement is also supported by other studies, such as Doré and Teixeira (2023), who agree that formal education is critical to growth. Still, at the same time, they emphasize that attention must also be focused on a range of factors in the field of education, such as teacher training, strengthening the school educational environment or reducing the inequality of opportunities. It means that not only quantity but also the quality of education matters. This statement is also supported by Pritchett (2024), who, following education and its support, states that attention should not be focused only on investing in education but also on its results, such as creating valuable skills. Leite & Cardoso (2023) deal with the issue of education in relation to the economic performance and competitiveness of economies. They present the results that the expansion of human capital leads to the improvement of the overall economic structure of the country, so it can be assumed that it also increases its competitiveness. According to them, investments in education, expanding its availability, and developing opportunities in research and development, where educated people can express themselves, should be supported. The positive influence of a high educational level on the development of the national economy was also noted by Mulliqi et al. (2018). They state that in individual countries, there is a clear positive relationship between the workforce's level of education and the economy's competitiveness. Economies with more tertiary-educated people tend to fare better in competitiveness assessments compared to countries where only a smaller proportion of the workforce is tertiary-educated. Although the focus is primarily on tertiary education, it should not be underestimated that, in addition to a relatively high number of educated people in the economy, there is also a relatively high number of people without education/only with basic education. As Carillo (2024) argues, while highly educated individuals are the driving force of technological innovation, a labour force without adequate education can hinder the adoption of these innovations, and thus, the effect that can flow from individuals with high levels of human capital is lost.

However, as the OECD (2007) definition shows, education and support in this area are not the only factors determining the level of human capital in countries. Equally important attention must also be directed to the field of healthcare. According to Avdeeva (2024), the level of education and health of individuals are the main elements forming the basis of human capital, which is one of the factors of the economic prosperity of countries. Shuyong et al. (2024) in their study point to the fact that the government's investments in healthcare have a demonstrably positive effect on the growth of the level of human capital, which in turn has a supporting effect for economic growth as well. Railaite and Čiutienė (2020) confirm that public administration spending on healthcare has a positive and significant effect on life expectancy, while the increase in life expectancy is associated with the extension of the active action of human capital on the labour market.

On the other hand, Jiang and Wang (2023) draw attention to the risks of excessive public expenditure on healthcare. According to them, although insufficient public expenditure on health in the short term hinders economic growth to a certain extent, the pressure to increase public expenditure on health could be counterproductive in the long term. Although increasing expenditure can contribute to improving the level of health of individuals, enriching medical and health resources and thus promoting the accumulation of human capital, it also brings a significant economic burden on public finances, which can have a negative impact on

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economic development when diverting fewer financial resources to other, equally important areas for the development of human capital.

The situation where excessive investments were directed to the health sector in individual countries was visible during the recently ongoing COVID-19 pandemic. However, at that time, in addition to the fact that other areas were deprived of financial resources, one could also discuss the effectiveness of the investments in the health sector, since a significant part of it could only be aimed at ensuring anti-pandemic measures. Other studies point to the close connection between the field of education and the field of health. According to Baldanzi et al. (2021), there is a complementary relationship between education and health: if parents want to have better-educated children, they also increase investments in health. Such investments in health have a positive effect on long-term economic growth since it can be assumed that when people are healthier, they are more productive, and this fact could contribute to economic prosperity. On the other hand, Kirkpatrick et al. (2020) see the low level of education and poor health of the population as the main cause of differences in competitiveness between individual regions of the EU.

Although the majority of authors dealing with the issue of human capital examine its creation, maintenance and use mostly only in connection with its main determinants, such as the level of education, health or innovation ability, some pay attention to other aspects as well. One of them is culture. According to Bucci & Segre (2011), among other factors, investments in culture represent one of the essential engines of long-term economic growth. Culture generates significant economic income and stimulates the production of new ideas, technologies, etc., which contributes to the development of human capital in companies. At the same time, the World Competitiveness Centre (2023) considers the cultural dimension as important in relation to national competitiveness.

Debrah et al. (2018) state that human capital development and innovation are key determinants of international competitiveness. Much attention is focused on research and development as a basic prerequisite for creating innovations in connection with innovation capability. As reported by Islam et al. (2024), individual countries should allocate sufficient financial resources to support research and development since this is one of the main ways to ensure technological and infrastructural progress and thus support sustainable economic growth and overall competitiveness. The country's economic development, especially in the short term, depends primarily on the degree of orientation of educational and other state policies to ensure sufficient efficiency and intensity of investment in human capital (Koryakov et al., 2022). Other studies also support this idea (Nezhnikova, 2020; Di Cataldo & Rodríguez-Pose, 2017; Linhartová, 2020), which emphasize the importance of investments in individual areas determining human capital. Most studies examine human capital and its development only in relation to economic performance, while only a few ones (Mourao & Popescu, 2023; Liutak et al., 2023) focus on human capital and investments in it in relation to the overall competitiveness of countries. This fact thus provides considerable space for conducting research into this area.

This article will examine the impact of human capital on the competitiveness of the economies of seven European countries (the Czech Republic, Germany, Hungary, Poland, Romania, Slovakia, and Sweden) based on a comparison of the standardized values of indicators that can influence the level of human capital with the standardized values of WCI for the period of 2013 -2022. Since human capital is a very complex concept that includes many aspects, in this research it will be evaluated through the development of the level of several of its determinants, such as life expectancy, public administration expenditure on healthcare, population with tertiary education, population with lower than primary education, primary and lower secondary education, public administration expenditure on education, investment in research and development, as well as expenditure on culture. In the next part of the article, the focus will be on identifying the existence of statistically significant changes in the level of human capital or competitiveness in the monitored countries.

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3. Research objective and methodology

This article aims to identify the level of human capital in seven European countries (Czech Republic, Germany, Hungary, Poland, Romania, Slovakia, and Sweden) and to compare it with the competitiveness of the mentioned countries through the evaluation of normalized indicators, and subsequently to identify the dynamics of the development of the mentioned variables in the monitored countries. Key factors influencing the level of human capital and the World Competitiveness Index (WCI) were included in the assessment. The analyzed period was 2013-2022, while statistical data from Eurostat and data reported by the World Competitiveness Centre were used. The choice of countries was not random. The researchers aimed to show how the V4 countries stand in the evaluation compared to the countries that are generally considered to be the most/least developed within the EU countries.

According to the definition of Becker (1975), human capital is a qualitative characteristic of an individual. It is necessary to express it quantitatively to evaluate it in relation to other variables. Since there is no definite agreement on how the level of human capital can be expressed most objectively, as it depends on many determinants, the researcher decided to use the standardized variable method to evaluate its level. This method is used where it is necessary to assess data expressed in different units. When implementing this method, it is necessary to distinguish between maximizing and minimizing variables. When calculating the standardized score, the relationship is then based on:

if x_j is the maximizing variable: $z_{ij} = \frac{x_{ij} - \overline{x_j}}{s_j}$

if x_j is the minimizing variable: $z_{ij} = \frac{\overline{x_j} - x_{ij}}{s_j}$

where $\overline{x_j}$ is the arithmetic mean, s_j is the standard deviation.

To express the level of human capital, the values of seven partial indicators were normalized. While in six cases, they were maximizing variables (life expectancy, public administration expenditure on health, share of the population with tertiary education, public administration expenditure on education, research and development expenditure, public administration spending on culture) and in one case, it was a minimizing variable (the share of the population with lower than primary education, primary and lower secondary education). Subsequently, for better data comparability, also the values of the world competitiveness index were standardized.

In the next part of the article, a statistical analysis of the competitiveness of the monitored seven EU countries is presented. The researchers' intention was to find out whether there were statistically significant changes in the competitiveness of the mentioned countries during the period 2013-2022. To carry out a statistical analysis of the competitiveness, a one-factor analysis of variance (ANOVA) was used. This method enabled the researcher to compare the average values of the competitiveness of the examined economies between individual years and determine whether the differences between them are statistically significant. First, the null and alternative hypotheses were formulated:

H0: There is no statistically significant change in the competitiveness of countries in individual years.
H1: There is a statistically significant change in the competitiveness of countries in individual years.

One-way analysis of variance (ANOVA) was also used to evaluate human capital. The researcher investigated whether there were statistically significant changes in the level of human capital in the seven countries monitored between 2013 and 2022. In this case, the hypotheses were formulated as follows:

H0: There is no statistically significant change in the level of human capital in the observed countries in individual years.
H1: There is a statistically significant change in the level of human capital in the observed countries in individual years.

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By performing a one-factor analysis of variance, the researcher was able to identify how dynamic the development of the level of human capital and competitiveness was in individual countries during the monitored period. Therefore, the results of this analysis were intended to clarify whether the development of the selected variables in the monitored countries is stable or whether there are larger or smaller fluctuations that can tell about the specifics of individual economies.

In the area of competitiveness, the researcher subsequently verified the findings from the one-factor analysis of variance using the convergence method. First, the β-convergence method was applied, where the calculations were based on the regression equation:

$(1/ T)^* \log (Yi,T / Yi,0) = \alpha + ß * \log Yi,0 + \gamma * Xi + Ui$
Subsequently, based on the relation $(1/ T)^* \log (Yi,T / Yi,0) = \alpha + ß * \log Yi,0 + Ui$ σ-convergence was calculated.

4. Results

First, the level of human capital in the monitored countries was expressed. Table 1 introduces the standardized values of indicators affecting the level of human capital, which are cost indicators (expenditure of the Ministry of Health, education, culture and research and development) and result indicators (expected average life expectancy, share of the population with tertiary education, share of the population with less than primary, primary and lower secondary education) (Kwon, 2009). This procedure for each partial indicator allowed the researcher to monitor the position of each country in the particular area compared to the average.

Table 1. Standardized values of indicators affecting the level of human capital for the monitored countries (2013-2022)

	Average Life Expectancy at Birth	Public Administration Expenditure on Health	Share of the Population with Tertiary Education	Share of the Population with Lower than Primary Education and Primary and Lower Secondary Education	Public Administration Expenditure on Education	Expenditure on Research and Development	Public Administration Expenditure on Culture
The Czech Republic	0.213	0.010	-0.491	1.271	-0.299	-0.293	-0.120
Germany	1.081	1.351	0.255	-0.407	0.630	1.200	0.482
Hungary	-0.904	-0.789	-0.336	-0.493	-0.542	-0.596	0.240
Poland	-0.321	-0.808	0.421	0.927	-0.552	-0.661	-0.603
Romania	-1.287	-0.962	-1.425	-1.604	-0.903	-0.847	-1.333
Slovakia	-0.493	-0.442	-0.447	0.884	-0.526	-0.673	-0.637
Sweden	1.711	1.641	2.022	-0.578	2.192	1.870	1.970

Source: the researchers' own processing of data taken from Eurostat (2024)

The standardized values of the partial indicators affecting the level of human capital in the seven countries for 2013-2022, as stated in Table 1, provide a more detailed overview of how the individual countries manage to develop human capital. The stated standardized values of the partial indicators represent modified data that allow a direct comparison of the monitored countries in all areas, regardless of the original measures and units. The normalized values show significant differences among the compared countries in the monitored period. These differences can be caused by various factors, e.g. different approaches of the governments of the individual countries to support the selected areas. For better clarity of the position of the countries within the partial indicators, a ray graph based on a simple visualization, which enables a comparison of the performance of the monitored countries within the selected seven partial indicators, is introduced.

