

Managing Resource-Saving Development of Agri-Food Enterprises in the Context of Food Security and Sustainability: Strategic Aspects

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Abstract

Purpose: The study's purpose was to examine the management of agri-food enterprises' resource-saving development to minimize potential imperfections in managing material and human resources and improve data quality.

Materials and methods: A combined analysis was used to display the potential relationships between the agri-food sector achievements and basic indicators of natural resources' sustainability and resilience to risks. The analysis covered Ukraine, Romania, and Poland. The analysis allowed for developing a general management scheme, including a management transformation comparative description in the economic growth context.

Results: The study revealed that Ukraine is clearly not on the path to progress in manufacturing enterprises and agriculture, as most of its indicators do not meet global nutrition goals. At the same time, Ukraine remains an export-oriented country. Its agri-food enterprises' activities focus on external markets, corresponding to the priorities of the country's agricultural policy and sustainable development goals of the United Nations organization.

Conclusion: The obtained results provide knowledge about and understanding of processes that occur in the agri-food enterprises' organizational structure in countries with different development levels. The awareness of these processes is crucial for effective enterprise management in the resource conservation context.

Keywords: agricultural sector; climate policy; food security; management; market conditions.

JEL: A1, Q5, Q1

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Introduction

Climate change and related restrictions on agricultural resources, world population growth and associated food needs, the spread of Covid-19 around the world, and the introduction of social and political measures in movement, social distancing, and mask regime – all these factors have negatively impacted the agri-food sector in most countries of the world. As of 2020, 94% of the total employed workers resided in states with workplace closure measures, 42.8% of employed were left without any income, and 8.9% of the world population were undernourished (UN, 2020). Millions of agri-food enterprises appeared on the verge of closing. Among the most affected ones was the meat industry. The world's largest pork processor, Smithfield (Coface, 2020), closed several of its United States (US) plants after employees caught the coronavirus. China imposed trade restrictions on meat supplies from several agri-food businesses in Brazil, Argentina, and North America. Meanwhile, some European Union (EU) countries, such as France, Germany, and Poland, faced labor shortages for agricultural commodity harvests due to border closures and the inability to employ migrants (Eurostat, 2019; Coface, 2020). However, as the coin has two sides, agriculture has also faced different pandemic-related consequences. Even though the overall state of affairs on the market could hardly be called favorable, such grain producers as Poland and Romania (growers of rye, oats, and corn) have benefited from this situation. The reason is that during periods of general containment, the demand for these products – along with their prices – increased from 15% to 20% (Eurostat, 2019; Coface, 2020). The current standing in the world has provided an opportunity for agri-food enterprises to rethink production management in an uncertain environment, ensuring higher yields with fewer resources (such as soil, water, and nutrients). The Covid-19 prompted all market participants (government, producers, intermediaries, consumers) to reconsider the vulnerabilities of the entire food system by accelerating digitalization and rational use of natural resources (Rowan and Galanakis, 2020). In this context, the management of agri-food enterprises should combine an innovative approach to both management and farming methods.

The next section reviews current studies on the problematic issue compared to foreign experience. In addition, various aspects of the matter are highlighted and in the global context. The purpose of the study and its main tasks are also determined. The following section presents the methodology and all stages of the experiment, including data collection, calculation of the obtained data, analysis of the features of climate policies selected for the study of countries. Then, we provide an analysis of the results obtained after the experiment, followed by an analysis of similarities and differences with the results of experiments conducted by researchers from other countries, which makes

it possible to compare and contrast domestic achievements with foreign ones. The final section summarizes all the results of the study, focusing on the practical significance of the work and prospects for further research.

Literature Review

The modern economy depends largely on the efficiency of national production provided by enterprise management and specifics of the surrounding landscape (natural resources, socioeconomic development, technologies, innovations; Tisenkopfs et al., 2020). Sotnyk and Shevtsov (2015) suppose that it is the cost-effective use of resources that forms the foundation for competitive and effective management as it relies on the introduction of technology and innovation in the development and operation of enterprises. They define the resource-saving strategy as a system of long-term goals of resource-saving activities of an enterprise, determined by the overall objectives of its development and the most effective ways to achieve them. Moreover, Sotnyk and Shevtsov (2015) note that the increased attention to resource-saving facilitates the transition of a national economy to a sustainable development model. In this context, researchers indicate that enterprise management is likely to be based on the following management principles:

- 1) environmentalism – openness of the enterprise to the external environment;
- 2) compliance – internal consistency of the elements of the strategy;
- 3) entrepreneurial skills – focus on results and benefits;
- 4) flexibility – the adaptive ability of the system;
- 5) innovation – introduction of scientific and technological developments in the activities of the enterprise.

