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**TRANSITION TOWARDS THE ARTIFICIAL INTELLIGENCE VIA RE-ENGINEERING OF
DIGITAL PLATFORMS: COMPARING EUROPEAN MEMBER STATES ***

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Abstract. The present study is directed at comparing the performances of the 27 European Member States in the period 2012 – 2021 with the choice of assessing their improvement in the transition toward Artificial Intelligence. The study, opening from an analysis of the key factors with strategic rate in the countries' transition, is centered on society, law, physiology, and trust impacts. The valuation of the effects was evaluated by seeing forty - two official European Commission reports in order to create a composite analysis and assessment of the state of the transition in Europe. The study pointed at understanding the degree of transition related to 27 European Member States in the realization of AI targets. The outcomes of the study highpoint that the transition, evaluated with the support of the composite analysis, is current with a different degree between the Member State and only some elements could be evaluated as suitable in the transition toward an artificial intelligence system in the Europe.

Keywords: Artificial Intelligence; European Member States; Digital Platforms; Trust

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JEL Classifications: L2, L26

1. Introduction

Artificial intelligence (AI) is the last frontier of the digital transformation. Technologies, software, programs and applications have gotten smarter thanks to machine learning. That is, thanks to particular algorithms, they are able to learn and act even without direct human control. The use of AI applications is now increasingly widespread in daily life and in various work environments. These are the public administration challenges in the world of AI. The European Union code of ethics of 2019: towards a "reliable" and "anthropocentric" AI to ensure a more reliable and anthropocentric AI, the European Union has published the European code of ethics for artificial intelligence". The European strategy reads the guidelines of 8 April 2019 - places the human being at the center of

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the development of AI with the aim of creating trust in anthropocentric artificial intelligence. The European Union then indicated six fundamental requirements to be respected: human intervention and surveillance, technical robustness and safety, confidentiality and data governance, transparency, diversity, non-discrimination and fairness, social and environmental well-being. Responsibility also understood as accountability. AI should: 1) respect the law, 2) observes ethical principles and 3) demonstrate robustness. The European Union wants to extend its code of ethics even beyond its borders for an ethical approach to artificial intelligence that is increasingly global. Legg and Hunt (2007), starting from collective definition (page 18) in which 18 sources of intelligence definition have been founded, highlight the importance of psychological definition. The thirty - five definitions displays the strong relation between this topic and the definition of Artificial Intelligence (AI) verify in literature. In Particular, the Authors in “AI researcher definition” (page 21) take into account, 18 definitions of AI. Following this research stream the Authors propose, using the synthesis of the psychological and artificial literature, a possible definition of intelligence identifying three common features: (1) “a property that an individual agent has as it interacts with its environment or environments”, (2) “related to the agent's ability to succeed or profit with respect to some goal or objective”, (3) “depends on how able that agent is to adapt to different objectives and environments” (page 20). The authors point out that intelligence involves adaptation, learning and understanding. At its simplest, then, intelligence is “Intelligence measures an agent’s ability to achieve goals in a wide range of environments” (page 23). It is interesting to note that, from a technological point of view the Authors do not take into account an artificial intelligence definition, but use an interesting perspective to contribute to the deepening of the topic and its possible definition. In fact, following this research stream, Medelyan, et al, (2009) highlight the strategic importance of the relation between artificial intelligence and products with particular attention to the role that artificial intelligence has in creating communities and exchanging information using in the digital age, the platforms. Korb, et al, (2010) offer to researchers and operators of the sector an interesting both technological and methodological points of view with particular attention to the application of AI. During the same period, Arel, et al, (2010) highlight the strategic importance to develop an overview of AI with particular attention to strengths and weaknesses, that depending on the application and context in which it is. Only in three years the, use of AI will be extensive and will be linked to the entire products and services world. This extensive use of AI is linked also to semantic network, as Navigli, et al, (2012) have developed in their research’s. Furthermore, Mitchell, et al, (2013) developed an interesting approach to AI, pay more attention to the ability to learn. The Authors, argue that this ability is strictly linked to the intelligent behavior. Following this pillar the Authors, highlight that the advancement in the theory and computer modeling of knowledge processes is of great implication to fields concerned with understanding intelligence. Nilsson (2014) has highlighted the strong development of the topic, with its innumerable applications and theoretical elaborations. The Author, underline the importance to bridge the gap related to AI, particularly between theory and practice. Following this research stream, Ghahramani, (2015), highlight the importance to consider the theme of learning as well as intelligence. The Author recalling the studies, also cited in this introduction, raises the need to deepen the topic. The AI, is a structured sector with to economic and social perspectives and offer continually, technological innovation. What is the future of this sector? It is interesting to note that starting from a technological point of view (Adams et al, 2012; Armstrong et al., 2014) highlight the necessity to develop a future of AI in relation with its applications. Müller, et al, (2016) provide to answer this question highlighting that it is not possible to chart the future of AI without considering its fields of application. AI finds wide application in industry 4.0. Its application is linked to the production, design, interaction and management of objects with the environment, big Company, SMEs, Startup but also groups and individuals (Siarry et al., 2020). The application fields range from the healthcare sector see Covid 19 (Allarm et al., 2020), to marketing (Davempport et al., 2020), passing through manufacturing production and sustainable development (Goralski, et al, 2020), private services and public administration (Marino et al, 2021d; Borges et al., 2020). These applications are limited also by the use of the technology itself in some European countries. For example, the phenomenon of the digital divide (Pariso et al, 2020) poses serious problems of economic growth in countries such as Italy, Greece (Marino et al, 2021b). The deep and rapid diffusion of AI highlights the need for multi - model and predictive approaches that can help also, firms in the decision-making process. Furthermore, the