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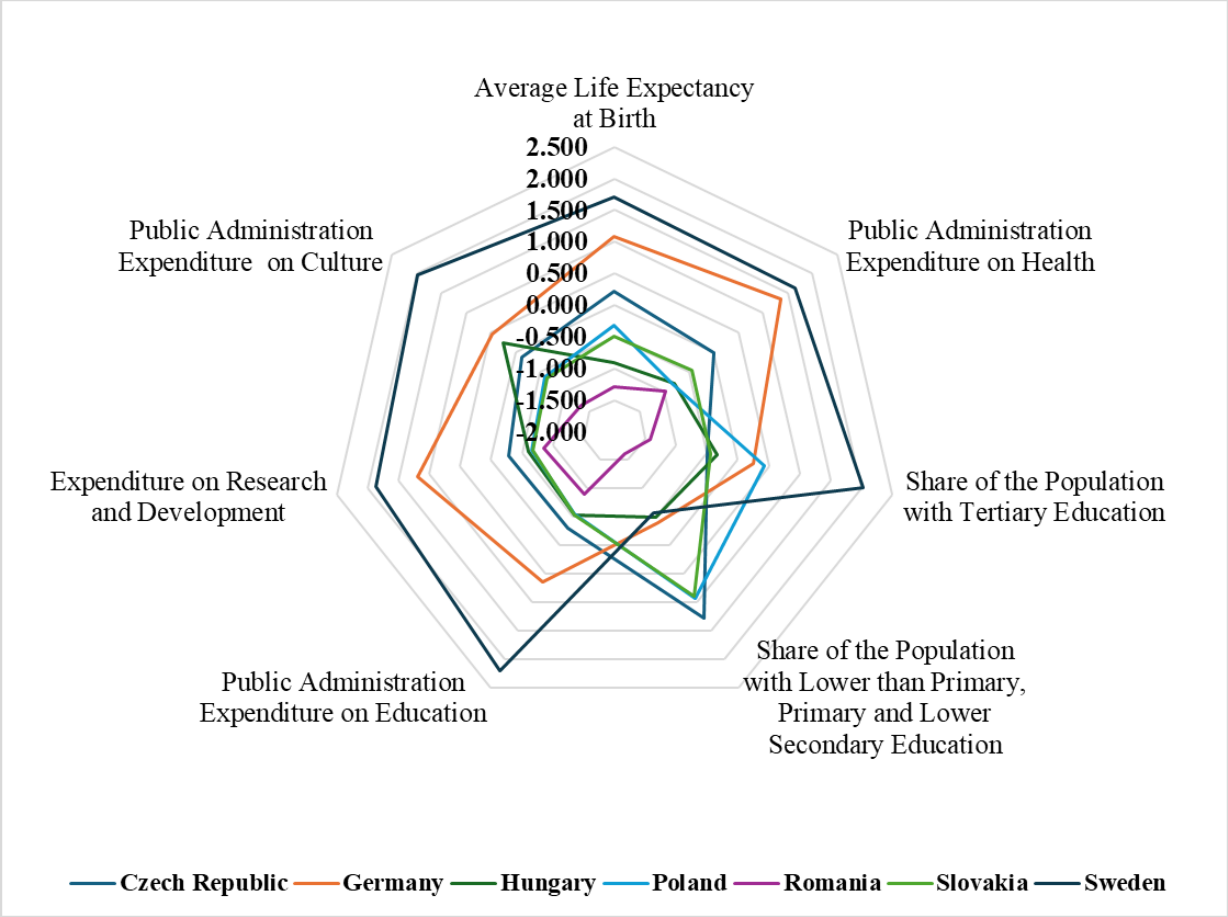


Figure 1. Visualization of the results within the partial indicators
Source: the researchers' own processing

In Sweden, the highest normalized score values were recorded for most indicators, except the share of the population with less than primary, primary and lower secondary education. This indicates the potential of this country to develop human capital. The high value of the standardized score, especially in the field of education (share of the population with tertiary education, public administration expenditure on education), indicates a strong orientation of the country towards increasing the educational level in society. However, even though there is a large number of people with higher education in the Swedish population, there is also a surprisingly large number of people with lower than primary education, elementary and lower secondary education, which, according to Carillo (2024), can represent an obstacle to the further development of the country. Thus, Sweden ranked second to last in the evaluation of this indicator. Germany, like Sweden, showed above-average normalized score values for most indicators, although it lagged behind Sweden. The smallest difference in the normalized score between these countries was observed for health expenditure, which, in absolute terms in recent years, has been even higher than in Sweden. However, due to lower health expenditure in the pre-pandemic period, Germany failed to overtake Sweden in the 2013-2022 summary evaluation. The relatively high value of the normalized score in Germany for expenditure on health and research and development may indicate the priority focus of the German government's policy. The Czech Republic showed the highest values of the normalized score among all monitored countries for the share of the population with lower than primary education, primary and lower secondary education. In other words, the Czech Republic showed the smallest share of such individuals in the population. Their low share is positive for every economy because such individuals often have difficulties succeeding in the labour market, and, as already indicated in the literature review, they can hinder the introduction of innovations (Carillo, 2024). The Czech Republic also showed average to slightly above-average values of the normalized score in the area of average life expectancy and public administration expenditure on health. This may be a signal that the Czech Republic will prioritize support in this area but has fallen behind in public administration investments in education, culture, as also in

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investments in research and development. However, the lowest normalized score within the monitored indicators was reported for the share of the population with tertiary education with a value of -0.491. For Hungary, an above-average normalized score was recorded only for public administration expenditures on culture. In the remaining areas, Hungary reported below-average values for 2013-2022, with max. - 0.904 for life expectancy. The low value of the normalized score even for public administration expenditures on health indicates that the development of health care is not a priority for Hungary. In Poland, two above-average values were recorded in the normalized score – for the share of the population with lower than primary education, primary and lower secondary education and the share of the population with tertiary education, where it stood out in the evaluation better than, e.g., the Czech Republic or Germany. This fact indicates that the orientation of the countries is mainly in the field of education. In Slovakia, all values of the normalized score, except the share of the population with lower than primary education, primary and lower secondary education, where Slovakia ranked third, were negative. The situation was similar in Romania, which showed a deeper below average than Slovakia in all evaluated areas. The below-average values of the normalized score within individual indicators indicate that these countries face significant challenges in the area of human capital development.

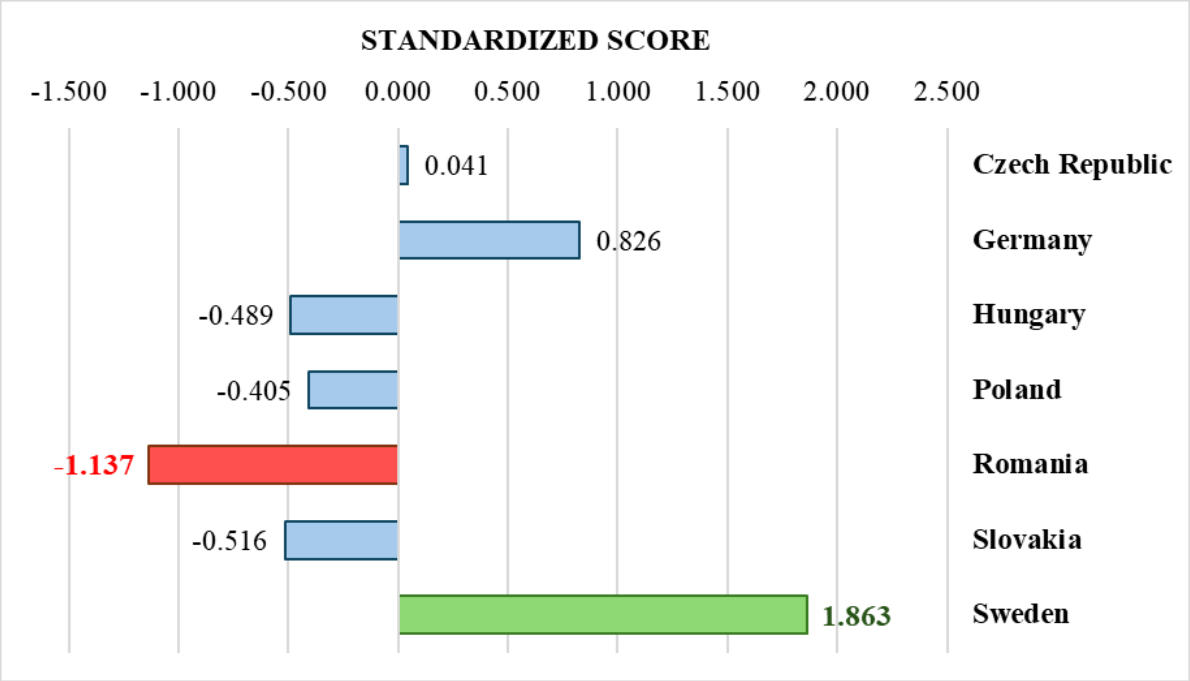


Figure 2. Normalized scores for all areas
Source: the researchers' own processing

Figure 2 shows normalized integrated values of the seven indicators affecting the level of human capital in the seven European countries for 2013-2022. The measured values shown in the graph are therefore a dimensionless number - an integral indicator that includes all monitored areas (life expectancy, public administration expenditure on health, share of the population with tertiary education, share of the population with lower than primary education, primary and lower secondary education, public administration expenditure on education, research and development expenditure, public administration expenditure on culture). The normalized values are visualized in a horizontal bar graph, where the x-axis shows the normalized values achieved by the monitored countries and the y-axis shows the individual countries. The normalized values can be negative or positive, reflecting whether countries lag behind the average in human capital development, or, on the contrary, perform better than the average. Sweden achieved the highest positive normalized score (1.863), significantly outperforming other countries, including Germany, with the second-highest score (0.826). However, based on the values achieved, it can be concluded that the difference between the two countries was enormous in favour of Sweden. According to the aforementioned evaluation, Sweden has created the best conditions for the development of human capital, and it also performed best in the evaluation of most partial indicators affecting the level of human capital. The exception is the value of the share of the population with lower than primary

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education, primary and lower secondary education. However, Germany, with a plus score, can also be evaluated as a country with effective investments, especially in the area of health and a policy aimed at promoting human capital. Germany reported the second-highest normalized scores in five of the seven partial indicators. Among the countries with a positive score, the Czech Republic was only slightly better than the average with a value of 0.041. This value indicates that the Czech Republic lags significantly behind Germany and Sweden, and there is still considerable room for improvement, but compared to the remaining countries (Poland, Hungary, Slovakia, Romania), it has created better conditions for the development of human capital. Although the Czech Republic shows slightly below-average results in several partial indicators, the summary value of the normalized score is positive, on the basis of which the situation in the Czech Republic cannot be evaluated as negative. Although the Czech Republic lags behind the most advanced countries, it can be assumed that there is room for improvement that can be implemented in a relatively short time. The remaining monitored countries showed a negative normalized score, which means that they are below the average and the conditions they create for the development of human capital lag behind those created by Sweden, Germany or the Czech Republic. Poland shows a negative score with a value of -0.405, i.e. it ranks fourth among the seven monitored countries in the evaluation of human capital. Poland lags behind the average in several areas, but compared to Romania, this lag is not dramatic. The situation is similar in Hungary, which reached a score of 0.489, and in Slovakia, with a score of 0.516. In these countries, the conditions for the development of human capital are below average compared to Romania (-1.137), but it must be noted that all V4 countries still performed relatively well in the evaluation, and - with the exception of the Czech Republic - they create similar conditions for the development of human capital. Romania, with the lowest score of -1.137, shows the biggest deficit in the conditions for human capital development. This indicates significant deficiencies and the need for fundamental improvement in this area to approach the rest of the countries.



Figure 3. Normalized Score - World Competitiveness Index (2013-2022)
Source: the researchers' own processing

Figure 3 shows the normalized scores of the World Competitiveness Index (WCI) for the years 2013-2022 for the seven EU countries. The horizontal x-axis shows normalized WCI values, the vertical y-axis shows the individual countries. As in the previous case, the normalized values can be negative or positive based on which it is possible to evaluate how well the country performed in comparison with other countries. Sweden showed the highest positive normalized score (1.517) overall for the monitored years 2013-2022, which means that it is the most competitive country among the countries monitored. It also performed best in the evaluation of indicators affecting the level of human capital; based on this fact, it can be concluded that the creation of suitable

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conditions for the development of human capital is reflected in the overall competitiveness of the country. Germany showed the second highest positive value of the normalized score (1.126) so it can also be marked as a country in which the development of human capital is reflected in its competitiveness in an adequate way. The last country where a positive, more precisely slightly above-average normalized score (0.113) was recorded was the Czech Republic. Within the monitored countries, the Czech Republic can also be marked as competitive but with some room for improvement. In the assessment of the level of human capital, it also showed a slightly above-average score. With minimal deviations for a positive value, in both comparisons, it was third among the seven countries. The remaining four countries showed a negative normalized score, i.e. they are below the average in the WCI comparison for the years 2013-2022. Poland achieved a normalized score of -0.256. Although it is below the average and is less competitive than the Czech Republic, Germany or Sweden, the lag is not very significant. Hungary's result (-0.690) already indicates a significant lag in the area of competitiveness. In the assessment of competitiveness, according to the normalized score, it ranks fifth among the seven countries examined, as well as in the assessment of the level of human capital. Romania (-0.882) and Slovakia (-0.927) showed the lowest negative scores in the evaluation of the competitiveness of the economy. These two countries fared the worst in the evaluation of the level of human capital, although Romania showed significantly worse results than Slovakia. Based on the comparison of the location of the countries in the two investigated areas, it is possible to state that the level of human capital in them correlates to a certain extent with their competitiveness but this relationship is not entirely clear-cut. It can be seen that despite the fact that Hungary, Poland and Slovakia showed similar scores when evaluating the level of human capital, greater differences were noted among them when evaluating competitiveness.

The standardized values of partial indicators affecting the level of human capital for the period 2013-2022 and their comparison with the standardized values of the World Competitiveness Index (WCI) for the same period in the seven EU countries pointed to significant differences among the analyzed countries. With regard to the results, it can be assumed that the creation of suitable conditions for the development of human capital can indeed be one of the factors that affect countries' competitiveness. Sweden and Germany have an above-average level of human capital and an above-average level of competitiveness, so it can be assumed that their high level of human capital is clearly reflected in their competitiveness. On the other hand, countries with a negative score, such as Slovakia and Romania, show a below-average level of human capital and a below-average level of competitiveness. However, it is not the case that the country with the worst-rated human capital is also the least competitive.

