

# **Diversification in the enterprises' activities for sustainable development in the agricultural sector**

**Olena Denysiuk**

Department of Management and Entrepreneurship  
Zhytomyr Polytechnic State University  
10005, 103 Chudnivska Str., Zhytomyr, Ukraine

**Ihor Svitlyshyn**

Department of Management and Entrepreneurship  
Zhytomyr Polytechnic State University  
10005, 103 Chudnivska Str., Zhytomyr, Ukraine

**Iryna Tsaruk**

Department of Finance and Credit  
Zhytomyr Polytechnic State University  
10005, 103 Chudnivska Str., Zhytomyr, Ukraine

**Olga Vikarchuk**

Department of Management and Entrepreneurship  
Zhytomyr Polytechnic State University  
10005, 103 Chudnivska Str., Zhytomyr, Ukraine

**Andrii Dankevych**

Department of Economics and Law  
Educational and Scientific Institute of Economics and Management  
National University of Food Technology  
01033, 68 Vladymyriivska Str., Kyiv, Ukraine

Department of National Security, Public Management and Administration  
Zhytomyr Polytechnic State University  
10005, 103 Chudnivska Str., Zhytomyr, Ukraine

**Abstract.** The relevance of the study is determined by the need to develop and implement effective mechanisms for sustainable development of agricultural enterprise under current economic conditions, which allows solving the issues of public employment in rural areas and increasing the overall level of citizens' incomes in a qualitative way. The purpose of the study is to investigate the practical possibilities of developing the diversification of agricultural enterprises' activities, to assess the real prospects for stimulating their activities and increasing the overall level of organisation of the modern agricultural enterprises' functioning. The basis of methodological approach is the combination of methods for system analysis of the basis for implementing the diversification of the agricultural enterprises' activity with the analytical investigation of the prospects for the development of agricultural production in modern economic conditions. The results of this study indicate that there are multiple factors affecting the development of diversification in agricultural enterprises in relation to the nature of their activities and the type of commodity products they manufacture, as determined by the specifics of the market and its activity at given time intervals. The findings and conclusions of this study are of significant practical relevance to agricultural workers, whose professional responsibilities include the implementation of measures aimed at the diversification of agricultural enterprises, and the realisation of pre-designed programmes for the development of agricultural enterprises in a particular region or nation-wide. The aim is to increase the overall economic potential of the country, through the development of the agricultural sector.

**Keywords:** agriculture, agricultural production, diversification of agricultural activities, rural areas, development investments, business plan.

## **Introduction**

Nowadays, various factors in their diversity form the basis for all economic and social diversification processes. In the case of diversification in the agricultural sector, the geographical, natural and climatic conditions in which agricultural enterprises operate have an important influence on their functioning. Moreover, a combination of other factors determining the diversity of agricultural products and various economic risks also have an impact, which in general objectively promotes and causes the diversification of projects and business strategies of these enterprises (Parray and Shameem, 2019). Current processes related to the lifestyles and occupations of people living in rural areas have a significant impact on modern society and the economy. This often takes place against the background of a growing complexity of the international division of labour between individual states, and increasing interdependencies, in the context of implementing food policies and import substitution policies.

Modern researchers have developed a whole range of measures that aim to significantly reduce the impact of risks on the economic activities of agricultural enterprises and organisations. Limiting the concentration of risk is one of the most effective methods of risk reduction. In the context of this postulate there is a consistent delineation of rights and obligations to the extent that the theoretical emergence and development of a risk situation cannot have any impact on the performance of an individual organisation (Bazer et al., 2019). Diversification is one of the most effective mechanisms for reducing the level of risk in the activity of an agricultural organisation. Diversification is essentially the implementation of different types of activities, whether it is the release of products of different kinds or the implementation of financial injections into the activity from different sources. In some situations, this methodology is applied when there is a need to capture a specific niche in the market by an individual organisation. In this situation, diversification is not only directly linked to the reduction of risk, but also implies the prospect of receiving a certain income.