simulation of human behavior for autonomous problem solving has been an interdisciplinary field of research in which AI plays a leading role. Classical control systems are used for static environments, where technological, organizational, economical and decision making process change slowly. Unfortunately, these environments are on the verge of extinction (Chen et al., 2019) in fact, the speed of the changes, to be interpreted, need models that process, select and interpret the information and suppose the decision-makers (Blažič, et al 2019). Following this research stream, the relationship between AI and decision process has been investigated particularly team composition and its diversity (Andrejczuk, et al. 2019). The ability of technologies to learn, replicate and process information has grown over the years, underlining the need for regulation of the interaction between firms and technologies, people and technologies, shifting the focus of research from the technological point of view to privacy and ethics (Russell et al 2015). The present study is focused on comparing the performances of the 27 European Member States in the period 2012 – 2021 assessing improvement of the transition toward Artificial Intelligence. The study is focused on society, law, physiology and trust impacts. The valuation of the effects was evaluated by seeing forty - two official European Commission rapports in order create a composite analysis and assessment of the state of the transition in Europe. The study pointed at understanding the degree of transition related to 27 European Member States in the realization of AI targets. The focus of our research is on the European Union, specifically the Member States. Each state is a transition and innovation agent, but it must also solve the uncertainties and bottlenecks that change management highlights. The European Union's member States function as agents that cooperate and compete to create a more ethical and open Europe with the help of artificial intelligence. This type of reflection focuses on the following research question: are the Union's Member States a multi-agent network, and are they addressing the issues associated with the transition to Artificial Intelligence? In reality, not only the private sector, but also the Member States as transformation agents, can recognize improvements in order to adapt their operational structures and subsystems to handle the different frameworks of reference, which are defined by the implementation of new management principles, such as ethics in the relationship between people and technology. This study is one of the first regarding the transition to Artificial Intelligence of the European Union. The issue is strongly addressed by the European Commission (2020) with its recent documents that highlight the need to accelerate towards the transition. An overview is now more important than ever. In particular, the issue of ethics is particularly felt by the European Parliament, as recently highlighted in the official documents of the European Institution. Through our scientific hypothesis, we want to contribute to the acquisition of knowledge in order to better explain the observed phenomena. Artificial intelligence is a dynamic transformation that can be broken down on a micro level, such as job practices, professionalism, and human resource abilities, or on a macro level, such as organizational borders, organizational processes, and the position of States as transition agents. It is worth noting that this final macro aspect, the position of states as agents of transformation in relation to Artificial Intelligence, has received little attention in the literature. This knowledge gap can be filled because certain transformations, such as those including the circular economy (Marino, et al, 2021c) and artificial intelligence, see states as the primary agents of the transformation in terms of implementing and managing laws and prospects for economic growth. The rapid and continuing growth of emerging technology, as well as the advancement of Artificial Intelligence, demonstrate that the conventional paradigm of the state as a supplier of resources and a regulator of rights is no longer sustainable. States compete with one another to draw investments in advanced and innovative industries that are characteristic of ICT and its evolving forms. These considerations emphasize the importance of rethinking the old State model in terms of people, business and community.

2. Theoretical background

AI products' create benefits for people, businesses and the community: more advanced diagnostic tools, more rational and ecological arrangements of collective settlements - the so-called smart cities, information packages for the exercise of professions. Furthermore, AI will be able to produce a quantity of intelligent consumer goods - IoT - capable of rationalizing the behavior of consumers and users of products, and the provision of services. Even more evidences, it was thanks to it and to the joint effort of pharmaceutical companies and healthcare

companies around the world that in the space of a year it was possible to have the vaccine against Covid-19 when the normal average was around 10 years. At the same time, this technology has also recently brought about necessary in-depth research, as in the case of remote work. It is equally true that AI can create applications that violate human rights both individually and collectively and in any case produce socially undesirable effects. Here, it is necessary to act with a balanced regulation. This regulation must involve the implementation of actions and results that are ethical and not adverse to human rights. This complex field of study and action is analyzed, evaluated and developed in the literature starting from the relationship between ethics as more principles. Ethics are moral principles that govern a person's behavior or the conduct of an action. The psychology has debated ethics for many centuries (Capone, et al, 2020), and there are various well-known principles. The psychological principles of ethics are still today, 2021, strong anchors that guide behaviors and decisions in particular in the relationship between companies, people and technologies. The interaction between technologies, institutions and people represents the main theme to which to apply the philosophical principles mentioned above. Among the technologies available, those that have a high degree of interaction and pervasiveness are those classified as AI. AI ethics are linked to the important enquiry of how, manufacturers and operators should behave in order to reduce the ethical harms that can arise from AI, either arising from unethical design, unsuitable application or abuse. The scope of AI ethics is wide and immediate. A brief point-to-point approach may be highlighted as follows: data privacy and bias in AI systems; concerns about, the impact of AI on jobs and the workplace; concerns about the possibility of AI systems reaching or exceeding human-equivalent capabilities. AI applications, in the last 10 years has shifted from an academic and industry concerns to a matter for political as well as public debate. The increasing AI impact in all sectors: industry, finance and leisure, policing & the judiciary, transport, healthcare, as well as the prospect of AI strategic contribute to the arms race, has prompted an unexpected number of national and international actions, from academia, NGOs and industrial groupings, government and professional groups related to the ethics issue. These national and international actions have led to a multiplicity of results, such as, the publication of a large number of researches developed by international journals, a growing number of countries, but is interesting to note that groups of countries, have announced AI strategies and set up national advisory or policy organizations. Furthermore, new ethical standards are emerging from private and public institutions, big Company, SMEs and Startup. The pervasiveness of AI has been also, assessed in areas such as accounting. In this sector, accounting firms are recording a high impact of AI, both horizontal and vertical; therefore, auditing and advisory functions are changing with benefits for both consultants and customers. At the same time, however, reflections emerge, both, by consultants and customers, on the need for secure data and information processing and verification of ethical behavior by accounting firms. Furthermore, the studies, highlighted the specific impact of technology on ethics, with particular attention to professionalism and judgment in this sector. Nevertheless, this same phenomenon is present in the network as well as within financial promoters. Moreover, the role of auditors in the public and private sectors has created an important debate on the relationship between business ethics and the ethical behavior of auditors. The regulatory changes governing the sector offer interesting research ideas on the ethical dimension should be implemented in the public and private services sector. The mismatch and integration between business and ethics has been a long debate (Phillips et al., 1999). Following this research stream, Crane et al., (2019) underline the importance of a clear point of view linked to business and ethics in the age of globalization. Furthermore, the studies, designed to experiment with their suggested protocol a new logic to address issues concerning the relationship between ethics and business. It is interesting to note that recently contribute by Freeman et al, (2020) starting with the new story of business, highlighted the differences between the topics of business and ethics and provide to elaborate an integration model. This model has been taken up and developed in theoretical studies and applications, concerning decision-making and human resource management (HRM). Starting from a reference article, Greenwood, (2002) related to HRM, with particular attention to a review and conceptual analysis of the topic, the Author pointed out the importance to study and develop reflections and evaluations linked to “not of whether HRM is ethical, but of whether HRM can be ethical.” Furthermore, the studies, noted that the organizations utilizing progressively more and more on algorithm-based HR decision-making to monitor their employees. Poff et al (2019), underline the importance to develop of the professional ethics in business with particular attention to different both structures