Significant differences in the level of human capital as well as in the level of competitiveness were found among the monitored countries. Since the researcher assumed that the goal of lagging countries should be to catch up with the most developed countries gradually, the next step was to identify whether there are statistically significant changes in the level of human capital, or competitiveness in the monitored countries in the period 2013-2022. The changes would indicate that the lagging countries really tend to approach the developed countries.

Table 2. One-factor analysis of variance of competitiveness for the years 2013-2022

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	965.839	9	107.3154	0.492703	0.873785	2.040098
Within Groups	13068.57	60	217.8096			
Total	14034.41	69				

Source: the researcher's own processing of data taken from https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-competitiveness-ranking/ (2024)

Table 2 offers the results of a one-factor ANOVA for the analysis of the competitiveness of the monitored countries between the years 2013-2022. The variability among the groups (965.839) is relatively low in comparison with the overall variability. The variability within the groups (13068.57) is relatively high which

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means that most of the variability in the data is caused by differences within the given year, or differences in competitiveness among the countries, and not by differences among the individual years. The F-statistic reached a value of 0.4927, which is less than the critical value of 2.04, i.e., the differences between the average values of competitiveness in the individual years are not large enough to be statistically significant. The p-value is 0.87, which is more than the chosen level of significance $\alpha = 0.05$. Based on the above results, the null hypothesis that there is no statistically significant change in the competitiveness of the countries among the individual years can be accepted. That means that the average competitiveness is the same in all years and does not differ in any of them. It follows that the competitiveness of the Czech Republic, Poland, Hungary, Germany, Romania, Slovakia and Sweden did not change significantly during the years 2013-2022 and maintained relatively stable values. This can be positive for countries that have a high level of competitiveness and are focused on maintaining their current levels. However, it is not positive for the countries lagging behind; their goal should be to increase their competitiveness significantly. Therefore, the goal of further research could be to analyze the factors that can have an impact on competitiveness in the mentioned context and to find out whether – alike competitiveness - they develop consistently or whether there are certain deviations in their development despite the fact that this is not reflected in changes in the level of competitiveness.

Table 3. One-factor analysis of variance of the level of human capital for the years 2013-2022

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.00558	9	0.00062	0.00061	1	2.0401
Within Groups	61.3827	60	1.02305			
Total	61.3883	69				

Source: The researchers' own processing of data taken from https://ec.europa.eu/eurostat/web/main/data/database (2024)

Table 3 shows the results of one-factor ANOVA for the analysis of the level of human capital in the monitored countries for the period 2013-2022. The between-group variability (0.00558) is very low in comparison to the total variability (61.3883), while the within-group variability (61.3827) is almost identical to the total variability. This suggests that most of the variability in the data is due to the differences within a given year, which means differences in the level of human capital among the countries rather than differences among the years. The low value of the F-statistic (0.00061) compared to the critical value (2.04) signals that the differences among the average values of human capital in the individual years are not significant enough to be considered statistically significant. The p-value (1.0) is higher than the established level of significance $\alpha = 0.05$ so there is not enough evidence to reject the null hypothesis. It can be concluded that there is no statistically significant change in the level of human capital in the monitored countries in the studied period. The level of human capital in the Czech Republic, Poland, Hungary, Germany, Romania, Slovakia and Sweden did not change significantly in the period 2013-2022 and remained relatively stable, similar to the level of competitiveness. Such a result can be caused by the fact that the factors that formed the basis for assessing the level of human capital developed relatively consistently, and there were no significant fluctuations within them. This, similar to the case of competitiveness, can be positive for the countries with a high level of human capital, such as Sweden or Germany, but not for the countries that lag behind in their development.

When investigating the development of competitiveness, the results obtained from the one-factor analysis of variance were further refined by the convergence method.

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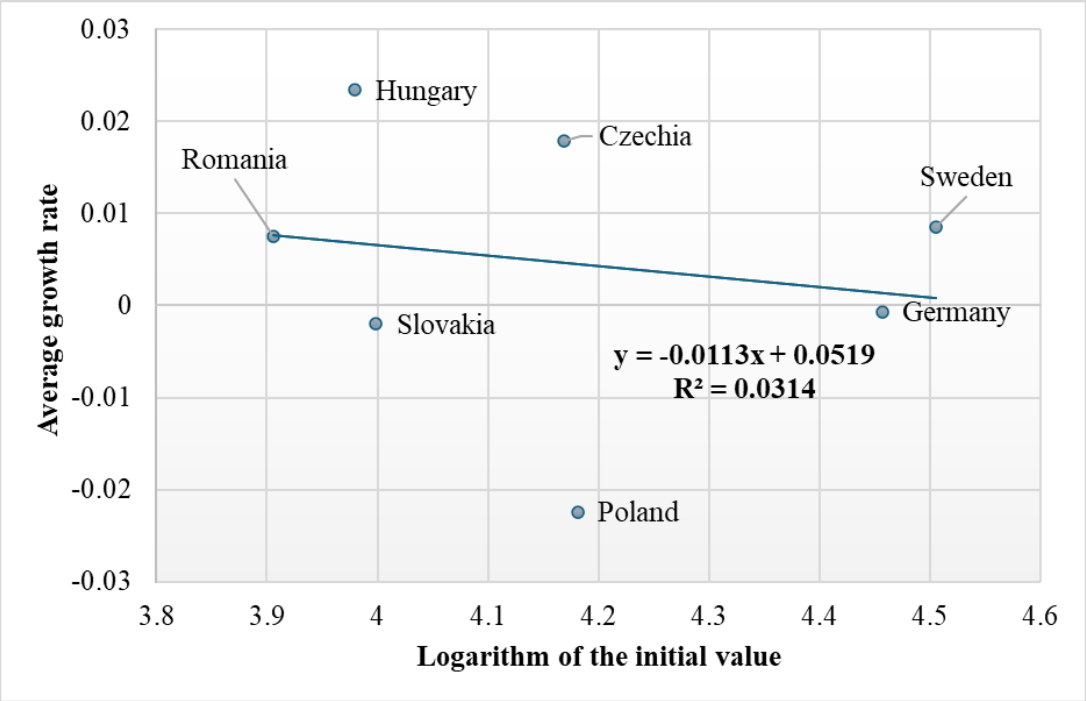


Figure 4. β - convergence in the field of competitiveness
Source: the researchers' own processing

Figure 4 introduces the results of β - convergence. The linear regression function, which took the form y = -0.0113x + 0.0519, has a decreasing tendency, which means there is a prevailing tendency towards weak convergence. This fact is confirmed by the negative coefficient - 0.0113. Overall, it can be concluded that the countries with a higher initial value of competitiveness had lower growth rates. The highest average growth rate was recorded by Hungary (2.34%) and the Czech Republic (1.79%), followed by Sweden (0.85%) and Romania (0.75%). A decrease in competitiveness between 2013 and 2022 was recorded in the remaining countries. In Germany (-0.06%) and Slovakia (-0.19%), the decrease was only insignificant; however, in Poland (-2.24%), it was more significant. The coefficient of determination reached a value of 0.0314. That means that the model explained only 3.14% of the total variability. Based on this, it can be concluded that the convergence results are insignificant, and the results of the one-factor analysis of variance were confirmed, which proved that there is no statistically significant change in the level of competitiveness in the monitored countries. A low value of the coefficient of determination may indicate that factors other than the initial level of competitiveness may have a more significant impact on increasing competitiveness, and thus the selected model could be improved in the future by including additional variables.

Since beta convergence evaluates the development of variables only on the basis of their initial and final state, which subsequently also indicates the rate of growth, it was supplemented by sigma convergence, which is based on standard deviations.

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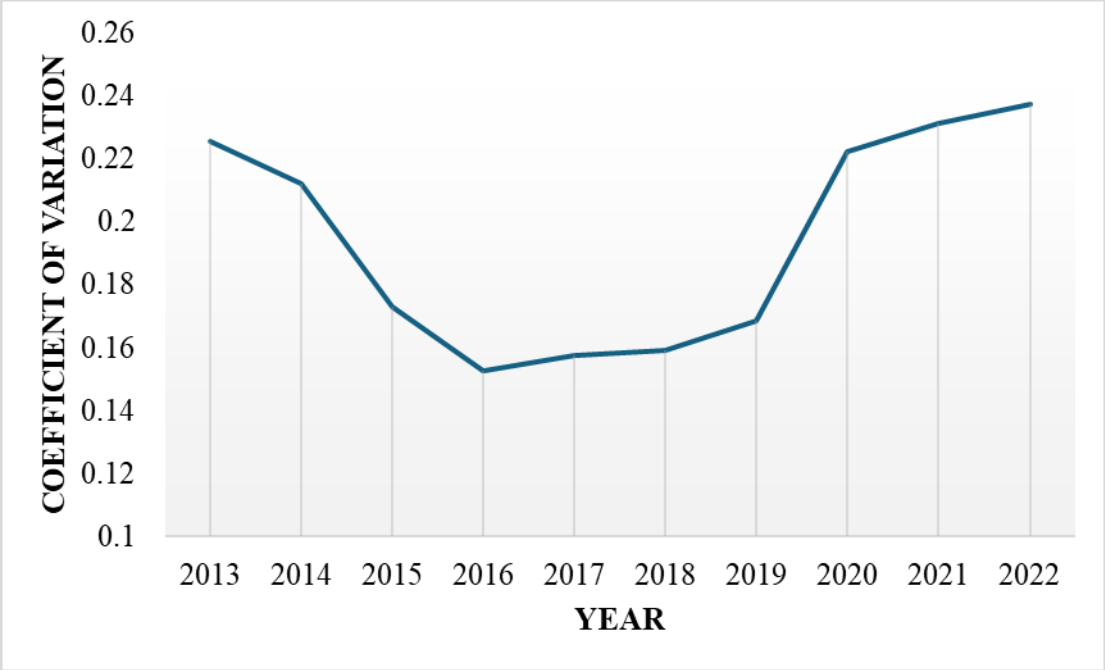


Figure 5. σ – convergence in the field of competitiveness
Source: the researchers' own processing

Figure 5 shows that the sigma convergence had an overall slightly increasing tendency in the observed period (from 0.225 in 2013 to 0.237 in 2022). However, as the graphic representation shows, until 2016, the differences in competitiveness between the seven monitored countries were decreasing that is the countries were getting closer to each other. In this period, the coefficient of variation decreased to 0.152. Subsequently, until 2018, the values of the coefficient of variation had been relatively stable which indicates that there were no significant changes in competitiveness among the monitored countries. Starting from 2019, the coefficient of variation began to grow, reaching a value of 0.237 in 2022. That shows that the differences in competitiveness between the monitored countries increased, which indicates a tendency for divergence in the period of 2019-2022.

5. Discussion

Multi-criteria methods, which include the normed variable method on which the research study is based, guarantee a certain degree of objectivity. On the other hand, subjectivity can be present in the evaluation by reflecting on the selected indicators (Ivanová & Masárová, 2018). In addition to the indicators, Laifa and Benhassine (2023) point out the possible degree of subjectivity when using multi-criteria methods. In this research, this fact mainly referred to expressions of the level of human capital, which can be evaluated on the basis of a considerable number of determinants. To reduce the degree of subjectivity as much as possible, the researcher chose those determinants that were most often investigated in various studies (see literature review) - life expectancy, public administration expenditure on healthcare, population with tertiary education, population with lower than primary education, primary and lower secondary education, public administration expenditures on education, investments in research and development, as well as expenditures on culture. Considering the standardized values of the partial indicators affecting human capital, where Sweden and Germany had the first two places among the seven examined countries in the evaluation of expenditure indicators for all four of them (public administration expenditure on health, education, culture and research and development expenditure) it can be stated that the most advanced economies realize that investment in areas which contribute to the development of human capital is the basis for the future economic advancement of countries (Nezhnikova, 2020; Koryakov et al., 2022) and should not be seen as a burden but as an investment - even though their effects are not manifested immediately but only after a certain time (Augustia et al., 2020). The position of Germany and Sweden not only in the evaluation of the partial indicators but also within the aggregate score of human capital and the level of competitiveness is not accidental. Other authors, such as Minhaj & Ahmed (2023), also consider investments in human capital and the development of other related areas

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as key aspects to achieve maximum economic growth and secure an advantageous position in the competitiveness rankings. If we look at the result indicators within the partial indicators, it is necessary to state that the researcher's findings are in accordance with Mulliqi et al. (2018), who claim that countries with a larger number of university-educated population (Sweden) achieve higher competitiveness compared to countries in which a relatively small part of the population has university education (Romania). Considering the overall results of the countries in the field of human capital and their comparison with the results in the field of competitiveness, it can be assumed that the creation of suitable conditions for the development of human capital may indeed be one of the factors that affect the competitiveness of countries. In the countries where the level of human capital is above average (especially Sweden and Germany but also the Czech Republic), the level of competitiveness is also above average, and vice versa in the countries where the level of human capital is below average, the level of competitiveness is also below average (Poland, Hungary, Slovakia, Romania). Based on this, this research identifies with Schwab and Zahidi's (2020) statement that human capital is one of the key drivers of economic prosperity and productivity and thus of the overall competitiveness of countries. The results of the one-factor analysis of variance show that there is no statistically significant change in the level of human capital or in the level of competitiveness in the monitored countries in the individual years. In the field of competitiveness, the results were further refined by the convergence method, which confirmed the previous finding. Similar to Miron et al. (2022),, who applied the convergence method to GDP development, no evidence in favour of absolute β - convergence was found. Stable development in the field of competitiveness as well as in the field of human capital can be viewed positively on the one hand - especially in the case of highly developed countries - but lagging countries should try not only to maintain the current level but also to look for opportunities for its improvement and more dynamic progress. This is also emphasized by Sener and Delican (2019), who also state that support for increasing competitiveness is more demanding in less developed countries than in the most developed countries. That is why less developed countries should create mechanisms that will enable them to maintain and support their level of competitiveness. Moreover, although the findings show that the level of human capital in the monitored countries did not change significantly. Miron et al. (2022) emphasize the role of human capital as a strategic element of competitiveness in strengthening the process in which lagging countries catch up with advanced countries. Most studies assess human capital in relation to the overall competitiveness of countries, which represents a broader approach - comparing to the usual focus on economic performance. However, the main contribution of this study lies in the proposed research design, which is described in detail in the methodological section of this study. The level of human capital is not expressed through complex indexes, such as the HCI, which is usually given by the World Bank, or the HDI, which is given by the UN. In this study, a less traditional approach was used, and a standardized variable method was used to express the level of human capital, which is not commonly used for this purpose. Another applied research procedure was also different from other similarly oriented studies. Most of them, such as Elistia and Syahzuni (2018), evaluate the interrelationship of the examined variables through causal analysis. Still, our research used comparative analysis, which was complemented by a number of other methodological procedures. These procedures were described in detail in the methodological section.

