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MECHANISM FOR SUSTAINABLE DEVELOPMENT OF ECONOMIC POTENTIAL OF FOOD INDUSTRY

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Abstract. The purpose of this paper is to identify major deterrents hindering sustainable development of the food industry in the Republic of Kazakhstan and to chart steps to overcome the challenges involved. Methodologically, the study relies on retrospective analysis to evaluate development trends in the food industry, as well as an expert survey of Kazakh food industry professionals. The findings indicate that Kazakhstan has considerable potential, yet it is not yet utilised efficiently. With the rising demand for processed food products, small and medium businesses in the food industry often cite raw material shortages as a major obstacle for running production at full capacity. Moreover, experts also refer to other factors hindering the development of the food industry, such as financial deficits, high proportion of outdated and worn equipment, outdated production processes, etc. According to the experts, the priorities in addressing the challenges of sustainable development include refinement of government support measures in the food industry and establishment of modern infrastructure to ensure proper storage and delivery of products to consumers, For example, establishment of agroparks and networks of rural transformation centres, as well as digitalisation of the industrial production of food products.

Keywords: sustainable food system; sustainable development; food production; food industry; manufacturing; economic potential

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JEL Classification: Q1, Q11, Q12

1. Introduction

The food industry has been increasingly viewed as a potential source of development for rural economies, as it creates synergy between consumers, industry and agriculture. A well-developed food industry with a higher degree of processing helps to reduce loss, improves value added, facilitates agricultural crop diversification and better yields for farmers, supports employment and improves export revenues. The sector can be also instrumental in addressing the issues of food security, food inflation and adequate supply of healthy nutritious food.

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Global industry always follows global consumer needs. Changing lifestyles, growing incomes and preferences shifting more toward packed and ready-made food products prop up the role of the food industry. It accommodates huge growth potential for the Republic of Kazakhstan, which has a large production base of food products. Kazakhstan ranks sixth globally by the size of pasture resources (Worldstat, 2020). Over the last decade, cultivated areas under feeding crops rose by 39% to reach 3.3 million ha in 2019 (FAOSTAT 2020; Serikbaeva et al. 2019).

Kazakhstan is now in the top ten among wheat exporters in the world; grains have remained an unchanged constituent of exports over the period of independence and the only type of agricultural exports, whereas, in general, the country has been a net importer of agroindustrial products (Anderson et al. 2018). Agriculture in Kazakhstan has shown steady and robust growth for years. According to the Statistics Committee of the Republic of Kazakhstan, the data for 2014-2018 show that the output of crop farming grew 2.2 times, while the total output of animal farming grew 1.9 times (Statistics Committee of the Republic of Kazakhstan 2020a). Compared to 2014, the population of cattle rose by 1.11 million heads in 2018, while the poultry population increased by 9.3 million heads. Compared to 2014, the gross yield in 2018 rose by 3,111.5 thousand tonnes for grains and beans, 1,146.0 thousand tonnes for oil crops, and 396.5 thousand tonnes for potato. Food product consumption has registered an increase in recent years. Between 2014 and 2018, the monthly per capita consumption of bread and cereal products rose to 11.5 kg from 10.5 kg, meat and meat products – to 6.5 kg from 5.9 kg, and milk and dairy products – to 21.8 kg from 18.8 kg (Statistics Committee of the Republic of Kazakhstan 2018a). The growing demand and stimuli offered by the Government of the Republic of Kazakhstan have produced positive effects on the food industry (Mustafayeva et al. 2019). Food production rose by 38.4% to 1,527.7 billion tenges in 2018 compared to 1,103.5 billion tenges in 2014 (Statistics Committee of the Republic of Kazakhstan 2020b). The food industry of Kazakhstan is indicated as a potential industry of growth in the currently implemented State Programme of Industrial-Innovative Development of the Republic of Kazakhstan for 2015-2019 (Decree of the President of the Republic of Kazakhstan dated August 1, 2014, No. 874 "On approval of the State Programme of Industrial-Innovative Development of the Republic of Kazakhstan for 2015-2019 and on Introduction of Amendment to the Decree of the President of the Republic of Kazakhstan dated March 19, 2010 No. 957 “On the List of State Programmes”). The sector shows potential to significantly contribute to employment and income growth.

That said, despite the considerable production base, the level of processing remains low. The volumes of processing in animal farming produce in Kazakhstan do not exceed 35% vs. 40% in Russia, 50% in Belarus and more than 90% in developed EU countries. A serious challenge for food industry development is the shortage of raw materials in meat and dairy production, grain and oil crop production. In 2018, Kazakhstan's flour milling factories only operated at 36% of their capacity and oil mills – at 35% (AgroInfo News Agency 2019). Factors hindering the development of Kazakhstan's food industry and measures to unlock its economic potential make a relevant subject for research.

The hypothesis of this study is that a proper approach might help the food industry in Kazakhstan to utilise the potential of agriculture, promote the country's industrialisation, change the structure of inner value added and diversify exports beyond raw materials.

2. Literature Review

The food industry is a complex network of farmers and various types of enterprises providing a major share of the food supply consumed by the global population (Pomozova et al. 2019). The sector is part of the agroindustrial complex and comprises a complex of industries engaged in the processing of agricultural, forestry and fishery produce to make food products, ingredients and components, feeds and additives, beverages and mineral waters, spirits, beer and wine, tobacco products (Sapozhnikova et al. 2017). The main objective is to ensure the stable supply of main types of food products (Zocca et al. 2018). Food industry sustainability is a principal strategic

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challenge for all stakeholders engaged in the food supply chain from agriculture, food and ingredient production, packaging and distribution to consumers (Grasseni et al. 2014). The food industry bears environmental responsibilities for maintaining biodiversity, preserving water resources and cutting waste and emissions (Ermolova et al. 2019). Moreover, the global food industry comes under intensifying pressure in terms of raw material supplies, sources of ingredients and maintaining production for rising populations amid the steady drive for optimisation and supply chain control (Yunusa et al. 2018).

