



## MANAGEMENT

## МЕНЕДЖМЕНТ

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### MANAGING THE INVESTMENT ACTIVITIES OF THE AGRICULTURAL ENGINEERING COMPANIES UNDER RISK

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**Summary.** *The paper deals with the analysis of managing agricultural engineering business investment processes that encourage the provision of the investment resources and agricultural engineering business development. It is determined that the subject influenced by risk situation in this investigation is the investment project. In this context the classification features of the basic risk types corresponding to the investment projects implementation under uncertainty are identified. The author investigates and summarizes theoretical grounds, essence, and specifics of the concept of “company investment activities”. The investment risks are identified and classified in this paper. Methodological approaches to evaluation of the investment effectiveness adjusted to risk are considered and analyzed. The status and tendencies in investment development for agricultural engineering companies in Ukraine are analyzed. As the result of the carried out analysis, it is determined that the prospects for the development of Ukrainian mechanical engineering in agricultural industry are caused by significant decrease in the number of machinery at the agricultural companies with slow-pace restoration and wearing of basic equipment. The author develops the methodological approach to the evaluation of investment feasibility and effectiveness for the agricultural engineering companies based on the system of balanced representative factors for comprehensive assessment of the absolute and relative ratio of the company investment attractiveness. This investigation evaluates the investing feasibility and effectiveness for the agricultural engineering companies by analyzing the companies of Kirovohrad region. The strategy for problem situation modeling considering evaluation utility function of investment project amount is proposed in this paper. The number of collected values makes it possible to choose the correct management strategies for agricultural engineering companies with low efficiency and to broaden opportunities for their step-by-step recovery, restructuring, or reorientation with minimum expenses.*

**Key words:** *investing, managing company investment activities, investment risks, investment feasibility and effectiveness, company investment attractiveness, the evaluation utility function of investment project amount, investment decisions.*

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## УПРАВЛІННЯ ІНВЕСТИЦІЙНОЮ ДІЯЛЬНІСТЮ ПІДПРИЄМСТВ СІЛЬСЬКОГОСПОДАРСЬКОГО МАШИНОБУДУВАННЯ В УМОВАХ РИЗИКУ

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**Резюме.** Розглянуто процеси управління інвестиційною діяльністю підприємств сільськогосподарського машинобудування, які створюють умови для формування інвестиційних ресурсів та розвитку підприємств сільськогосподарського машинобудування. Встановлено, що об'єктом, на який розповсюджується дія ризикової ситуації, у дослідженні виступає інвестиційний проект. У зв'язку з цим визначено класифікаційні ознаки для ідентифікації основних видів ризиків, що відповідають реалізації інвестиційного проекту в умовах невизначеності. Розглянуто й проаналізовано методичні підходи до оцінювання ефективності інвестиційної діяльності з урахуванням ризику. Здійснено аналіз стану й тенденцій розвитку інвестиційної діяльності підприємств сільськогосподарського машинобудування України. В результаті проведеного аналізу визначено, що потенційні можливості для розвитку українського машинобудування для агропромислового комплексу зумовлюються суттєвим зниженням кількості техніки в сільськогосподарських підприємствах, яка відновлюється досить низькими темпами та значною зношеністю основних засобів. Розроблено методичний підхід до оцінювання доцільності та ефективності інвестування підприємств сільськогосподарського машинобудування на основі використання системи зважених репрезентативних коефіцієнтів для комплексного оцінювання рівня абсолютної та відносної інвестиційної привабливості підприємства. Проведено оцінювання доцільності та ефективності інвестування підприємств сільськогосподарського машинобудування на прикладі підприємств Кіровоградської області. Запропоновано механізм моделювання проблемних ситуацій з урахуванням оцінювальної функції корисності обсягу інвестиційного проекту. Множина отриманих значень дозволить обрати правильні напрями управління діяльністю малоефективних підприємств сільськогосподарського машинобудування та розширити можливості їх поступового відновлення, реструктуризації або перепрофілювання діяльності з мінімальними втратами.

**Ключові слова:** інвестування, управління інвестиційною діяльністю підприємства, інвестиційні ризики, доцільність та ефективність інвестування, інвестиційна привабливість підприємства, оцінювальної функції корисності обсягу інвестиційного проекту, інвестиційні рішення.