Conclusions

The aim of this study was to identify the level of human capital in seven European countries (Czech Republic, Germany, Hungary, Poland, Romania, Slovakia, and Sweden) and through the evaluation of standardized indicators to compare the mentioned countries in the area of competitiveness. Subsequently, the aim was to identify the dynamics of human capital development and competitiveness in the monitored countries. The goals set were achieved. The comparison of human capital in individual countries with the level of competitiveness shows that in countries where the level of human capital is above average (Sweden and Germany), the level of competitiveness is also above average. And vice versa, in the countries where the level of human capital is below average, the level of competitiveness is also below average (Poland, Hungary, Slovakia, Romania). Sweden achieved a position significantly above average in both areas. Germany ranked second in both places; however, while it was not far behind Sweden in terms of competitiveness, it was more significantly behind in terms of human capital. Out of the V4 countries, the Czech Republic fared best in the evaluation although it remained quite significantly behind Germany and Sweden.

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Nevertheless, as the only country of the remaining countries included in the analysis in both areas, the Czech Republic showed slightly above-average values within the normalized score. On the contrary, Slovakia fared the worst among the V4 countries and was surpassed only by Romania in the level of human capital. In the evaluation of competitiveness, it even stood the worst of the monitored countries. The lagging countries should strive for more dynamic development in order to be able to approach gradually the countries that fared better in the evaluation. However, one-factor analysis of variance showed that between 2013-2022, there were no statistically significant changes in the level of human capital or the level of competitiveness in the monitored countries, and therefore, the development of the level of human capital and competitiveness in them is relatively stable. In the area of competitiveness, these results were confirmed by the convergence method. From the point of view of countries that have already reached a high level of development, stability can represent a certain degree of certainty for securing their position in the future. However, although stability is important, the priority for lagging countries should be to improve and ensure a more dynamic development of the level of human capital and overall competitiveness.

Although the mail goal was fulfilled and the position of the countries in terms of their competitiveness and the level of human capital was identified, as well as the dynamics of the development of both investigated variables, it is important to point out the possible limitations of the conducted research. As previously mentioned, the use of multi-criteria methods introduces a certain degree of subjectivity into the analysis, depending on what indicators will be included in the evaluation (Ivanová & Masárová, 2018; Laifa & Benhassine, 2023). In the case of human capital, this problem is even greater because it is a qualitative characteristic of a person that needs to be expressed quantitatively using a range of different indicators. It is generally recommended to use income, cost and performance indicators (Kwon, 2009). However, the research conducted did not pay attention to the area of income. Another limitation could be the fact that the standardized variable method evaluates the position of countries in relation to an average value. This average value can, however, change depending on the characteristics of the countries included in the analysis. Considering the mentioned facts, the goal of future research could be to eliminate the inaccuracies resulting from the mentioned facts and to expand the research to a larger sample of countries.

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DEVELOPMENT OF MUTUAL AGRI-FOOD TRADE BETWEEN KAZAKHSTAN AND CHINA

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Abstract. The study's relevance is due to the need for a significant increase in exports of products, which is supported by growth in the agro-food sector of Kazakhstan. However, increasing international tensions may jeopardize the opportunities for agro-food exports. In addition, more utilization is needed to ensure food production growth. Accordingly, an analysis of the fundamental factors determining Kazakhstan's agro-food export, resource potential, and expansion possibilities is critical. We are focused on the potential for market expansion in China and the development of exports of agro-food products with high-added value (non-resource exports). The study analyzes the main indices that characterize the comparative advantages of exports and indices of trade complementarity for individual markets. The paper assesses the real growth opportunities for agro-food exports, including particular products and goods in mutual trade with China. The absence of significant structural shifts in Kazakhstan's agro-food products supply to the Chinese market has been revealed. It is shown that the share of food and processed industry products in Kazakhstan's exports to China remains low compared to growth in exports of products of a low degree of processing. The weaknesses of Kazakhstan's agro-food exports are associated with the need to better realise the agricultural industry's resource potential.

Keywords: agriculture; agri-food trade; agro-food; exports; imports; resources; resource potential; competitiveness

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JEL Classifications: F18, Q17

1. Introduction

Considering Kazakhstan's growing agricultural production and agro-export, increasing the volume of mutual trade with China, one of the country's most important trade partners is possible. This will contribute to the improvement of the financial and economic situation of agricultural producers. In this regard, it is essential to develop a set of measures for the balanced development of Kazakhstan's agriculture, taking into account the available resource potential as the fundamental factor of competitiveness, allowing it to expand trade with China. This paper defines resource potential as a set of available resources (labour, land, water, material) conjugated, allowing for economic effect. As one of the economic effects, we can single out the output of agricultural products, which could be exported. Exports provide agricultural producers income and help build economic relations with other countries. China is particularly important in this context, being the Republic's major trade and economic partner. Given the above, the resource potential is considered from the result-oriented direction of the study.

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In China, ensuring food security remains paramount, which requires stability in the production and supply of agro-food products abroad. In this regard, it is also crucial for China to have strong ties with Kazakhstani product suppliers.

The aim is to determine the real opportunities for growth of Kazakhstan's agri-food exports in the Chinese market based on comparative advantages, competitiveness and complementarity of trade, taking into account the resource potential of agriculture.

2. Literature review

The main directions of resource potential realization in the development of agriculture were discussed in the works of many scientists: Pyagai, Bespayeva and Iskakova (2022), Gusakov, Pilipuk and Rastorgueva (2023), Dolla (2011).

Studies in this direction in Kazakhstan are conducted by Akimbekova, Baymuhanov and Kaskabaev (2021); Kurmanova, Sukhanberdina and Urazova (2022); Eszhanova, Kalikov and Abdykadyr (2023); Mukhamedova et al. (2023), Shakeev et al. (2024); Zhagalbayev, Feng and Kazhiyeva (2024),

The results of the scientific achievements of the authors mentioned above are adopted as the analytical and methodological basis of this paper. In addition, the findings of Chinese scientists - on the issues of China's agricultural policy and its significance for the world commodity markets (Hansen, Tuan & Somwaru, 2011) - are used. The results of integrating urban and rural development are studied, and the following problems of the country's agricultural economy are identified: insufficient growth rates of farmers' incomes and resource outflow (Chen, 2009). Fan, Cho, and Ryu (2018) identified that public investment in agricultural research and development (R&D), rural education, and infrastructure has significant positive returns, including the reduction of poverty and regional inequality. Nurgazina et al. (2020) found that the structure of foreign trade in agricultural products between Kazakhstan and China is dominated by inter-industry trade based on comparative advantages, which means different trade orientations of countries and a considerable potential for further cooperation.

Wang et al. (2022) results showed that Kazakhstan has a low share of the international grain market: however, wheat, barley, and buckwheat have substantial export advantages.

Zhou and Tong (2022) found differing competitiveness of agricultural products trade between China and the countries along the "Belt and Road". The scientists attributed Kazakhstan to weaker countries and stressed the importance of policies, among other factors, determining the capacity of trade in agricultural products.

Special attention in studies (Janshanlo, Askarova, & Agzamov, 2022; Abula et al., 2022; Khairullina, 2023; Omarbakiyev et al., 2023; Tkacheva et al., 2024) was paid to the risks and opportunities for Kazakhstan in the implementation of the Chinese project of the Silk Road Economic Belt. The basis of economic relations between Kazakhstan and China in agriculture is agri-food trade, so this article focuses on this aspect. In the literature, there are no examples of comprehensive analysis of the interaction problems between Kazakhstan and China, taking into account comparative advantages, competitiveness and complementarity of trade with regard to the resource potential of agriculture.

3. Research methodology

The study is based on ITC Trade Map data, namely mirror agri-food trade statistics from the Chinese side. The time series covers the years 2004-2022.

The Trade Complementarity Index (TCI) is one of the indices. This is a measure of the extent to which one country's import structure matches another country's export structure.

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$$TCI = 100(1 - \sum(\frac{|m_{ik} - x_{ij}|}{2})), \quad (1)$$

where: x_{ij} – is the share of commodity i in the world exports of country j and m_{ik} – is the share of commodity i in all imports of country k.

The index ranges from 0 (no goods are exported by one country and imported by another) to 100 (export and import shares are the same).

The comparative advantage analysis in trade is based on Balassa's revealed comparative advantage (*RCA*) coefficient for goods from Kazakhstan and China. The calculation formula is presented below:

$$RCA = \frac{x_i/X}{x_{wi}/X_w}, \quad (2)$$

where: x_i – export of product i from a certain country, X – total exports of the country are taken, x_i – world exports of product i, X – total world exports.

RCA shows the ratio of the share of a product group (or a particular product) in a country's exports to the share of a product group (or a particular product) in world exports.

Since *RCA* does not consider the role of import flows of products, the analysis of the competitiveness of Kazakhstan's agro-industrial complex and China is supplemented by the calculation of the Lafay index (*LFI*). This indicator is:

$$LFI = 100\left(\frac{x_{ij}-m_{ij}}{x_{ij}+m_{ij}} - \frac{\sum_{j=1}^{N}(x_{ij}-m_{ij})}{\sum_{j=1}^{N}(x_{ij}+m_{ij})}\right)\frac{x_{ij}+m_{ij}}{\sum_{j=1}^{N}(x_{ij}+m_{ij})}, \quad (3)$$

where: N – is the total number of goods sold; x_{ij}, m_{ij} – are exports and imports of goods j by country i, respectively.
In addition, export competitiveness index (*XCI*) is used:

$$XCI = \frac{x_{it}/X_{it}}{m_{kj}/M_{kt}}, \quad (4)$$

where: x_{ij} – exports of product j of country i; X_{it} — total exports of country i; m_{kj} — imports of product j to market k; M_{kt} — total imports in market k.

4. Results

Among the countries of the world in terms of agro-food trade, China is a major partner of Kazakhstan. According to data for 2022, its share accounts for 11.3% of Kazakhstan's exports and 2.5% of Kazakhstan's imports from there. Moreover, China is among the top three importers of Kazakhstani agro-food products and ranks 4th among the largest suppliers to Kazakhstan.

If, up to 2013 inclusive, agro-food products did not occupy a prominent place in the mutual trade between Kazakhstan and China, then further its role begins to strengthen, especially with regard to exports from Kazakhstan. According to the results of 2022, the share of agro-food products in the structure of exports from Kazakhstan to China reached 3.6%, while Kazakhstan's imports from China - 2.1% (Figure 1).