Lu et al. (2020) propose to move away from traditional governance in the agri-food sector and embrace more holistic paths to green development. In turn, Shubravskaya (2015) and Han et al. (2020) examine the management of an agri-food enterprise through the perspective of its mission. They state that the enterprise is the primary link in ensuring the physical availability of food for the population since the volume of products and transportation from producer to consumer determines the pricing policy. Han et al. (2020) and Ananno et al. (2020) emphasize that agricultural products are perishable, and the entire agri-food supply chain faces the challenge of products' safety and quality. Therefore, the level of agri-food enterprises' development directly affects the affordability of food for all groups of the population and defines the level of national food security and the socioeconomic situation (Shubravskaya, 2015; Ananno et al.,

2020; Treutwein and Langen, 2021). Given that the activity of an agri-food company aims to ensure market supply and demand (Kamilov et al., 2018), it presupposes the following:

- manufacturing new types of products to meet the actual needs of the consumer;
- ensuring production efficiency by minimizing costs and digitalizing activities;
- creating conditions that provide the enterprise manager with economic independence;
- constant updating of plans for achieving goals in accordance with the external environment.

Saguy et al. (2018) pay particular attention to innovation and believe that it opens new horizons for initiating changes and opportunities to alleviate traditional industrial and academic conservatism and risk aversion. Bell et al. (2020) declare that in order to innovate and change the ratio of input and output, three types of interventions are needed. These are policy interventions (business support, participation in research), technological interventions (introduction of new technologies and methods to increase productivity), and management interventions (innovation management). According to the Food and Agriculture Organization (FAO, 2020e), in 2019, the budget expenditures for research and academic staff training in the agri-food sector domain amounted to USD 4.82 million, which is 10% more than the year before.

Over the past few years, sustainable development has become increasingly relevant for Ukraine. Some of the central strategic goals for the development of the Ukrainian agri-food sector are food security (Kyzym et al., 2020; Poliakova et al., 2020), shift to the export of science-intensive innovative products to achieve sustainable development, success in world markets (Markina et al., 2019), and the formation of an anti-crisis infrastructure for agri-food enterprises (FAO, 2020a). In accordance with the identified goals, Ukraine is undergoing a transition from a command economy to an economy focused on the external market. In 2019, the Ukrainian government approved Export Strategy with reference to agriculture (Cabinet of Ministers of Ukraine, 2019). This document expanded the scope of action in the agri-food sector and set out the following goals:

- 1) expand the export commodity nomenclature by increasing the number of export items;
- 2) diversify markets by opening new trade directions recognized as priority ones;
- 3) increase the number of Ukrainian enterprises involved in global supply chains and extend the access of small and medium-sized enterprises to external markets.

Shubravska (2015) notes that the sustainable development of the agri-food sector in Ukraine is determined by the state of the digital economy and its ability to provide enterprises with technologies and resource conservation programs. She declares that these particular factors were chosen for their ability to create conditions for minimizing manufacturing expenses and improving its quality and competitiveness. As declared in FAO statistics (FAO, 2020e), the volume of budget support to the agricultural sector in Ukraine for 2018–2016 increased 5.3 times, amounting to 444.0 million USD in 2018 against 82.7 million USD in 2016. Nevertheless, the number of researchers in the R&D sector worldwide for the analyzed period showed a downward trend and comprised 988 million people versus 1037 million people, respectively (Knoema, 2020b). In general, Schmidt (2016) remarks that in order to create a favorable environment for the development of the agri-food sector, first of all, Ukraine should improve the management of its agri-food enterprises, currently characterized by an irrational use of natural resources, outdated production technologies, and regulatory documents inconsistent with international standards.

As we can see, most of the reviewed studies focus on issues of management in terms of increasing productivity, costs reduction, and introducing innovations and novel technologies. Nevertheless, they do not prescribe precisely how enterprises should introduce environmental components in management, at what stages, in what sequence, or at least how to be economically profitable and resistant to changes in the external environment. Against this background, we formulate several hypotheses:

H1: Favorable progressive changes in the structure of the agri-food sector have a positive effect on the development of the economy and the achievement of a high level of food security.

H2: In the face of climate change, agriculture affects the priorities of the country's agricultural policy.

H3: Resource-saving management in agri-food enterprises has a positive effect on overcoming structural deformations in the agri-food sector of Ukraine.

The management of agri-food enterprises is examined to ensure an effective organization of the enterprise management system in the context of resource-saving development and using the experience of European countries.

Thus, the ultimate purpose of this paper is to analyze the management of agri-food enterprises' resource-saving development to minimise potential imperfections in managing material and human resources and improve data quality.

To achieve this goal, the study focuses on the following tasks:

- 1) to conduct several monitoring studies focused on the agri-food sector in the context of promoting its sustainable growth in countries with different development levels;
- 2) to analyze risks connected with natural resources and sustainability;
- 3) to create a management plan for agri-food enterprises' resource-saving development that would include a comparative characteristic of management transformation under the backdrop of economic growth.

Methods and Materials

This research provides an analytical overview of thematic studies on the development of the agri-food sector in Ukraine, Poland, and Romania so as to prepare a management plan for Ukrainian agri-food enterprises based on best world practices and directed at resource-saving development. The choice of the countries to consider is justified by the fact that Romania and Poland border with Ukraine and have a common history and positive experience in reforming the economy (until recently, they had the status of countries with economies in transition) and the agri-food sector. The research is based on data retrieved from reports of various international organizations (Coface, 2020; Eurostat, 2019, 2020; FAO 2020; Global Food Security, 2020; Knoema, 2020) and the State Statistics Service of Ukraine (State Statistics Service of Ukraine, 2019, 2020).