To meet current daily requirements of the global population, the daily nutrition supply should provide at least 360 million tonnes of carbohydrates, 364 million tonnes of proteins and 195 million tonnes of fats (Global Info Research 2020).

A growing body of analytical studies questions the long-term sustainability of current trends in food production and consumption (Agovino et al. 2018; Aitkazina 2013). Unstable prices, restrained accessibility and interdependence of global commodity markets alongside the growing vulnerability of food production systems to climate change and the loss of agrobiodiversity will make food even more inaccessible for the poor (Aschemann-Witzel and Peschel 2019).

Many researchers approach food industry development in the context of a sustainable food system (SFS) (Charis 2018). Views are diverse as to what a "sustainable" food system is and what falls into the domain of "sustainability" (Moumen et al., 2019; Tvaronavičienė and Ślusarczyk, 2019; El Iysaouy et al., 2019; Coderoni and Perito 2020; Chehabeddine and Tvaronavičienė 2020). According to the definition of the Food and Agriculture Organisation (FAO), a SFS is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised (Food and Agriculture Organization of the United Nations 2018). A SFS has multiple aspects to it, such as food supply safety, health issues, affordability, quality, food industry strength in terms of jobs and growth (Baldwin 2015). To be sustainable, a food system should simultaneously generate positive value in three dimensions: economic, social, environmental (Li et al. 2019). On the economic dimension, a food system is considered sustainable if the activities conducted by each food system actor or support service provider are commercially or fiscally viable (Hodbod and Ikin 2015). The activities should generate benefits, or economic value-added, for all categories of stakeholders: wages for workers, taxes for governments, profits for enterprises and food supply improvements for consumers (Trubilin et al. 2020). On the social dimension, a food system is considered sustainable when there is equity in the distribution of the economic value added, taking into account vulnerable groups categorized by gender, age, race and so on (Schipanski et al. 2016; Oteros-Rozas 2019). Of fundamental importance, food system activities need to contribute to the advancement of important socio-cultural outcomes, such as nutrition and health, traditions, labour conditions, etc. (Porter 2015). On the environmental dimension, sustainability is determined by ensuring that the impacts of food system activities on the surrounding natural environment are neutral or positive, taking into consideration biodiversity, water, soil, animal and plant health, the carbon footprint, the water footprint, food loss and waste and toxicity (Dong et al. 2020; Dudin, et al. 2020). The structure of the food system is dynamic and driven by complex and varied trends such as urbanisation, population growth, climate change and forces such as technological change and innovation, policy change and so on (Vallejo-Rojas et al. 2016; Aitkazina 2019).

The overall performance of the food system, measured in terms of sustainability, is the result of the intertwined conduct of all actors in the system. Firms, farms and consumers, for instance, all can have the power to influence food system performance and initiate change. SFS, as engines of growth, create value-added that has five components (Béné et al. 2019):

- salaries to workers;
- return on assets (profits) to entrepreneurs and asset owners;
- tax revenues to the government;

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- benefits to consumers;
- impact on the socio-cultural and natural environment.

Taking a holistic view of the food system will have practical implications for development strategies and plans for the food industry.

3. Methods

The study was based on data gathered from reliable and authoritative sources, such as the official web portals of Business Navigator (Business Navigator 2020), the Union of Food Products Producers of Kazakhstan (UFPPK), the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" (National Chamber of Entrepreneurship of the Republic Kazakhstan “Atameken” 2020), Food industry (Food industry 2020), etc.

The methodology of this research combined qualitative and quantitative analysis. Retrospective performance analysis of food industry development provided quantitative data, while in-depth interviews with key people at individual enterprises produced qualitative input. The survey was meant to indicate major challenges hindering the development of the food industry in the Republic ofKazakhstan by way of analysis of expert input concerning the industry. The expert survey was conducted by phone using computer equipment. The expert sample included top and middle managers from the food industry. The sample included randomly selected companies from the Commercial Register of the Republic of Kazakhstan. Respondents from 167 companies took part in the survey, including three big, five mid-size and 159 small companies from the food industry of Kazakhstan.

4. Results

The food industry is a major constituent of the agroindustrial complex and a leading industry in Kazakhstan, contributing 6.9% of the Republic's total industrial output. Companies of the food industry create positive growth rates of industrial output in the sector in general: total food production in the Kazakh national currency terms rose by 38.4% between 2014 and 2018. In terms of physical volume for 2014-2018, per capita production grew in cereals and wholemeal flour (+29.8%) (calculated by the author according to (Statistics Committee of the Republic of Kazakhstan. 2018b)), cheese and cottage cheese (+17.3%), margarine and edible fats (12%), meat and edible meat offal (+13.9%), vegetable oil (+11.6 %), processed milk (+7.7%), sausage and similar meat products (+1.5%). Simultaneously, there was a significant decline in per capita production of fruit and vegetable juices (-30.2%) and sugar (-29.5%). A limited decline is also registered for fresh bread production (-7.8%), fine flour (7.4%), butter and dairy fat spreads (-7%). Notably, processing levels remain relatively low for main agricultural products in Kazakhstan. For example, the 2018 level of grain processing for food consumption was at 13.5% of the total grain resources in the country (calculated by the author according to (Statistics Committee of the Republic of Kazakhstan 2018c)). For instance, the same figure is 25.7% in the Russian Federation (calculated by the author according to the data from (Federal State Statistics Service of the Russian Federation 2020)) or 23.9% in Ukraine (State Statistics Service of Ukraine 2020). The average annual capacity utilisation levels in meat, milk and sugar processing are considerably below the same figures for the Russian Federation and Belarus (Figure 1).

