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# COMPETITIVENESS OF UKRAINIAN FOOD INDUSTRY ENTERPRISES: INDUSTRIALIZATION, PERSISTENT TRANSFORMATION AND EUROPEAN INTEGRATION

S u m m a r y

**Background**. The aim of this paper is to explore and identify key tools of the scientific and methodological approach to diagnosing the sustainable level of the industrialization index of competitiveness of food industry enterprises (FIE) in order to improve their position and competitive advantage in the European market by implementing directions for transforming entities' persistent activities in compliance with the digital innovation vector, as well as business interests in the implementation of common export guidelines.

**Results and conclusions**. A set of interconnected and interdependent stages of the scientific and methodological approach to forming a diagnostic tool for the state of the industrialization index of competitiveness of FIE was proposed. Models of structural and strategic analysis that allow assessing the effectiveness of implementing tools at individual levels of achieving a sustainable level of the industrialization index of competitiveness were identified and the specific transformation of the persistent activities of FIE is was presented. A comparative dynamic trend of the share of the food industry in the GDP of Ukraine, the EU countries, Southeast Asia and the Pacific region was carried out.

**Keywords:** competitive advantages, digital innovation, European integration, export, industrialization

## Introduction

The European vector of economic development chosen by Ukraine requires the activation of levers for increasing the competitiveness of food industry enterprises,

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which, in the context of the globalization of market relations and dynamic progress from international partners, are constantly in the system of circular coordinates of functioning. However, European integration preferences, which should strengthen assistance to food industry enterprises, dictate new requirements for the content and formation of a new model of stabilization of their competitiveness, which should become the basis for accelerating counteraction to external challenges in the conflict (war) period of development of Ukrainian exports. At the same time, the time lag of the forecast of alternative export orientations of the food industry is a powerful impetus for the activation of 20 % of the total volume of industrial production in Ukraine to stabilize the level of competitiveness of the industry with a guarantee of food security in the conditions of extraordinary circumstances and challenges that from time to time can cause harm, destabilize competitive opportunities and high competitiveness in the market.

Scientists Sychevsky and Yuzefovych [33] emphasize that the main criterion for the competitiveness of the food industry of Ukraine is the ability of producers to withstand competition in the domestic and international food markets, to try to resist outdated factors of progress in society. Along with the guarantees of export dominance, the food industry provides stable support to agricultural enterprises and households in rural areas, and is also a necessary component of the agro-industrial complex, which has a significant natural resource potential of agriculture (a large area of fertile soils and location in favorable climatic zones). This allows growing a wide range of products according to the long traditions of agricultural production.

Despite the dominant export vector of Ukraine, the state provision of a stable level of competitiveness of food industry producers is unfortunately decreasing, since in times of crisis the country's economy suffers the greatest losses; there are no guarantee levers for increasing the competitiveness of sub-sectors and preserving their competitive advantages through the development of innovation. There is a need for rapid changes and the reorientation of food production goals in a qualitatively new plane, and this is especially relevant for Ukraine. As Vyshnevsky and Knyazev (2018) emphasize, Ukraine has significantly lost its position in the world as an industrial state, the volume of industrial production per capita in Ukraine lags significantly behind the average world level and the gap is not decreasing.

This requires the introduction of new technologies, circular innovations, as well as a marketing strategy for the Ukrainian food industry with a transition to a green course in the future [43]. Geets [12] emphasizes that Ukraine’s future export opportunities will depend on the state of competitiveness of the national food industry. The need to develop a Ukrainian scenario of neoindustrialization and find the most favorable conditions for its successful implementation is emphasized by Zaloznova [47], who notes that Ukraine, having a predominantly open but uncompetitive (in global terms)

food industry, cannot ignore the global process of neoindustrialization, which provides potential chances to reach a new level of production and efficiency.

According to Fedulova [10], the development and implementation of a breakthrough technological policy in the food industry of Ukraine will allow solving the strategic task of mobilizing the country's national export potential and forming a new technological structure. The progressive development of this agro-industrial sector of the economy depends on the suppliers of agricultural raw materials; it requires proper storage and transportation conditions for finished products, which often have a short shelf life; requires compliance with regulatory requirements for the quality of manufactured food products, the introduction of certification and standardization systems, the use of modern innovative technologies that ensure the appropriate safety of food products [20, 21].

The aim of this paper is to propose and apply a comprehensive diagnostic tool for assessing the sustainable level of the industrialization index of competitiveness of food industry enterprise, the one that integrates financial and investment approaches with quality, safety and digital-innovation metrics, to support strategic decision-making under European integration and wartime conditions.

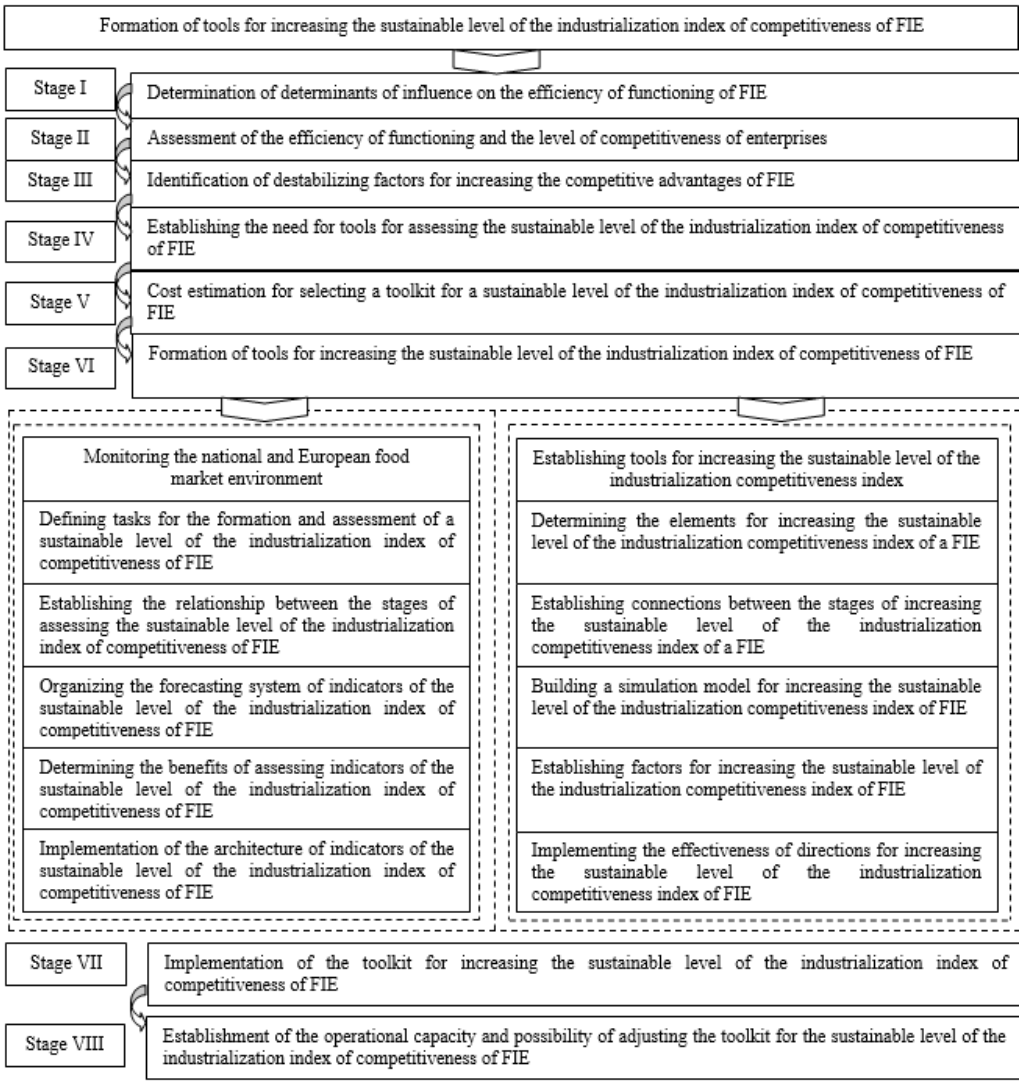
Materials and Methods

Modern conditions of economic activity of FIE require constant improvement of financial condition, increase of profitability level, which occurs in conditions of intensifying competition. For the vast majority of FIE, a low level of competitiveness industrialization index is characteristic. It is advisable to form and implement ways to increase it through the activation of investment activity and the introduction of digital innovations in the strategy of competitive advantages, development and implementation of various methods, tools and levers. The desired effect can only be achieved by using the tools to increase the sustainable level of the industrialization index of competitiveness, that is, to develop and make quality decisions, highlighting competitive advantages, increasing innovative activity and digitalization, improving the marketing system, using innovative technologies in the production and resource cycle, choosing the optimal strategy of competitive advantages and cooperating with international partners in a competitive environment.

It is proposed to improve the tools of scientific and methodological approach to diagnosing the sustainable level of the industrialization index of competitiveness of FIE, which contains a complex of interconnected, interdependent stages (Figure 1).

The diagnostic tool for the state of industrialization of the competitiveness of FIEs is the basis for developing a strategy for competitive advantages under the influence of the national and European environment. This is provided when the process of production and export of products is improved with profit maximization. Constant market monitoring includes searching for information about the target market and the

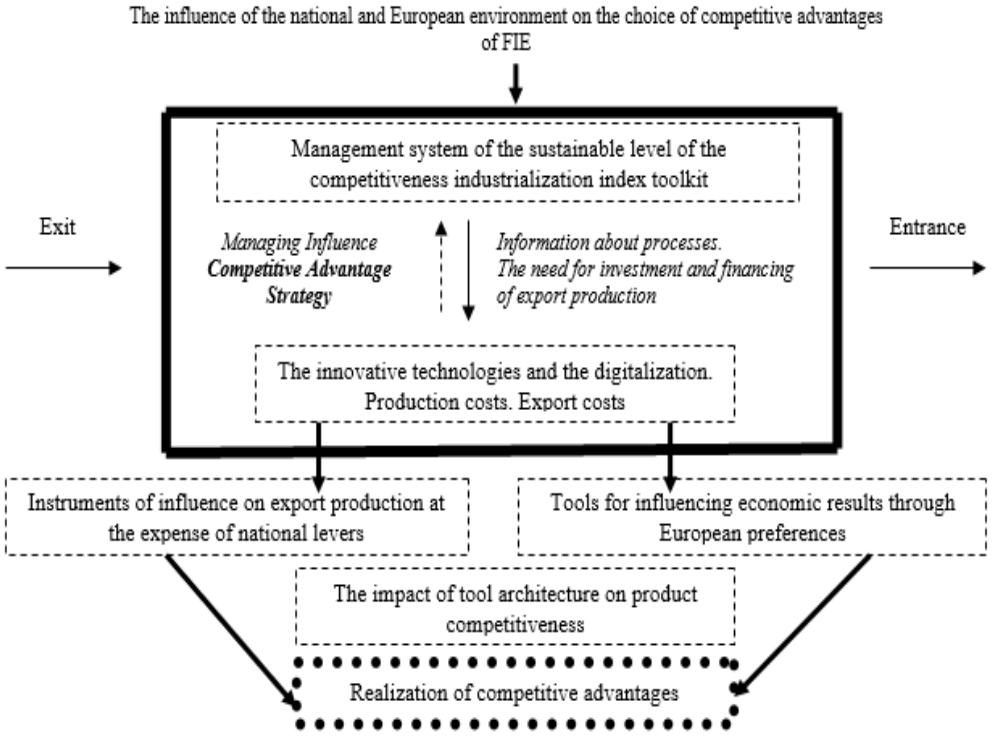
systematic sale of food products, including strengthening the position in E-commerce markets in the trajectory of economic and financial variables, digital innovations and innovative technologies of the industry.