and institutions. Following this conceptual background, the aim of the paper is mapping the main ethical dilemmas associated with the development of AI in European Member State. Starting from the considerations highlighted above and connecting them to the purpose of the study, it is possible to identify 4 sets of main application fields, formed by topics related to it. The figure 1 collect the main dilemmas associated with the development of AI in European Member State. In Europe, an interesting debate and actions related to AI insist until today 2021 and will insist on the future. The first step is to highlight the main dilemmas associated with the development of AI. This first step is summarized in Figure 1.

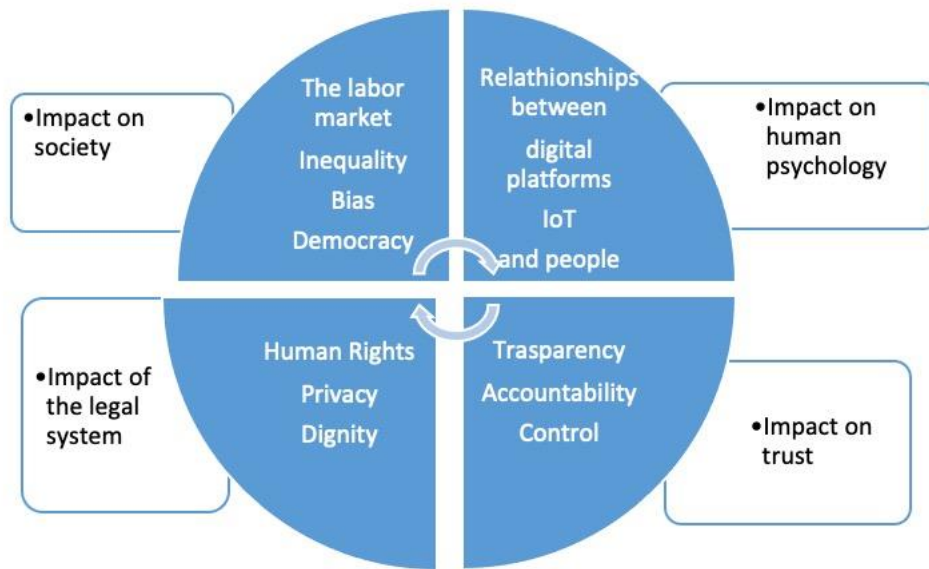


Figure 1. The main dilemmas associated with the development of AI
Source: The authors

The main dilemmas and its pillars are strictly linked each to other as elaborate in figure 1. In the next section will be evaluated, after the development of the individual themes, the actions of the European Member States. The evaluation of the actions is related to the main ethical dilemmas identified and linked to AI.

3. Methodology

Answering the research question (Swanson et al, 2013) means having a qualitative meta-analysis (QMA) collecting and processing the information necessary to create an accumulation knowledge that improves both the transition path of individual Member States and academic research. In order to evaluate AI awareness in the European context, it is necessary to understand how the countries are implementing and should implement actions related to AI. Forty two, official reports (2012 – 2021) were issued: Agency for Digital Italy (2019), AI4All (2019), AI For Humanity (2018), Austrian Council on Robotics and Artificial Intelligence (2018), Austrian Council on Robotics and Artificial Intelligence (2019), British Standard BS 8611 (2016), Council of Europe (2019a), Council of Europe (2019b), Consultative Committee of the Convention for the Protection of Individuals with regard to the Processing of Personal Data (2019), De.digital (2018), Digital Poland Foundation (2019), European Commission (2012), European Commission (2017), European Commission (2018a), European

Commission (2018b), European Commission (2018c), European Commission (2018d), European Commission High-Level Expert Group on Artificial Intelligence (2019), European Commission High-Level Expert Group on AI (2019b), European Parliament, Council and Commission, (2012), European Parliament, 2017, G20 (2019) G20 Ministerial Statement on Trade and Digital Economy, UK Government Office for Science (2015) Artificial intelligence, GOV.UK (2018a), GOV.UK (2018b), GOV.UK (2019). The UK's Industrial Strategy, Government Offices of Sweden (2018), International Telecommunication Union (2018), International Telecommunication Union (2018), Malta AI (2019), Ministry of Economic Affairs and Employment of Finland (2017), Ministry of Economic Affairs and Employment of Finland (2018a), Ministry of Economic Affairs and Employment of Finland (2018b), OECD (2019), Swedish AI Council. (2019), The Danish Government (2018), The Danish Government (2019), UK Government Department for Digital, Culture, Media & Sport (2019), United Kingdom Commission for Employment and Skills, (2014), World Economic Forum (2018), World Economic Forum. (2019a), World Economic Forum (2019b). National strategies on Artificial Intelligence (2020). Their common denominator was to evaluate AI awareness of the European Countries.