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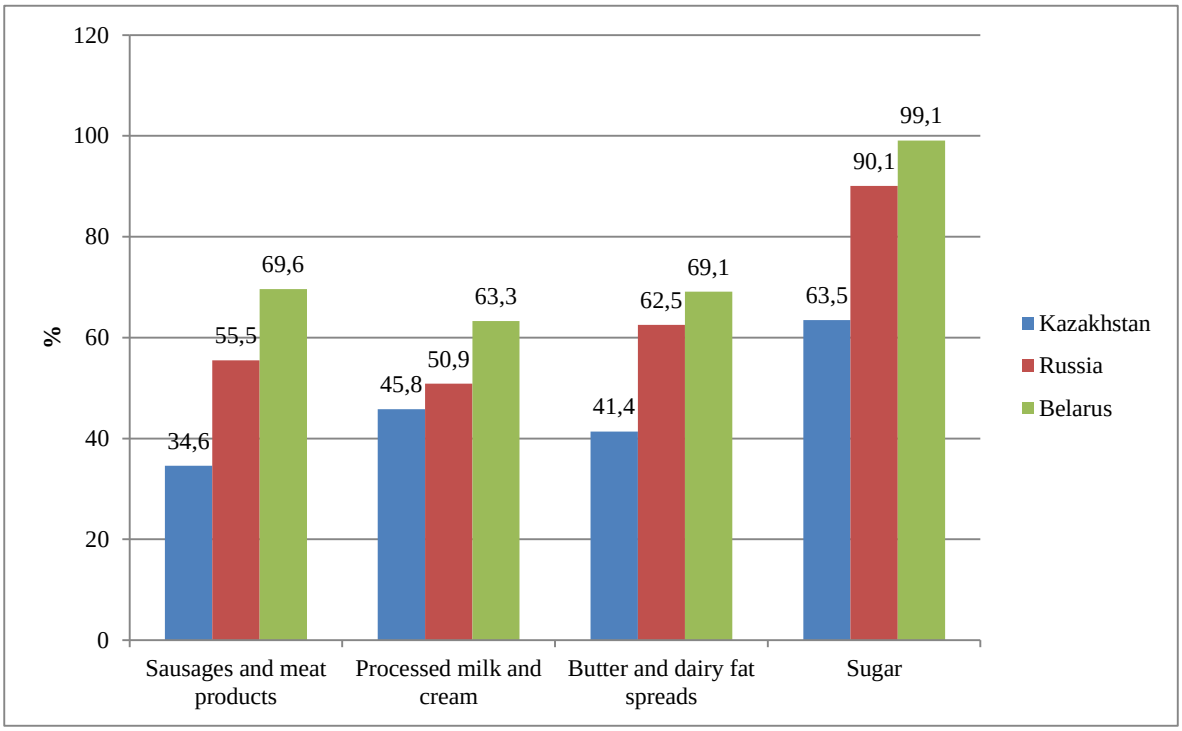

Figure 1. Average annual capacity utilisation levels in meat, milk and sugar processing
Source: Compiled by the authors

Despite the rather wide range of food products supplied by Kazakh food producers, the trade balance is negative. For now, food imports in Kazakhstan exceed exports. With that, product output nationally is almost twice lower than imports (Table 1).

Table 1. Trade balance in food products for the Republic of Kazakhstan in 2018

Products	Trade balance, thousand USD	Exports, thousand USD	Imports, thousand USD
Meat and edible meat offal	-166,041.2	45,050.3	211,091.5
Fish and crustaceans	-14,260.2	56,546.8	70,807
Preparations of meat, fish or crustaceans	-82,308.3	11,520.8	95,829.1
Dairy produce, birds' eggs, honey, other edible products of animal origin	-190,900.9	65,568.8	256,469.7
Vegetables, roots and tubers	-39,628.1	126,769.1	166,397.2
Fruit and nuts	-489,795.8	14,561.7	504,357.5
Coffee, tea, spices	-109,031.7	11,800.5	120,832.2
Preparations of vegetables, fruit, nuts	-198,206	7,649.5	205,855.5
Products of the milling and cereal industry	441,547.4	466,236.3	24,688.9
Preparations of cereals, flour, starch or milk	-227,651.6	53,012.1	280,663.7
Oil seeds and oleaginous fruits	295,149.5	355,406.6	60,257.1
Animal or vegetable fats and oils	-56,752	140,003.8	196,755.8
Sugars and sugar confectionery	-192,963.1	63,656.7	256,619.8

Source: Compiled by the authors

The main categories of Kazakhstan's food exports are products of the milling and cereal industry and oil crops. The bulk of food imports consists of fruit and nuts, sugars and sugar confectionery, dairy products. Value chain

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analysis indicates that almost no highly processed food is currently produced in Kazakhstan, except for starch, mare's milk powder, fish flour.
Overall, the outlook among enterprises of the food industry in Kazakhstan is viewed as satisfactory (Figure 2).

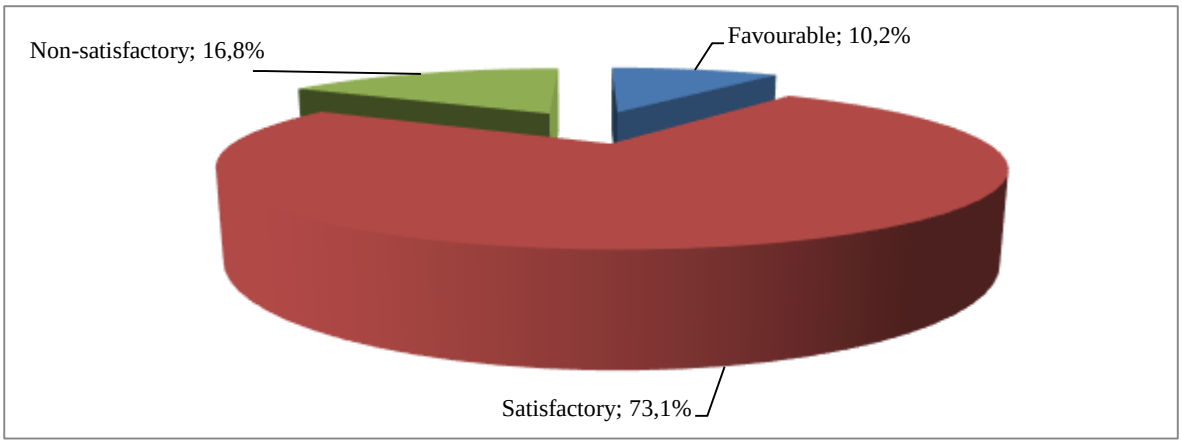

Figure 2. Expert appraisal of the economic conditions at enterprises of the food industry in Kazakhstan
Source: Compiled by the authors

About a third of the experts pointed at economic improvements at enterprises of the food industry over the last three years. However, most experts (44.9%) believed the conditions were unchanged. 13.8% of the respondents cited worsening conditions in the industry (Figure 3).