Explanatory notes: Source: built and improved based on data by Yevtushenko et al. [46].

Figure 1. Stages of diagnostic tool formation
Rycina 1. Etapy tworzenia narzędzia diagnostycznego

Continuous adaptation to changes in consumer demand ensures export opportunities. This involves the formation of possible anticipatory actions in case of unforeseen circumstances, changes in consumer requests, changes in the cost structure and their minimization, and increasing the volume of export production while diversifying European preferences and integrating them into food industry development programs; simultaneously, improving the tools for implementing a public-private partnership. Ensuring the reach of planned actions includes obtaining the effect of financing export production. The formation of an individual approach to consumers is based on a set of economic factors, including the coordination of marketing decisions for different variants of potential consumer behavior and making appropriate changes to the production process (Figure 2).




Explanatory notes: Source: constructed by the authors.

Figure 2. FIE competitive advantages management
Rycina 2. Zarządzanie przewagą konkurencyjną FIE

The proposed approach details the diagnostics of the effectiveness of the process of evaluating the system of indicators and their interaction according to target criteria, in compliance with the following requirements: clearly regulate the period of time dur-

ing which the toolkit is formed; taking into account the characteristics of the competitive advantages of FIE, i.e. indicators of persistent activity in compliance with the vector of digital innovations (Yevtushenko et al., 2020). The strategy of competitive advantages, one of the main tools for a sustainable level of the industrialization index of competitiveness of FIE, is a strategic analysis of the inherent properties of the object, which allows assessing the readiness to attract internal competitive resources of entities at a specific time, in a specific place, under specific conditions.

At the same time, the application of the strategy of competitive advantages with the European vector of development makes it possible to introduce the indicator of the industrialization index of competitiveness of FIE in order to stabilize the functioning of an integral agro-industrial sector with the separation of "persistent activity" of entities (Kuprina, 2019). This direction of activity reflects the degree of FIE's economic growth under the influence of factors of the European environment with a sufficient level of efficiency of export production and ensuring industrial competitiveness in the country or region. To analyze the persistent activity of FIE and its associations, it is necessary to apply diagnostic tools for the sustainable level of the industrialization index of competitiveness, i.e. in the range of managing the process of digital innovations in the agro-industrial sector (Table 1).

Strategic analysis models allow assessing the effectiveness of implementing tools at individual levels of achieving a sustainable level of the industrialization index of competitiveness of FIE. Some of them are distinguished: the McKinsey strategic analysis model studies food industry entities at regional and national levels; the KEF analysis model studies associations of FIE at meso-, micro- and mini-levels (large and medium-sized businesses – agro-industrial holdings, agricultural enterprises, mini-enterprises of the food industry); the EFK analysis model studies FIE (small businesses – FIE) at a nano-level (Kuprina, 2021; 2023).

To assess the persistent activity of FIE in the integrated system of the agro-industrial sector at a macro- or meso-level of research, it is necessary to take into account the full cycle of export production – from the production of raw materials to the processing and sale of products using innovative technologies and the implementation of E-commerce through digital innovations [13].

Bringing such research to the highest economic effect requires the selection of models for assessing the sustainable level of the industrialization index of the competitiveness of the food industry as a whole in the country or region. This can be a "PEST analysis", which is carried out using four groups of factors of the European environment at a macro level (economic, political and legal, innovative and technological, digital innovations) in order to determine the results of the current and future persistent transformation of the development of the food industry on the basis of European inte-

gration preferences and ensure competitive export opportunities –increasing competitive advantages [16].

Table 1. Diagnostic and management tools for the process of persistent activity of FIE in compliance with the digital innovation vector in the agro-industrial sector

Tabela 1. Narzędzia diagnostyczne i zarządcze dla procesu trwałej aktywności FIE zgodnie z wektorem innowacji cyfrowych w sektorze agro-przemysłowym

| Object of evaluation | Assessment of the level of industrialization of the competitiveness of the research object | | Managing the process of persistent activity with a digital innovation vector | | Level of research into the object of industrialization of competitiveness | Research initiator |
|---|---|---|---|---|---|---|
| | evaluation method | competitive advantage strategy assessment tools | management tools | control functions | | |
| Food industry, including at a meso-level | McKinsey method | Strategic analysis based on expert assessment | External monitoring | Planning. Control. Internal monitoring. | Macro- and meso-level | Local and state authorities |
| Entities of the agro-industrial sector: large and medium-sized FIE, their merger with large and medium-sized businesses of agriculture | KEF analysis | Method of analysis of effective competition (expert assessment) | External and internal monitoring. Strategic analysis. | Planning. Accounting. Control. External and internal monitoring. | Meso-, micro-, and mini-level | Local and state authorities. Business owners. European investors. International lenders. |
| Entities of the agro-industrial sector: mini-FIE and their combination with mini-businesses of agriculture | EFK analysis | | | | Nano-level | |

Explanatory notes: Source: compiled and improved by the authors based on data by Yatskovy [45], Dovbnya and Krasina [9], Bazik [4].

However, the most adaptive approach and more appropriate at Euro-, macro- and meso-levels is the McKinsey tool for analyzing the industrialization competitiveness index of FIE. It is combined with a matrix method that assesses the long-term attractiveness of industry entities and their competitive position in the areas of persistent activity in compliance with the digital innovation vector.The method is based on the determination of the complex values of the industrialization index of competitiveness with the allocation of the quantitative value of a system of indicators of export opportunities and their importance in order to achieve the goals set.

The matrix "attractiveness of food industry enterprises – the industrialization of competitiveness" (McKinsey) is a portfolio analysis tool used to develop strategies for developing the range of food industry enterprises. The McKinsey model is a matrix consisting of nine cells for the comparative analysis of strategic directions of persistent activity of food industry enterprises [17].

In addition, the McKinsey model allows us to identify the industrialization of the food industry as a key factor in increasing the competitiveness of export production. This includes the modernization of production processes, the introduction of new technologies, automation, the improvement of logistics and management, as well as the development of new products taking into account the requirements of international markets. The criteria for industrialization of the food industry are: the modernization of production facilities (the replacement of outdated equipment with modern one, the introduction of automated lines, which allows increasing production volumes and reducing the cost of production); the introduction of new technologies (use of advanced technologies for processing, packaging and storing food products, which helps to preserve their quality and extend the shelf life. This includes, for example, vacuum packaging, drying, freezing technologies, and others); increasing the efficiency of logistics and management (the optimization of logistics processes, the implementation of inventory management systems and supply chain management, which reduces costs and time for transporting and storing products); the development of a research base (investment in scientific research and development of new products and technologies that meet modern consumer requirements and international standards. This includes research in the field of food safety, food additives, functional products and others); the development of new markets (the adaptation of products to the requirements of different countries, the development of labeling and packaging that meets local standards. It is also important to study the competitive environment and develop effective marketing strategies for each market); improving the skills of personnel (training and retraining of employees, so that they can work on modern equipment and implement new technologies. It is also important to attract highly qualified specialists in the field of food technology, management, marketing and logistics) [17].

The impact of industrialization on the competitiveness of food industry enterprises is determined by: reducing the cost of production (by introducing modern technologies and automation, enterprises can reduce production costs, which allows them to set more competitive prices in export markets); improving product quality (modern technologies allow for the production of higher quality food products that meet international standards and consumer requirements); increasing production volumes (industrialization allows enterprises to increase production volumes, which is important for meeting demand in export markets); increasing management efficiency (the introduction of modern management systems allows enterprises to manage their resources more

effectively, which improves their financial performance and competitiveness); creating new products (industrialization allows enterprises to develop and produce new types of food products that meet modern market requirements)[17].

There are five sequential steps for the correct construction of the McKinsey matrix:

Step 1: the selection of criteria for measuring the attractiveness of segments and assessing the level of industrialization of the competitiveness of food industry enterprises in each segment. At this stage, the products of food industry enterprises are substantiated and determined, which are able to satisfy the basic needs in a new segment of the external market at a more effective level (better properties, accessibility in use). The resources of food industry enterprises and their ability to influence the industrialization of the competitiveness of export food production are recognized (the strength of the enterprise's brand). A food industry enterprise is able to compete in the segment; having a stronger brand; the sufficiency of resources in the field of finance and their distribution, marketing, personnel qualifications, sales channels, logistics; rapid response to changes in the external market in the presence of other players in the market. The strength of competition is diversified, that is, threats from new market participants are identified; intensity of competition (division of the market into active and passive players); the level of saturation of the market segment; the ability of players to form barriers or give a go when a food industry enterprise enters the segment; the ability to take a place in the sales channel, logistics. Markets with a low level of competition are the most interesting for food industry enterprises (players are inactive, the market is not saturated and not divided); as well as the segments in which competitors are unable to quickly form appropriate measures and in which entry barriers are insignificant.

Step 2: determining the weight (importance) of each criterion of attractiveness and industrialization of competitiveness. Market attractiveness by the McKinsey method means: the attractiveness of the segment in terms of potential sales volumes; low barriers to entry into the segment for new players; the ability of the segment to ensure long-term profits of a company; the absence of risks in the market (risks = potential threats that affect the instability of segment sales in the long term). Attractiveness criteria include market factors, consumer factors and factors describing trends (segment dynamics). The decision to enter or not enter a segment should be based on an assessment of the ability of a food industry enterprise to gain consumer loyalty, which is easier to obtain by offering a unique, unparalleled product that at the same time satisfies current needs as much as possible. Otherwise, entering a segment without a unique, truly necessary product increases the likelihood of unsuccessful entry into highly competitive markets.

The market factors of segment attractiveness include: the current size of the segment or market capacity; the level of segment development and its potential capacity in terms of volume and value; the growth rate of the segment over the past three years;

the possibility of further expanding the brand's range when entering the segment; the number of players in the segment and the dynamics of their sales; the presence of advertising support in the segment.

A segment is considered attractive for a food industry enterprise according to market factors if: the size of the segment is large (1st ÷ 4th place in the entire market – it is recommended to look at the value of the market capacity); the growth rate of the segment exceeds the growth rate of the market (both in terms of volume and value); there is a limited number of players in the segment without investment in advertising; with successful entry into the segment, further expansion of the range is possible.