Strategic planning of the activities of agricultural enterprises, and planning the diversification of their operations, is based on a qualitative analysis of all marketing opportunities available. This analysis includes both the agricultural enterprise itself and the entire rural administrative area, since the main activities of the enterprise cannot be developed without the appropriate investments and quality partnerships. (Zinyengere et al., 2017). In particular, this applies to the activities of enterprises belonging to the processing and food industry that operate in close contact with the agricultural sector. This suggests that there is a real need to identify potential partners among entrepreneurs in this particular category and to conduct research into market potential in the field of labour resources and the agricultural sector in general (Ghosh et al., 2021). The qualitative development of a diversification strategy involves the need to consider the different economic, natural and social conditions of the rural areas in which agricultural enterprises operate. When it comes to the activities of enterprises producing agricultural goods, it is essential to analyse the prospects for the development of production activities in a given geographical area as a whole. This should consider its geographical location and natural characteristics that affect various aspects of the enterprise's activities as a producer of agricultural goods (Keswani et al., 2021).

The purpose of this study is to analyse the real prospects for the development of the diversification of agricultural enterprises' activities under current economic conditions and considering the specific features of their activities, conditioned by a combination of natural, geographical and economic factors that are crucial in terms of development prospects of these enterprises in the current economic environment.

## **Materials and Methods**

The methodological approach in this study is based on the combination of methods for system analysis of the basis for implementing the diversification of the agricultural enterprises' activity with the analytical investigation of the prospects for the development of agricultural production in modern economic conditions. The study is preceded by the development of a qualitative theoretical basis, which is necessary to provide the focus of the research and which highlights the main aspects relevant

in the context of studying the main development areas of the diversification of agricultural enterprises' activities. The theoretical basis consists of available scientific research of a number of Ukrainian authors and, mainly, authors from other countries devoted to the qualitative coverage of the prospects for the development of diversification of agricultural enterprises' activities in modern market and economic conditions. To ensure a high level of comprehension of the information presented and to increase the objectivity of the assessments, all information taken from research papers and cited in this study has been translated into English. This study was carried out in three main stages. The first stage of this study involved a theoretical survey of the studies available within the scope of the stated research topic, to establish an objective theoretical basis for subsequent scientific developments. This stage also involved a systematic analysis of the basis for implementing the diversification of agricultural enterprises' activities, which involved comparing the data obtained from various sources to develop the prevailing concept of this research and its subsequent application in practice.

The second stage involved an analytical investigation of the prospects for the development of agricultural production in the current economic conditions. This is the basis for the generation of subsequent conclusions regarding the quality of development of agricultural enterprise activity diversification. This stage implies the use of a substantial amount of statistical and computational information as an objective illustrative basis for this study and the establishment of qualitative results, based on the factual data obtained. Furthermore, this stage included an analytical comparison between the preliminary results obtained in the course of the study and the results and conclusions obtained by other researchers of the problematic issues directly related to the development of diversification of agricultural enterprises' activities in modern economic conditions. In general, this contributes to the generation of objective results, based on the analytical comparison performed and the correlation of data obtained from several sources. At the final stage of this study, based on the theoretical and practical findings, the final conclusions were formulated as a logical reflection of the results obtained and as a summary of the whole body of scientific research. Generally speaking, the results and conclusions obtained in the course of this study can be used in the future as an effective methodological basis for conducting further studies within the framework of the investigation of the main aspects in the development of diversification of agricultural enterprises' activities.