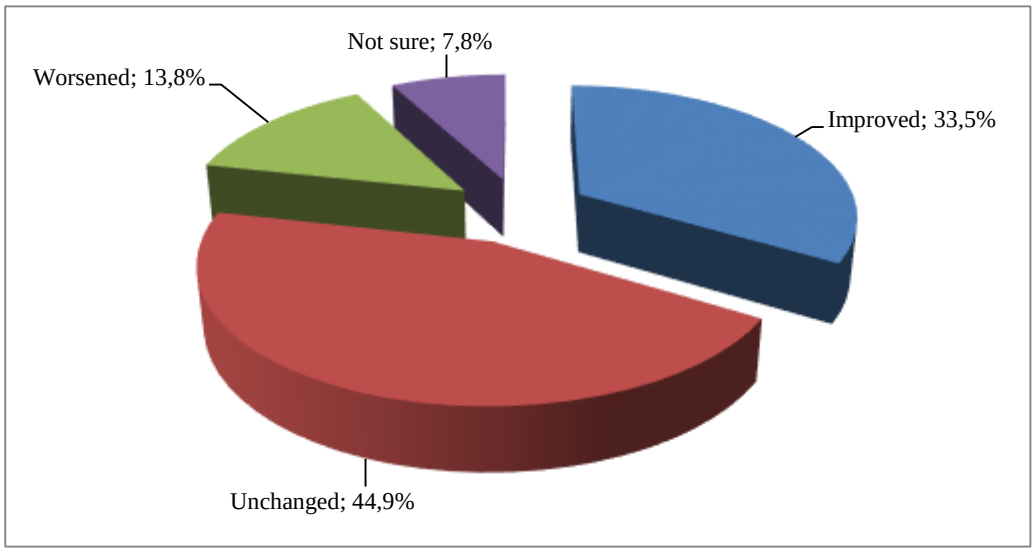

Figure 3. Expert appraisal of dynamic economic conditions in the food industry in Kazakhstan
Source: Compiled by the authors

The absolute majority (97.6%) of the experts mentioned higher prices for finished products at their enterprises. Only 2.4% said prices for finished products had been unchanged over the past year at their enterprises. According to the experts, higher prices are due to growing production costs and, particularly, higher prices for agricultural raw materials. Official figures show that agricultural producer prices for grain crops rose in 2018 by 14.1% compared to the previous year. Considerable price increases were also registered for such major raw materials as chicken eggs (+12.9%), oil seeds (+5,4%), raw milk (+5.9%), poultry (+4.5%), cattle (+ 4.2%) and others.

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The majority of the experts (96.4%) predicted higher prices for major food products for the next year. Within a year, most experts saw rising demand for most food staples, except for butter, oils and fats and sugars and confectionery (Figure 4).

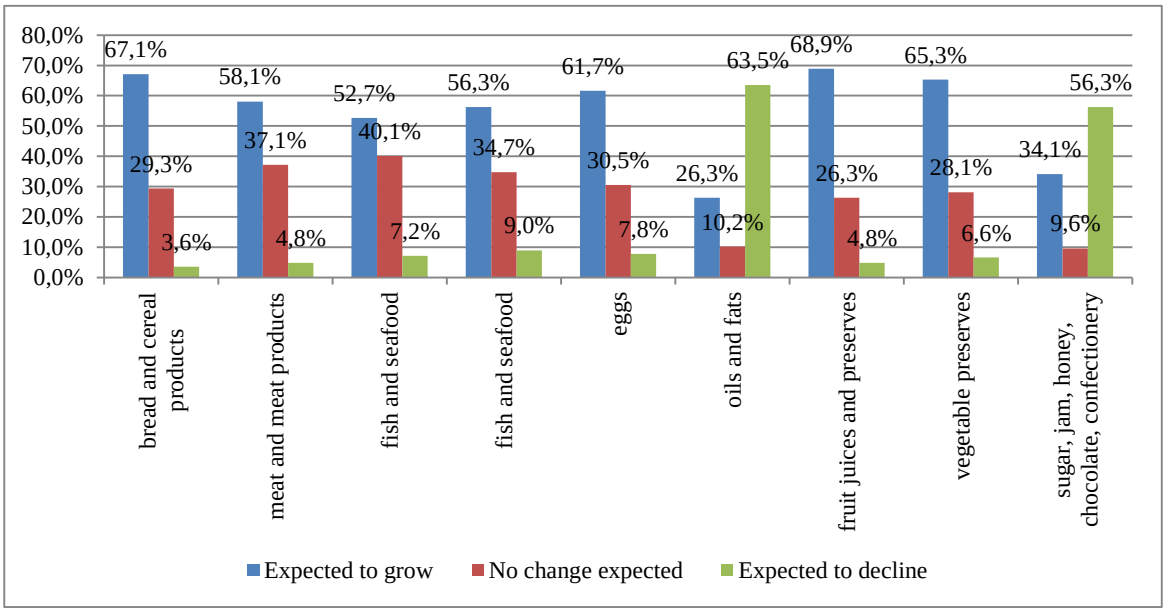

Figure 4. Breakdown of expert views on the demand for major food staples
Source: Compiled by the authors

The primary reasons cited for higher food prices include changes in the purchasing prices of agricultural raw materials, product demand, the tenge exchange rate, etc. (Figure 5).