The factors of segment attractiveness related to consumption contracts include: the size of the target audience; the culture of consumption of goods in the segment (developed or not developed); the level of knowledge and loyalty to competitors' goods; the existence of unsatisfied or hidden needs among consumers of the segment. A segment is considered attractive for a food industry enterprise according to consumer factors if: the size of the segment's consumer base is large (1st ÷ 4th place in the entire market); a low level of product consumption culture – high market growth potential; the level of knowledge of competing brands among the audience is not high, the level of loyalty is low; part of the current consumer needs in the product are not satisfied, there are hidden and unmet needs. Consumer factors are the most important factors of the McKinsey model, as they assess the presence of free market niches (analyzing the existence of unmet needs of buyers). Key market trends include: segment growth forecast for the next five years (in value and in kind); an analysis of consumer trends (are there prerequisites for changing consumer behavior); an analysis of risks caused by changes in the macro environment – demographic, political, natural, socio-cultural, economic factors; the existence of prerequisites for the emergence of new market players and increased competition. A segment is considered attractive for a food industry enterprise according to key trends if: a long-term growth of the segment is predicted (especially when the segment is the fastest growing of the evaluated alternatives); existing consumer trends are favorable for entering the market; minimal risks of the impact of the macro-environment on the reduction of market capacity (risks: economic crisis, a change of government, climate change, worsening climatic conditions, lowering the standard of living of the population, reducing the target audience due to a demographic decline, etc.).

Step 3: the assessment of each segment according to the selected criteria of attractiveness and industrialization of competitiveness.

Step 4: the determination of the potential of each segment based on consumer and market trends. Each segment is assessed from 1 to 10, where 1 is the least consistent with the statement, and 10 is the most consistent with the statement.

Step 5: the selection of target segments and the distribution of resources of food enterprises in the matrix, according to the total score of industrialization of competitiveness and attractiveness, taking into account the importance of the criterion.

The McKinsey tool is employed to distinguish sub-indices affecting the sustainable level of the industrialization competitiveness index of the food industry: the country's influence on world trade in food industry products; food industry export quality index; food industry industrialization intensity index; food industry export index per capita; share of food industry exports in total exports; share of food industry value added in total GDP; share of medium and high-tech food industry exports in total agro-industrial exports; share of food industry exports in the total export index; share of medium and high-tech activities in the food industry export index [36].

Factors influencing the sustainable level of the industrialization index of competitiveness of enterprises in the food industry segment at a meso-level are: the growth index of export production of food industry products in the region, which indicates its attractiveness in the integrated system of the agro-industrial sector; the Harfindal-Hirschman index, which takes into account export production of food products by region and the sustainable level of industrialization of competitiveness of FIE.

Factors influencing the stable level of the industrialization index of the competitiveness of enterprises in the food industry segment at a meso-level are: the growth index of export production of food industry products in the region, which indicates its attractiveness in the integrated system of the agro-industrial sector; the Harfindal-Hirschman index, which takes into account the export production of food products by region and the stable level of industrialization of the competitiveness of food industry enterprises; the trend of changes in the number of food industry enterprises in the region (their formations and associations), which confirms the attractiveness of the non-monopolized market; the trend of changes in market capacity within the region, which affects the attractiveness of the industry; the relative share of the food industry market – the ratio of food production within the region relative to another most attractive one in terms of competitiveness of the region (country) for food production; the dynamics of increasing the market share of the food industry – takes into account the share of food production of enterprises of a certain industry in the region relative to the largest region in terms of the volume of food products of the same industry produced by entities (positive dynamics indicate the strengthening of competitive positions (advantages)); the assessment of food industry exports – the percentage of food industry exports in the total volume of agro-food sector production (indicates an increase in the level of competitive position (advantages) with an increase in the level of exports in the total production); the relative assessment of the result of persistent activity of food industry enterprises in compliance with the digital innovation vector – the level of profitability of food industry export production, which confirms the profitability of the

business and the sustainable industrialization of the competitiveness of enterprises [17].

It is more expedient to assess the sustainable level of the industrialization index of competitiveness of enterprises engaged in the export production of food products in the region using the Harfindal-Hirschman Index ($I_{hh}$).

The Harfindahl-Hirschman Index ($I_{hh}$) is used to assess the level of industrialization of the competitiveness of enterprises in a certain sector of the food industry, provided that products are exported, and is the sum of the squares of the market shares of all food industry enterprises. The index is calculated using the following algorithm (formula (1)) [45]:

$$I_{hh} = \sum S_i^2 \quad (1)$$

where, $S_i = OP_1/PO$ – for all ($i$ = 1,...,$n$); $OP_1$ – the volume of export production of products of the i-th enterprise of a certain branch of the food industry, EUR; $OP$ – the total volume of export production of products of a given assortment in a certain branch of the food industry, EUR; $n$ – the total number of food industry enterprises exporting products; $S_1$ – the market share of the i-th branch of the food industry.

In the conditions of pure industrialization of the competitiveness of food industry enterprises, this coefficient is equal to 1 or 10,000 (if the market share is expressed in percent), and in the conditions of minimal concentration, respectively, 1/n or 10,000/n [45].

The Herfindahl-Hirschman Index reflects the degree of industrialization of the competitiveness of food industry enterprises and, therefore, is inversely proportional to the intensity of competition. The values ($I_{hh}$) are very useful in attributing the competitive environment of a food industry enterprise to one of the four well-known classical models of the competitive market [45].

The interpretation of the values of the Herfindahl-Hirschman Index is presented in Table 2.

It is proposed to choose the average level of assessment of this indicator within 0.21 ÷ 0.40 due to the influence of objective factors and conditions: natural and climatic, the level of concentration of the raw material base, etc. If the value of the indicator ($I_{hh}$) is less than 0.2, this is the most attractive market; more than 1.0, the market is dangerous from the point of view of competition. A scale is formed for assessing the factors of the sustainable level of the industrialization index of competitiveness of enterprises of the food industry at a meso-level, provided that their persistent activity is transformed (taking into account digital innovations and innovative technologies), which is determined by experts (Table 3).

Table 2. Interpretation of the values of the Herfindahl-Hirschman Index
Tabela 2. Interpretacja wartości indeksu Herfindahla-Hirschmana

| Meaning | Model of industrialization of competitiveness of food industry enterprises in the market | Intensity of industrialization of competitiveness between food industry enterprises |
|---|---|---|
| $\rightarrow 0$ | Pure industrialization of the competitiveness of food industry enterprises – a very large number of enterprises engaged in export production of standardized products; no price control; very elastic demand; non-price methods of competition are not practiced; no obstacles to persistent activity | Very high |
| from 0 to 0.4 | Monopolistic industrialization of the competitiveness of food industry enterprises – a large number of enterprises engaged in export production of differentiated products; the range of price control is narrow; elastic demand; non-price methods of competition are used; the entry barrier to persistent activity in the industry is insignificant | High |
| from 0.4 to 1 | Oligopolistic industrialization of the competitiveness of food industry enterprises – a small number of enterprises; the range of price control depends on the level of coordination of the actions of enterprises; mainly non-price competition; the presence of significant obstacles to persistent activity | Low, provided that alliances are created |
| more 1.0 | Pure monopoly of industrialization of food industry competitiveness – one company that produces and exports a unique product that has no effective substitutes; significant control over prices; demand is inelastic; entry into the industry for other market players is blocked | – |

Explanatory notes: Source: formed and improved by the authors based on data by Yatskovy [45]

The transformation of the persistent activity of FIE at all levels of the research (macro-, meso-, micro- and mini-levels) and the stages of organizing the restructuring of technology into innovative and digital ones allows us to increase their sustainable level of the industrialization index of competitiveness in accordance with changes in the European environment and develop a strategy of competitive advantages. Such processes in the country (region), in our opinion, can be aimed at hard, moderate and soft transformation of the persistent activity of the studied entities under the current architecture of sub-indices and indices (Table 4).

Table 3. Scale for assessing the sustainable level of the industrialization index of competitiveness under the condition of transformation of persistent activities of FIE

Tabela 3. Skala oceny zrównoważonego poziomu wskaźnika industrializacji konkurencyjności w warunkach transformacji trwałych działalności przedsiębiorstw z sektora przedsiębiorczości gospodarczej

| Factor (sub-indicator, index) | Rating scale | | | | | Factor weight |
|---|---|---|---|---|---|---|
| | 1 score | 2 scores | | 3 scores | 4 scores | 5 scores | |
| Attractiveness of food industry enterprises | | | | | | | |
| Share of growth in export production of food products on a country-wide scale [%] | | less 1.0 | 1.01÷1.05 | 1.05÷1.07 | 1.07÷1.09 | more 1.09 | 0.2 |
| Share of change in the number of food industry enterprises in the agro-industrial sector of the region [%] | | reduction more than 8 | reduction up to 8 | increase from 1 to 8 | increase to 17 | increase more than 17 | 0.23 |
| Share of change in the capacity of the agro-industrial market in the region [%] | reduction more than 8 | reduction to 7 | | increase from 1 to 5 | increase to 12 | increase more than 12 | 0.27 |
| Index of attractiveness of food industry enterprises in the region [%] | less than 0.85 | 0.86÷0.88 | | 0.89÷1.20 | 1.21÷1.45 | more than 1.45 | 0.3 |
| Sustainable level of industrialization index of competitiveness of food industry enterprises | | | | | | | |
| Share of export production in the food industry market [%] | | less than 0.4 | 0.5÷0.75 | 0.76÷1.07 | 1.08÷1.4 | more than 1.4 | 0.10 |
| Increase in the share of export production in the food industry market [%] | | less than 0.1 | 0.2÷0.6 | 0.7÷1.2 | 1.3÷1.8 | more than 1.8 | 0.23 |
| Share of export production of processed products in the total volume of production of the agro-industrial sector [%] | less than 4 | 5-10 | | 11-21 | 22-32 | more than 32 | 0.17 |
| Level of profitability of export production of the food industry [%] | more than 14 | 14-9 | | 8-5 | 4-0.2 | less than 0.1 | 0.20 |
| Harfindal-Hirschman index (industrialization index of competitiveness of enterprises in the region) | | less than 0.2 | 0.21÷0.40 | 0.41÷0.65 | 0.66÷1.00 | more than 1 | 0.30 |

Explanatory notes: Source: formed and improved by the authors based on data by Kuprina [17]

Table 4. Transformation of persistent activities and ensuring a sustainable level of the industrialization index of competitiveness of food industry enterprises

Tabela 4. Transformacja działalności trwałych i zapewnienie zrównoważonego poziomu wskaźnika industrializacji konkurencyjności przedsiębiorstw przemysłu spożywczego

| Type of transformation of FIE | Relative deviation of the values of general sub-indicators of the industrialization index of competitiveness | Deviation of the values of partial sub-indicators of the assessment of the effectiveness of persistent activity of FIE according to KEF analysis and EFC analysis | |
|---|---|---|---|
| | | normative value | without normative value |
| Soft | No increase, unstable trend and fluctuations | Negative deviations from normative values, no trend towards improvement | No increase, unstable trend and fluctuations |
| Moderate | Reduction up to 25 % | Reduction up to 25 % | Fluctuating trend, decrease up to 25 % |
| Hard | Reduction up to 50 % | Reduction up to 50 % | Sustained trend towards decreases or negative value |

Explanatory notes: Source: formed and improved by the authors based on data by Bazik [4]

The formation of integrated vertical formations of FIE in interaction with agricultural production entities allows the use of outsourcing – a moderate transformation of persistent activity. The rigid transformation of FIE, taking into account agricultural production entities, contributes to the formation of transnational structures with their own strategy of competitive advantages in the country. Their creation is based on the experience of transnational structures of European countries [16].