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**Introduction.** Development of Ukrainian economics and its adaptation to the world economy requires new approaches for optimization of investment, creation, receipt, and usage of the investment resources, etc. Traditionally, the issues mentioned above stay significant for the domestic core industries, including agricultural engineering. Instead of that the agricultural engineering companies rather live through prolonged stagnation due to lack of capitalization to implement potential investment projects. It bears a negative systematic impact on the competitiveness of national production. In these settings, it is necessary to restore the technical and technological capacity of the agricultural engineering companies, to update and accelerate their development, and that requires scientific justification of the effective investments. Taking the above mentioned into consideration it is of great importance today to analyze the investment processes for the agricultural engineering companies.

**Review of the latest research and literature.** The issues of developing the investment processes are conventionally studied by academic economists and described in the foreign and national economics literature. The significant payment to science of investment was made by such outstanding academic economists as J. Keynes, J. Kendrick, M. Markowitz,

F. Modigliani, W. Nordhaus, P. Samuelson, D. Hyman, O. Kuzmin, O. Melnyk, A. Peresada, Y. Pinchuk, Zh. Poplavska, etc. The issues of investment processes development for the agricultural engineering companies have been studied by the following national economists: L. Artemenko, Y. Bilousko, N. Biliak, M. Bondarchuk, O. Boltianskyi, O. Hryvkiivskyi, O. Dobrozorov, etc. However, numerous researches have not solved yet the problems of company investment improvement based on simplified receipt of investment resources together with the development of the effective mechanisms to promote investment in the companies.

**The objective of the paper is to** analyze the management of the agricultural engineering business investment processes that create the settings for the investment resources formation and development of the agricultural engineering companies.

**Statement of the task.** The following scientific tasks have been set out to achieve the target goal: to analyze status and tendencies in investment development for the agricultural engineering companies in Ukraine; to analyze methodological approaches to evaluation of the investment effectiveness adjusted to risk; to develop the methodological approach to the evaluation of investment feasibility and effectiveness for the agricultural engineering companies based on the system of balanced representative factors for comprehensive assessment of the absolute and relative ratio of the company investment attractiveness

**Statements of main problems of investigation.** Investigation of the prerequisites for the risks at the agricultural engineering companies has enabled transformation of the outer business environment into the conditions for the company to perform the investment activities. These conditions are the information base of potential risk-creating external factors.

It has been established that the subject influenced by risk situation in this investigation is the investment project. In this context the classification features of the basic risk types corresponding to investment projects implementation under uncertainty have been identified. The additional component for identification of the risk types in the investment project is specifics of the agricultural engineering companies and their operation [1]. Therefore, the grouping criteria for the main risk types have been identified that consider specifics of operation of the agricultural engineering companies and technical and economic indicators of the investment projects. The risks are suggested to be assorted depending on the consequences of impact on the subject: risks leading to emergency condition; risks leading to financial loss; risks entailing the damage for the third parties. Such classification enables to set up the risk map according to the stages of the investment project life cycle and to analyze and assess the risks [2].

The investigation of investment effectiveness evaluation methods has shown the lack of the complex approach addressing all specifics of the current economical development. With the purpose of systematic conflict resolution, it was suggested to consider investment effectiveness in the context of the efficiency of the investment projects, the efficiency of organizational and economical investment facility, and evaluation of the agricultural engineering company investment attractiveness [3]. It was found that each group of methods has its user community, and the specified methods can complement each other depending on the need. The investment project efficiency evaluation criteria are mainly used by the private investors [4].

It was found that all suggested criteria are sufficiently informative. However, the evaluation criteria for investment project effectiveness are mostly considered by the small private investors that can not influence the external and infrastructural environment. The evaluation methods for the organizational and economical mechanism of investment arouse significant scientific and practical interest because of its novelty and ability to evaluate the effectiveness of the investment process. The importance to apply the methods to evaluate the investment attractiveness of the agricultural engineering companies is based on their flexibility – they can be both stable and modifiable when some factors can be added or simplified addressing the user's needs.