Synoptic framework

We elaborated this information and devised a synoptic framework to outline the progress made so far and to identify possibilities and opportunities for improvement.

3.1. Austria

Austria shows a high AI profile, mainly focused on innovation. The country is oriented to improve ethical outcome linked to the promotion of initiatives, Council on Robotics and Artificial Intelligence with “Einsatz von Robotern und autonomen Systemen” (RAS) that could support the main ethical dilemma associated to the development of AI. The White Paper identifies some critical issues in the development of AI, in particular in the manufacturing sector related to human resources management. Despite this, an effective Austrian AI strategy should include objectives aimed to increase ethical actions. The country's National AI plan related to Figure 1 is focused on the topic: impact on society, with particular attention to the labor market. The economic opportunities linked to AI must be supported by the solution of ethical dilemma, sustaining HRM and taking advantage by the fact that the AI represents 63% of national GDP in the transition from mechanical to digital production and will be necessary to implement strategic actions to increase the ethical behaviors.

3.2. Belgium

Belgium devised a general framework supporting the AI. The actions related to main ethical dilemma concern all four impacts. The actions linked to impact on society, starting from labor market identified the actions to be taken by the public sector. The continuous support of public employees, to understand the implications of AI in public administration, with training and knowledge sharing actions has yielded valid results that the government intends to extend also to the private sector. Despite these actions, both, public and private sectors, underline the importance of complementing ongoing initiatives. The central Government highlight an investment level of €80 million per year equal to at least €1 billion by 2030.

3.3. Bulgaria

Bulgaria has large numbers of AI players across the industry and startups relative to the size of its economy. This strength is all in the private sector, while the public sector suffers from significant weaknesses in the delivery of services using digital and AI solutions. It is interesting to note that in this Country there is a deeply mismatch between public and private sector related to AI. As consequences, some spheres of the impact on society, on the legal system and on the trust in terms of democracy, human rights, transparency, a result that is difficult to understand and the subject of evident and long-term social tensions. Starting from these assumptions Bulgaria presents a weak position in the AI implementation.

3.4. Croatia

Croatia is committed to a new social, entrepreneurial and technological innovation. This innovation starts from AI and spreads throughout society in both social and legislative aspects. The national AI plan is mainly focused on sustainability actions linked both public and private sectors. The country should gear its efforts towards raising awareness of AI transition policies and promoting tax incentives. The European Commission has strongly recommended that both the private and the public sectors should implement AI actions in their activities.

3.5. Cyprus

Its national AI plan mainly focuses on renewable energy (wind and solar). The problems related to the low level of AI investments' determine bottlenecks and to boost the ethical dilemma. In fact, in the public sector, i.e. digital platforms, the rise of consolidation remote work are creating problems linked to the operator's competencies. These difficulties are wide because is linked to the digital divide of this European Member State. Despite this, Cyprus is putting in place a national strategy for the development of AI. The Public Administration, are developing the plan related to ethical dilemma with particular attention in public sector, supporting AI in domains such as universities, school and National Health Service.

3.6. Czech Republic

The Czech Republic has been quite active in pursuing the solution of ethical dilemmas towards the AI with a good profile in the private sector and particularly in SMEs. In addition, on one hand, the country received substantial EU funding, mainly concentrated in the sector of innovative technologies to raise the awareness of the population in the AI utilization. On the other, as impact on the legal system, the Country has developed an intensive enacting proper legislation to the ethical dilemmas. Several initiatives have been undertaken such as the national AI Plan in which the AI has a leading role in the long term planning.

3.7. Denmark

Denmark has been active in promoting the AI plan and to solve ethical dilemmas with particular attention to the public sector. The country has leader profile in University, School and National Health Service. HRM and AI displays a low level of conflict. The private sector is structured with a large number of SMEs in which AI and related legislation developed complying with the solution of ethical dilemmas. At the same time, the country is one of the highest producers of AI products and workers in digital platforms modality. Many initiatives have been implemented such as the Danish AI Economy to reduce the ethical dilemmas linked both, public and private sectors. The country should work harder at coordinating actions at the national level with actions at the local level in order to avoid different approaches to AI. The strategy is performed by 24 actions for which €9.2 million has been held in reserve by the Danish government for the period 2019-2027.

3.8. Estonia

Estonia published reports on how to advance AI in public and private sector. The proposals made in the last report have been formed into a national AI strategy for 2019-2021. In the strategy, the government takes a leading role in accelerating and supporting the use of AI-based applications in the public and private sector. The AI strategy of this European Member State takes into account actions to boost AI from the government, public sector and impact on society with particular attention to ethical dilemmas, as democracy, bias and inequality. AI in the economy, with particular attention to ability, skills, competencies in the private sector with the necessity to identify a security plan in data repositories, impact on trust – one of four main pillars highlighted in conceptual background Figure 1 – and the impact of the legal system in terms of privacy and dignity. The strategy outlines specific action items across different fields from data governance and open data related activities to support specific projects and skill development.