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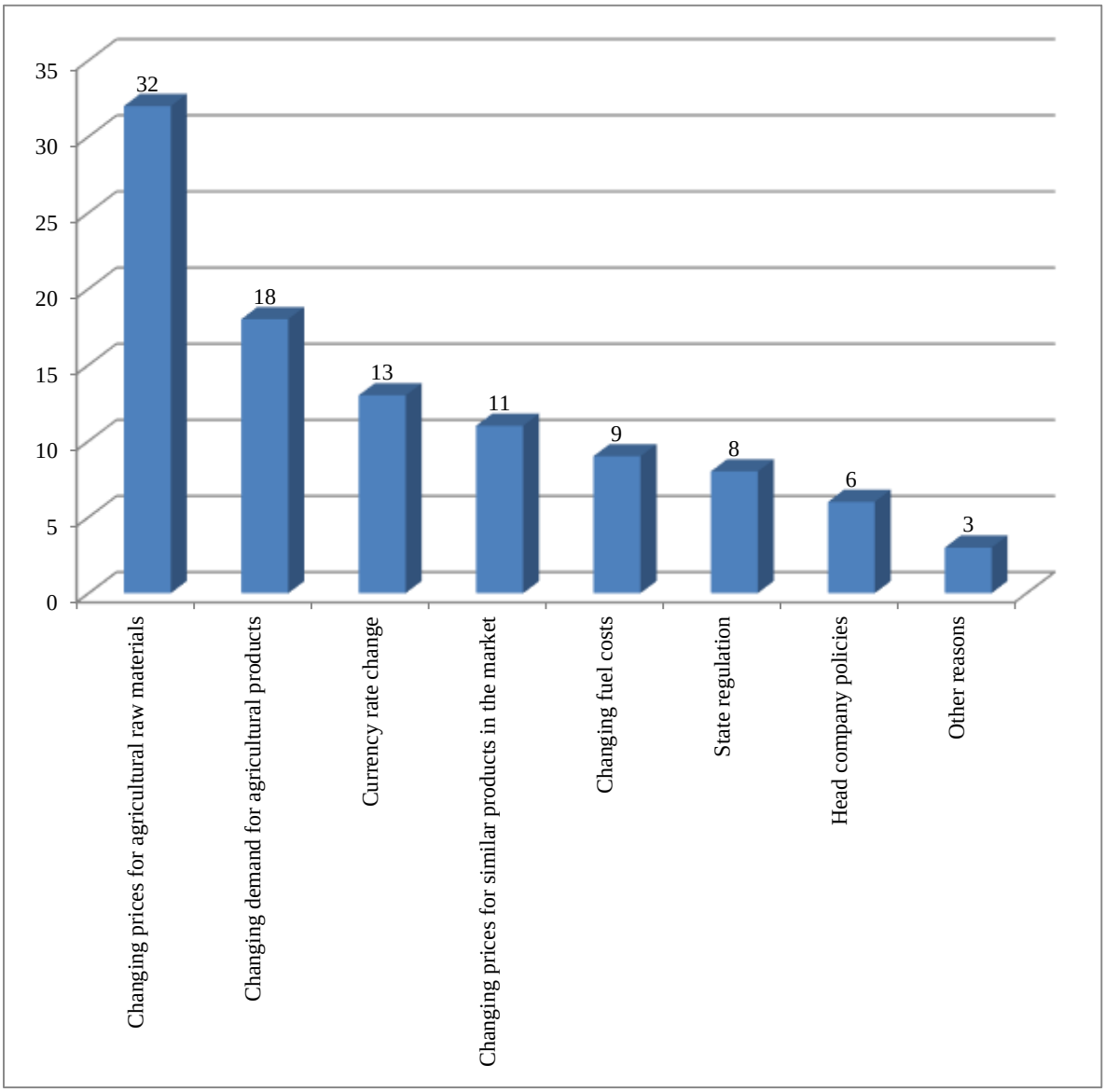

Figure 5. Reasons for expected price increases for products of the food industry in Kazakhstan
Source: Compiled by the authors

According to the experts, the main deterrents exerting the biggest influence on production growth at food enterprises in Kazakhstan include the shortage of affordable domestic materials and working capital, high share of morally and physically outdated and worn equipment, operation under outdated technologies (Figure 6).