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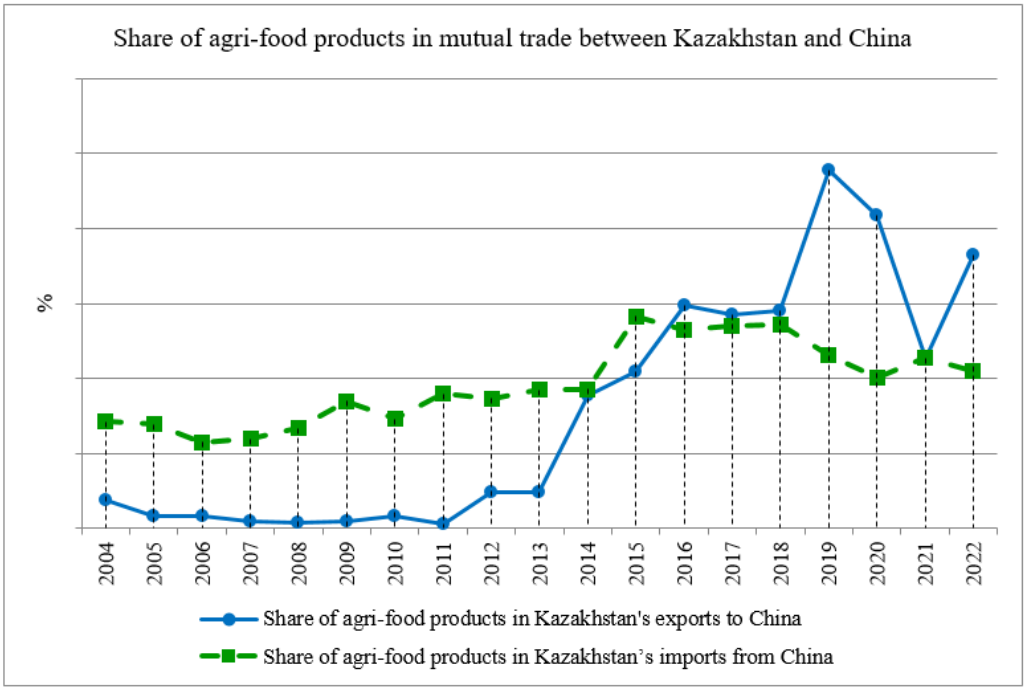


Figure 1. Share of agri-food products in mutual trade between Kazakhstan and China in 2004-2022, %
Source: compiled and calculated by the authors according to ITC Trade Map.

From 2016 to 2022, the turnover of mutual trade in agri-food products between Kazakhstan and China increased 2.5 times and amounted to $885.1 million (Figure 2).

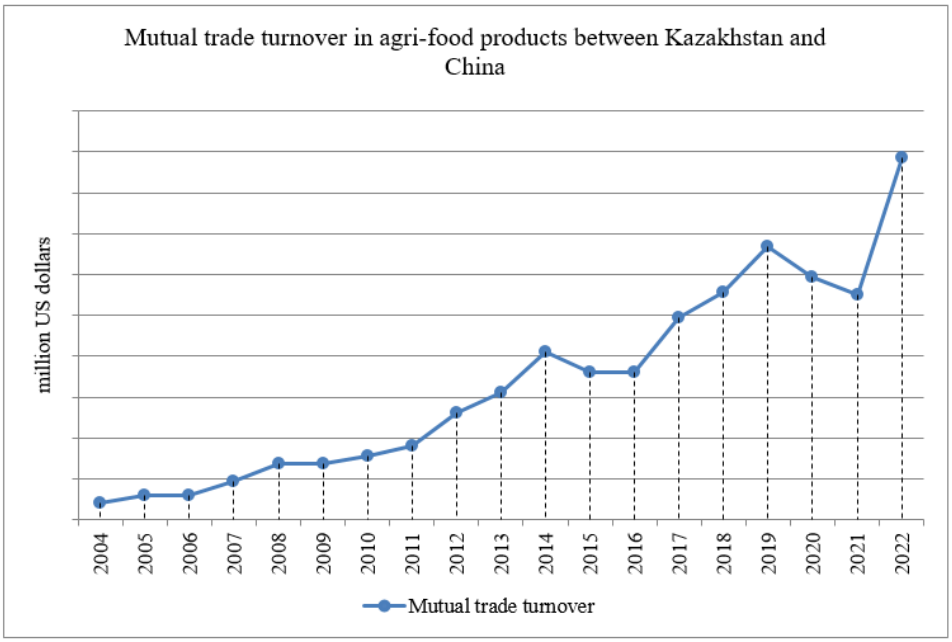


Figure 2. Turnover of mutual trade in agro-food products between Kazakhstan and China in 2004-2022, mln USD. USD
Source: compiled and calculated by the authors according to ITC Trade Map

In 2022, agro-food exports from Kazakhstan to China increased 3.8 times compared to 2016, amounting to 540.5 million USD. USD. The dynamics of Chinese exports could have been more impressive: USD 344.7 mln with a growth of 1.6 times over the same period (Figure 3). The success of Kazakh exporters is due to a lower growth base compared to China.

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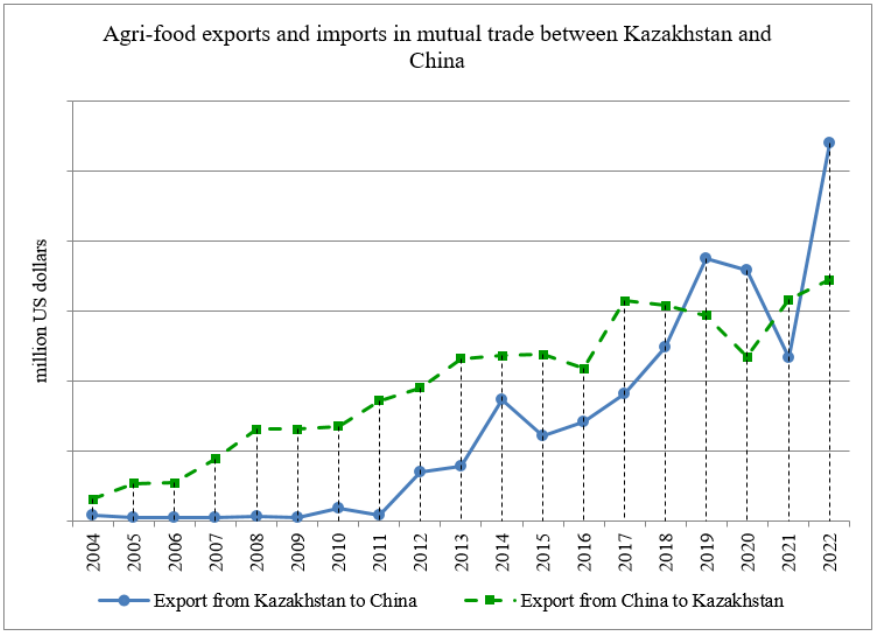


Figure 3. Agro-food exports and imports in mutual trade between Kazakhstan and China in 2004-2022, mln USD. USD
Source: compiled and calculated by the authors according to ITC Trade Map.

Kazakhstan has had a positive agri-food trade balance with China since 2019, which amounts to $81.4 million. In 2021, it became negative again (-84.0 million USD). Only in 2021 did it become negative again (-84.0 million USD) due to the introduction of temporary export bans in Kazakhstan in the context of measures to combat COVID-19. By the end of 2022, the balance increased to USD 195.8 million. By the end of 2022, the balance increased to USD 195.8 million (Figure 4), mainly due to the high growth rate of Kazakh supplies.

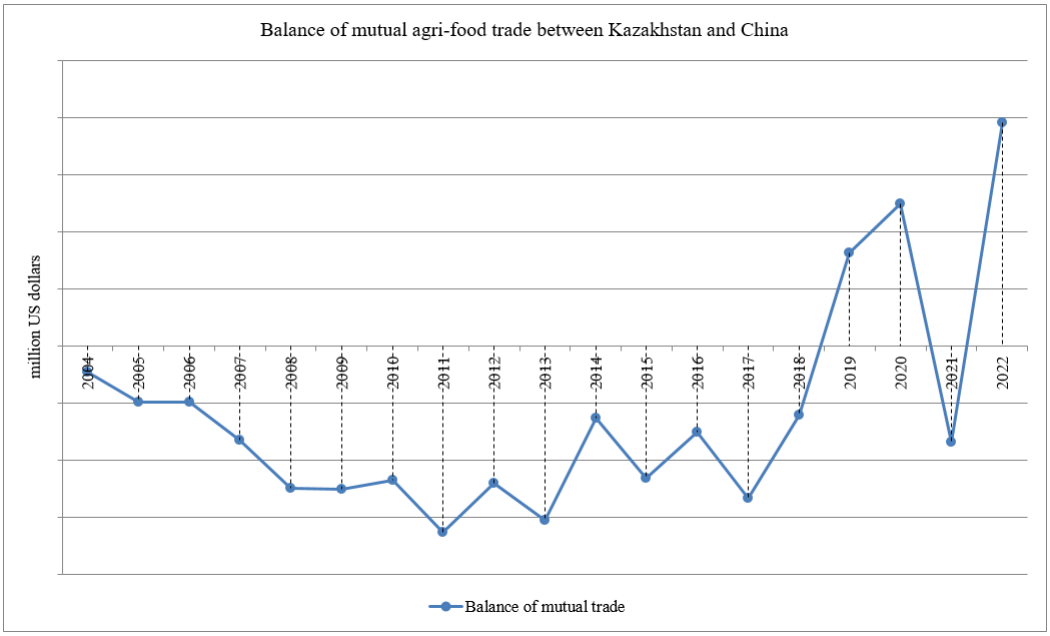


Figure 4. Balance of mutual trade in agro-food products between Kazakhstan and China in 2004-2022, mln USD. USD
Source: compiled and calculated by the authors according to ITC Trade Map.

At the same time, the structure of Kazakhstan's exports to China has not undergone more significant changes. According to our calculations based on ITC Trade Map data, it is still dominated by supplies of products with a low degree of processing. The main exports to China are flax seeds ($99.6 million, or 18.4% in the structure of exports to China).

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The main exports to China are flax seeds ($99.6 million, or 18.4% in the structure of Kazakhstan's agro-food exports to China by 2022); crude sunflower oil ($91.2 million, or 16.9%); sunflower seeds ($79.2 million, or 14.6%); wheat waste ($63.6 million, or 11.8%); and barley ($53.4 million, or 9.9%). Over the past five years, exports of crop products from Kazakhstan to China have increased 4.6 times, from 750,000 tons in 2019 to 3.5 million tons in 2023.

At the same time, the structure of Chinese exports to Kazakhstan differs in the direction of greater diversification. The first five in terms of export volumes in 2022 were shiitake mushrooms ($32.8 million, or 9.5% of the structure of China's agro-food exports to Kazakhstan in 2022) and walnuts. The first five in terms of exports in 2022 were shiitake mushrooms ($32.8 million, or 9.5% in the structure of China's agro-food exports to Kazakhstan, according to the results of 2022); walnuts without shells ($24.5 million, or 7.1%); canned vegetables, fruits ($22.1 million, or 6.4%); canned tomatoes ($19.5 million, or 5.7%); walnuts in shells fresh, raw or dried ($18.8 million, or 5.5%). According to the index of complementarity of agro-food exports, China is ahead of Kazakhstan - 58.2% against 49.1% according to the data for 2022 (Figure 5). One can note a positive trend in the dynamics of both indices, which indicates the feasibility of further development of bilateral trade. The main export items of both countries correspond to each other's needs.

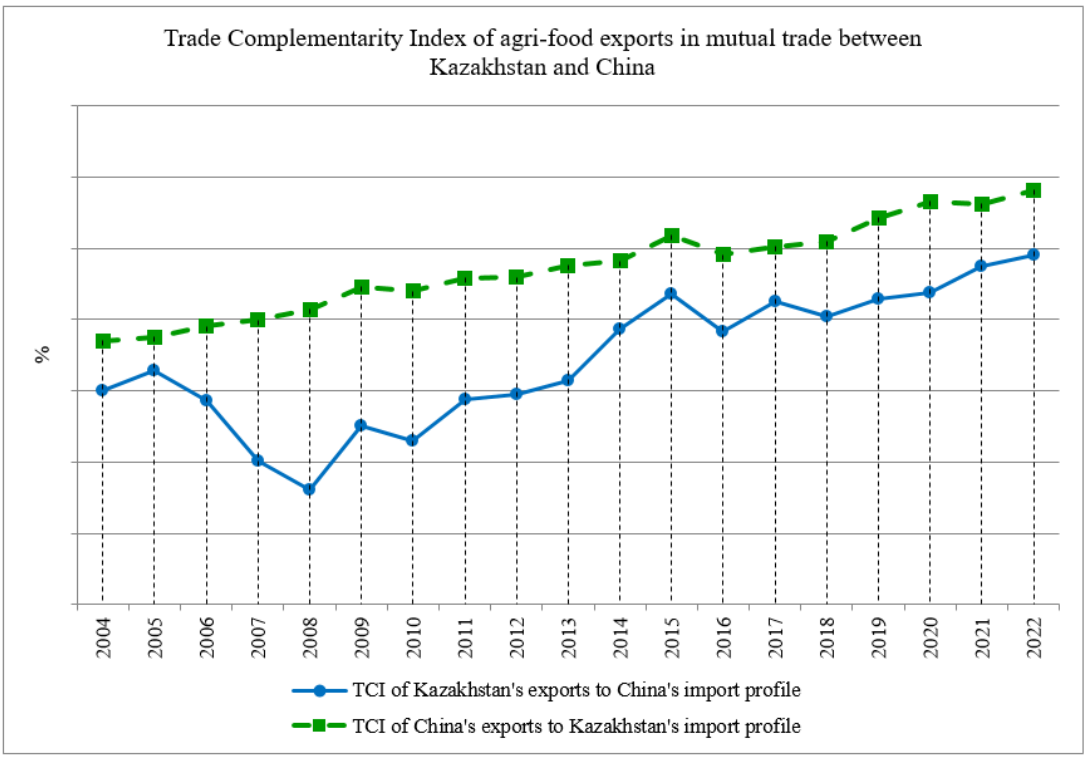


Figure 5. Index of complementarity of Kazakhstan's agro-food exports to China's agro-food import profile (blue line) and index of complementarity of China's agro-food exports to Kazakhstan's agro-food import profile (green line) in 2004-2022, %.
Source: compiled and calculated by the authors according to ITC Trade Map data.
Note: TCI - complementarity.