Statistical data was considered in the following sequence:

- indicators of productivity of agricultural policy and its agents (agri-food enterprises): FAO (2020b; 2020c; 2020d), Eurostat (2020), State Statistics Service of Ukraine (2019, 2020);
- food security data (The Economist Intelligence Unit, 2020); according to the methodology of the Global Food Security Index (GFSI, 2020), the strong point of agricultural policy in Ukraine, Romania, Poland is represented by any indicator scored over 75 points, whereas the weak side is defined as any indicator scored below 25 points;
- indicators of employment in the agri-food sector: Eurostat (s2020), State Statistics Service of Ukraine (2020);

- Trade policy indicators (Knoema's World Data Atlas, 2020a);
- Climate policy indicators: World Bank (FAO, 2020b; 2020c; 2020d; 2020e).

This research was conducted in three stages. The first stage implied carrying out monitoring studies in Ukraine, Romania, and Poland from the perspective of achievement of Sustainable Development Goal 2 (SDG 2). These three countries have different development levels. Ukraine is a below-average income economy, Romania is an upper-middle-income economy, and Poland is a high-income economy. The conducted monitoring studies made it possible for us to establish and analyze the agri-food sectors' priorities and economic contribution, food security strengths and weaknesses, the dynamics of foreign trade, and the level of employment in the context of large, medium-sized, small, and micro agri-food enterprises. All this provided a solid ground for conclusions about the economic systems of Ukraine, Poland, and Romania as objects of management in the development of the agri-food sector.

At the second stage, we analyzed the countries' climate policies. Apart from this, we assessed basic indicators of natural resources' sustainability and resilience to risks, determined under the FAO methodology in the context of agri-food enterprises.

The third stage was the final one. Using a combined approach (the results of monitoring studies on the agri-food sector's development) and taking into account the basic indicators of resilience to natural resources degradation and risks and the management practice of agri-food enterprises in the EU countries, a scheme of managing a Ukrainian agri-food enterprise was designed. This scheme took into account the principle of resource conservation and the comparative characteristics of two economy types: market and command.

The research object was represented by the organization of the management system of an agri-food enterprise, whereas the subject was the process of transformation of agri-food enterprises from command-oriented management to resource-saving management.

Results

According to the FAO report on the progress in food and agriculture with reference to the United Nations' (UN) Sustainable Development Goals (SDGs), as of 2020, progress remains insufficient in the food and agriculture domain. Before the onset of Covid-19 (2015–2019), about 10% of the world's population was undernourished. However, as

the coronavirus spread around the world, this figure increased dramatically and amounted to 25.9% already in 2020 (FAO, 2020f).

Ukraine continues to be firmly committed to the principles of the UN and the SDGs, in particular to the goal of achieving food security and improved nutrition while promoting sustainable agriculture. Its current policy in agriculture and climate change within the frame of food production management and reference to agroecological data and resource conservation principles remains an important contribution to future improvements. The modern agricultural policy of Ukraine guarantees the availability of safe, nutritious, and environmentally friendly food for the entire population following regulatory documents that take into account international standards (Cabinet of Ministers of Ukraine, 2004; 2007).

Given the global trends in food security and the importance of different options for the development of management of agri-food enterprises in the EU countries, the present paper reviews Romania and Poland as economies with a positive experience of reforming the agricultural sector (Kyzym et al., 2020). Current policies of Poland and Romania in the field of food production aim to improve the overall safety and efficiency of the food system. They are dedicated to doubling the agricultural productivity and incomes of small-scale food producers – in particular farms – by guaranteeing access to land, financial services, resources, knowledge, markets, and employment (FAO, 2020f). Table 1 presents data on the potential of the agri-food sector of Ukraine, Romania, and Poland in order to get a clear idea of their capabilities.

As the monitoring results indicate (Table 1), Poland is close to Ukraine in terms of country area, forest area, population, and urban to rural ratio. However, according to data for the Global Food Safety Initiative (GFSI), income level, and the stage of development of agricultural policy priorities, there is a significant difference between Ukraine and the other two countries. Ukraine occupies a lower position than Poland and Romania with a GFSI of 57.6 and a GDP of USD 411.2 billion in public-private partnership (PPP). Besides, Ukraine's agricultural policy focuses on the legalization and development of agri-food business, whereas Poland and Romania concentrate on their maintenance.

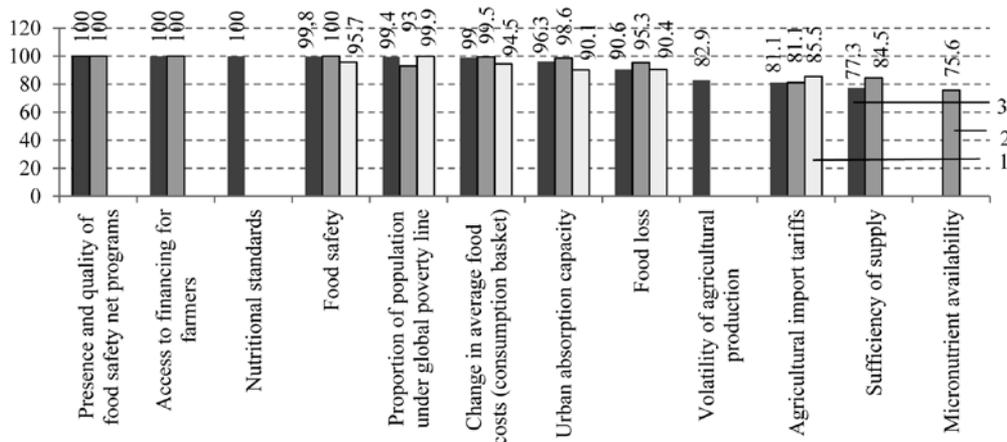
In this respect, it would be rational to consider the strengths and weaknesses of food security in Ukraine, Romania, and Poland for the sake of their more in-depth comparison. As shown in Figure 1, we may confidently declare that Poland and Romania have priority over Ukraine in the number of agricultural policy strengths: from 10 to 11 for Poland and Romania against 6 for Ukraine.