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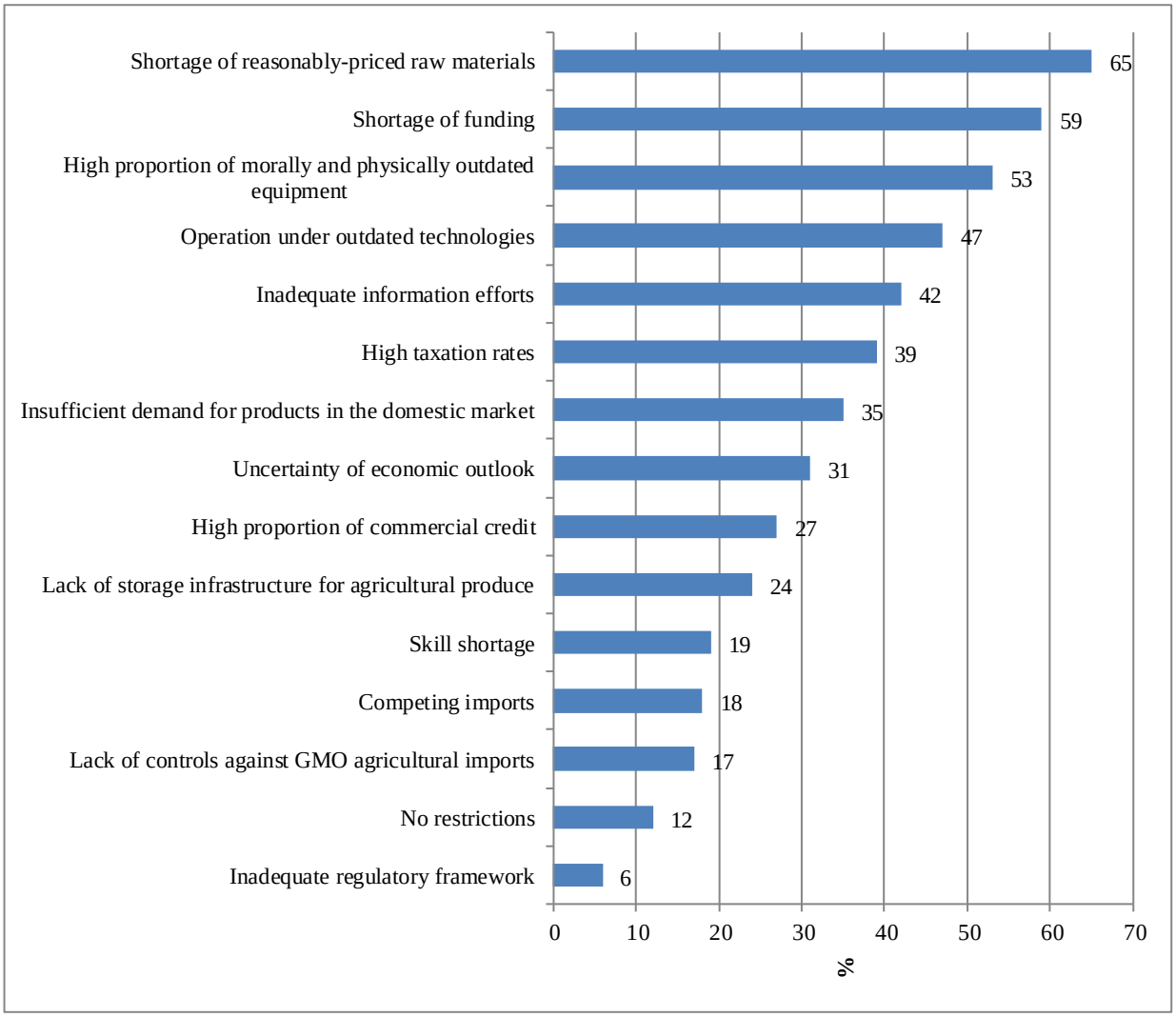

Figure 6. Deterrents of production growth in the food industry of the Republic of Kazakhstan
Source: Compiled by the authors

65% of the experts cited the shortage of reasonably-priced quality raw materials. The issue is especially acute for the meat processing and fat-and-oil sectors of Kazakhstan's food industry. Moreover, after the introduction on January 1, 2020, of the Technical Regulation of the Customs Union 033/2013 "On safety of milk and dairy products", the experts projected sharply lower raw material inventory levels at dairy enterprises of Kazakhstan.
Another strategic challenge, in the experts' view, is the lack of funding (59% of respondents). Further, the shortage of reasonably-priced quality raw materials and funding are interdependent and result in low capacity utilisation levels at enterprises.

The third most significant challenge cited with regard to food industry development is the high rate of physically and morally outdated equipment at enterprises. According to the respondents, their production capacities are dozens of times behind those operated at similar enterprises abroad, and their installed equipment is not energy-efficient, which blocks productivity growth and efforts to achieve sufficient margins in food production. Apart from the above challenges, food industry development is deterred by such factors as outdated technology, inadequate information efforts to shift consumer focus toward Kazakhstan's domestic supply, high taxation rates.

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5. Discussion

The priorities in addressing the challenges of sustainable development in the food industry proposed by the experts primarily include government support of enterprises in the processing industry, development of modern infrastructure for storage and delivery of agricultural raw materials, development of digital technologies in the agroindustrial complex, etc. (Figure 7).