## **Results**

The conducted study on the basic principles for the development of diversification of agricultural enterprises in modern economic conditions has produced the following results. The development of diversification in agricultural enterprises requires the following main aspects to be taken into account:

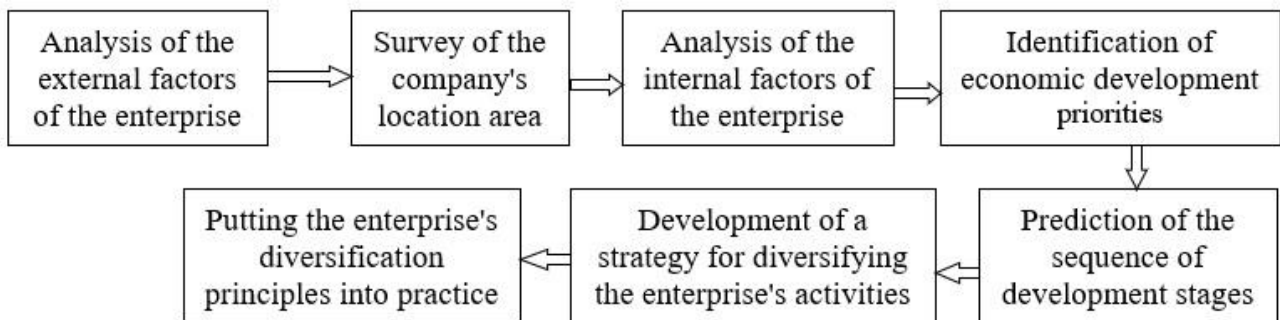
1. Main areas of activity of an agricultural enterprise.
2. Allocation of material and technical resources in accordance with specific types of activity.
3. Allocation of the financial assets of the agricultural enterprise according to the priority areas of activity.
4. Identification of the financial risk level of the enterprise's activities in each specific area.
5. Definition of a risk management strategy for an agricultural enterprise.

The need to develop the diversification of an agricultural enterprise may be conditioned by multiple reasons, among which it is worth mentioning:

1. Use of a variety of resources, both natural, material and human, which necessitates their rational management.
2. Expansion of social and human needs in the area of agricultural products use.
3. Changes in the demographic structure of the population in the regions where agricultural enterprises operate.
4. Changing economic condition of the state in specific time periods.
5. Influence of national traditions in certain geographical regions.

Furthermore, differences in the climatic and environmental conditions of the regions where agricultural activities are carried out, the increase in economic risks, can also have a significant impact on the development of diversification of agricultural enterprises. The latter factor is the most

important in terms of its impact on the development of agricultural enterprise diversification, since the implementation of diversified agricultural projects and strategies for agricultural activities in certain geographical regions depends on traditions. At the same time, modern society and the development of economic trends are most influenced by the lifestyles of people living in rural areas and the agricultural business practices adopted by agricultural enterprises (Leakey, 2017). The latter factor has a significant impact on the development of economic risks and requires the establishment of qualitative conditions for ensuring economic security, combined with the introduction of a set of measures to organise the state's food policy. Figure 1 shows a schematic diagram of a sample development strategy for the diversification of the activities in an agricultural enterprise. Notably, the main criterion for the economic efficiency of developing a particular agricultural sector and defining the priority areas for diversifying the activities of an agricultural enterprise should be the market saturation with the goods that can be manufactured by agricultural producers belonging to a particular administrative region or group of regions in rural areas.



**Figure 1.** Development scheme of a strategy for the development of diversification of an agricultural enterprise

A strategy for diversifying the activities of an agricultural enterprise in the livestock sector is proposed as an example. The first stage involves an analysis of the livestock market in the region where the enterprise is located, an analysis of the nation-wide market conditions for agricultural products. For this purpose, an analysis of the level of consumption in the market is carried out for each type of product manufactured by the agricultural enterprise, considering the real needs of the population for this type of product. The results obtained allow making an objective forecast of the development prospects for an agricultural enterprise, in relation to the release of products for a specific purpose. In this context, it is essential to determine the market consumption coefficient for a specific type of agricultural product:

$$C_c = W_c / C_m \times 100\% \quad (1)$$

where:  $C_c$  – coefficient of market consumption, in relation to a particular type of agricultural products;  $W_c$  – consumption volume of agricultural products of a certain type in a given geographical region (statistical value);  $C_m$  – capacity of the market for a given time period.