Such Kazakhstani export items characterize the highest index of export competitiveness in the Chinese market as products of the flour and cereals industry (XCI was 10.5 in 2022); cereals (3.7); tobacco (2.0); vegetables (1.4); finished meat and fish products (1.3) (Figure 6). Of the commodity groups covering the products supplied to the PRC, comparative advantages at the world level were revealed for all of them. Thus, the Balassa index for flour and cereal products in 2022 was 8.5, for cereals - 3.6, and for oilseeds - 1.2. The Lafaye index for the same commodity groups amounted to 0.6, 1.4, and 0.3, respectively. If we talk about the leading commodity positions of Kazakhstan in the Chinese market, we can highlight the eggs of birds without shells and egg yolks, fresh, dried (501.7); wheat flour or wheat-rye (433.2); onions, shallots, garlic, leeks (302.4); wheat gluten (271.0); cereals, coarse flour and cereal granules (193.3); undenatured ethyl alcohol (102.0).

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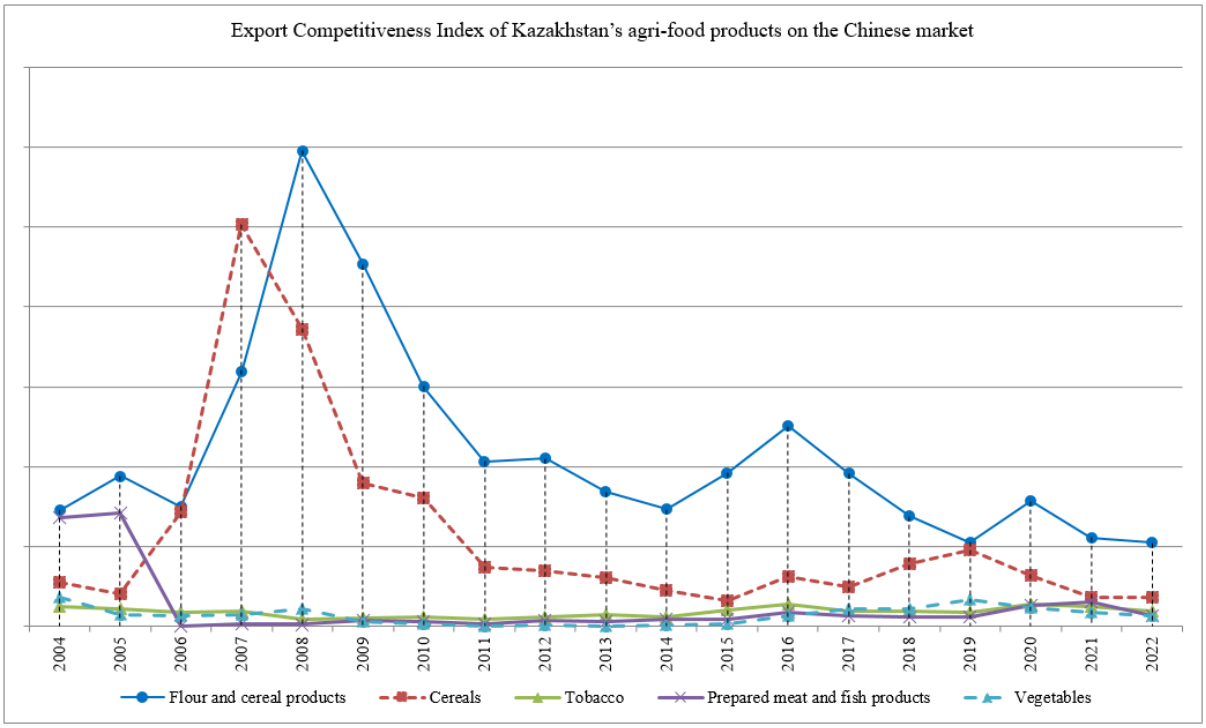


Figure 6. Export competitiveness index of Kazakhstan's agro-food products in the Chinese market in 2004-2022.
Source: compiled and calculated by the authors according to ITC Trade Map.

Among Chinese goods on the index of export competitiveness in the market of Kazakhstan in 2022, the leaders are plant materials for wicker (XCI was 5.0 in 2022); shellac, gum, resins (3.8); fish and crustaceans (1.1); finished products from meat, fish (0.7); processed products of vegetables, fruits (0.4) (Figure 7). When considered in the context of China's leading commodity items, we can note pelts and other parts of birds with feathers or down, feathers and parts of feathers (482.4); fruits and nuts preserved for short-term storage (123.7); peanut butter (93.4); plant materials used mainly for weaving (e.g., bamboo) (69.4); aquatic invertebrates other than crustaceans and molluscs (67.5); mutton and goat meat (44.9).

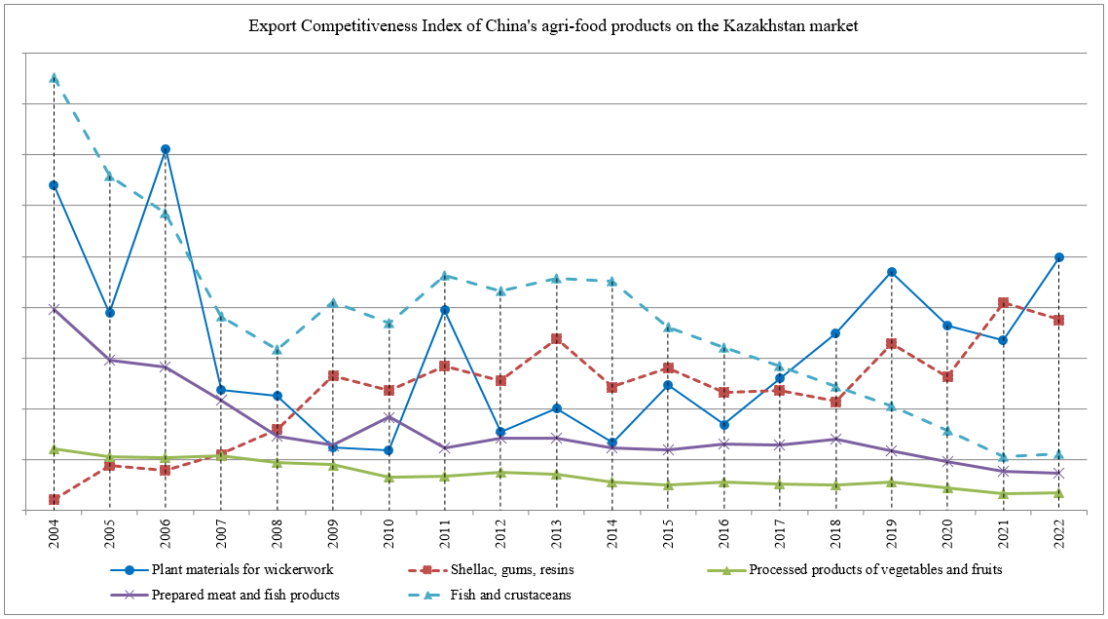


Figure 7. Export competitiveness index of Chinese agro-food products in the market of Kazakhstan in 2004-2022
Source: compiled and calculated by the authors according to ITC Trade Map.

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China annually imports more than $150 billion worth of agricultural products and foodstuffs from countries worldwide. Expenditures on food products in the country are estimated at $1.1 trillion per year, and this figure is growing and is projected to reach $1.8 trillion in the next five years. At the same time, the country has reached its capacity limit in grain production. Given the high demand, China is the most promising market for Kazakhstan's agricultural exports. However, working more actively on logistics issues is necessary to maximise this potential.

China intends to continue importing meat, grain, vegetable oils and other agricultural products from Kazakhstan. Given the size of the Chinese market, there is potential to increase imports from Kazakhstan.

In addition, PRC proposes to take control of establishing a subcommittee on cooperation in the agro-industrial complex. The platform will allow the organization of regular joint visits and establish permanent direct contacts between the authorized agencies of the Republic of Kazakhstan and the PRC on topical issues of the agricultural sector.

It is noted that the draft charter has already been developed, and the Chinese side proposed to sign it at the meeting of foreign ministers of the SCO member states, which was held in May 2024 in Astana. The parties considered a proposal to build a modern meat processing plant equipped with new technologies in North Kazakhstan.

Wheat is the main crop supplied by Kazakhstan to China. In 2023, its exports amounted to 592 thousand tons, for the first quarter of 2024 - 220 thousand tons. However, we note that within the new season, wheat supplies from Kazakhstan to China decreased - if in September 2023, about 62 thousand tons of this product was shipped, in December, this figure fell to 19.3 thousand tons. The main reasons are logistical problems and periodic temporary bans on shipments to China imposed by NC Kazakhstan Temir Zholy JSC.

Over the past five years, exports of crop products from Kazakhstan to China have increased 4.6 times, from 750 thousand tons in 2019 to 3.5 million tons in 2023. China's grain harvest is 650 million tons for the ninth consecutive year, and the per capita grain share is 493 kg. However, the gap between grain supply and demand may widen, making it necessary to increase production capacity further to ensure food security.

Corn and soybeans will mainly contribute to increased grain production, while rice and wheat will improve quality and structure. The State Development and Reform Committee of the PRC and the Ministry of Agriculture and Rural Affairs of the PRC plan to assist 720 county governments in implementing a range of projects to improve grain production capacity.

According to an action plan released by the State Council of the People's Republic of China, China aims to increase grain production capacity by more than 50 million tons by 2030. By that time, the area under cereals will amount to about 117 million hectares. China has increased grain imports by almost 30%.

With the growth of the economy in China, the structure of nutrition is actively changing. If rice and greens had been consumed more in the past, now the consumption of meat, milk, dairy, and flour products is growing.

At the same time, domestic production growth is affected by problems that hinder the full utilization of the resource potential of Kazakhstan's agriculture. Such issues include soil erosion and degradation, population outflow to urban areas, and lack of water for irrigation. Although China is increasing imports primarily of food products and represents a large market, Kazakhstan risks failing to meet the challenge of increasing exports due to insufficient utilization of the resource potential of agriculture and problems with transportation and logistics infrastructure.

For example, logistical difficulties prevent further increases in exports from the republic. Kazakhstan is landlocked and uses railroads. If we analyze all land crossing points of China by rail, Alashankou is a central transhipment hub in the Xinjiang Uygur Autonomous Region. In 2023, more than 23 million tons were transported through it, with an annual growth rate of 12%. However, for comparison, we note that Ningbo

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seaport handles more than 100 million tons of cargo per month. Kazakhstan is currently working on constructing a new railroad terminal near Bakhty Point; its commissioning will increase logistical opportunities. However, it is necessary to pay attention to the potential of Lianyungang Port, where there is a logistics terminal in Kazakhstan. This route opens Kazakhstan's access to the sea and provides excellent trade opportunities. Several countries - Vietnam, Korea and Japan - are interested in buying Kazakh grain and oilseeds.

In June 2024, the first Kazakh-Chinese grain forum will be held in Xinjiang Uygur Autonomous Region of China, a significant step towards strengthening cooperation in grain supplies from Kazakhstan to China.

The grain forum will be attended by representatives of Kazakh and Chinese businesses, government agencies and state companies of the two countries involved in the regulation of export/import of grain and grain products on the way to barrier-free trade: the removal of FMD restrictions on exports of meat products from the south-eastern regions of Kazakhstan to China in February 2024. This allowed Kazakhstan to resume exports of high-quality livestock products to China based on the organisation of joint projects in Kazakhstan for the production and deep processing of agricultural products, including the principles of production cooperation in the export of grain and oilseeds, meat, poultry, dairy and fish products, honey and other types of food.

In the future, it is planned to establish a joint subcommittee on cooperation in agriculture, which will make it more effective and realize the potential for collaboration between the two countries in the field of the agro-industrial complex.

Kazakhstan's agriculture is characterized by relatively low production efficiency, high wear and tear of machinery and tractor fleet, and lagging in technology, which demonstrates underutilization of resource potential. Strengthening the resource potential of agriculture will create favourable opportunities for development, allowing an increase in the total volume of added value exported by each particular country. In addition, high resource potential would diversify exports while stimulating production and income growth.