Table 1. Food and agriculture potential, 2019

Indicators	Ukraine	Romania	Poland
Country area, ha	60335	23840	31268
Land area, ha	57929	23008	30619
Agricultural area, ha	41515	13521	14374
Forest area, ha	9644	6929	9435
Global Food Security Index, rank/score (the best score amounts to 100)	57.1 (rank 76 of 113)	64.3 (rank 38 of 113)	75.6 (rank 24 of 113)
Income level, billion (USD PPP)	Below average (GDP 411.2)	Above average (GDP 583.8)	High (GDP 1,265)
Population, million	41.9	19.6	38.0
Ratio of urban to rural population, %	69.4:30.6	54.0:46.0	60.1:39.9
Agricultural sector priorities	<ol style="list-style-type: none"> 1. Farm development, organic production, product certification, and creation of a stable legal framework; 2. Land reform and food security under the EU regulations; 3. Agriculture supply-chain optimization and increased access to international markets; 4. Better environment and rational use of natural resources 	<ol style="list-style-type: none"> 1. Supporting small-scale family farms and increasing recognition of their role in supplying the country with food; 2. Public health protection; 3. Environment protection; 4. Promotion of agro-industrial trade 	<ol style="list-style-type: none"> 1. Family farms as the basis of the agricultural system; 2. Sustainable development of small, medium-sized, and large farms; 3. Building a competitive position of Polish agri-food products in foreign markets; 4. Dynamic development of rural areas in cooperation with cities

Source: own elaboration of data retrieved from FAO (2020b, 2020c, 2020d), and State Statistics Service of Ukraine (2019).

Figure 1 designates that the core strengths of food security in Poland and Romania are the presence and quality of food safety programs and access to financing for farmers (100 points), whereas for Ukraine, it is the proportion of the population under the global poverty line (99.9 points). Thus, we may argue that Poland and Romania are more focused on developing rural areas and supporting food production and the environment, whereas Ukraine is predominantly concentrated on reducing poverty.

Figure 1. Food security strengths by countries, 2019: 1 – Ukraine; 2 – Romania; 3 – Poland


Source: own elaboration of data retrieved from FAO (2020b, 2020c, 2020d).

Weaknesses of food security are determined by the presence of problems that negatively affect farming and production progress. The current problems of the analyzed countries are presented in Table 2.

Table 2. Food security problems by country, 2019

Problem	Ukraine	Romania	Poland
Public expenditure on agricultural R&D	1.1	5.5	5.2
Gross domestic product per capita (USD PPP)	6.8	22.1	X
Political stability risk	16.7	X	X
Total	3	2	1

Source: own elaboration of data retrieved from FAO (2020b, 2020c, 2020d).

As one can see from Table 2, public expenditure on agricultural R&D is a serious obstacle for all three countries under consideration, especially for Ukraine (1.1 points on a 25-point scale). It is beyond argument that agricultural innovation is crucial for improving the sector's productivity and reducing negative environmental impacts.

The prevailing share of the Ukrainian agri-food sector is held by small, medium-sized, and micro-enterprises, which is in line with the EU practice. In view of this, small and medium-sized enterprises can be deemed the backbone of the Ukrainian economy.

They provide jobs and meet the need for food for both the country's population and the population of other states in the world. Table 3 proposes an overview of enterprises in the agri-food sector of the EU and Ukraine as of 2019.

Table 3. Analysis of large, medium-sized, small, and micro enterprises for the EU and Ukraine in 2019

Indicator	Ukraine	EU	Ukraine	EU	Ukraine	EU	Ukraine	EU
	Large (≥ 250 employed)		Medium-sized (50–249 employed)		Small (10–49 employed)		Micro (≤ 10 employed)	
Number of enterprises, %	0.1	0.2	4.5	0.9	10.5	5.2	84.9	93
Number of employed, %	7.6	33.3	53.2	17.0	21.8	20.2	17.4	29.5
Value added, %	66.0	43.8	10.9	18.4	12.7	17.4	10.4	20.4

Source: own elaboration of data retrieved from Eurostat (2020) and the Cabinet of Ministers of Ukraine (2004).

What follows from Table 3, the economic clout of large enterprises in the EU is significantly higher in terms of employment and value added. In contrast, in Ukraine, the clout of medium-sized enterprises is higher in terms of employment and the clout of large enterprises in terms of value added. Not less interesting is the fact that in 2019 there were 50,205 small and medium-sized enterprises in Ukraine, providing jobs for 523,611 people and bringing UAH 189,433.534 million of value added.