3.9. Finland

Finland is one of the European leaders in the AI transition with high attention to ethical dilemmas. The Country planned a strong national financial system to sustain the innovation in the AI in relationship with ethic outcome. Finland created a national AI program in public and private sector, developing several projects for to improve the relationship between innovation, technology and workers, citizens, firms and public administration. This European Member State, organized the World AI Forum conference. The latter was able to encourage the adoption of several best practices and to establish AI and ethical guidelines. In line with these actions, Finland, pay more attention that other Member States to the harmonization of its legislative framework with the European Parliament's criteria for AI and human rights. To support this strategy, has been busy € 8.3 million funding for 2019–2022.

3.10. France

Development of artificial intelligence (AI) is a priority to France. The Country with the task related to AI and ethical dilemmas, are implementing a French strategy on the subject. No other European Member States have shown this reactiveness in AI. The strong push towards AI is given by the idea that it is one of the keys to tomorrow's world. The impact on society, labor market, highlighted in terms of employment, that AI development is possible only with ethical attention to human resource and right. At the same time, the new professions and skills that are emerging in France are supported with specific actions by improving effectiveness of lifelong learning. It is therefore essential to master the technology concerned. Its development raises important ethical questions in terms of impact trust and legal system: algorithm neutrality, use of private data and e-inclusion among them. In this framework, it is interesting to note that many of the biggest digital companies' heads of AI research are currently French. To support these challenges the French Government will invest €1.5 billion to the development of AI in the next two years.

3.11. Germany

Germany shows a very advanced profile in the transition towards the AI with a good management and the ethical outcome. This good management extends to both the impact of AI on society and the legal system. Digital platforms, influence human psychology, displays before pandemic time a balanced relationship with remote work in terms of employees, training and income received. The country carried out several well-coordinated AI initiatives with a good coordination at the national level aimed at achieving the transition from mechanical to digital society. The strengths of the German AI plan can be found in the strong national policy, the awareness and receptivity of the population towards the technological issues. The budget to implement AI strategy, amounts to €3 billion for the period 2019-2025.

3.12. Greece

The country's performance is particularly poor, both in the private and in the public sector. The main weaknesses that can be identified in the AI actions are mostly due to the difficulties in overcoming the barriers created by the mechanical model. Moreover, there is a slow response in adopting the EU Commission's proposals. Efforts have been made to promote new legislation in terms of the impact of the legal system, and to allocate funds for educational and organizational purposes in terms of transition towards AI and ethical outcome. On one hand, impact on society and the legal system and on the other, impact on trust and psychology must be improved in terms of governance, structures and operative task. These decision process making should be supported by a new management culture. The European Commission has strongly recommended that both the private and the public sectors should promote AI and ethical outcome. National Action Plan on AI; should promote, transparency laws and regulations; simplify administrative procedures; implement an AI trust.

3.13. Hungary

The Hungarian national AI Strategy has been published in the first half of 2020. The complete strategic plan aims to sustain all pertinent sections of the AI value chain from public and private sector with particular attention to data generation and management. The plan underlines the importance of basic and applied research, technology development and AI applications. More particularly, the plan aims to: change the basic pillars of Hungarian ecosystem from mechanical to digital: this challenge take into account data industry, R&D, education, infrastructure and regulatory framework. Focusing on the specific development of public sector, the plan declares the strategic importance to create the conditions of a friendly interaction between the public sector and citizens. The education system and health organization are the pillars of this challenge in public context. Nevertheless, private sector in the National plan plays a strategic role in terms of transition from traditional to innovative sectors. The transition from mechanical intelligence to AI in this Member State has been slow and intermittent. Barriers include a lack of extensive resource-efficient and strategic thinking that could facilitate the transition. The barriers are present both public and private sectors. In the private sector, the SMEs and big companies are intensely attached to the mechanical intelligence. In the agricultural and the public sector, no effective plans or actions were implemented to support the transition. The European Commission underlined the importance of undertaking to implement a Hungarian AI Roadmap, to reduce the gap with outcomes declared by the European Commission.

3.14. Ireland

The Department of Business, Enterprise and Innovation (DBEI) is the focal point in the development of the national AI Strategy. The National plan presents a complete framework addressing the future steps to confirm that use of AI will benefit society. In line with these assumptions, the strategic pillars are: to improve the relationship between enterprise development and AI sector; to develop a human capital long life education; to invest in digital and connective infrastructure; to assure ethics standard and friendly regulatory framework. The Member State created strong actions linked to AI program. Particular attention is dedicated in several government support programs, planning a public e-course to raise awareness about AI, along with creating test for testing public sector AI applications. The private sector will have the occasion to use chosen innovation and development grants for increasing machine learning based solutions. Furthermore, education and research are also in application of a new Master's curriculum at the University as well as interdisciplinary partnership between ICT sector and educational platforms.

3.15. Italy

Italy's AI strategy, formulate in 2019 provide a National guide, elaborating actions and policy recommendations as a first step for Italy's AI strategy. The public consultation linked to National strategy, designed current issues to develop the AI strategy for Italy. The long-term strategy identifies as bottleneck to improve, public services and its digitalization. Furthermore, it presents key actions to increase in terms of: developing AI skills and competences at all education levels with particular attention to the building sector (Agliata et al, 2020) and public administration a lifelong learning program will be implemented; boosting AI competitiveness of the entrepreneurial ecosystem; coordinating a regulatory and ethical framework. Italy's performance has been more positive in the private in terms of SMEs transition towards AI. It is interesting to note that Italian SMEs represent the backbone of Italian production by a number of production units, employees and contribution to GDP. In the public sector, the implementation of AI shows serious delays, both at the central and local level. The biggest bottlenecks for both levels concern the advanced age of public employees and weak digital training. The national level presents as weakness in the use of AI, while the local level does not invest in the purchase and use of this technology. The European Commission underlines the importance to implement an AI plant, to boost the transition. The Italian government allocates €1 billion of public investments by 2025 for the strategy implementation.