As an example, it is suggested to consider the specifics of the livestock market in the Zaporizka oblast of Ukraine. The volume of actual consumption of meat and meat products by the population does not exceed 70% of the total market capacity, indicating that there are opportunities to increase the volume of meat production in the region. The market consumption coefficient for the region under study is low, which confirms the need for consistent development of livestock farming in the region, as the main area of diversification for agricultural enterprises located in the area. Table 1 provides data on the volume of livestock products consumption and market capacity in Zaporizka oblast.

**Table 1.** Volume of livestock products consumption in Zaporizka oblast and capacity of livestock market

Products	Consumption rate (kg per year) C	Population of the region P	Capacity of the market for marketable products $C_m = C \times P$
Meat products	95	1687000	160.27
Dairy products	426	1687000	718.66
Eggs (thousand units)	355	1687000	598.88

A development strategy for diversifying the activities of an agricultural enterprise should include a clear sequence of actions to implement the main objectives of the enterprise's development at specific intervals and to reduce the degree of economic risks from its activities. For the example under consideration, this strategy requires the following actions to be carried out:

1. Calculating cost figures for livestock products in accordance with accepted taxation standards.
2. Determining the volume of production per unit of time, and considering the area of farmland used for grazing and keeping livestock.
3. Calculating the output volumes of livestock products per one employee of an agricultural enterprise.

With regard to the example under consideration, the share of producers in Zaporizka oblast in the livestock products market of the country ranges from 67% to 72%. The analysis of the advantages and disadvantages of the geographical area under study in terms of assessing the real prospects for diversifying livestock production activities allows determining strengths and weaknesses and identifying the main trends in reducing the risks of economic activities, in relation to this type of livestock production. At the same time, the gradual implementation of a strategy towards the diversification of the livestock producers' activities will contribute to the development of the entire agricultural sector in the region. This would have an overall positive impact on its economy and have a positive effect on the economic development of the state in general (Kuden et al., 2017). The correct strategy of the agricultural enterprise diversification is facilitated by the identification of the potential opportunities for the available human resources and the competent use of the labour force employed by these enterprises. At the same time, the quality and qualifications of the labour force have a direct impact on the efficiency of the agricultural enterprise's operations and hence on the effectiveness in making decisions regarding the reduction of business risks. Furthermore, the diversification of agricultural enterprises' activities implies the search for new markets for the manufactured products, and the opportunities to implement new activities of these enterprises, including the production of new types of goods combined with the improvement of employees' qualifications. A comprehensive approach to the implementation of the objectives set will generally contribute to achieving optimum results in the development of diversification in the agricultural sector, which is expressed both in terms of increasing the volume and quality of production and improving the qualifications of professionals (BIRTHAL and HAZRANA, 2019).

In general, the development of diversification of agricultural enterprises' activities involves the consistent consideration of many factors directly affecting this process and determining the level of the enterprise's subsequent functioning, in the context of its objectives to increase the volume and quality of products and to reduce the overall level of risks in its economic activities. For each specific agricultural enterprise, the diversification of its activities should be carried out in a consistent manner, considering its specific characteristics and the type of produced goods.