Based on the above, from the position of purposefulness, increasing the sustainable level of the industrialization index of competitiveness of FIE in the region is a dynamic process of reaction to external factors and challenges, achieving tactical goals of a business environment (agricultural business, state institutions and European partners) at a meso-level in order to increase the effective use of competitive resources of a territory and ensure innovative processes in the economy, creating programs (strategies) of competitive advantages through direct or indirect influence of competitors and eliminating rivalry with other territorial units [6, 22].

## Results

European integration processes affecting the development of Ukrainian FIE currently require the search for new tools for their persistent activity that contribute to maintaining a stable level of industrialization of competitiveness and the effective ability to introduce innovations in all areas, creating and promoting environmentally safe and high-quality products [13]. However, the adaptation of Ukrainian food industry producers to changes in European markets with an appropriate level of industrialization of competitiveness is difficult in the conditions of martial law, since the state levers of

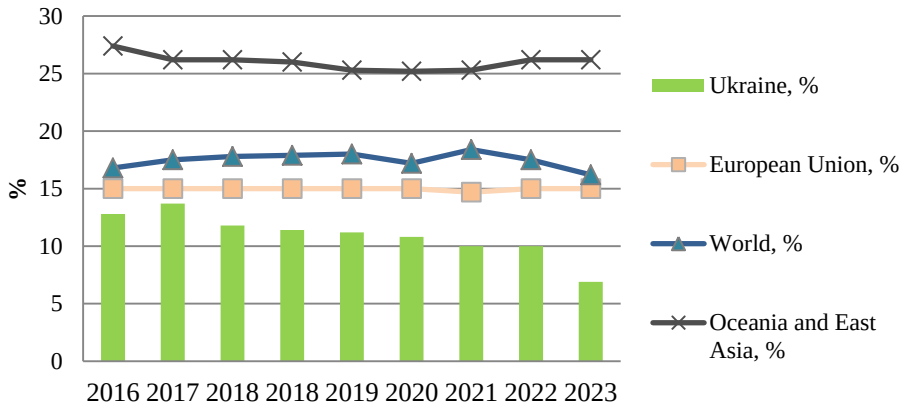
competitive advantages of the industry are partially ineffective, there is no direct support for the structural components of industrialization of competitiveness of the studied entities at a macro level in order to ensure powerful export potential [16].

The main challenges for Ukrainian FIE are the restrictions implemented by the provisions of the Free Trade Area Agreement (FTA) with the EU and the partial implementation of trade preferences for Ukraine in the direction of European foreign trade relations [23, 34]. Such a situation has negative consequences in the short term, since the sanctions imposed against Russia in 2022 increased the supply of food industry products from EU member states, reducing opportunities for Ukrainian exporters. There is an objective need to diversify external markets for processed food products. Focusing on today's realities, the focus of state policy on increasing exports from Ukraine has shifted to countries in the Middle East, Asia and Africa (such as Turkey, Pakistan, China, etc.), whose markets are characterized by low competition, the presence of free niches in the processed products segment and the absence of strict conditions for product standardization [54].

Direct losses to the Ukrainian food industry since the start of the full-scale invasion of the aggressor country into the country's territory reached EUR 11 billion (8.6 % of the total amount of losses inflicted on the economy) [33]. The largest losses were recorded in the Donetsk, Kharkiv and Kyiv regions. One of the extremely negative consequences of the full-scale war on the territory of Ukraine was the large-scale deindustrialization of the competitiveness of the food industry. In 2022, the share of the food industry in Ukraine's GDP was 7.6 %, while in 2021 it was at the level of 10.3 %, in 2020 ÷ 10.1 % (Figure 3).

Between 2016 and 2023, the share of the food industry in GDP in Ukraine decreased by 5.5 percentage points, while in the world this indicator was stable and averaged 15 ÷ 16 % (in the EU countries – 15 %).The world leader in the share of the food industry in GDP in 2023 was Ireland (38 %), which took a course towards the development of an economy based on high technologies, digitalization and support for education and science. An important role was played by the Industrial Development Agency, which promoted foreign investments, subsidies for many companies, training of qualified personnel and issuing grants for research and development.

As for Ukraine's closest neighbors – the countries of Central and Eastern Europe – in 2023, the share of the food industry was at the level of 17 ÷ 21 % (in the Czech Republic – 21 %, Slovakia – 20.3 %, Poland – 17.5 %, Hungary – 17.2 %). In the Baltic countries – Lithuania, Latvia, Estonia – this figure was 16.3 %, 13 % and 12.8 % respectively. The share of the food industry in GDP is significantly higher in the countries of Southeast Asia and the Pacific region, which indicates that they have overtaken the agro-industrial leadership of European countries, the USA and Canada. In 2023, the



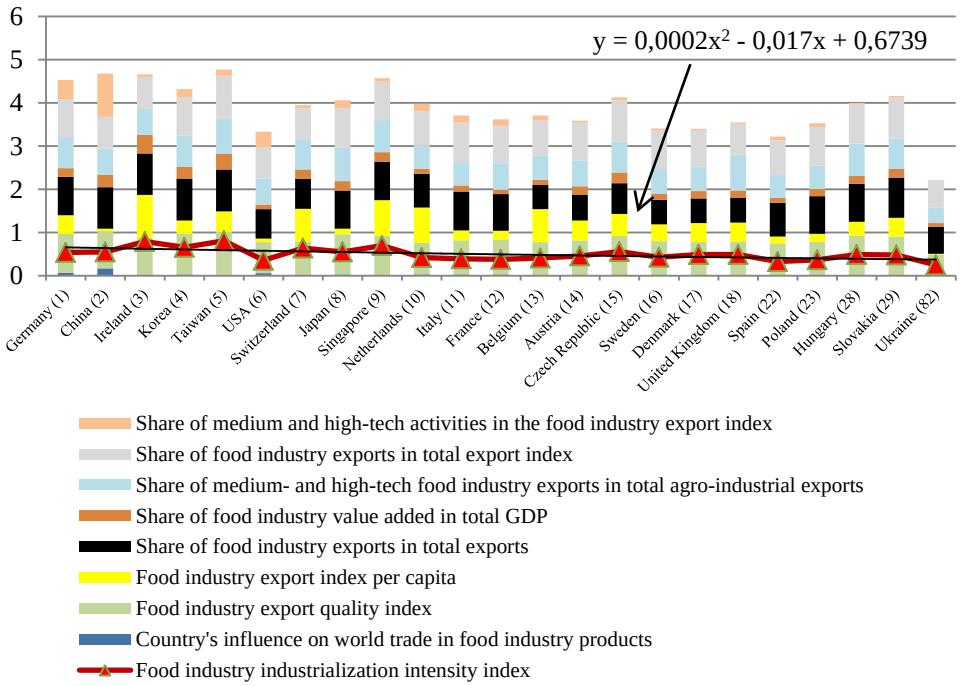

Explanatory notes: Source: built based on data by World Bank Group [44], United Nations Development Program [35], United Nations Industrial Development Organization [36]

Figure 3. Comparative dynamic trend of the share of the food industry in the GDP of Ukraine, the EU countries, Southeast Asia and the Pacific region between 2016 and 2023 [%]
Rycina 3. Porównawcza tendencja dynamiczna udziału przemysłu spożywczego w PKB Ukrainy, krajów UE, Azji Południowo-Wschodniej i regionu Pacyfiku w latach 2016÷2023 [%]

share of the food industry in GDP in China was 27.7 %, Thailand – 27 %, South Korea – 25.6 %, Singapore – 20.5 %, Japan – 19.2 % [23]. In the architecture of the components of export opportunities of the EU countries and Ukraine, which ensure a stable level of the industrialization index of the competitiveness of the food industry, it is possible to single out the sub-indicator of the quality of food industry exports (Figure 4).

In 2023, among the EU countries, the highest level of this indicator was in Hungary (92 %), the Czech Republic and Slovakia (91 %), Germany (90 %), France and Austria (81 %). Ukraine provides only 49 % of the quality of food products on the world market [23, 29]. The leading position in terms of the share of medium- and high-tech food industry exports in the total exports of the agro-industrial sector of the EU countries, which takes into account the competitive advantages of innovative export production technologies and digital innovations for promoting products to the market, is held by the United Kingdom – 84 %, Germany – 72 %, Hungary – 75 %, the Czech Republic – 71 %, Slovakia – 70 %, Ukraine – only 36 %.

In the ranking of the Competitiveness Index of the Food Industry (CIP), Ukraine in 2023 took 82nd place among 153 countries; in 202,1 the country took 69th place. The leaders of this ranking are Germany, China, Ireland, South Korea and the USA (Figure 5).



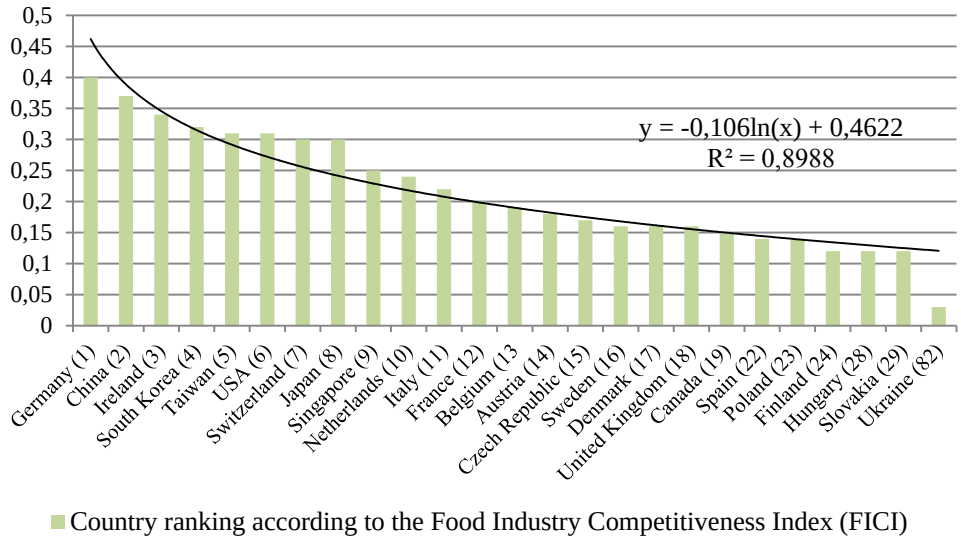

Explanatory notes: Source: built based on data by Sobkevich [29], Pisarenko et al. [27], United Nations Industrial Development Organization [36]

Figure 4. Sub-indicators of export opportunities and their impact on the industrialization index of the EU countries and Ukraine in 2023

Rycina 4. Podwskaźniki możliwości eksportowych i ich wpływ na wskaźnik industrializacji krajów UE i Ukrainy w 2023 r.

In general, between 2015 and 2023, the export of food products from Ukrainian producers increased by 3.1 times. Despite the scale of financial losses from the full-scale aggression of Russia, in 2022, Ukrainian FIE increased their export capabilities by 1.1 % compared to 2021. However, in the period from 2022 to 2023, the volume of exports fell by 3.8 % (Figure 6).