Given the importance of resource potential in strengthening and enhancing the sustainability of agri-food trade, the following conclusions are legitimate. Expanding exports to China should be implemented not only by increasing the export of raw materials but also by processing them in the territory of Kazakhstan. This can be realized through the establishment of joint ventures with Chinese investors. They could help expand the exports of goods with high added value.

In addition, it is essential to stimulate the expansion of the range of goods. Expanding the resource potential of Kazakhstan's agricultural sector harmonizes with reducing trade and logistics costs and barriers. In this regard, it is advisable to stimulate foreign direct investment, trade development, transportation and other types of infrastructure.

Conclusions

There is a clear trend of increasing Kazakhstani supplies to the Chinese market. The products with identified comparative advantages are exported to China in bulk. At the same time, the share of exports of agricultural raw materials and processed products of the agro-industrial sector of Kazakhstan differs from Chinese indicators. The share of raw material exports from Kazakhstan to China exceeds the share of processed products.

The weaknesses of Kazakhstan's agro-food exports are related to the need for more realization of the resource potential of the agricultural sector. Strengthening trade relations with China should accompany a further increase in Kazakhstan's agro-food exports.

An important place should be given to the coordination of work of the state and business to improve the competitiveness of Kazakhstan's exports and the development of resource potential.

Therefore, it is essential to ensure the development of competitive food and processing industries on the territory of Kazakhstan, stimulating the expansion of the range of goods, diversification of exports through the

production and sale of goods with high added value, improving customs procedures, facilitating the attraction of foreign direct investment, development of trade, transportation, warehousing and other types of infrastructure.

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EVALUATION OF REVENUES, EBITDA, NET PROFIT, AND CORPORATE INCOME TAXES IN RELATION TO THE INCOME SIDE OF THE STATE BUDGET*

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Abstract. The effective operation of small, medium, and large enterprises is essential for society and the state budget. The efficiency of companies from an accounting and financial reporting perspective can be measured based on data presented in financial statements. The structure of financial statements is defined by the Decree of the Ministry of Finance of the Slovak Republic, and these statements also serve as a mandatory attachment to the corporate income tax return. According to the Accounting Act, legal entities' financial statements are published in the Register of Financial Statements, which is publicly accessible. The state aims to build a control system that ensures the monitoring of accounting and corporate income tax to secure the income side of the state budget. In the Slovak Republic, the control body for business entities is the Financial Administration of the Slovak Republic, including tax offices under its jurisdiction. This paper aims to highlight the correlation between achieved revenues, net profit, the EBITDA financial indicator, and corporate income tax with a focus on the results of the control activities of the Financial Administration of the Slovak Republic. The research involved 146,560 business companies, with the analyzed companies selected from the following sectors: retail, metalworking and metallurgy, construction, transport and logistics, vehicle sales and maintenance, electrical engineering, energy and mining, healthcare, and the automotive industry.

Keywords: financial statements; revenues; EBITDA; net profit; corporate income tax; income side of the state budget; tax audit

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JEL Classifications: H83

1. Introduction

A financial statement in the Slovak Republic is defined as a structured presentation of facts that are the subject of accounting provided to users who utilize this information. The financial statement consists of the balance sheet, income statement, and notes. The definition and structure of the financial statement in Slovakia are based on the International Accounting Standards for Financial Reporting IAS/IFRS - 1 Presentation of Financial Statements to ensure uniformity for accounting entities that are required to account according to international

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accounting standards. The data presented in the financial statement provides informational resources for financial analysis and is also subject to tax audit (Frintrup et al., 2020).

This article offers an analytical view of revenues and an analysis of revenues, EBITDA, net profit, and corporate income tax in relation to the income side of the state budget. Attention is drawn to the importance of the efficient operation of small, medium, and large enterprises, as well as their connection to the income side of the state budget and the activities of tax offices that audit accounting and the correct calculation of corporate income tax obligations.

The state budget of every country represents a balance between the state budget's income and expenditures. The income side of the state budget includes corporate income tax. According to the State Budget Act for 2024 in the Slovak Republic, the planned income from all taxes is €18,633,856,000, of which income from corporate income tax represents €4,475,610,000, which means 24.01% of the total income.

2. Literature review

Accounting entities calculate the profit before tax as the difference between revenues and expenses, considering the provisions of the Income Tax Act. After this, accounting entities calculate the profit after tax (net profit). The financial statement is the primary informational resource for presenting economic information about a company's performance. The various parts of the financial statement are interconnected, which is also reflected in the triple accounting principle. The balance sheet, through the line item "profit after tax," provides information about net profit. This line item also serves as a connecting line between the balance sheet, income statement, and cash flow statement. The financial statement is the primary informational resource for financial analysis worldwide (Štangová et al., 2012; Farkaš, 2020; Šlosárová et al., 2020; Ogbeide et al., 2021; Bowen et al., 2024).

Financial analysis provides a wide range of financial indicators through which the economic health of business companies can be examined. For financial managers as well as shareholders of business companies, the most commonly used financial indicators are revenues, EBITDA, net profit, and corporate income tax (Sacer & Zyznarska-Dworczak, 2020; Frintrup et al., 2020; Pavic, 2020; Baker et al., 2021).

The state budget represents a balance of the state's income and expenditures, legislatively regulated each year by the State Budget Act. The income side, primarily consisting of direct and indirect taxes, plays a crucial role. Business companies are taxpayers of corporate income tax, and therefore, the efficient operation of these companies is an essential factor for the income side of the state budget. EU member states have similar structures for their state budgets but different corporate income tax rates. These topics are discussed by the authors of the following publications: Beck & Mozdzen, 2020; Cheben et al., 2021; Natalizi, 2020; Roca, 2021; Wijekoon et al., 2021; Lombardi et al., 2020; Miah et al., 2021; Silva et al. 2021. Other insights are presented by authors in their publications: Mi et al. 2016; Cachia, 2017; Pavic, 2020; Frintrup et al., 2020; Víghová, 2022.

3. Characteristics of Financial Statements in Relation to the Triple Accounting System

Business activities in the Slovak Republic are defined in the Commercial Code and the Trade Licensing Act as activities performed continuously, in one's own name, and on one's own responsibility, with the aim of generating profit. Business activities are associated with the obligation to maintain accounting records (Šlosárová et al., 2020). According to the Commercial Code, business entities registered in the Commercial Register are required to use double-entry accounting. According to the Accounting Act, they become accounting entities that must comply with the provisions of the Decree of the Ministry of Finance of the Slovak Republic No. 23 054/2002-92, which establishes detailed procedures for accounting and the framework chart of accounts for entrepreneurs using double-entry accounting. The final presentation of the accounting results is the financial statement, which is defined according to § 17(1) of the Accounting Act as a structured presentation of facts that are the subject of accounting, provided to users who utilize this information. The financial statement for entrepreneurs (for large and small enterprises) consists of a balance sheet, an income statement, and notes. These

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parts of the financial statement are interconnected, and this interconnectedness is known as the triple accounting principle (Baker et al., 2021). This principle is illustrated in the Figure 1 below:

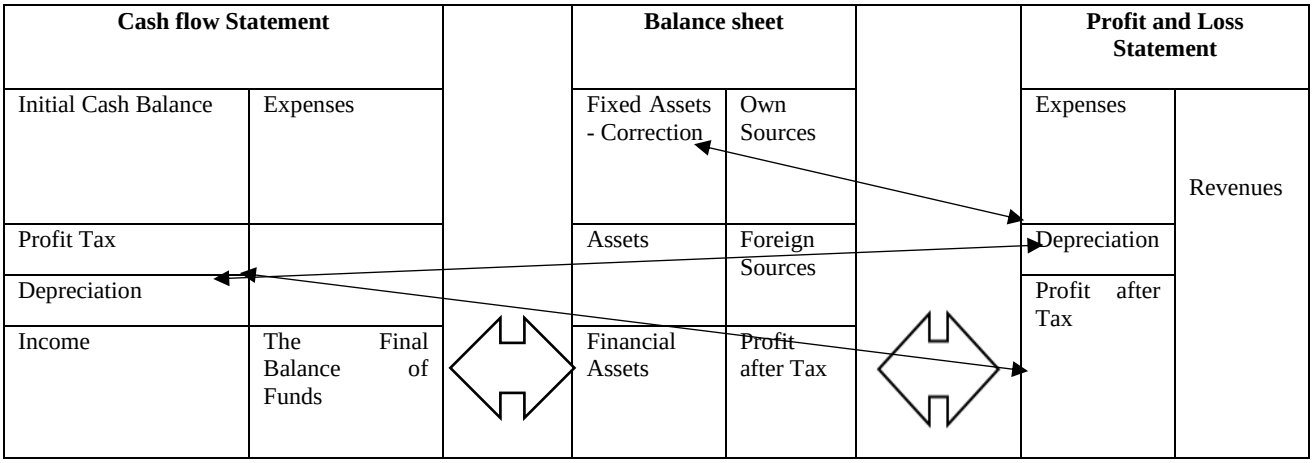


Figure 1. The Triple Accounting System (based on financial statements for small and large accounting units for entrepreneurs)
Source: Based on data from the financial statements of 146,560 business companies – www.finstat.sk

The diagram of the triple accounting system shows the relationship between the various parts of financial statements, specifically the cash flow statement, balance sheet, and income statement (Schultzová et al., 2018). The relationships can be observed in the reported net profit as well as the amount of depreciation (Farkaš, 2020). The net profit and depreciation figures appear in all the statements, and their amounts must be consistent.

The basic financial statements in the Slovak Republic, according to § 17(3) of Act No. 431/2002 Coll. on Accounting, as amended, are: the balance sheet, the income statement, and notes (the cash flow statement is also part of the notes, which must be prepared by large accounting units). Large accounting units are business entities that have a total asset value exceeding €4,000,000; their net turnover exceeds €8,000,000; and their average number of employees during the accounting period exceeds 50.

The income statement contains information on revenues (sales), profit before tax, profit after tax (net profit), as well as the amount of corporate income tax payable.

- **Revenues (sales)** represent, according to the Accounting Act, an increase in the economic benefits of an accounting entity during the accounting period, which can be reliably measured (Štangová et al., 2012).
- **Profit before tax** is calculated as revenues minus expenses.
- **Income tax** is divided into current income tax and deferred income tax. Current income tax represents an external settlement relationship of the accounting entity—specifically, the relationship with the state budget through the tax office. Current income tax is regulated by Act No. 595/2003 Coll. on Income Tax, as amended. Deferred tax represents an internal settlement relationship of the accounting entity (i.e., the relationship between accounting periods). Deferred income tax reflects that portion of the income tax expense that arises due to the obligation to pay income tax in the future and is accounted for in the period to which it relates in terms of time and substance; thus, the accrual principle, as a fundamental principle of double-entry accounting, is applied. At the same time, the amount of the reported profit after tax is also affected; accounting for the deferred tax liability prevents the distribution of profit to the owners, thereby applying the principle of prudence.
- **Profit after tax** represents the profit before tax minus the tax liability (both current and deferred) (Pavic, 2020).

The financial statements serve as the basis for calculating financial analysis indicators and are also an attachment to the corporate income tax return. Entities are required to submit these financial statements to the tax office

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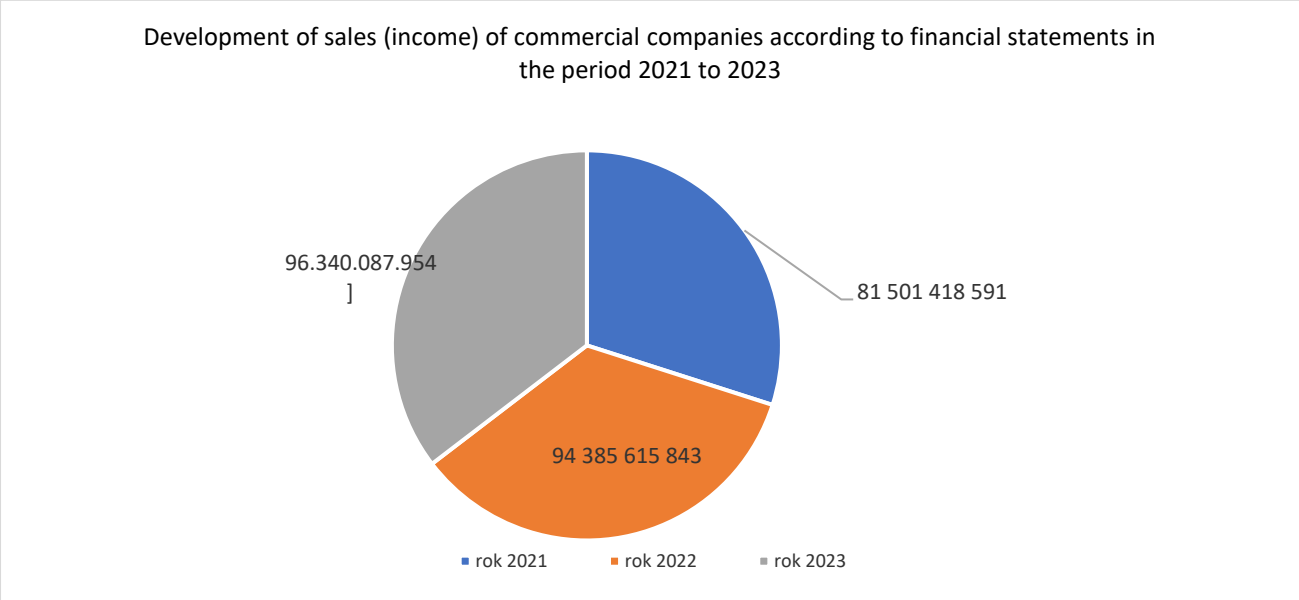
exclusively electronically within three months after the end of the accounting period, in accordance with § 49 (2) of Act No. 595/2003 Coll. on Income Tax, as amended.