## Discussion

The management strategy for agricultural enterprises involves the consistent creation of conditions, the development and implementation of mechanisms for the stable development of the enterprise, ensuring the maintenance of a proper level of employment and increase in the income of the population. In this context, diversification strategies for an agricultural enterprise are an integral part of its corporate strategies, in particular its growth strategies, which allow determining, firstly, the

priority areas for the development of the mentioned enterprise in accordance with market realities and, secondly, the availability of necessary production resources and the expediency of additional acquisitions (Borisova et al., 2005). The vigorous activity of agricultural enterprises under modern market conditions significantly intensifies competition. This leads to a gradual reduction in the employment of labour resources, a decrease in income, standard of living and quality of life, an increase in the rate of outflow of able-bodied citizens from rural areas. The development of new types of entrepreneurial activity can contribute to preventing mass unemployment. One of the key areas in the development of any nation's rural economy should be considered a strategy of diversification, which involves complementing and expanding traditional sectors of specialisation with new industries. The agricultural sector is no exception in this context. The gradual development of the diversification of agricultural enterprises' activities leads to the preservation of the prospects for the development of agricultural production and the maintenance of economic growth rates in the state as a whole (Moroz and Marukha, 2016).

Nowadays, diversification strategies for agricultural enterprises represent a certain set of solutions aimed at solving the main problems associated with the gradual development of fundamentally advanced areas of activity by the agricultural enterprise. They will eventually enable the full satisfaction of urgent market needs. Moreover, they will provide specific benefits aimed at increasing the financial sustainability of the enterprise and creating new jobs, along with the consistent implementation of a set of measures to ensure the financial stability of the enterprise and the stabilisation of the overall economic situation in rural areas and the geographical location of the enterprise (Srivastava et al., 2020). The implementation of diversification of the agricultural enterprises' activities in the current economic conditions is caused by numerous objective prerequisites. These include, in particular, the constantly growing needs of society for quality agricultural products and the needs of citizens for workplaces. Furthermore, significant changes in the demographic structure of society and the need to make changes to the existing state of the economy are important aspects. The state of the agricultural sector in any country is significantly influenced by current competition, which is reflected in the emergence and development of new economic linkages, the expansion of existing ones, the emergence of new economic trends, the division of society by standard of living, and the structure of actual demand (Galeana-Pizana et al., 2021).

The processes of agricultural enterprise diversification can contain numerous and diverse factors at their core. These include differences in climate conditions, in the regions where these enterprises operate, and differences in the types of agricultural products, which determine the characteristics of particular agricultural enterprises. The degree of economic risk should also be considered and diversification is a powerful tool to reduce it (Fatch et al., 2021). It contributes to the delimitation of citizens' rights and obligations in such a way that when any situation directly related to the economic risk of an agricultural enterprise arises and develops, there is no hindrance to its economic activity. The diversification of agricultural enterprises' activities is of significant importance in terms of the need to improve the economic sustainability of modern agro-industrial enterprises and their adaptability to the constantly changing conditions of the external environment. The current crisis state of the world economy under pandemic conditions necessitates an extremely cautious approach to the issues of determining the main areas for the future development of agricultural enterprises. This is caused by the significant constraints on the agricultural sector's financial development and the slowdown in the use of resource conservation technologies in agricultural production (Autio et al., 2021). In the current resource-constrained environment, producers of agricultural goods often do not strive to increase production capacity and gross output, which directly depends on the current state of the material and technical base in the agricultural enterprise. Under conditions of acute shortage of production and financial resources, the producers of agricultural commodities have to find reserves to improve the financial sustainability of the enterprise, to develop the available production capacities.

The current stage of global economic development obliges agricultural enterprises to search for effective ways of developing their existing competitive advantages. At the same time, the key

strategic areas for the sustainable development of the agricultural sector of the economy should be based not only on the expansion of the agricultural enterprises' fields of activity, but also on the diversification of different types of marketable products (Yamashita and Hoshino, 2018). In the current situation, the diversification of agricultural production and the nomenclature of commodity items is the most important area of establishing economic entities of a modern market economy. Moreover, the implementation of qualitative diversification in a number of agricultural enterprises will contribute to the intensification of their activities and create favourable conditions for their subsequent economic development. The gradual development of the range of commodity items in the agricultural sector enables the enterprises to develop new markets for their products, obtain new channels of distribution and additional amounts of money for the expansion of their business and the development of production (TerAvest et al., 2019). Consistent development of the agricultural enterprises' activities, accompanied by the launch of new product ranges, forms the qualitative prerequisites for the creation of a full and expanded turnover of goods, and has a beneficial effect on the soil composition in the regions where agricultural enterprises are located. The development of the types of products grown by agricultural enterprises forms the reserves for ensuring a high level of financial health of the agricultural enterprise and increasing its competitiveness in the current market conditions.