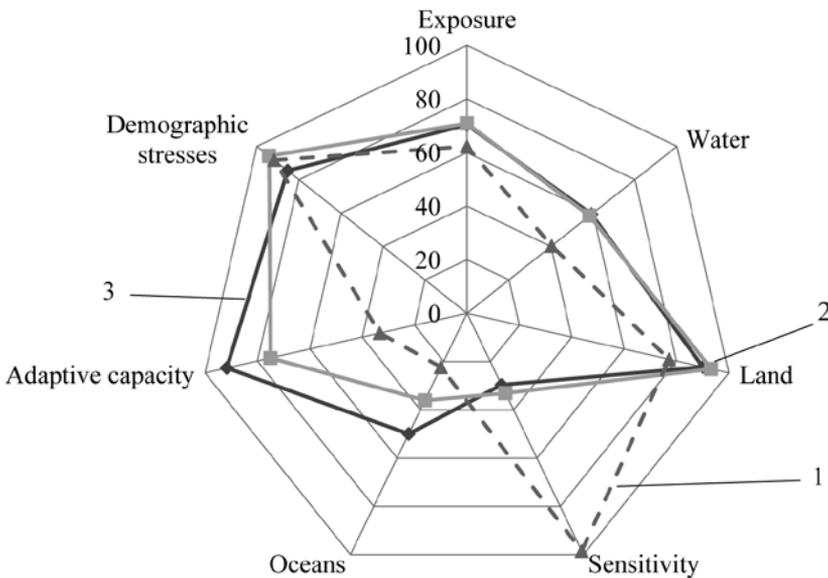
Nevertheless, there has recently been a global downtrend in government investments in agriculture. From 2015 to 2018, public expenditure on agricultural R&D decreased from 1.73% to 1.48%, with a subsequent drop in the sector's contribution to global GDP: from 5.54% to 5.28% (FAO, 2020b; 2020c; 2020e).

Farming is the most important element of the agri-food industry. Therefore, we should keep in mind that it can be influenced by various natural phenomena that can pose long-term threats to a country's food systems, like interruptions in the food supply. The basic indicators defining the sustainability of natural resources and their resilience to risks include (Figure 2):

- exposure (measures the exposure to and management of the impacts of climate change);

- water (measures the health of fresh-water resources and how depletion might impact agriculture);
- oceans (measures the health of oceans);
- land (measures the health of the land and how land degradation might impact agriculture);
- sensitivity (measures how susceptible countries are to the depletion of natural resources and agricultural productivity);
- adaptive capacity (measures the degree to which countries are creating systems and adopting practices to manage risk);
- demographic stresses (measures the degree to which demographic stresses might increase countries' sensitivity to agriculture-related climate exposure and natural resource risk).

Figure 2. Natural resources & resilience indicators: 1 – Ukraine; 2 – Romania; 3 – Poland

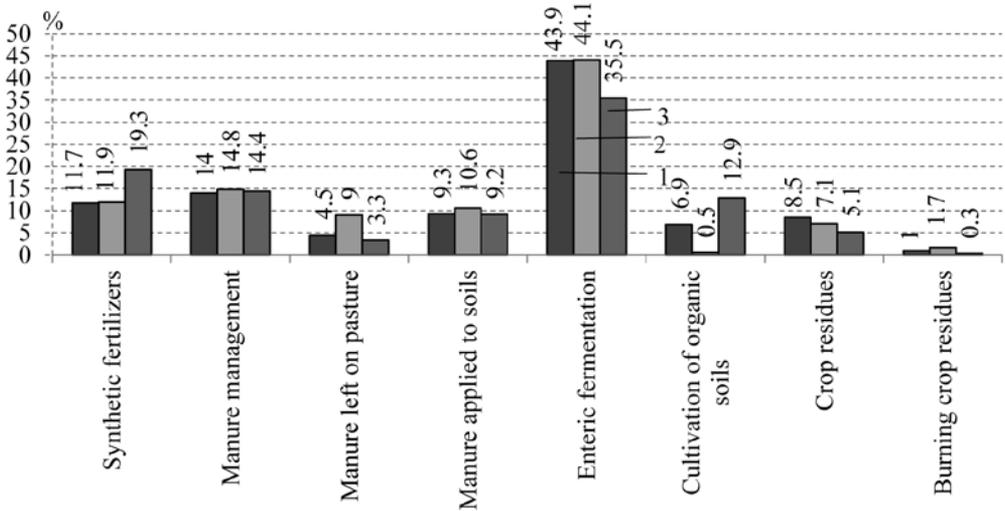


Source: own elaboration of data retrieved from FAO (2020b, 2020c, 2020d).

In general, we can see that in Poland the greatest attention is paid to such categories as land (93.3 points) and adaptive capacity (91.7 points). In Romania, similarly to Poland, the priority is given to land (90.3 points), followed by demographic stresses (94.2 points). In turn, Ukraine focuses on sensitivity (98.5 points) and demographic stresses (91.8 points). In view of the results presented, we may say that the EU countries privilege the care and preservation of land, while Ukraine gives precedence to the analysis of risks.