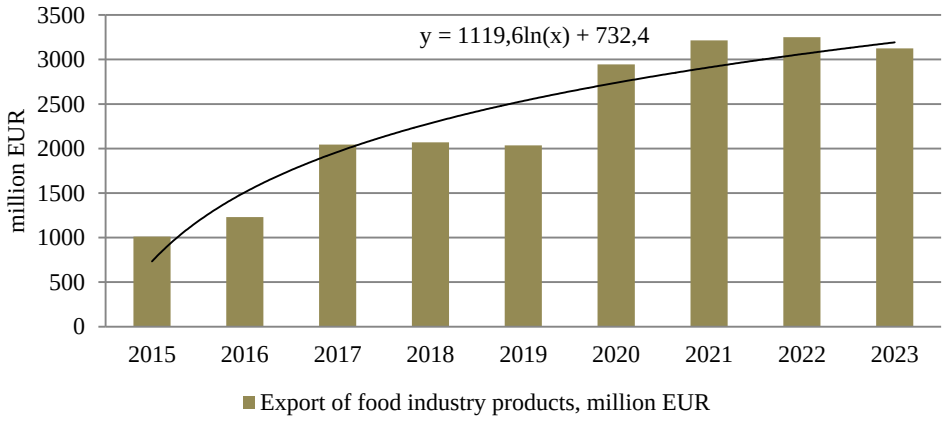
At the same time, within the framework of the Agreement, Ukrainian food industry producers deepened tariff liberalization for various product groups in the EU countries, increasing the level of quality, safety and environmental friendliness of processed products without customs tariffs and barriers. The impact of the reduction of EU import duties during the period of implementation of the Free Trade Agreement of Ukraine made it possible for the country to export 18 ÷ 20 % more food products to the EU than in the absence of liberalization.




Explanatory notes: Source: built based on data by Sobkevich [29], Pisarenko et al. [29]

Figure 5. Ranking of EU countries and Ukraine by the Food Industry Competitiveness Industrialization Index (FICI) in 2023

Rycina 5. Ranking krajów UE i Ukrainy według Wskaźnika Konkurencyjności Przemysłu Spożywczego i Industrializacji (FICI) w 2023 r.

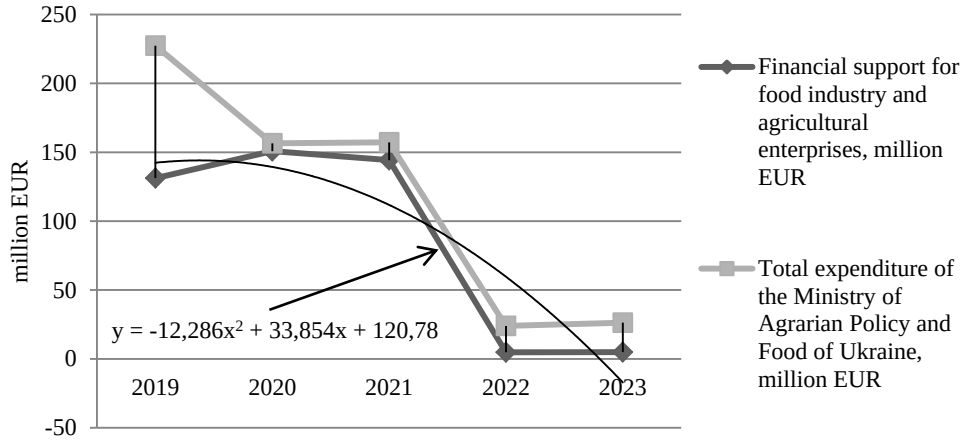



Explanatory notes: Source: built based on data by Ukrainian Center for European Policy [34], State Statistics Service of Ukraine [31]

Figure 6. Export of food industry products of Ukraine for 2015÷2023 [million EUR]

Rycina 6. Eksport produktów przemysłu spożywczego Ukrainy w latach 2015-2023 [mln EUR]

Negative phenomena that pose a real threat to the industrialization of the competitiveness of FIE in Ukraine appear in the production-resource, financial and investment areas. This is due to the reduction of state financial support programs for food industry and agricultural enterprises, which are limited by budgetary resources (taking into account the lack of support from the trade attaché) and the promotion of the Ukrainian product brand in European markets. In 2020, the government allocated EUR 131.2 million to support food industry and agricultural enterprises. Budget funds were used to develop the competitiveness of the meat subsector of the food industry and the livestock sector of agriculture by making loans cheaper [1]. Between 2021 and 2022, EUR 150.8 million and EUR 144.3 million were spent under the program to support the food industry and agricultural producers, which accounted for 96 % and 70 % of all development expenditures of the Ministry of Agrarian Policy and Food of Ukraine (Figure 7).



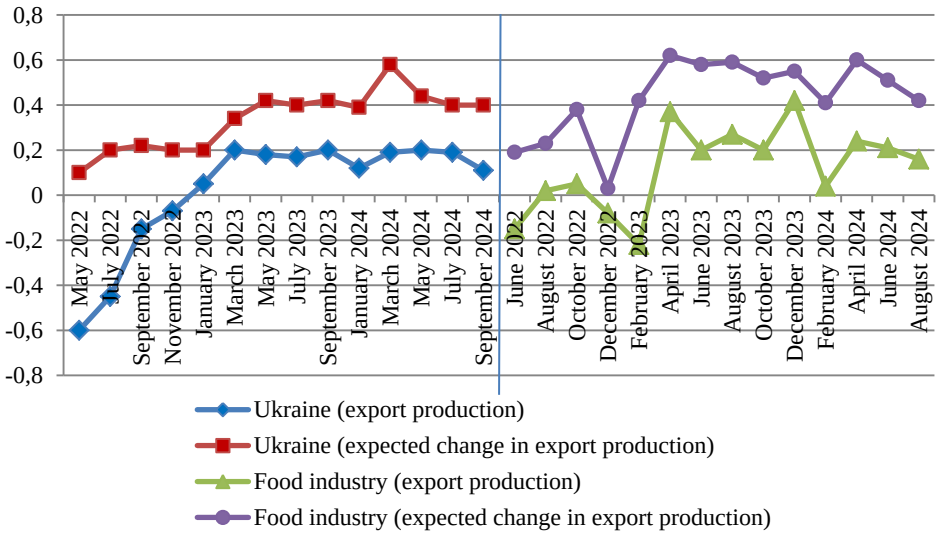

Explanatory notes: Source: built based on data by Verkhovna Rada of Ukraine [38, 39, 40, 41, 42]

Figure 7. State expenditures to support the competitive advantages of the food industry and agriculture of Ukraine from 2019 to 2023 [million EUR]

Rycina 7. Wydatki państwa na wsparcie przewagi konkurencyjnej przemysłu spożywczego i rolnictwa Ukrainy w latach 2019÷2023 [mln EUR]

In 2022, expenditures on state support for the agro-industrial sector decreased sharply – by 22 times (to EUR 4.8 million). In 2023, these expenditures remained almost unchanged and amounted to EUR 4.9 million. The development expenses of the Apparatus of the Ministry of Agrarian Policy and Food of Ukraine between 2022 and 2023 were brought to only EUR 23.9 million and EUR 26.32 million, which is 6 times less than the volume of 2021.

Since the beginning of 2024, there has been deterioration in the index of change in export production of food industry products (Figure 8). In August 2024, it decreased to 0.16, which is a lower indicator compared to previous months at the country level.

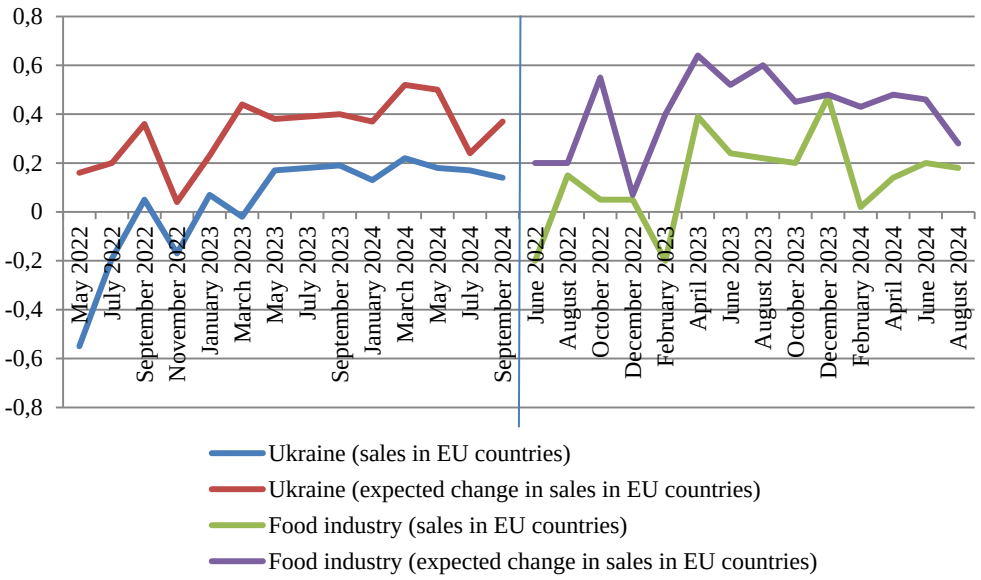



Explanatory notes: Source: built based on data by Blinov and Shevchuk [7]

Figure 8. Index of changes in export production of food industry products of Ukraine from 2022 to 2024
Rycina 8. Wskaźnik zmian produkcji eksportowej wyrobów przemysłu spożywczego Ukrainy w latach 2022÷2024

The assessment of the food industry situation shows that since the spring of 2024, there has been a deterioration in the index of change in sales of FIE on the European market, which decreased to 0.4; the share of enterprises that increased their exports was only 29.6 % (Figure 9).

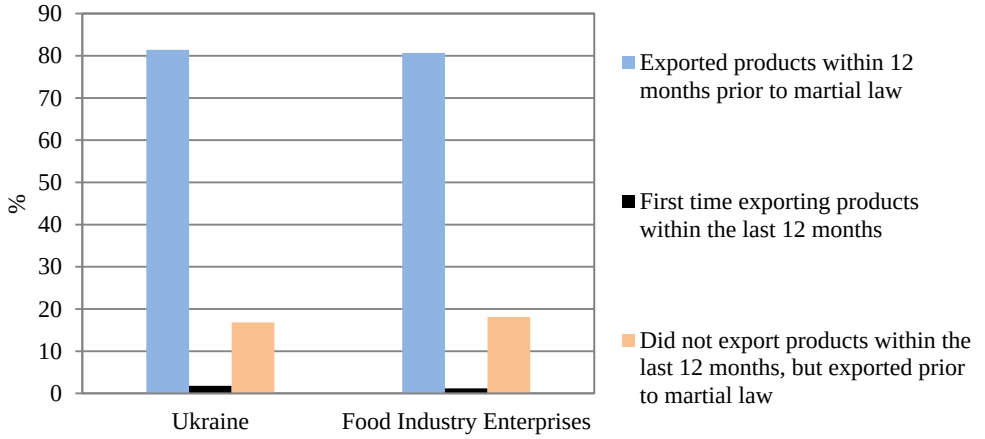
Forecasts of the index of expected changes in food sales to European countries in 2024 also deteriorated to 0.37, which has been the lowest value since October 2022. However, the industry remains optimistic, with 41.8 % of enterprises expecting an increase in export production. In 2024, only 66.4 % of FIE were engaged in exporting products since the beginning of the full-scale military conflict in Ukraine (Figure 10), and even during intensive blockades and restrictions from Poland, and only 1.2 % of enterprises first started export activities during the last 12 months of 2024.