4. Analysis of Revenues, EBITDA, Net Profit, and Corporate Income Tax Payable

Our research focused on business entities categorized by industry, with a total sample size of 146,560 companies. The specific industries are listed in Table 1. As part of the research, we conducted an analysis of revenues, EBITDA, net profit, and corporate income tax payable. The reason for selecting these indicators is their ability to provide insights into the efficiency of business operations.

Analysis of Achieved Revenues (Sales)

Revenues for accounting entities using the double-entry bookkeeping system are recorded according to accounting procedures under Class 6 – Revenues. These primarily reflect the realization of the entity's own outputs in relation to the external environment. Revenues also include changes in the inventory levels of internal stocks, the capitalization of internal services, and the recognition of subsidies, grants, and contributions. Revenues may also pertain to financial activities, including, but not limited to, revenues from the sale of securities and shares, interest income, foreign exchange gains, gains from the revaluation of securities, income from long-term and short-term financial assets, derivative operations, and other financial revenues. The accounting entity presents revenues in the income statement, serving as a fundamental basis for calculating the pre-tax profit (see Table 1). Additionally, the total revenue amount is reported in the corporate income tax return.



Graph 1. Sales (Revenue) Development
Source: Own processing based on data from the financial statements of 146,560 companies – www.finstat.sk

Graph 1 presents the revenue development of the analyzed accounting entities. Based on the results presented in the financial statements, there was an increase in revenue by €12,884,197,252 when comparing the accounting periods 2021/2022. Comparing the periods 2022/2023, an increase of €1,954,472,111 was observed. The reason for the revenue increase is that business operations have resumed strongly after COVID-19. Companies could conduct their production processes and sales of goods and services without restrictions.

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Table 1. Revenue (Sales) Development in the 10 Largest Sectors in Slovakia
(Entities are ranked by the total revenue in the accounting period 2023)

Sector	Accounting period 2021	Accounting period 2022	Accounting period 2023	Comparison 2022/2023	Comparison 2023/2022
Wholesale	16 647 046 095 €	20 077 810 811 €	19 445 901 412 €	20,6 %	-3,1%
Retail	6 757 704 611 €	7 809 251 743 €	7 973 278 205 €	15,6 %	2,1%
Metal production and Metallurgy	7 567 226 703 €	9 003 157 825 €	7 948 789 076 €	19,0 %	-11,7%
Construction	5 482 148 436 €	6 640 325 573 €	6 940 303 085 €	21,1%	4,5%
Transport and Logistics	5 081 511 100 €	5 871 154 441 €	5 559 205 448 €	15,5%	-5,3%
Vehicle sales and maintenance	3 389 052 433 €	3 919 396 092 €	4 685 506 813 €	15,5%	19,5%
Electrical Engineering	3 480 756 645 €	3 697 495 823 €	3 818 189 355 €	6,2%	3,3%
Energy and Mining	2 710 322 448 €	2 978 135 950 €	3 779 342 596 €	9,9%	26,9%
Healthcare	2 881 303 051 €	3 218 850 899 €	3 615 701 194 €	11,7%	12,3%
Automotive Industry	2 692 336 374 €	3 054 780 708 €	3 521 088 256 €	13,5%	15,3%

Source: Based on data from the financial statements of 146,560 companies – www.finstat.sk

The research focused on the companies within the sectors listed in Table 1. The revenue growth, as measured by sales figures, can be observed in Table 1. The rate of revenue growth in the construction, wholesale, and retail sectors was higher in 2022 than in 2023. In 2023, a decline in the growth rate of revenue (sales) was recorded.

Analysis of the Financial Indicator EBITDA

The research also included an analysis of the financial indicator EBITDA, which is calculated as follows: profit before tax + depreciation + net book value of sold long-term assets and materials – sales from the disposal of long-term assets – sales from the disposal of materials (see Table 2). The practical application of the EBITDA financial indicator lies in its ability to reflect the operational performance of companies, making it one of the key indicators in financial analysis. Its main advantage is that it excludes certain items from profit, providing a more accurate picture of a company's core profitability and operational efficiency.

Table 2. Sum of the EBITDA Financial Indicator for the Years 2021, 2022, and 2023

Accounting Period	EBITDA
Year 2021	9.203.561.882 €
Year 2022	9.347.446.833 €
Year 2023	9.034.856.894 €

Source: Own processing based on financial statements of 146,560 companies; www.finstat.sk

The analysis indicates an increase in EBITDA of €143,884,951 for the period 2021/2022. However, for the period 2022/2023, businesses experienced a decrease in EBITDA by €312,589,939. The decline in EBITDA for the period 2022/2023 was due to a decrease in profit before tax in the analyzed companies.

Analysis of Net Profit (After-Tax Profit) and Corporate Income Tax Payable

The research results show how revenue development affects the financial indicator EBITDA and will influence the development of net profit, which is presented in Table 3.

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Table 3. Development of Net Profit (After-Tax Profit) for Analyzed Companies

	Accounting period 2021	Accounting Period 2022	Accounting Period 2023
Profit after Tax (Net Profit)	4.993.615.760 €	5.496.210.314 €	4.674.814.831 €

Source: Own processing based on financial statements of 146,560 companies – www.finstat.sk

From Table 3, it is evident that when comparing the years 2021/2022, there was an increase in net profit of €502,594,554. In the comparison of the periods 2022/2023, there was a recorded decrease in net profit of €821,395,483 for the companies. This fact also impacts the companies' payable tax obligations.

Achieved revenues and net profit influence the calculation of companies' tax obligations. According to Slovak regulations, accounting entities calculate the pre-tax financial result using the formula: revenues minus expenses, based on double-entry bookkeeping data. This calculated financial result is then adjusted according to the provisions of Act No. 595/2003 Coll. on Income Tax, as amended, to determine the taxable base for corporate income tax and compute the payable income tax. The payable income tax represents the tax liability for the company and revenue for the state budget (see Table 4).

Table 4. Development of Payable Corporate Income Tax for the Years 2021, 2022, and 2023

Accounting Period	Payable Corporate Income Tax for Analyzed Companies in EUR
Year 2021	1.427.439.594
Year 2022	1.508.204.816
Year 2023	1.192.192.361

Source: Own processing based on financial statements of 146,560 companies; www.finstat.sk

The analysis of the selected 146,560 companies also focused on the payable corporate income tax. The payable corporate income tax of the analyzed companies showed an increase of €80,765,222 between 2021 and 2022, and a decrease of €316,012,455 between 2022 and 2023. Table 5 provides an overview of the payable corporate income tax by industry.

Table 5. Overview of Payable Corporate Income Tax by Industry

Industry	Accounting period 2021	Accounting Period 2022	Accounting Period 2023	Comparison 2022/2021	Comparison 2023/2022
Wholesale	151.983.407 €	190.766.536 €	145.567.949 €	25,5 %	-23,7 %
Energy and Mining	153.370.474 €	134.987.005 €	140.537.567 €	-12,0 %	4,1 %
Construction	65.598.898 €	90.185.383 €	78.584.339 €	37,5 %	-12,9 %
Healthcare	61.208.838 €	70.283.038 €	76.886.216 €	14,8 %	9,4 %
Retail	58.842.820 €	65.710.737 €	65.483.123 €	11,7 %	-0,3 %
Electrical Engineering	34.115.404 €	35.650.236 €	40.852.104 €	4,5 %	14,6 %

Source: Own processing based on data from www.finstat.sk

5. Results of Tax Audits Focused on Corporate Income Tax

The state budget represents the balance of the state's financial management for a specified accounting period, which is the calendar year (Beličková, 2010). It reflects the balance between revenues and expenditures. The revenue side of the state budget is significantly composed of tax revenues. In the Slovak Republic, taxes are collected, enforced, and controlled by the Financial Administration of the Slovak Republic through tax and customs authorities (Vighova, 2022).

Table 6. Structure of Corporate Income Tax Collection by Tax Authorities for the Period 2021- 2023

Tax Type/ Year	2021	2022	2023
Corporate Income Tax	2 904,59	3.863,35	4.315,70
Revenue to the State Budget	7.903,23	9.022,70	11.167,31

Source: Own processing based on the Financial Administration Annual Report 2023.
Data are expressed in millions of Euros.

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Based on the data provided in Table 6, the share of corporate income tax revenue in the state budget for the year 2023 was 38.64%. This represents a decrease compared to 42.81% in 2022 and 36.75% in 2021.

Any government's responsibility is to ensure revenue for the state budget through various controls (Thusi & Matyana, 2024). Tax compliance and detecting illegal tax evasion play a crucial role in a country's economy, given that taxes constitute a significant portion of state revenue. In the Slovak Republic, tax audits focusing on corporate income tax are conducted by tax authority employees.

In 2023, tax auditors conducted a total of 6,859 audits. Of these, the most significant proportion was audited on Value Added Tax (VAT), totalling 4,713, which accounts for 68.7% of the total audits. There were 967 audits related to corporate income tax, 816 audits related to personal income tax, 17 audits related to income tax from dependent activities, 4 audits on motor vehicle tax, 340 audits focused on accounting, and 2 audits on other areas.

Table 7. Overview of Findings from Tax Audits Conducted by Tax Authorities for the Period 2021-2023

Year	Overview of the findings from the performed inspections						
	VAT	**Corporate Income Tax**	**Personal Income Tax**	**Income Tax from Dependent Activities**	**Motor Vehicle Tax**	**Accounting Compliance Audits**	**Total**
2021	390.089	222.161	10.811	664	32	857	624.614
2022	290.328	114.637	7.641	336	101	3.532	416.575
2023	182.220	228.017	7.360	641	27	460	418.725

Source: Prepared by the author based on the Annual Report on the Financial Administration for 2021 to 2023

Table 7 shows that the largest share of findings from the conducted tax audits pertains to corporate income tax (i.e., business entities).

Conclusion and Recommendations

1. As part of the research on revenues (sales), the financial indicator EBITDA, profit after tax (net profit), and payable corporate income tax, we found the following:
The subject of the research was the financial statements of 146,560 commercial companies. These companies were selected for analysis from the following sectors: retail, metalworking and metallurgy, construction, transportation and logistics, vehicle sales and maintenance, electrical engineering, energy and mining, healthcare, and the automotive industry.

- Revenues (sales) for commercial companies in the 2021/2022 accounting period increased by €12,884,197,252, and in the 2022/2023 accounting period, revenues also increased by €1,954,472,111.
- The financial indicator EBITDA showed an increase of €143,884,951 in the 2021/2022 accounting period, but a decrease of €312,589,939 in the 2022/2023 period.
- The net profit of the analyzed commercial companies increased by €502,594,554 in the 2021/2022 accounting period, but decreased by €821,395,483 in the 2022/2023 period.
- Payable corporate income tax for the analyzed companies increased by €80,765,222 in the 2021/2022 period, but decreased by €316,012,455 in the 2022/2023 period.
- The payable corporate income tax for the analyzed companies decreased by €316,012,455 when comparing the years 2022/2023.

The above results lead to the following recommendation for the analyzed companies: The increase in revenues did not lead to an increase in net profit or payable corporate income tax due to rising costs. Therefore, we recommend cost optimization in accordance with Act No. 595/2003 Coll. on Income Tax, as amended, for the analyzed companies to achieve higher net profit (profit after tax).

2. The conclusions drawn from the analysis of the Financial Administration of the Slovak Republic's audit activities, related to ensuring revenue for the state budget in the area of corporate income tax, are as follows:

- In 2023, the number of legal entities registered in Slovakia, according to the Financial Administration of the Slovak Republic, was 391,344. Out of this number, auditors conducted accuracy checks on the tax obligations of 967 legal entities.

- The amount of findings from the audits of legal entities in 2023 was €228,017,000.
- One focus of the audit activities in 2023 was on international transfer pricing (concerning large business entities), involving a total of 32 legal entities with international transactions, resulting in findings amounting to €105,430,000. Additionally, domestic transfer pricing (also concerning large business entities) was audited for 63 entities, with a total finding of €7,165,000.

Based on the above analysis, we recommend improving the efficiency of tax audits and increasing the number of audits conducted where there is a likelihood of findings. A means to achieve this trend is to initiate tax audits following local investigations where auditors have identified violations of the Income Tax Act or the Accounting Act.

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