In addition to being a sector of the economy exposed to climate changes and risks, agriculture is also a source of greenhouse gas (GHG) emissions (CO₂ equivalent) (FAO, 2020e). Figure 3 explicates GHG emissions by agricultural activities for 1990–2017.

Figure 3. GHG emissions by agricultural activity, 1990–2017: 1 – Ukraine; 2 – Romania; 3 – Poland

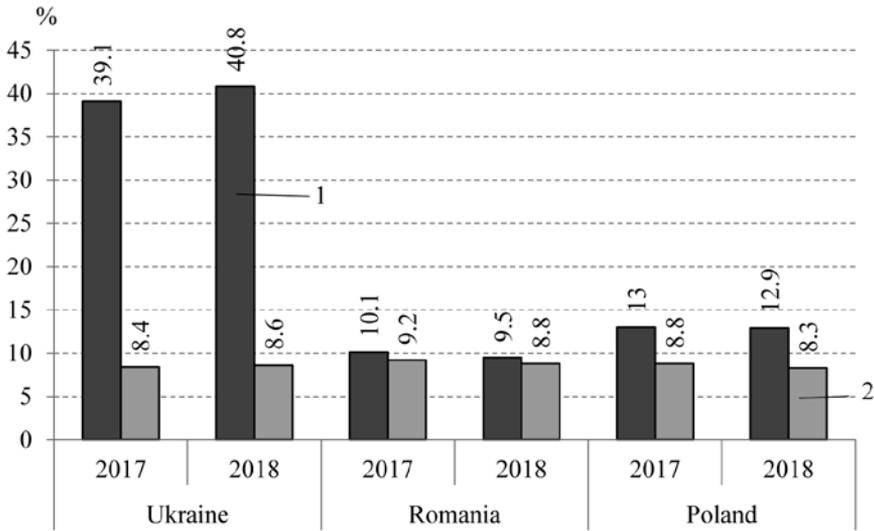


Source: own elaboration of data retrieved from FAO (2020b, 2020c, 2020d).

As Figure 3 depicts, the largest GHG emissions come from enteric fermentation (more than one-third of all emissions in agriculture: from 35.5% to 44.1%), whereas the smallest share of GHG is produced by burning crop residues (from 0.3% to 1.7%). As of 2020, Ukraine plans to implement measures to mitigate climate change and participate in international market mechanisms for emission trading (FAO, 2020e), which is in line with international standards for climate and trade.

Today, agri-food trade policy is on duty for restoring the balance of supply and demand in the market. It takes into account the consequences of natural phenomena and aims to ensure food security in the context of SDGs. A thorough review of agri-food trade in the countries under consideration for 2017–2018 unveiled that the share of food imports did not exceed the level of 9.2% in 2017 and 8.8% in 2018. At the same time, their exports were greatly facilitated by Ukrainian cross-border sales of food products and amounted to 39.1% and 40.8% for 2017 and 2018, respectively (Figure 4).

Figure 4. Agri-food trade, 2017–2018: 1 – food exports (% of merchandise exports); 2 – food imports (% of merchandise imports)



Source: own elaboration of data retrieved from Knoema (2020a).

Following the priorities of Ukrainian agricultural policy – namely access to international markets and rational use of natural resources – and keeping in mind the current situation with Covid-19, agri-food enterprises in Ukraine (large, medium-sized, small, and micro) are forced to review their management models with reference to resource-saving. Building on the practice of EU countries in the field of business activity, an effective approach for agri-food enterprises – especially for small and medium-sized ones – is to create a sustainable cooperative relationship in the form of outsourcing or strategic alliance. Table 4 displays the positive and negative aspects of such a relationship.

In sum, we identified key characteristics of agri-food enterprises’ management with reference to the transformation of the economy of Ukraine. In a command economy, management is centralized and performed in a stable external environment, whereas in a market economy, under uncertain conditions, management is much more strategic. In the case of Ukraine, a management model should be updated in accordance with the priorities determined by UN experts, in particular by the FAO. The general management scheme with the distinctive characteristics of various economy types is shown in Figure 5.