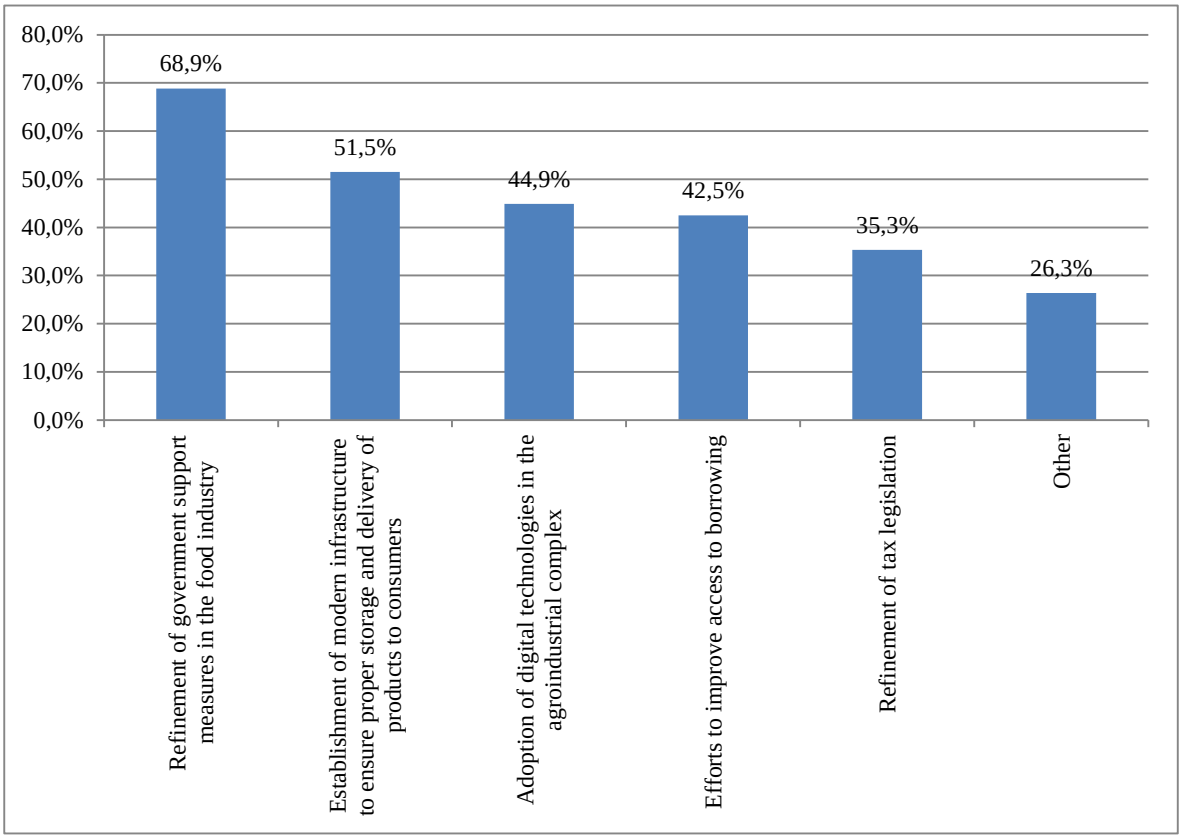

Figure 7. Priority measures in addressing the issues of sustainable development of food industry enterprises in Kazakhstan
Source: Compiled by the authors

Almost 69% (115 respondents) expressed certainty that food industry development would require government support measures focusing on agricultural producers. According to the experts, the most efficient mechanisms of government support include subsidies for raw materials produced and transferred for processing, subsidies to reimburse processing enterprises for the purchasing costs of agricultural products for deep processing and VAT exemption on output of the enterprises engaged in processing of Kazakh agricultural materials (Figure 8).

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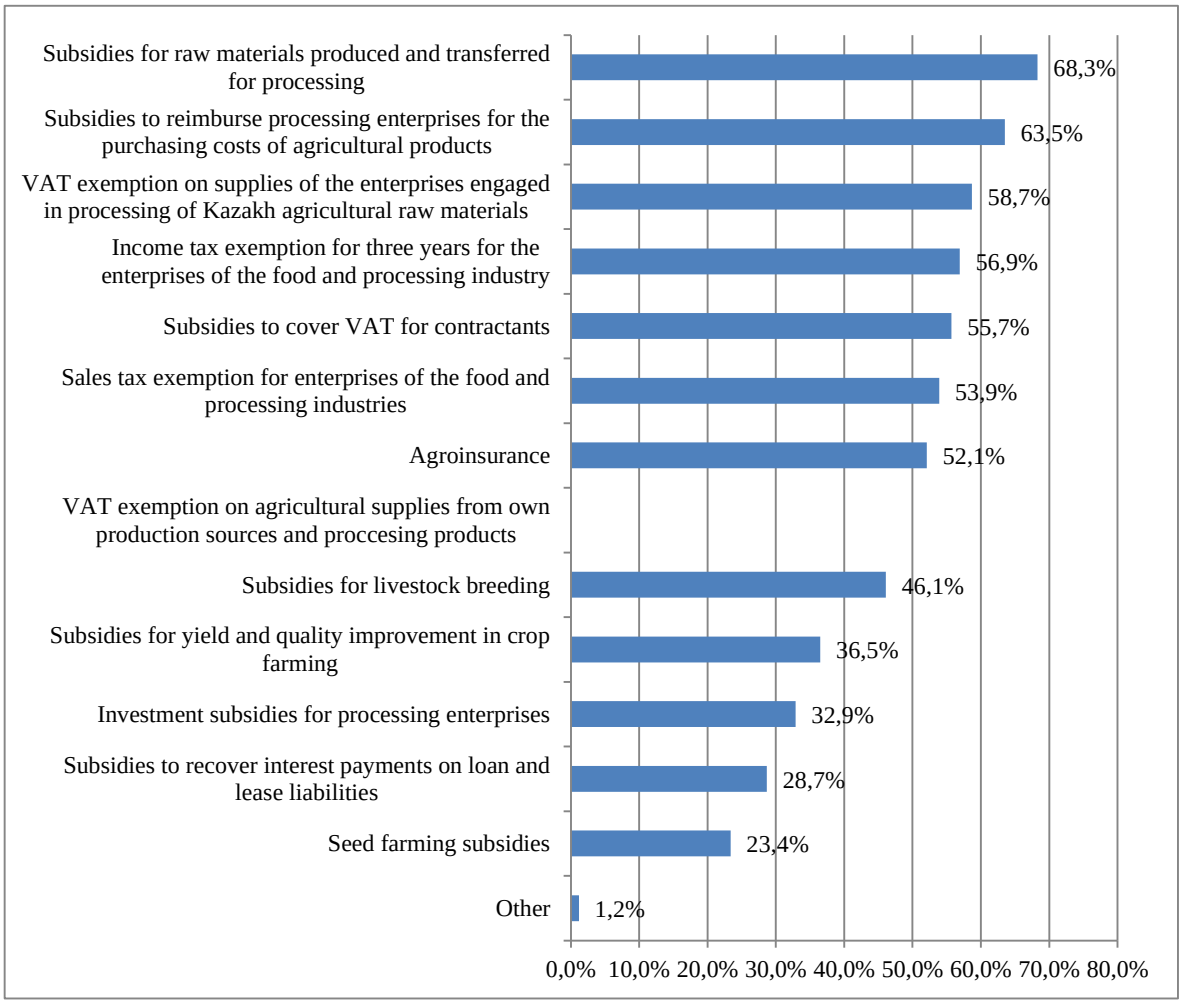

Figure 8. Expert appraisals of the efficiency of government support for processing enterprises in Kazakhstan
Source: Compiled by the authors

Simultaneously, the experts note that the existing government support measures should be subject to a cardinal overhaul. The experts pointed at the need to reduce inefficient natural subsidies, which distort pricing and are qualified by the WTO as the Amber box, for example, per-ha support and subsidies per unit of output in animal farming (kg, litre, head). According to the experts, thus additionally saved funds should be used to resume subsidies for raw materials and develop financial instruments such as interest rate compensation, investment subsidies, agroinsurance, credit society systems and the institute of guarantees, which all require additional funding.