Explanatory notes: Source: built based on data by Blinov and Shevchuk [7]

Figure 9. Index of changes in sales of products of Ukrainian FIE on the European market between 2022 and 2024

Rycina 9. Indeks zmian sprzedaży produktów ukraińskiej FIE na rynku europejskim w latach 2022÷2024



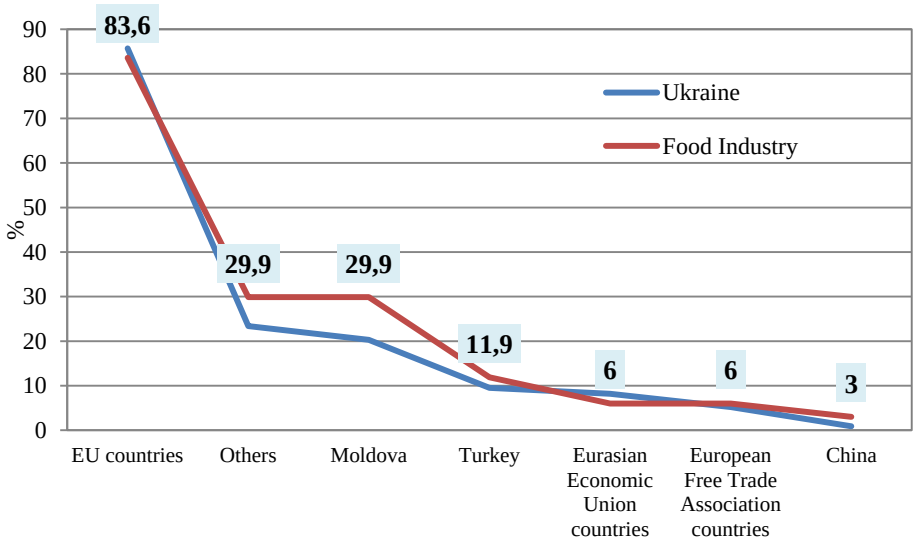

Explanatory notes: Source: built based on data by Ministry of Economic Development and Trade of Ukraine [23]

Figure 10. Share of Ukrainian FIE acc. to the index of change in product exports between 2022 and 2024 [%]

Rycina 10. Udział ukraińskich przedsiębiorstw z sektora FIE według wskaźnika zmiany eksportu produktów w latach 2022÷2024 [%]

Before martial law in the country, 80.7 % of enterprises in the industry were engaged in the export of processed products. The pace of export recovery in the food industry remains higher than the overall rate in the country: the export change index in August 2024 was +0.12 for the food industry, compared to 0.09 at the national level. During this period, 61 % of enterprises did not change the volume of exports, but 13.4 % of them slowed down their foreign economic activity. During this period, expectations for export growth in the short term worsened – the index of expected changes decreased in April 2024 from 0.48 to 0.28.

In August 2024, the main export channel for FIE remained the EU countries (83.6 %). Only 6 % of enterprises exported their products to the countries of the European Free Trade Association (Norway, Switzerland, Iceland, Luxembourg) and 6 % to the countries of the Eurasian Economic Union (excluding Russia and Belarus). Other important areas of foreign economic activity for FIE include Moldova (29.9 %), Turkey (11.9 %) and China (3 %) (Figure 11).



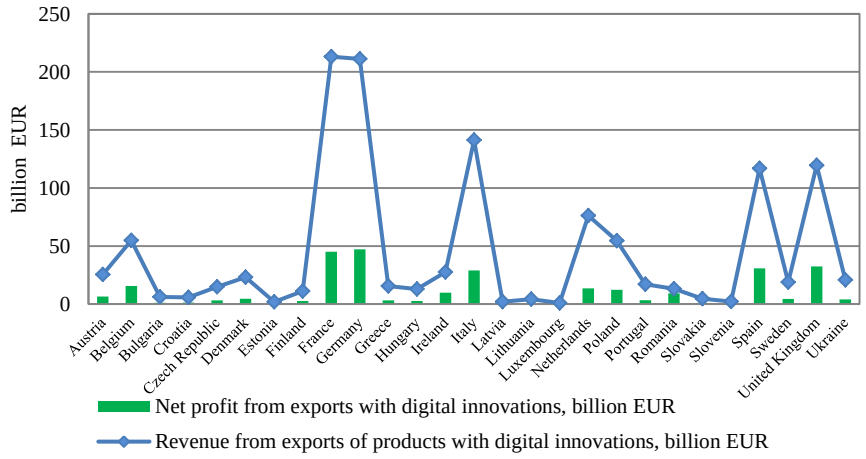

Explanatory notes: Source: built based on data by State Statistics Service of Ukraine [31], State Statistics Service of Ukraine [32]

Figure 11. Logistics channels for the export of Ukrainian food industry products in 2024 [%]
Rysunek 11. Kanały logistyczne eksportu produktów przemysłu spożywczego Ukrainy w 2024 r. [%]

FIE in the EU countries, guided by the process of persistent activity, in compliance with digital innovations, contribute to the development of the economy. At the same time, they are ahead of business entities in other sectors of production. In 2023, the export turnover of EU food industry enterprises amounted to EUR 1,118 billion ,

net profit – EUR 236 billion. This industry is extremely attractive for investment and has one of the largest capital investments among all the other industries. In 2023, investments in the amount of EUR 45 billion were made in European FIE. The EU food industry is one of the three main export-oriented industries in terms of revenue and employment in most member states.

The EU, France, Germany, Italy, Spain and the United Kingdom are the largest producers and exporters of food products in terms of revenue, net profit and the number of people employed in export production. The leaders in the number of enterprises in this sector are Italy, France, Spain, Germany and Poland. Ukraine ranks 12th among 28 countries in terms of revenue, 13th in terms of net profit, 6th in terms of the number of employees in this sector, and 14th in terms of the number of enterprises (Figures 12 ÷ 13).



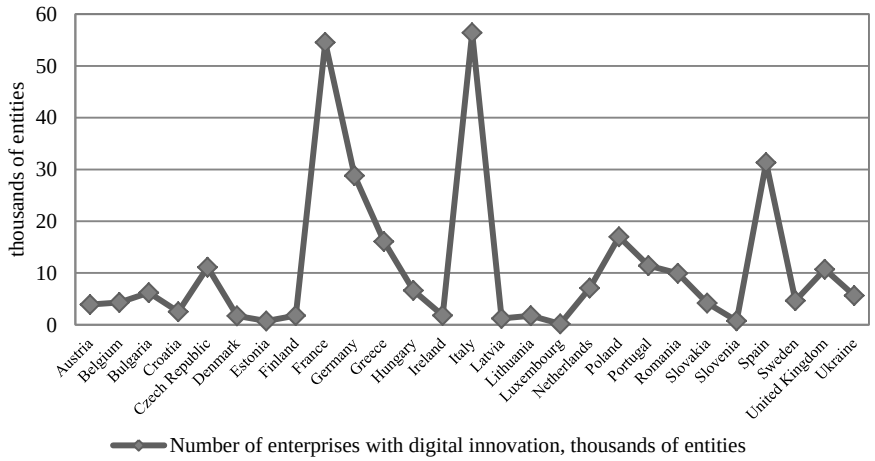

Explanatory notes: Source: built based on data by United Nations Industrial Development Organization [36], Pisarenko et al. [27]

Figure 12. Economic indicators of persistent activity of FIE of the EU and Ukraine for 2023 [billion EUR]

Rycina 12. Wskaźniki ekonomiczne trwałej aktywności gospodarek zagranicznych UE i Ukrainy na 2023 r. [mld EUR]

An important direction in increasing the level of international investment attractiveness is the development of innovative technologies and digital innovations. The share of EU food companies that are fully aware of the new prospects of digital innovations is 91 %. About 59 % of food companies have the necessary experience to use new innovative technologies and apply them in production. In Ukraine, this figure is about 3 %. Almost a third of food industry enterprises in 2021-2023 have implemented

digital innovations, 70 % are investing in innovative technologies of the production process, 58 % in the development of new products. Over the past few years, robotics has become a common practice in the food industry of EU countries, and throughout the entire production line. The largest share of food robots is in Germany and Italy (45 %). Their total number in the EU food industry production is 30,000 [24, 25].




Explanatory notes: Source: built based on data by United Nations Industrial Development Organization [36], Pisarenko et al. [27]

Figure 13. Economic indicators of persistent activity of FIE of the EU and Ukraine with observance of digital innovations in product exports for 2023

Rycina 13. Wskaźniki ekonomiczne trwałej działalności przedsiębiorstw z sektora gospodarki rolnej UE i Ukrainy z uwzględnieniem innowacji cyfrowych w eksporcie produktów na 2023 r.

The west central regions of Ukraine showed an increase in activity in subsectors of the Ukrainian food industry. Due to the lack of raw materials (fruit and vegetables), which were traditionally supplied for processing from the south of Ukraine, western producers were forced to reorient and re-equip their production lines for the production of canned meat products, which are used, for instance, for the needs of the army [14]. In contrast, in front-line zones, enterprises are forced to suspend production. Export production of sunflower oil is 30 ÷ 40 % of the pre-war level.

Producers in the meat processing subsector work with limited resources. In 2023, compared to 2022, the production of meat by-products of all types increased by 1.5 %, due to an increase in poultry production by 5.2 %; the production of processed beef and pork products decreased by 4.3 % and 3 % respectively. The reason is a dynamic decrease in the number of cattle and pigs. In 2023 and at the beginning of 2024, the number of cattle sharply decreased by 18.4 %, and pigs by 9.2 % compared to 2022 [2].

These problems may lead to a limitation of the volume of export production, which in turn will lead to an increase in the price of processed products for consumers and the unstable state of industrial competitiveness of enterprises in the European market due to the import of food supplies from EU countries, the depreciation of the hryvnia, the increase in logistics prices, etc. [19].

**Discussion**

In the process of European integration, under the conditions of trade liberalization and an open domestic market in Ukraine, a stable state of industrialization of competitiveness is achieved by those FIE that realize national advantages, focusing on a constant increase in labor productivity, significantly reduce the unemployment rate, prices, energy and material consumption of products, and environmental load in relation to competitors (taking into account both the period of manufacture and operation, and the disposal and reuse of production waste, i.e. the introduction of a circular vector of food industry development according to the principles of green economy) [17, 18]. Ukraine will acquire the status of a candidate for EU membership; this will open up significant prospects for Ukrainian food industry enterprises – attracting foreign investment and technology transfer, and in EU development programs [11].

The high level of concentration in the European retail market of Ukrainian food products can significantly affect the main distribution channels, which require compliance with certain conditions: the formation of large batches of products, flexible prices, as well as short delivery times [3]. Therefore, improving the state of industrialization and competitiveness of food industry enterprises requires effective and constructive recommendations.

Digitalization in the food industry of Ukraine is a key direction for increasing efficiency, reducing costs and stabilizing the state of industrialization of the industry's competitiveness in the European market. However, unlike other sectors of the economy, digital initiatives have not acquired such broad parity restructuring in the persistent activities of food industry enterprises [36]. Therefore, stimulating regulations for digital innovations in the food industry are needed on the basis of coordinated efforts of both public and private entities, in particular: the reinvestment of income from export production in the development of the agro-industrial sector; joint innovation efforts of the government, research institutes and big businesses to create research and development (R&D) centers. For these needs, programs and initiatives aimed at increasing the industrial competitiveness of FIE and strengthening competitive advantages in the European market are relevant (Table 5).