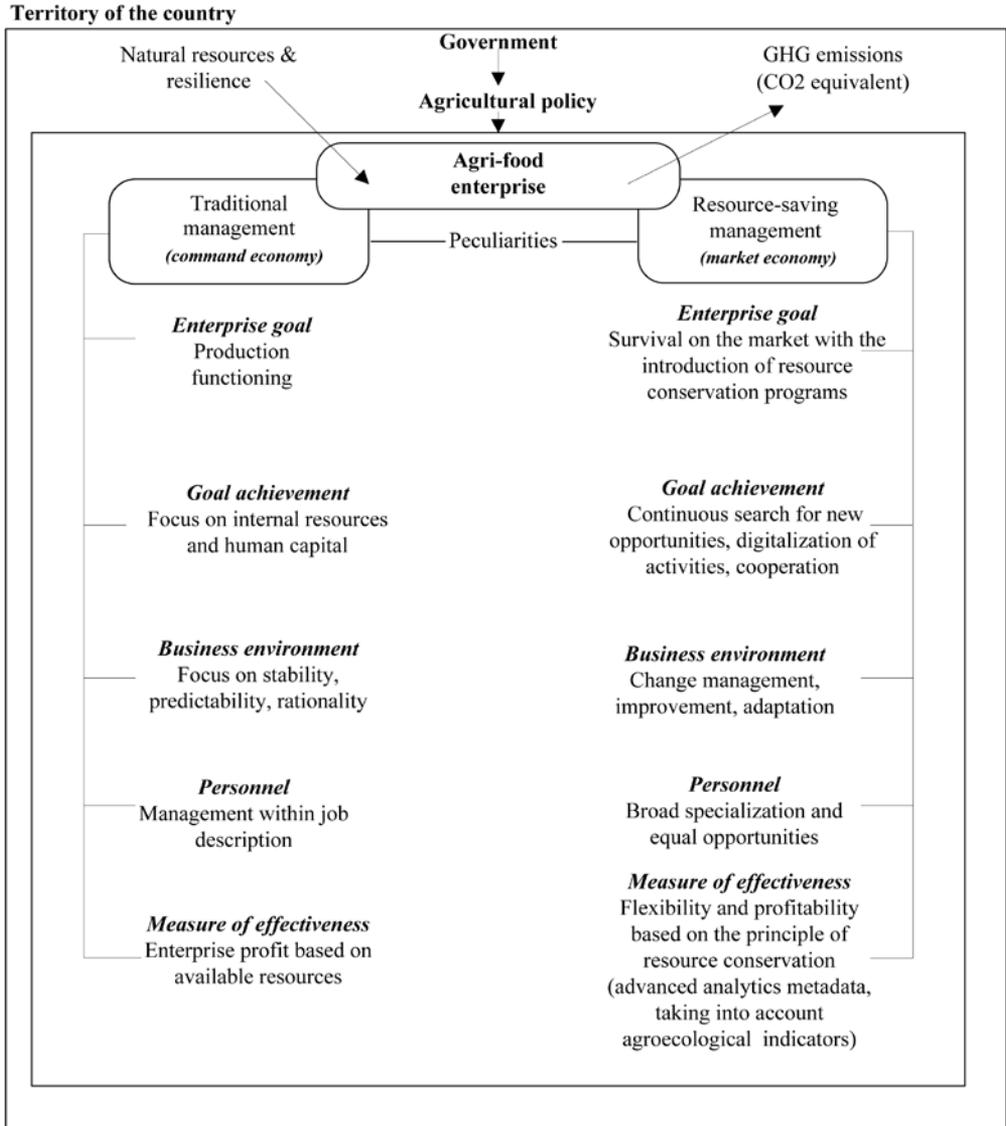
Table 4. Outsourcing and alliance as means of building a sustainable cooperative relationship: pros and cons

Definition	Function	Positive aspects	Negative aspects
Outsourcing: progressive management or third-party business	Assists in adapting to access the market	Facilitates cost reduction	Leads to a lack of quality control and supply chain coordination; unable to sustain organized cultivation of value and thus is not recommended as a long-term strategy
Strategic alliance: provides an opportunity to participate in joint projects to create common value	Provides enterprises, especially small, medium-sized, and micro, with the opportunity to engage in effective collaboration to pursue joint innovation, increase competitiveness, propose quality services, and create supply/value chains	Covers strategic partner selection, alliance rationale, communication management, risk control, opportunistic behavior prevention, trust and confidence, commitment and cultural issues that ensure cooperation stability of the alliance	Uncertainty in the external environment can lead to many adverse consequences for the stability of cooperation in the alliance (partners can change their benefits in the alliance depending on the benefits of the external environment)

Source: own elaboration of data retrieved from Han et al. (2020).

Resource-saving management (Figure 5) implies a system aimed at achieving economic profitability based on resource conservation programs, using agroecological indicators, innovations, and technologies. This management is directed at reducing quantitative and qualitative losses at the stages of agri-food products' manufacturing and processing. It acts as an instrument of market infrastructure, which is of paramount importance to lower the cost of resources needed.

Figure 5. Resource-saving management scheme for an agri-food enterprise in the context of command and market economies



Source: own elaboration.

Discussion

The results of monitoring the sphere of food production showed that the identified priorities of agricultural policy imply a search for a balance between state goals and benefits that producers, intermediaries, and consumers will receive. Thus, it makes sense to analyze the entire food system to eliminate negative impact factors. Bustos (2020) defines the food system as a system that ensures economic, social, and environmental sustainability; that is, society benefits from satisfying the need for food with a positive or neutral impact on the environment. This effect can be achieved with effective management of enterprises, especially small, medium-sized, and micro, which provide the largest number of jobs for the working-age population in Ukraine and the EU and support the national economy balancing supply and demand (Shlykova and Levanda, 2019). Shubravskaya and Prokopenko (2016) designate that the increase in food production should be achieved through resource conservation, namely the rational use of land, human labor, water, and capital. Waechter (2018) argues that this practice can help improve income and employment prospects in rural areas and increase domestic production, which will promote economic development and food security in the country. In turn, the current research was based on the following key points necessary to be considered by agri-food enterprises to perform proper management:

- Efficient management model – outsourcing or strategic alliance – to obtain collective support in the face of uncertainty;
- Control of financial resources, including the manufacturing value added;
- Employment, as a crucial factor for the enterprise's well-being;
- Environment (natural resources and emissions);
- Trade indicators, according to which the demand for manufactured products in the markets is estimated.