3.16. Latvia

Latvia's AI performance is quite poor, in fact only in 2020; the government released its national AI strategy. The primary problem is to create in private sector an economic value. This sector is structured in large part with startup and SMEs, with a strong vocation for the implementation of digital technologies and AI, but at the same time, a difficulty in investing huge capital to compete on global markets. There is a high stakeholders' awareness in the public sector. In this sector, the transition towards AI is considered as a first strategic step to improve services and to create a large base of opportunities to invest in Latvia. European Commission recommendations are linked to the AI strategy and its implementation. Particular the suggestions concern the use of EU financing also to improve the infrastructure with common rules at the national and local level. In addition, the application of AI national plan, for both public and private sector, include a training program as support to boost the transition.

3.17. Lithuania

Lithuanian Artificial Intelligence Strategy: a vision for the future is the national plan linked to develop AI in this European Member State. The purpose of the strategy is to modernize and increase the current AI ecosystem in Lithuania and guarantee that the Nation is organized for AI implementation. A focusing group related to private sector, academia and governmental institutions has drafted the National plan. The plan, make available an outline of the current AI scenery in Lithuania and a series of policy recommendations in key areas with the purpose to: improving the skills and education in AI for all citizens; joining the national research and innovation ecosystem in the field of AI; facilitating the development and use of AI in all economic activities; strengthening national and international collaborations in AI networks; developing an ethical framework for AI applications. The Lithuanian strategy does not embrace tangible policy actions, but interesting guideline for all stakeholders in the country with policy recommendations aligned with the European Commission. It is possible to identify a weakness in the plan, relating to the non-detailed share of investments for the identified actions.

3.18. Luxembourg

Luxembourg distributed its national AI strategy, in 2019. The strategy is part of a larger policy program related to digital transformation towards the development of a digital society. The strategic National plans outline the application field of AI and the strategic policy trajectories in key areas to realize them. The policy vision of Luxembourg's strategy is to support the attention to HRM. The ambition of this Country has become a leading digital society in the world. The following trajectories are considered strategic: a lifelong learning as a support to the digital transformation both public and private sector; a strong dissemination of lab for applying AI; to collaborate with international projects with strategic partners in AI. These trajectories are supported by growing investments in AI and associated technologies. It is interesting to note that a consistent range of public investments is linked to an ethical and regulatory framework. Particularly, the regulatory program is linked to privacy and security to safeguard transparent AI development. The national AI strategy does not divulge financial assessments for its implementation.

3.19. Malta

Malta's national AI strategy started in 2019. The ambition is to increase AI opportunities in the global economy. To realize this objective, the strategy presents three pillars to boost the transition towards Malta's AI strategy: first of all the national strategy underline the importance of to create an AI ecosystem based on investments, start-up support and innovation; this ecosystem, must be supported by the adoption of AI both in the public and private sector. Particularly in the private sector, the economic, technological and financial attention will support Startup and SMEs, or a large number of Malta industrial structures. The success of these purposes depends on five horizontal enabling factors that are shared across the two sectors: education, workforce, legal and ethical framework and infrastructure. Unfortunately, the AI strategy does not reveal financial estimations for its complete implementation.

3.20. Netherlands

In 2019, the Dutch government has made public its national AI plan. The plan presents a set of policy actions and decision-making process to strengthen Netherlands' competitiveness in AI within the global economy. The actions and decision-making process of the Dutch AI strategy depend on three strategic pillars, pointing at: exploiting AI opportunities, boosting the adoption, use and development of AI in the private and public sector and encouraging the use of AI to achieve a new societal configuration; generating the right conditions supporting education and skills in AI are developing research and innovation in AI, enabling the admission both to qualitative and quantitative data improving the digital platforms; consolidation attention to the actions related to ethical issues, such as trust, human rights, consumer protection, and safety of citizens. The budget to promote and support AI innovation is estimated at € 63 million.

3.21. Poland

In 2019, the Government has published the National plan of its national AI strategy, entitled "Artificial Intelligence Development Policy in Poland for 2019-2027". The roadmap released by the Ministry of Digitization forecasts to approve the national AI strategy by the end of 2020. The outcome of Poland's strategy is to support the development and innovation of the knowledge-based economy associate to the AI science and research. Furthermore, the National plan, to prepare citizens for the digital transformation by improving their abilities. Along this route, the National plan, declare that is strategic take into account the protection of human dignity and ensure ethical conditions related to AI. The plan pointed out the following specific objectives: improving the educational system supporting it by lifelong learning opportunities in AI sector; supporting development and innovation of AI companies in terms of research and financial resources; stimulating national and international partnerships in AI; generating a data ecosystem with particular attention to high-quality data and data exchange mechanisms; strengthening the digital infrastructure, boosting the development of AI innovations. The budget dedicated these objectives is estimated about at PLN 1.8 billion.

3.22 Portugal

The Portuguese government presented in 2019 its national AI plan 2019 – 2030. It is pointing out the risks and opportunities of a fast growing AI ecosystem in the Nation. Fastes growing is related to public sector boosting of knowledge investments in AI competences and in the private sector, supporting the technological, organizational and financial challenges. Furthermore, the National plan declares that people constitute the main pillar for the effective development of AI, in this framework, the plan pointed out the strategic importance to achieve actions and decision – making process related to inclusion, education, qualification, specialization and research. The national AI strategy does not divulge financial estimations for its implementation.