51.5% of the experts believed that developing advanced storage and delivery infrastructure is the second most significant measure to address the issues of sustainable development of the food industry in Kazakhstan. The experts emphasised that a vast majority of Kazakh agricultural producers were not integrated into commercial value chains. With the vast territorial spans to cover, agricultural value chains comprise numerous small subsistence farming operations. Long processing chains between farmers in rural territories and processors in urban areas are inefficient and result in the poor quality of input resources, high post-harvest loss and price rises. If these challenges are resolved successfully, the agricultural sector of Kazakhstan would be able to support agricultural development and sustain future economic growth.

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Despite the excellent growth potential, one of the key obstacles for the development of the food industry in Kazakhstan is the lack of infrastructure to support supplies to processors. Even with Kazakhstan's competitive advantages in certain agricultural crops, such as grains, oil seeds and fruit, the advantage is often lost because of weak links with agroindustry and limited competence of agricultural producers in advanced agricultural practices. Moreover, numerous intermediaries create excessive costs and inefficiencies. Losses on the way from farm gates to end consumers often reach 40% in fresh produce and up to 20% in grain crops, which results in unreasonably high prices. Processors struggle to maintain the required quantities and quality of raw materials due to the fragmented nature of the Kazakh agricultural system. Approximately 61.7% of the experts observed that an integrated production and distribution value chain system should be created by setting up agroindustrial parks (IAIP) and accompanying rural transformation centres to cut inefficient expenditure and attain competitive pricing for local produce. An IAIP is a geographical cluster of independent enterprises grouped to attain economies of scale and positive external effects through infrastructure sharing. As in global practice, an IAIP usually comprises open production zones, precision crop farming, knowledge and research centres, rural centres, agricultural infrastructure, harvesting centres, primary processing centres, RTC, social and agromarketing infrastructure, etc. Specialist infrastructure comprises refrigeration chambers, quarantine facilities, quality control laboratories, quality certification centres, raw material storages, controlled atmosphere and modified atmosphere storages, processing centres, etc.

Each IAIP is supported by a network of RTC maintaining links with the producers. RTC are geographical clusters of infrastructure and services, though on a smaller scale than IAIP. Farmers and farmer groups supply their produce and acquire agricultural resources. RTC accumulate agricultural produce, handle sorting, storage and, in some cases, primary processing before it is transported to IAIP. For most farmers, RTC make the main contact point to reach commercial agricultural value chains. Apart from the main functions, RTC also provide small-scale financial services to agricultural producers, as well as social services. 44.9% of the experts believed that food producers would get the most advantages of digitalisation as it promotes chain production as a standard pattern and brings producers and consumers closer together. Enterprises will be able to ensure acceptable cost levels in production while taking into account individual consumer requirements, with orders placed directly with the producer.

The following digital technologies were identified in the expert survey as having the biggest potential for the food industry (Figure 9).

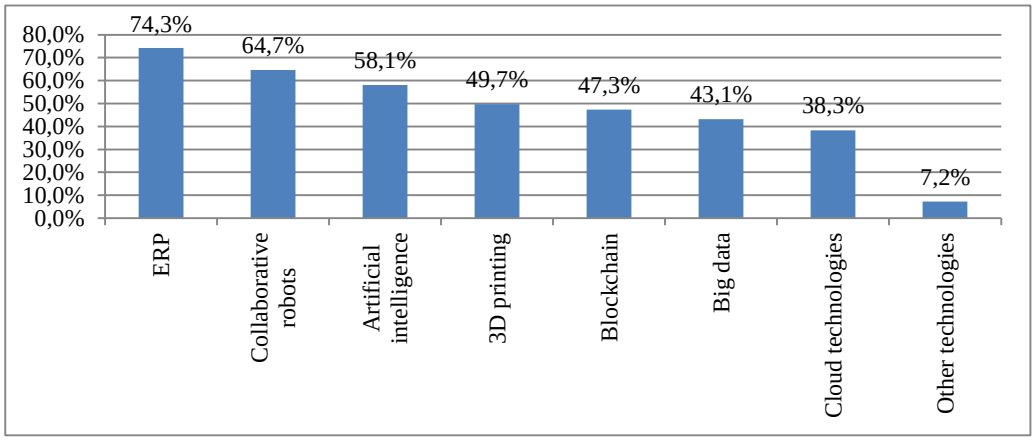

Figure 9. Ranking of digital technologies by the potential for the food industry, % of the respondents
Source: Compiled by the authors

Enterprise resource planning systems (ERP) will be likely central to this process and will remain coordination centres for many processes at food enterprises, as most companies are competent in such systems and the

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respondents cited many advantages. However, the survey also found a common belief that the requirements to such systems might be too high and they would prefer more user-friendly operation, extended documentation capabilities and more analytical options in their existing systems.

As to the emerging new technologies with the potential to influence the food industry, collaborative robots and artificial intelligence came in at the top, with 64.7% and 58.1% mentions, respectively. Much lower expectations were pinned down to 3D printing and blockchain. With that, potential applications of advanced digital technology in food production requires further research.

Therefore, the implementation of the above measures to ensure sustainable development in the food industry would help to uncover more of the available potential, speed up economic development and attain the objectives of industrial development in Kazakhstan.

Conclusions

The findings described in the paper support the proposed hypothesis. Unlocking the available potential of the food industry of Kazakhstan will promote growth in the production and exports of higher-value-added products. Kazakhstan needs to increase the production of food to serve its own needs, especially given the fact that the existing low capacity utilisation levels indicate there is room for improvement in this dimension. Moreover, the focus should be on high value added products, with analysis of their marketing potential in external markets. Expert input helped to identify major deterrents of the food industry operations in Kazakhstan and to chart steps to overcome the challenges of sustainable development. Most experts called for a refinement of government support measures for the enterprises of the processing industry, for dedicated efforts to create modern storage and delivery infrastructure and more active adoption of digital technologies in the agroindustrial sector, etc. Further, the environmental aspects of sustainable development of the industry also require further research. Another specific research focus should be the efficiency of government support measures in the processing sector.

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