In today's market environment, agricultural enterprises are required to qualitatively implement a strategy to diversify their activities, to ensure an appropriate level of flexibility and an effective organisational structure. Any areas of agricultural enterprise activity diversification should bring the expected economic benefits, generally having a positive impact on the development prospects of the agricultural sector of the economy. One of the key criteria for the economic efficiency of the agricultural sector development in the context of determining the main areas of agricultural enterprises activity diversification is the market saturation with products of a certain kind, manufactured by specific agricultural enterprises, in relation to a particular geographical region where these enterprises are located (Aubron et al., 2021). The ultimate effectiveness of diversifying the agricultural enterprises lies in preserving jobs while gaining additional opportunities to open up tax revenues conditioned by the expansion of production capacity, the development of domestic competition, and the production of goods that meet the current needs of society. One of the key components for the effective development of a modern agricultural enterprise is systematic and successful investment activities aimed at qualitatively improving the efficiency of agricultural enterprises under present conditions. The success of investment activities can only be achieved through the qualitative implementation of an appropriate investment strategy that is targeted and adapted to changes in the external environment (Leroux et al., 2021). Investments in the diversification of agricultural production imply an infusion of money into the functioning socio-economic environment of the enterprise, which opens up additional opportunities to expand the existing product range and develop agricultural production. The use of the available agricultural enterprise infrastructure gains new perspectives, which inevitably leads to an improvement in the quality of the agricultural products.

Conducting a timely diversification of agricultural enterprises' activities allows achieving a significant reduction of production risks, which has a positive effect on the production activity of the enterprise. However, the other side of reducing business risks is the need to invest additional resources, which is why not every agricultural enterprise can afford this kind of economic development. The transition of agricultural enterprises to a new type of technological mode, which will inevitably follow the implementation of a strategy of diversification in the agricultural sector, will lead to a gradual reduction in the level of public employment in the agricultural sector. To maintain the modern village as an independent subsystem of society, capable of performing both productive and numerous supporting functions, its economy must undergo diversification through careful stimulation of activities not directly related to agriculture in any way (Boughton et al., 2021). Properly implemented diversification of agricultural enterprises contributes to their gradual transfer to the category of suppliers of high-value output products, which vary considerably in their consumption characteristics. Another important aspect is the production of goods from areas that have

no direct connection to the typical production nomenclature. However, the diversification of food enterprises should not be equated with the specialisation of specific activities. Each process is an objective reality, with the nature of their flow determined by competition, the current state of demand in the industry, and the multiplicative efficiency of supply and demand. The effectiveness of diversifying the enterprises of a particular geographical region lies in the emergence of new opportunities for the use of raw materials, the development of production capacities, and free capital. The level of production and investment risk mitigation and the possibility to improve the supply of different types of food products to the population are also important.

In the narrow sense of the term, diversification of an agricultural enterprise's activities should be understood as an expansion of the goods that the enterprise produces, and this understanding does not go directly beyond the enterprise itself. In a broader sense, diversification encompasses a wide variety of processes, which can be characterised by the different areas and nature of investments, the formation of new, additional agricultural enterprises specialising in different types of products, the expansion of distribution channels for these goods, and the diversification of training for the staff of these enterprises. There is a widespread view according to which the diversification of the agricultural enterprises involves finding the ways for the enterprise to survive under changing economic conditions that imply the presence of a severe social and economic crisis. All these processes should be considered from a much broader perspective, as it is not only a matter of public employment, but also of gradually improving the quality of natural and climatic conditions, which generally contributes to an overall improvement in the quality of citizens' lives in specific geographical regions, against the background of the emerging trends of maintaining an appropriate level in economic security (Blazy et al., 2021).