3.23 Romania

The Romanian Government is preparing its national AI plan. Romania's AI plan should be developed by public consultation. The national security system will be applied to the AI sector. The aim of Government is to promote strategic research related to the development of the national AI sector with particular attention on one hand to public sector i.e., digital platforms oriented to citizens and on the other to private sector linked to the strategic industry. In this context, the Government declares a high attention to preserve human rights and social values.

3.24. Slovakia

This Member States include its AI development as part of a National digitalization strategy. In 2019, the Government elaborated the Action plan for the digital transformation of Slovakia in 2019 –2030. The action plan proposes a regular and innovative action in terms of how to create a sustainable and human centric, AI ecosystem. Moreover, particular attention is dedicated to the impact of trust. The digital transformation is the pillar and the action plan is based on a broad sharing of all stakeholders, including citizens. The National plans pointing out the long-term standpoint of this Member State for an effective digital transformation of the economy and society. The plan highlights an action list of policy initiatives with a short-term that covers the following critical issues to

overcome in order to achieve the objectives: developing digital transformation of education system preparing it for digital skills needed; supporting the digital and data economy; strengthening the skills and abilities of the public administration to update the data for an institution citizens friendly. Budget information on AI will be developed as a supplementary stage, together with the strategic partners from academia, business, civic society and non-profit organizations.

3.25. Slovenia

The improvement of a national AI strategy of this Member State is ongoing. The involvement of the national government of the main stakeholders present in the country has been carried out, but the actions taken and the expected results are not yet evident. The establishment of working groups containing of various ministries, research institutions and government departments has been organized to develop the AI strategy. The declared outcome is to support Slovenia in increasing its international competitiveness in AI. The first target identified, are the following: mastering the state of art in the country; analyzing technological and industrial capacities in AI field; coordinating the socio-economic changes linked to AI, i.e., the labor market and education system; creating proposals for systemic regulation of the field, i.e., trust and its impact with appropriate ethical and legal framework.

3.26. Spain

A complete elaboration in AI strategy has been elaborated in 2019. Despite the recent start point, Spain displays a series of priority actions and policy recommendations to generate the suitable ecosystem for the growth and application of AI technologies. These actions and recommendations are focused on the creation of a background of a solid Research, Development and Innovation (RDI) ecosystem in AI. In fact, it attends as the early structure for the expansion of a national AI strategy. The RDI strategy in AI identifies the following pillars: to develop the RDI system and the analysis of its socio - economic impact; to identify priority strategies in which research and innovation in AI should be implemented; to encourage the development of education and competences in the field of AI; to create proposals for systemic regulation of the field, i.e., trust and its impact with appropriate ethical and legal framework. Compa with Italy, the Spanish RDI strategy dedicated focus on the public sector. The strategy, intends to improve data governance and its quality with particular attention to public service delivery. The fixed outcome in terms of quality of service is a better interaction between public services and citizens. Following this action line, the Government is participating in the implementation of the European Open Science Cloud (EOSC) initiative, a cloud 5G infrastructure to promote open science at a European level. Nevertheless, this Member State, creating proposals for systemic regulation of the field, i.e., trust and its impact with appropriate ethical and legal framework.

3.27. Sweden

In 2018, this Member State published its AI strategy. The National plan points out the general guide for AI development. The plan, aims to outline a base for future policy decisions and activities. In fact, the plan supports the government in implementing AI systems and identify forthcoming of several strategic pillars to realize in short – term: improving education and training system; strengthening ethical and legal framework. The national plan outlines a wide range of opportunities and challenges in Sweden’s capabilities to reinforce the full prospective of AI. The Swedish AI strategy does not divulge financial estimations for its implementation.

4. Results

The surveys of European perspectives to AI have highlighted that there are strengths and weaknesses but also threats and opportunities. The strengths are: a) supportive of using digitization as strategic technology to improve productivity and job and to boost the transition. Furthermore, b) Member States agree such technology necessitates active and careful management. c) There is a strong attention to data ethics, including security and transparency, related to a strong ethical framework. d) Identify the AI actions and improve the quality of public