Table 5. Programs for managing the activity and industrialization of FIE competitiveness
Tabela 5. Programy zarządzania działalnością i uprzemysłowieniem konkurencyjności przedsiębiorstw z sektora przedsiębiorczości społecznej

| | |
|---|---|
| Digital Transformation of Ukraine" Program | A nationwide program that provides for a wide range of measures to improve the digitalization of the agro-industrial sector, including the food industry, and includes: the integration of modern digital technologies to automate production processes in the food industry; the creation of platforms for information exchange between state bodies and food industry enterprises to facilitate access to information and reduce administrative burden. |
| Program for supporting startups in the field of AgriTech and food industry "AgriFood Innovation Camp" | The program aims to develop innovative solutions in the field of agrotechnology, food processing, new methods of food and beverage production, and find solutions in the areas of food safety and sustainable consumption. |
| Smart Farming | The program aims to introduce digital technologies into agriculture and the food industry, encompassing the use of GPS systems, satellite technologies and analytical tools. |

Explanatory notes: Source: compiled based on data by Seeds [28], State Agency for Electronic Government of Ukraine [30]

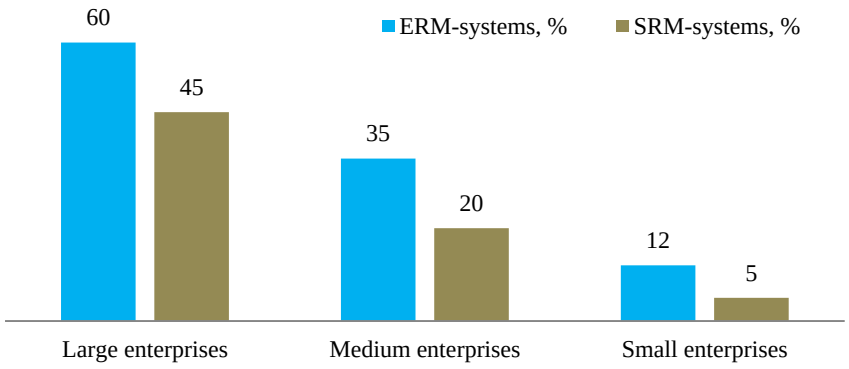
Programs and initiatives contribute to the development of recommendations for the development of digitalization of the food industry in Ukraine (Figures 14 ÷ 15), which aim to create conditions for the gradual integration of large, medium and small business producers into the European digital economy, as well as into European supply chains, create new jobs and ensure sustainable economic growth (Table 6).

Table 6. Recommendations for the transformation and development of digital innovations in the persistent activities of FIE in Ukraine
Tabela 6. Rekomendacje dotyczące transformacji i rozwoju innowacji cyfrowych w działalności stałej FIE na Ukrainie

| Recommendation | Characteristics | Implementation mechanism |
|---|---|---|
| The creation of a national program to support the digital transformation of the food industry | The state program to support the digital transformation of the food industry provides for: financing projects for small and medium-sized enterprises through affordable loans or grants; preferential loans for the implementation of ERP-systems and SRM-systems for small and medium-sized enterprises; state subsidies for enterprises that implement Blockchain or artificial intelligence (AI) technologies for quality control or supply chain management; training programs for improving the skills of personnel in the field of digital technologies. | The creation of a financial instrument that allows small and medium-sized enterprises to receive state funding for digitalization (through preferential loans or grants), through specialized ERP and SRM platforms. |
| Broad integration of Blockchain technolo- | The implementation of Blockchain technologies for monitoring and verifying the origin | Launching pilot projects for the implementation of Block- |

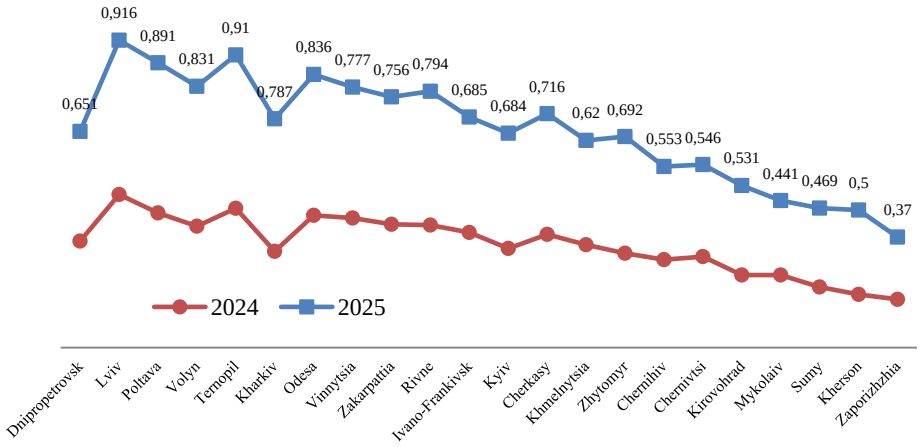
| | | |
|---|---|---|
| gies into supply chains | of products in supply chains ensures: the transparency of supply chains through reliable registration of all stages of production, transportation and sales; the reduction of the risk of food product falsification due to immutable records in the Blockchain network; the optimization of relations with suppliers due to automation of order confirmation processes and contract execution through smart contracts. | chain technologies for large and medium-sized enterprises in the food industry (for example, for monitoring the origin of raw materials or products). Support for legislative initiatives (the creation of standards for the use of Blockchain in the food industry). Partnership with European organizations for the adaptation of standards and certifications, in particular for export products. |
| Promoting artificial intelligence (AI) for optimizing production processes and forecasting demand | The development and implementation of programs that stimulate the use of AI for automation of production and forecasting demand in the food industry: tools for forecasting demand based on Big Data, for planning export production; the use of AI for automating quality control processes (the recognition of defects on production lines); the creation of an ecosystem of AI solutions, for selecting business tools. | The establishment of standards for AI solutions in the food industry that meet international standards (ISO). The creation of platforms for data exchange between enterprises and suppliers of AI solutions, as well as the development of innovations. The creation of scientific and practical institutes for business training and implementation of AI in production processes. |
| The development of e-commerce among small and medium-sized enterprises | Launching an initiative to support e-commerce among small and medium-sized enterprises to enter the European market through online social network channels: the creation of platforms for small businesses and sales of food products; training and educational programs for entrepreneurs, mastering E-commerce and online marketing; discounts on the use of payment systems for small businesses to reduce the costs of international transactions. | Launching its own Ukrainian online platform for food products, which will allow enterprises to sell products within the EU and other countries. Integration with international platforms (Amazon, eBay, Alibaba) to facilitate entry into global markets. |

Explanatory notes: Source: generated and calculated based on data by Osadcha and Pavelko [26]




Explanatory notes: Source: generated and calculated based on data by Osadcha and Pavelko [26]

Figure 14. Use of ERM-systems and SRM-systems by food industry enterprises between 2024 and 2025
Rycina 14. Wykorzystanie systemów ERM i SRM przez przedsiębiorstwa przemysłu spożywczego w latach 2024÷2025




Explanatory notes: Source: generated and calculated based on data by State Agency for Electronic Government of Ukraine [30]

Figure 15. Index of transformation of persistent activities by food industry enterprises in the regions of Ukraine between 2024 and 2025
Rycina 15. Wskaźnik transformacji działalności trwałej przedsiębiorstw przemysłu spożywczego w regionach Ukrainy w latach 2024÷2025

The implementation of digital innovations will help expand the tools of the scientific and methodological approach to diagnosing the sustainable level of the industrialization index of enterprise competitiveness through the formation of integrated marketing in the microenvironment of the market in canned fruit and vegetables, meat and

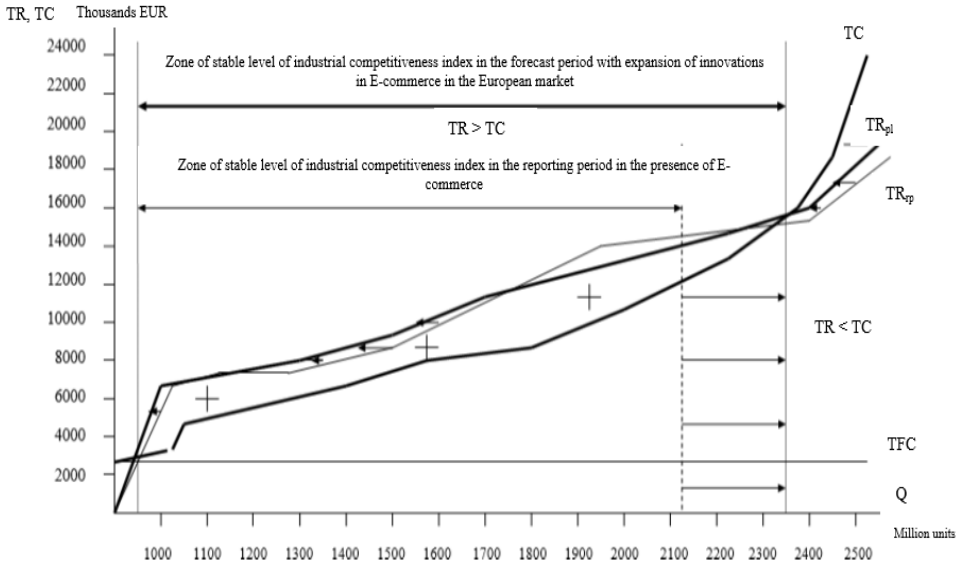
other products. We will reveal the mechanism for expanding the tools for diagnosing the object of research in the Ukrainian meat processing industry on the European market, taking into account the financial component, which depends on the results of persistent activity on the basis of digital innovations in the regions.