Currently, a significant number of studies have been published on the problematic issues of agricultural enterprise activity diversification at the macro- and micro-levels. Managing the production of all types of agricultural goods involves carrying out a set of measures for forecasting and planning agricultural activities, planning to increase the level of crop yields growing on the areas under the responsibility of specific agricultural enterprises. Studies on the evaluation of the natural and economic aspects in agricultural production requires the gradual overcoming of considerable methodological difficulties, which invariably arise from the considerable complexity of the research problem itself, the need to consider a substantial amount of environmental factors and circumstances and the availability of the necessary resources for the production systems of agricultural enterprises.

## **Conclusions**

The study of the basic principles for the development of agricultural enterprise diversification in modern economic conditions has led to the following conclusions. The development of diversification in a particular agricultural enterprise should be carried out considering its specific characteristics, determined by the geographical location of the enterprise, the type of agricultural goods produced by the enterprise, and the qualifications of the enterprise's operating staff. In general, diversification implies a gradual reduction in the level of economic risks of an enterprise's activities, its gradual transition to a more economically efficient mode of operation, considering the specifics of its activities. At the same time, the activities of a single agricultural enterprise and the results achieved in the course of these activities should be considered in the context of achieving an economic effect throughout the entire geographical region and nation-wide, which requires the improvement of the economic situation on a given scale. The reduction of the overall level of economic risks should be accompanied by an increase in production volumes and the achievement of a new level of economic efficiency.

Thus, the development of diversification in an agricultural enterprise implies a compulsory distribution of the financial assets of this enterprise, in accordance with the types of its activities, an accurate assessment of economic risks in each area of the enterprise's operations, and the development and consistent implementation of the economic risk management strategy of the company at each stage of its activity. Material and technical asset management also plays an important role in terms of the overall effectiveness of the diversification processes in the agricultural enterprise. This is because



any meaningful results in this sector can only be achieved if good quality material and technical base is in place to effectively address all issues relating to the various aspects of the agricultural enterprise's activities, including the production of competitive marketable goods. The development of diversification in the activities of an agricultural enterprise is the result of a structural interplay of a whole set of factors, in the context of the individual enterprise's specific features and its economic and social objectives.