services. The weaknesses are: a) not widespread use of AI into health service with particular attention to vulnerable members of society. b) A generic plan on ethical and legal framework, this plan is declined not in terms i. e., of age, gender, educational level, and location and a planning of related investments. c) Several Member States were not declaring the investments necessary to support the transition. d) Weak investments in connectivity and slow adaptation times to the objectives set by the European Commission. e) There is a low level of interdisciplinary collaboration between sectors and with other countries. The threats are: a) Member States are worried that AI will bring job losses, and is not evident if the turnover will be positive. In this case, the bottlenecks are linked to the new job opportunities across the EU. b) The bottlenecks related to access and protection of their data and information online, highlight high concern, in institutions, businesses and citizens. c) Only some Member States are focusing National plan on investment for business competitiveness and public services. d) In the national programming of the individual Members, the theme of the cultural change necessary to support the transition is not developed. The opportunities are: a) the European citizens holding a positive point of view about AI sector and its developments. This idea underline a positive approach linked to society, the economy, and citizens' lives. b) A large base of European Member States has incorporated in their strategy AI sector and related work groups. d) Several Member States will develop Centers of Excellence for AI research. e) Create a European Industrial Strategy related to AI sector. Strengths and weaknesses such as threats and opportunities are in terms of impact on society, on the legal system, trust, less on the psychological dimension (Figure 1). The impact of the psychological dimension, studied in the literature (Capone, et al, 2020), does not find space in the national programs in the 27 Member States in relation to the 42 official documents evaluated. This lack of attention in national programs is also linked to the human level (Adams et al, 2012) which, like the psychological level, is developed in the literature. The literature highlight the link between the results obtained in relation to the impact on society. Following the results of official national plan the impact on society with its pillars, highlight in the labor market some strengths and opportunities. Particularly, productivity and AI applications may create a mismatch between loss and job creation in the short run. It is interesting to note that this topic has been discussed in terms of meaningful AI: connecting business, labor market and work. Following this discussion stream, has been highlighted that in the long – run the mismatch characterized by a loss job, may develop economic and social inequality with negative consequences for the democracy of the Nation. These negative performance can reinforce traditions against innovation and spread negative bias in relation to the development of AI. The impact of the legal system has been pointed out in all 42 official documents evaluated, but the three pillars develop in literature are often stated and not detailed in the programs of the individual Member States. Some issues specific to this technology, such as identity theft, its protection and the penalties for this crime, are not explored and diverge within the European Union. The strong development of the digital platforms in terms of privacy (Stemler et al. 2019), one of the three pillars, underlines the necessity to integrate actions between law and control communication in relation to digital platforms. This role should be public with particular attention to human rights and dignity. Digital platforms, human rights, and dignity, are strictly linked to human resource management and its development as underline in literature (Csillag, 2019). Following this research stream is interesting to note that this approach affects the trust that is perceived and experienced by workers and citizens. The European Commission with satisfaction questionnaires from the individual Member States measures the impact on trust in AI era. This type of information gathering and processing concerns the citizens and less the workplaces. In fact, the pillars that emerge from the evaluation of the 42 official documents analyzed refer to the role of AI towards citizens: transparency, accountability, control, less in relation to SMEs, big companies, startup that use AI. This partial view, public social standard (Asif et al., 2019), does not help in understanding the phenomenon, of course, workers are citizens and vice versa, but the dynamics and use of these technologies is different in terms of methods and objectives. In literature this scenario has been developed with particular attention to leadership and philosophical approach with interesting results in terms of application and future issues. Unfortunately, these trajectories (Gindis et al, 2020; Chia et al, 2020) are not applied to the EU commission. The study of the 42 official documents shows that the Member States are very attentive to an economic dimension of the phenomenon in general terms of forecasting, but are unable to have detailed implications in the different areas of impact of AI. Particular elements of delay in processing are highlighted due

to psychological, legal and trust effects on the part of both citizens and workers in relation to the use, applications and future scenarios related to AI. This delay, on the other hand, does not belong to theoretical and case studies, which precisely on these issues highlight interesting results that foreshadow scenarios and trajectories in relation to which the public decision-maker should intervene to manage and regulate the future development of AI. Furthermore, the analysis shows a heterogeneous transition with all countries beware to impact on society with particular attention to economic variables. An interesting feature, by analyzing the European geographical areas, is represented by the fact that there are not leader areas in transition. These performances are highlighted also at operative level of the information related to the budget: only a few Countries have declared the budget dedicated to the transition in an official document assessed. The novelty and practical value of the obtained results are linked to a first comparison of AI in Europe with different configurations and trajectories.

5. Discussions

The comparison of conceptual context and obtained results demonstrates that AI is a European strategic topic. AI in Europe would have to be handled by the Union's member states not only through regulatory legislative interventions, but also, and most importantly, through the management of the transition towards a digital economic model and AI. It should be noted that the literature has not yet dealt exhaustively with the transformation and the position of the Member States that would promote the advancement of AI. The findings, as stated in the study paper, demonstrate bottlenecks in the guarantee of protection and constitutional rights of individuals and companies. Simultaneously, acts that strengthen the implementation of artificial intelligence in Europe are visible. The problem of establishing adoption criteria, which is entirely lacking, reveals a flaw in the ethical application of technology. The Member States are confronted with a quickly developing market, although their activities remain inefficient and not tied to a shared vision. The management of the Union's countries is focused on opposition to transition. The need to monitor the uncertainty of AI systems, which are seen as a direct threat to each Member State's defense, provides a high level of resistance to transition. Another source of opposition to transition is the presence of AI platforms with strict transparency obligations, such as government-provided automated networks, in which customers must be conscious that they are communicating with a software and must be able to select whether to proceed or to back off. AI transitions must be further investigated along this way in order to understand the position of Member States as transfer agents. In the digital age, the usage of networks, which has risen since the pandemic, should be better studied because it has not shown that Member States value work ethic, especially remote work. The desirable future is structured between utopia and the imagination of alternatives. This desirable future would include the commitment of conceptual and technological research, the acquisition of information about the phenomena, and the decisive intervention of the Union's Member States as agents of the transition to the AI society.

6. Conclusions

The paper presented an assessment analysis on the AI transition of the 27 EU Member States. Starting from a conceptual background and operational overview, the study defines the state of the art of the phenomenon. Moreover, have been identified strengths (4 points identified) and weaknesses (5 points identified) but also threats (4 points identified) and opportunities (5 points identified). These 18 points have been elaborated in relation to the literature in order to examine the transition degree of each country towards the AI. In conclusion, it can be observed that in order to moderate the gap within the 27 EU Member States, it is necessary to develop motivated government actions to support the best possible transition in each country. This requires a strong idea of what is AI in Europe, a willingness of the governments in term of policies, an entrepreneurial culture able to understand the different impacts as identified in the literature. AI represents a major shift in terms of opportunities, not only from an economic point of view, able to see in this opportunity a future inclusive of the different economic, social, legal and trust issues for all stakeholders. The AI is an open question, and therefore

the output of discussion linked to research results, reject a stance where from the transition must be seen as under constant development and re-interpretation.

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