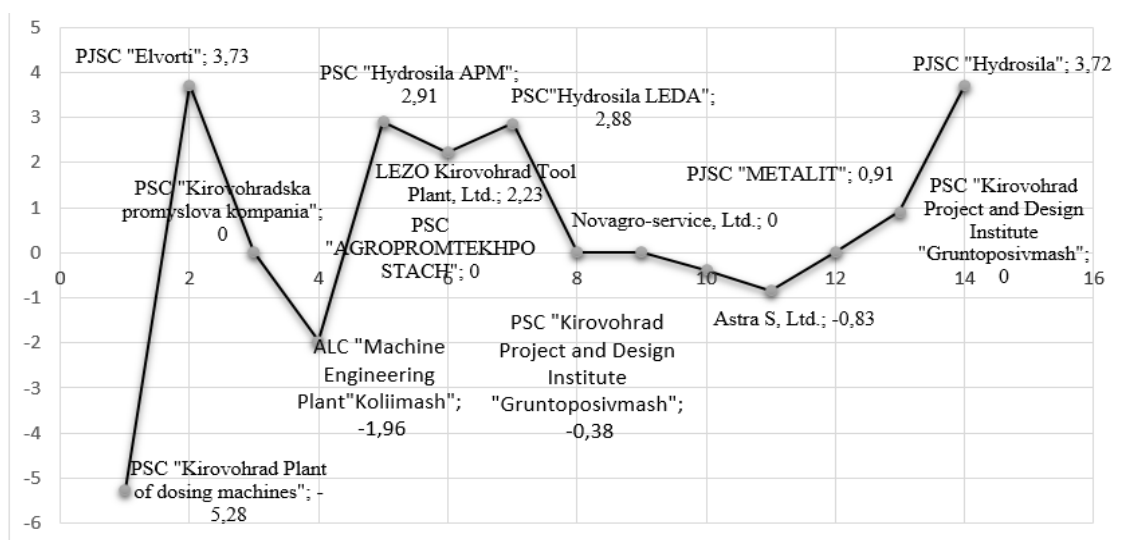
The mentioned methods identify particular decisions of the individual investors in some projects. However, there is still no method to provide applicable development of the relevant business industry that is a concern of the further research prospects [5].

After the analysis, it was established that the prospects for the development of Ukrainian mechanical engineering in the agricultural industry are conditioned by a significant decrease in the number of machinery at the agricultural companies with slow-pace restoration and wearing of basic equipment [6]. However, a large part of the agricultural engineering companies can not address such increasing demand because of the inability to update the technological processes. Meanwhile, the engineering companies try to improve the level of machinery manufacturing applying high-quality materials, technologies, electronic and automated systems to enrich the assortment, to replace the discontinued products with the new ones, etc [7].

According to the results of the analysis of the investment activities of the agricultural engineering companies within 2013–2018, the negative trends of the crisis impact were found such as: slow development of the machinery engineering branches; worse material and technical provision for business activities; decrease in the company social infrastructure; strong dependency from the suppliers of spare parts and details; complex environmental problems; accelerated obsolescence and wear and tear of basic facilities; insufficient own funds for production; the slack pace of innovations, investment, and scientific and technological progress. The branch has low profitability, considerable part of out-of-date fixed assets, and lack of funds for the own investment activities. As a result, only individual companies manage to survive under complicated political and economical conditions and to find short economic relations in the outside market to sell certain types of agricultural machinery. The main source of investment, for now, is still the company’s resources.

To investigate the practical aspects of investment management, its specifics and trends of development have been studied having analyzed 14 leading engineering companies in the Kirovohrad region.

The comprehensive rating of the agricultural engineering companies in the Kirovohrad region within 2009–2018 was performed considering the following factors: equity ratio; solvency ratio; working capital ratio; product profitability ratio; return on equity ratio (See Figure 1).



**Figure 1.** Business rating of the agricultural engineering companies in 2018

Source: proprietary solution.

The analysis shows that the agricultural engineering companies of the Kirovohrad region are significantly differentiated and inhomogeneous according to the scale and performance. The set of assessment results demonstrates highly negative trends in the development of the agricultural engineering companies because most companies are characterized by the unsatisfactory financial position that initially limits their opportunities for development in the sphere of the agricultural engineering and most likely leads to switching to other business activity.

According to the results of the analysis the conclusion can be made that there are two contradictory tendencies – on the one hand, some companies have sufficiently high rating number, on the other hand, the declining dynamics has emerged (PSC «AGROPROMTEKHPOSTACH», PJSC «Hydrosila», Hydroremservice LLC, Novagro-service, Ltd.). Meanwhile, there are companies where rating value has increased but is still negative, and it testifies the negative work of the company (Novagro-service, Ltd., PJSC «Hydrosila», PSC «Kirovohrad Project and Design Institute “Gruntposivmash”»). The following investigation of the agricultural engineering companies demonstrates that there are companies that have been in all three categories within 2009–2018 (PJSC «Metalit», PJSC «Hydrosila LEDA») testifying on the one hand, strengthened paying capacity, and on the other hand, work instability.