## References

- [1] Aubron, C., Vigne, M., Philippon, O., Lucas, C., Lesens, P., Upton, S., Salgado, P., Ruiz, L. 2021. Nitrogen metabolism of an Indian village based on the comparative agriculture approach: How characterizing social diversity was essential for understanding crop-livestock integration. *Agricultural Systems*, 193, Article number: 103218.
- [2] Autio, A., Johansson, T., Motaroki, L., Minoia, P., Pellikka, P. 2021. Constraints for adopting climate-smart agricultural practices among smallholder farmers in Southeast Kenya. *Agricultural Systems*, 194, Article number: 103284.
- [3] Bazer, F., Lamb, G.C., Wu, G. 2019. *Animal agriculture*. London: Academic Press.
- [4] Birthal, P.S., Hazrana, J. 2019., Crop diversification and resilience of agriculture to climatic shocks: Evidence from India. *Agricultural Systems*, 173, 345-354.
- [5] Blazy, J.M., Causseret, F., Guyader, S. 2021. Immediate impacts of COVID-19 crisis on agricultural and food systems in the Caribbean. *Agricultural Systems*, 190, Article number: 103106.
- [6] Borisova, O.V., Gritsenko, G.M., Fisak, S.A. 2005. The use of marketing methods in developing a strategy for diversifying the activities of an agricultural enterprise. *Bulletin of the Altai State Agrarian University*, 2(18), 83-88.
- [7] Boughton, D., Goeb, J., Lambrecht, I., Headey, D., Takeshima, H., Mahrt, K., Masias, I., Goudet, S., Ragasa, C., Maredia, M.K., Minten, B., Diao, X. 2021. Impacts of COVID-19 on agricultural production and food systems in late transforming Southeast Asia: The case of Myanmar. *Agricultural Systems*, 188, Article number: 103026.
- [8] Fatch, P., Masangano, C., Hilger, T., Jordan, I., Mambo, I., Kamoto, J.F.M., Kalimpira, A., Nuppenau, E.-A. 2021. Holistic agricultural diversity index as a measure of agricultural diversity: A cross-sectional study of smallholder farmers in Lilongwe district of Malawi. *Agricultural Systems*, 187, Article number: 102991.
- [9] Galeana-Pizana, J.M., Coututier, S., Figueroa, D., Jimenez, A.D. 2021. Is rural food security primarily associated with smallholder agriculture or with commercial agriculture? An approach to the case of Mexico using structural equation modeling. *Agricultural Systems*, 190, Article number: 103091.
- [10] Ghosh, S., Thongmee, S., Kumar, A. 2021. *Agricultural nanobiotechnology*. Oxford: Woodhead Publishing.
- [11] Keswani, C., Possas, C., Koukios, E. 2021. *Agricultural bioeconomy*. London: Academic Press.
- [12] Kuden, J., Braund-Allen, J., Carle, D. 2017. *Agriculture to zoology*. Cambridge: Chandos Publishing.
- [13] Leakey, R. 2017. *Multifunctional agriculture*. London: Academic Press.
- [14] Leroux, L., Faye, N.F., Jahel, C., Falconnier, G.N., Diouf, A.A., Ndao, B., Tiaw, I., Senghor, Y., Kanfany, G., Balde, A., Dieye, M., Sirdey, N., Loison, S.A., Corbeels, M., Baudron, F., Bouquet, E. 2021. Exploring the agricultural landscape diversity-food security nexus: an analysis in two contrasted parklands of Central Senegal. *Agricultural Systems*, 196, Article number: 103312.
- [15] Moroz, N.Yu., Marukha, V.R. 2016. Diversification of agricultural production. *Polythematic Network Electronic Scientific Journal of the Kuban State Agrarian University*, 119(06), 1-13.
- [16] Parray, J.A., Shameem, N. 2019. *Sustainable agriculture*. Oxford: Elsevier.
- [17] Srivastava, P., Gupta, M., Tsakiris, G., Quinn, N. 2020. *Agricultural water management*. London: Academic Press.

- [18] TerAvest, D., Wandschneider, P.R., Thierfelder, C., Reganold, J.P. 2019. Diversifying conservation agriculture and conventional tillage cropping systems to improve the wellbeing of smallholder farmers in Malawi. *Agricultural Systems*, 171, 23-35.
- [19] Yamashita, R., Hoshino, S. 2018. Development of an agent-based model for estimation of agricultural land preservation in rural Japan. *Agricultural Systems*, 164, 264-276.
- [20] Zinyengere, N., Theodory, T., Gebreyes, M., Speranza, C.I. 2017. *Beyond agricultural impacts*. London: Academic Press.
- [21] Ostapchuk, T., Orlova, K., Biriuchenko, S., Dankevych, A., & Marchuk, G. 2021. Defuzzification in the process of managerial estimating the value of agricultural lands. *Agricultural and Resource Economics: International Scientific E-Journal*, 7(4), 62-81. <https://doi.org/10.51599/are.2021.07.04.04>. (Scopus).
- [22] Dankevych, A., Sosnovska, O., Dobrianska, N., Nikolenko, L., Mazur, Yu., Ingram K. 2021. Ecological and economic management of innovation activity of enterprises. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu*, 5, 112-118. <https://doi.org/10.33271/nvngu/2021-5/118>. (Scopus).