Since Ukrainian enterprises in the meat processing industry form a strategy of competitive advantages and operate in conditions of monopolistic competition, then from the position of the implication configurations of outsourcing, as a soft transformation of the persistent activity of entities, it is necessary to form the volume of export production and pricing policy in the region using the McKinsey tool: a strategic analysis by total costs ($TC$) and total revenue ($TR$) of entities complying with the conditions of digital innovations; a strategic analysis by the threshold value of marginal costs ($MC$) and marginal revenue ($MR$) of entities complying with the conditions of digital innovations. According to the "golden" rule, the optimal volume of product exports is such that the marginal revenue from complying with the conditions of digital innovations is equal to the marginal costs (Formula 2) [8]:

$$MR = MC \tag{2}$$

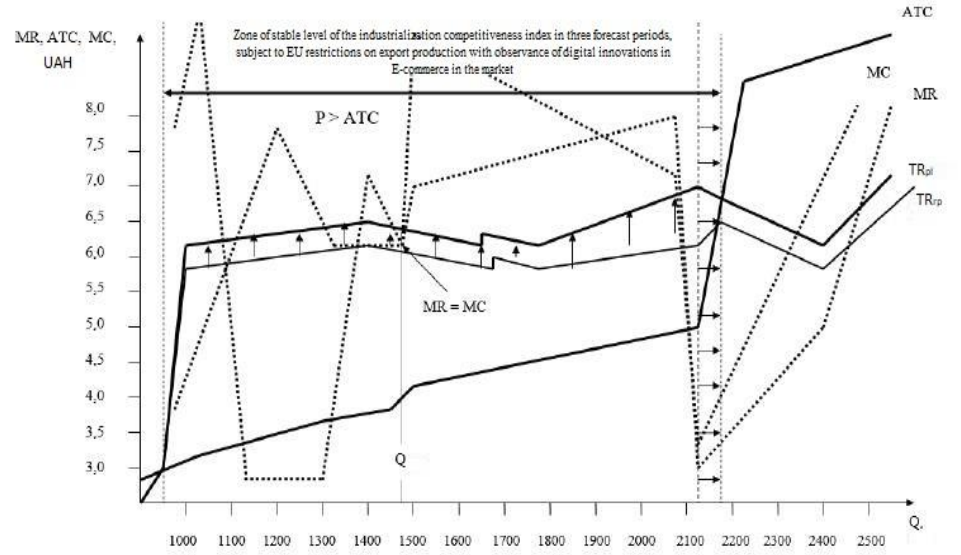
This model allows us to recreate the actual steady state zone of the competitiveness industrialization index. Figure 15 shows that the steady state zone of the industrialization index of competitiveness of enterprises in the region is within the range from 500 million units to 2,150 million units of export production of meat products to the European market. The expansion of the steady state zone of the industrialization index of competitiveness due to the saturation of demand for meat products can be due to the removal of restrictions on the threshold volume of export production within the new limits – from 500 million units to 2,350 million units in the forecast period ($TR_{pl}$) of supplies of goods to the European market (Figure 16).

The McKinsey strategic tool according to the boundary approach was used in the persistent activity of FIE, provided that they interact with other representatives of related agricultural sectors at the meso-level. The areas of competitive advantages were expanded (growing and exporting grain, raising livestock, producing and exporting meat and meat products, producing and exporting dairy products) and the potential income zone was determined (Figure 17).This allowed us to identify three optimal scenarios for the volume of export production of meat products, in which the maximum profit will be achieved in the three forecast years: $Q_1, Q_2$ and $Q_3$.




Explanatory notes: Source: constructed by the authors.

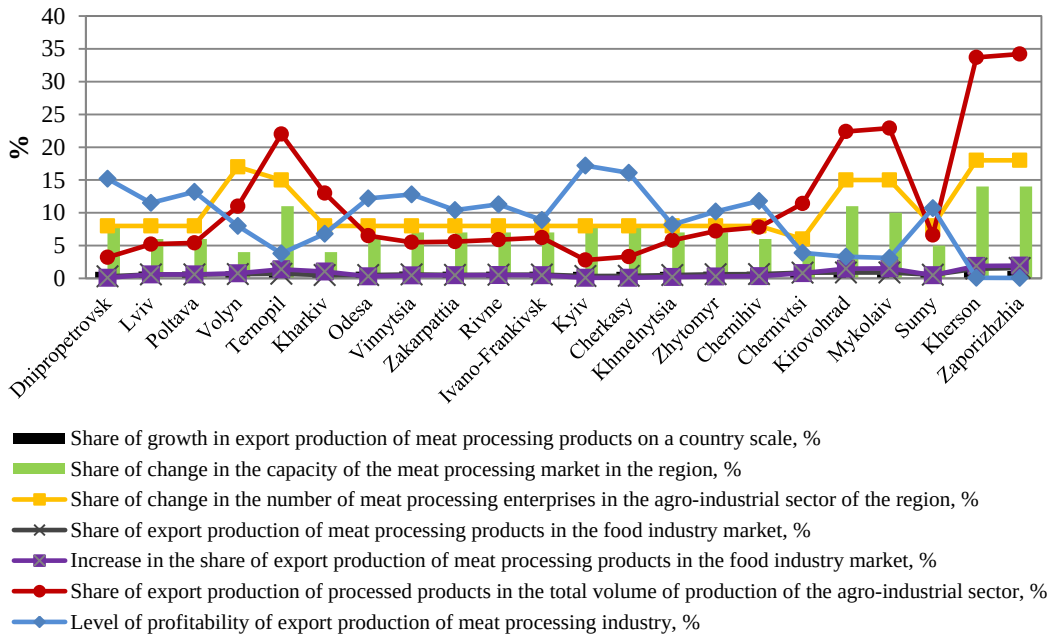
Figure 16. Steady zone expansion of competitiveness index (gross approach)
Rycina 16. Stała ekspansja strefy wskaźnika konkurencyjności (podejście brutto)




Explanatory notes: Source: constructed by the authors.

Figure 17. Steady zone expansion of competitiveness index (marginal approach)
Rycina 17. Stała ekspansja strefy wskaźnika konkurencyjności (podejście marginalne)

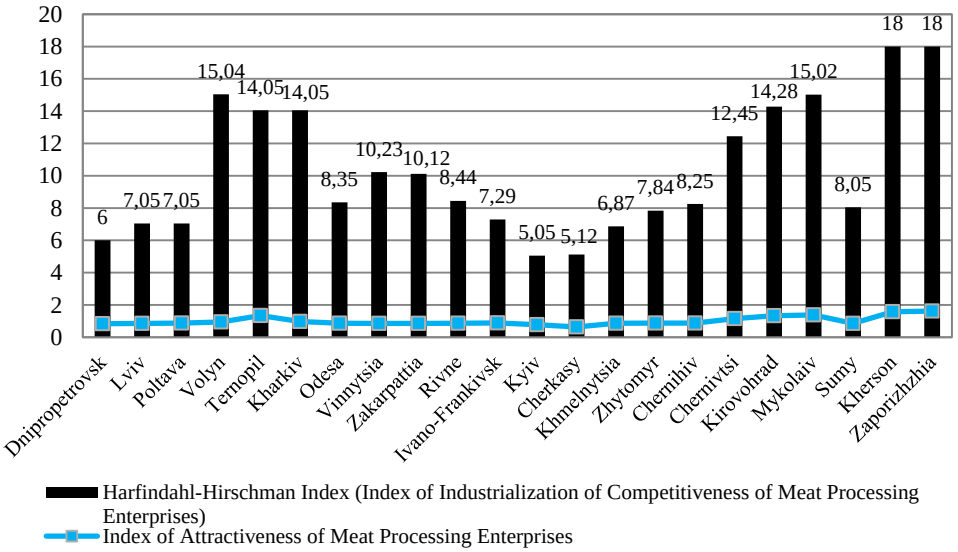
The orientation of meat processing enterprises to European demand and an increase in the optimal volume of export production, while adhering to the innovative principles of introducing E-commerce, makes it possible to expand the financial and resource area of business entities in the agro-industrial sector with a vertical development direction in a specific region, and to find the optimal level of sub-indicators of the attractiveness index and the industrialization index of competitiveness of enterprises on the European market from 2024 to 2025, as well as to determine the zone of the stable state of the industrialization index of competitiveness, due to planned changes in the cost component, which leads to a decrease in the cost of production (Figures 18 ÷ 19).




Explanatory notes: Source: calculated by the authors.

Figure 18. Forecasted sub-indicators of meat processing competitiveness (2024-2026) [%]
Rycina 18. Prognozowane podwskaźniki konkurencyjności przetwórstwa mięsnego (2024-2026) [%]

Therefore, under such circumstances, meat processing enterprises will have the opportunity to accelerate the increase in export profitability in the planned periods compared to the actual state and maintain competitive positions and advantages in the European environment with a small deficit of added value.




Explanatory notes: Source: calculated by the authors.

Figure 19. Indices of meat processing competitiveness (2024÷2026) [%]
Rycina 19. Wskaźniki konkurencyjności przetwórstwa mięsnego (2024÷2026) [%]

## Conclusion

1. The state of Ukrainian food industry enterprises (FIE) during the war can be characterized by three criteria – challenges, stability and prospects. As for the challenges, they are quite significant for FIE. The war caused serious disruptions in logistics chains, which complicates the delivery of raw materials and finished products. This affects the efficiency of production processes and the ability of enterprises to fulfill orders. In some regions of Ukraine, production facilities were destroyed, which caused significant losses for FIE.
2. Despite significant problems, FIE are among few entities that are characterized by relative stability. They provide the basic needs of the population in food products, which are an everyday demand both in the country and abroad. This makes the industry less vulnerable to economic and political shocks compared to other sectors. Despite the difficulties with exports, demand for food products remains stable. Ukrainian producers continue to find opportunities for sales of products on the domestic market and are looking for new export routes. Many FIE are actively introducing innovations and adapting to new conditions, developing new products, switching to alternative raw materials and introducing modern innovative technologies and digital innovations.

3. Accordingly, from these positions, the consolidation of efforts of public and private sector entities should be aimed at eliminating restrictions on the export production of food industry products, with the coordination of current economic results and the mobilization of competitive resources through international organizations, including at the European level by recognizing reliable partnerships. At the same time, the growing level of hygiene requirements and food safety standards means that food industry producers at all stages of the value chain must have appropriate quality assurance systems for export markets.
4. European partners, under existing preferences, offer regulations on the range of quality food industry products with high added value and authentic taste properties, thus implementing the directions of increasing the state of industrialization of the competitiveness of FIE in Ukraine, and thus ensuring comprehensive work on the possibility of implementing a strategy of competitive advantages in the market. As the growing popularity of healthy food and organic food products increases demand, Ukrainian food manufacturers which intend to work in the relevant segment must respond to this trend and properly adapt their assortment to the mechanisms of certification of organic production or circulation of organic products for compliance with legislative requirements with the involvement of accredited organizations.

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## KONKURENCYJNOŚĆ UKRAIŃSKICH PRZEDSIĘBIORSTW PRZEMYSŁU SPOŻYWCZEGO: INDUSTRIALIZACJA, TRWAŁA TRANSFORMACJA I INTEGRACJA EUROPEJSKA

S t r e s z c z e n i e

**Wprowadzenie**. Celem niniejszego artykułu jest analiza i identyfikacja kluczowych narzędzi naukowego i metodologicznego podejścia do diagnozy zrównoważonego poziomu wskaźnika industrializacji konkurencyjności przedsiębiorstw przemysłu spożywczego (PPS) w celu poprawy pozycji i przewagi konkurencyjnej na rynku europejskim poprzez wdrożenie kierunków transformacji trwałej działalności podmiotów zgodnie z wektorem innowacji cyfrowych, a także interesów przedsiębiorstw w zakresie wdrażania wspólnych wytycznych eksportowych.

**Wyniki i wnioski**. Zaproponowano zestaw powiązanych i współzależnych etapów naukowego i metodologicznego podejścia do tworzenia narzędzia diagnostycznego dla stanu wskaźnika industrializacji konkurencyjności PPS. Zidentyfikowano modele analizy strukturalnej i strategicznej, które pozwalają ocenić skuteczność wdrażania narzędzi na poszczególnych poziomach osiągania zrównoważonego poziomu wskaźnika industrializacji konkurencyjności oraz specyficzną transformację trwałych działań przedsiębiorstw z sektora przemysłu spożywczego. Przeprowadzono porównawczą analizę dynamicznego udziału przemysłu spożywczego w PKB Ukrainy, krajów UE, Azji Południowo-Wschodniej i regionu Pacyfiku.

**Słowa kluczowe:** przewagi konkurencyjne, innowacje cyfrowe, integracja europejska, eksport, industrializacja