It is claimed that the business activity of the companies within the analyzed period does not evolve rapidly either in growth or decline, and it demonstrates the lack of dramatic changes in the company that could improve its production and absence of different negative impacts. Thus, it can be concluded that the in-house resources influence the company activities, meaning that inertial development is typical for the studied companies. It is identified that the bottom line of the trends mentioned before is that development of the agricultural engineering companies in the Kirovohrad region has contradictory nature: on the one hand, some companies evolve, update and adapt to the new conditions, on the other hand, there are companies that either execute few orders or let their space on lease, and it demonstrates their complete degradation. Consequently, such grouping of the companies proves again significant differentiation of the companies in the Kirovohrad region by their level and business capabilities. Thus, the performed study ascertains that the issue of investment raising is urgent for the companies that can develop their production because the agricultural engineering companies being a part of the national engineering industry are the least prepared for the competitive business environment.

At the moment to ensure effective business the company needs to make an optimal choice of its activity area, including efficient management of the company capacities. To provide reasonable and reliable valuation of the investment opportunities the methodological approach is applied to evaluate practicability and effectiveness of the agricultural engineering company investment using the system of balanced representative factors for a comprehensive assessment of the company investment attractiveness.

The approach is distinguished by the ability to identify the investment economical effectiveness in the context of the production and other business activities; it helps to identify both absolute and relative ratio of the company investment attractiveness; it considers the industry characteristics of the company; it enables evaluation of the investment attractiveness of the companies with different types of ownership, business areas, and sizes.

The suggested methodological approach can cover both the investment activities and analytical mechanism to adjust the company activities. Monitoring of each component helps in case of change of the financial position to identify the weak spheres or, otherwise, to provide the potential investor with the information about prospective growth based on the work results. To improve reliability and ensure convenient calculations the special software was designed on

the basis of the methodological approach to forecast practicability of investment and identify its pattern considering the inserted data of the company financial statements.

The developed method is based on the two-stage analytics performed by the person evaluating investment opportunities. The first stage covers the evaluation of return on company investment. Such evaluation is intended to provide the information base containing performance indicators (business profitability, return on costs, income from 1 hryvnia of total assets, income from own funds, income from floating funds, fixed assets profitability) and financial ratio (current liquidity ratio, absolute liquidity ratio, part of floating capital, part of own funds in liabilities). The mentioned indicators enable to identify the relevant weight value of the level of studied indicators. The total number of the weight indicators summed up enables identification of an integrated appraisal ratio for investment feasibility by the level of the company investment attractiveness. The second stage of the study provides an evaluation of effectiveness to invest in production and maintenance service because the analysis of the trends in the companies studied has shown that the main business activities of the agricultural engineering companies are production and maintenance service. The study of the maintenance investment effectiveness provides calculation of production profitability, profitability of production expenses, and their growth factor.

The author's methodological approach facilitated in summarizing trends and patterns of the development of the agricultural engineering companies in the Kirovohrad region and acknowledging the number of negative trends in the development of the agricultural engineering companies with increasing dynamics. The calculated values help to choose correct strategies for management of the agricultural engineering companies with low efficiency and to broaden opportunities for their step-by-step recovery, restructuring, or reorientation with minimum expenses based on reliable, relevant, objective results of work.

The analysis has shown that the agricultural engineering company investment is the strategic reason to gain social and economical stability and the prerequisite for the economical development of the industry, region, and country. The problem situations with the related risks are explained by the nature of market relations, and they reduce the effectiveness of the investment decisions and represent the complexity of production and business functioning. That is why complicated processes of real investing require the proper management system.

To cover the issue of the investment decisions the mathematical model was developed that contains the basic elements required to create a broad picture of the strategic behavior of an expert as a human being. This model includes the number of strategies, results, and their numerical values, the number of indicators and criteria for effectiveness, the number of definite and indefinite factors, benefits system. The value of an investment project is determined by some expected profit that corresponds to the maximum increment in profit established by an investor. A thorough study of the reasonable evaluation criteria for the investment project effectiveness has shown that the effectiveness criterion is applied based on reasonable behavior that is analyzed by applicability, optimality, adaptability. The type of evaluation utility function of investment project amount is suggested that enables calculating the minimum profit from the investment, acceptable profit, and maximum guarantee result in satisfying investors' demands. Thus, a human factor is considered when making investment decisions. The benefits system is based on the ordering scale highlighting only the investors' priorities in the comparative importance of the factors influencing their decisions. However, it does not let finding out how much one factor is more influential than the other one. That is why the following studies are needed to identify the investors' priorities within improved metric scales.

**Conclusions.** The results of the investigation give reliable and qualitative information about real options ensuring the effective investment process at the agricultural engineering companies operation developed reasonable processes to promote investment. The number of collected values makes it possible to choose the correct management strategies for the

agricultural engineering companies with low efficiency and to broaden opportunities for their step-by-step recovery, restructuring, or reorientation with minimum expenses.

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