Barbut (2020) emphasizes the importance of the environmental aspect in business activity, namely the health and productivity of land and water resources. She argues that they are of fundamental importance for managing and restoring our natural capital effectively. Land degradation continues to pose a serious threat to rural livelihoods. It triggers forced migration, worsens the situation with labor shortage in enterprises, and creates industrial conflicts due to limited natural resources, especially in developing countries like Ukraine. Sartre et al. (2019) analyze the agricultural sector by turning to agroecology and ecosystem services. They conclude that these instruments contribute to the development of environmentally friendly rural production and facilitate greater integration in the sociopolitical territories in which they operate, but they also facilitate greater autonomy and less dependence on phytosanitary products.

Under these conditions, it becomes necessary to revise the priority areas of resource management so as to adhere to the ecology and resource conservation principles.

Barne and Wadhwa (2019) outline the achievements of climate policy, emphasizing the taxation of carbon dioxide emissions. They regard it as a tool for climate transformation and stimulation of low-carbon production in the agricultural sector (enterprises pay a tax depending on the volume of emissions). Corresponding carbon pricing initiatives are in place in Ukraine as well. Rational use of resources at all stages of production and waste processing is supposed to contribute to environmental sustainability. However, to date, no universal resource-saving method exists since each territory is unique, and managers need to assess context-sensitive barriers (audit of the enterprise and the environment), adapting to the available conditions.

Han et al. (2020) describe the problems businesses face in trade markets, focusing on small and medium-sized enterprises. The first problem is the selection of suitable business models, with the help of which the efficiency of the enterprise is achieved and, accordingly, profitability and consumer satisfaction are increased. The second problem lies in simultaneous compliance with the standards set in trade markets and the provision of high-quality transportation and delivery. These intricacies require a solution to the problem of control over costs and profitability. In this light, Atamanuk et al. (2018) propose using a management system based on an enterprise's economic state forecasting, which allows managers to evaluate the results of enterprise activities in the future by taking into account its resources (land, labor, fixed assets). Skobelev et al. (2019) suggest utilizing innovative technologies in enterprise management, particularly a cloud system, to boost agricultural production efficiency and benefit both large producers and small businesses. Meanwhile, Yakubiv et al. (2020) define the effectiveness of management in the context of the integration of three indicators: the economic, social, and organizational efficiency of management. Beck (2016) defines the European model of managing the agricultural sector as the most suitable in modern economic conditions, as its characteristic feature is multifunctionality and multifactoriality. Combining various solutions into a single way to use internal resources effectively is the primary goal of strategic management (Sotnyk and Shevtsov, 2015; Barne and Wadhwa, 2019). This research consolidated several critical points: the successful development of the agri-food sector of EU countries based on available experience, the effective use of the internal enterprise's resources, and an allowance for the external environment (the central goal of management plans).

In sum, we may state that all types of enterprises of the agri-food sector – large, medium-sized, small, and micro – represent a tool for ensuring food security within the framework

of sustainable development of the economy, environment, and society. Besides, under the current Covid-19 outbreak, they turned out to be effective in combatting the pandemic's adverse effects.

Conclusions

Our analysis showed that Ukraine is a country engaged in the active export of agri-food products with a considerable amount of agricultural land (41,515 ha) as compared to Romania (13,521 ha) and Poland (14,374 ha). At the same time, Ukraine ranks 76 among 113 countries in the GFSI, which corresponds to a satisfactory level of productivity of agri-food enterprises, poor public investment in agricultural technology development and innovation, and high sensitivity of agriculture to natural risks. The identified weaknesses of the Ukrainian agri-food sector reduce the efficiency of both the profitability of the enterprise and the quality of production. The investigation results allowed us to develop the scheme for managing resource-saving development in Ukrainian agri-food enterprises. This scheme is supposed to increase people's attention to protecting the land by introducing advanced solutions and achieving a balanced ratio between natural and human resources through resource conservation.

The study findings suggest that the adoption of EU countries' experience in agriculture can help Ukraine raise its economic development level, increase food quality, and improve food security. These actions will set in motion the transformation of the current Ukrainian food system and make it more sustainable.

The practical contribution of this research lies in the improvement of the management of agri-food enterprises with the account of the economic, social, and environmental dimensions. This is believed to increase the resilience and productivity of the enterprise, but also to promote the preservation of the ecosystem and strengthen the ability to adapt to climate changes. Moreover, our scientific contribution lies in the fact that our research assumed a multifactorial approach.

The obtained findings can be applied in the agri-food sector to manage an agricultural enterprise more effectively in terms of the rational use of available resources. Besides, they may be found useful in the process of innovation policy management, which provides feedback to national agri-food sector enterprises. The research limitation stems from the fact that the management scheme proposed for a market economy should be tested in agri-food enterprises both in countries with a transition economy and in developed countries with a mixed type of economy, by applying an empirical

assessment method. However, for this aim, substantial investments and a wide range of experts are needed to decide on the project's profitability.

Further research in this area should focus on the issues of added value from managing resource-efficient strategies in the structure of agri-food enterprises.

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