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DILEMMAS OF PRODUCTION MANAGEMENT IN THE CONDITIONS OF WAR

ДИЛЕМНИ ПИТАННЯ ВИРОБНИЧОГО МЕНЕДЖМЕНТУ В УМОВАХ ВІЙНИ

The article demonstrates that the conditions of war in Ukraine create complex dilemmas faced by managers in managing the production enterprises' activities. Among such dilemmas have been identified: the balance between quality and cost; the need for automation and robotization; the need for globalization and localization; the need for supply chain transformation and production strategies. Attention is drawn to the fact that all outlined questions require defining the situation's context and choosing between alternatives, each with its advantages and disadvantages. The author emphasizes the importance of making informed choices among alternatives, which should be based on careful analysis and evaluation of each dilemma. The author has taken steps towards specifying existing situations in production management and identifying available solution alternatives, considering the needs of the domestic market, resource constraints, and specific technological changes in production. The purpose of the article is to specify the dilemmas of domestic production management in wartime conditions.

Keywords: production management situations, production management decisions, managerial actions, resources, supply chain.

У статті доведено, що війна в Україні продукує складні дилеми, з якими стикаються менеджери у процесі керування виробничою діяльністю підприємства. Серед таких дилем можна виділити підтримку балансу між якістю та вартістю; потребу в автоматизації та роботизації; потребу глобалізації та локалізації; потребу трансформації ланцюгу постачання та стратегії виробництва. Звернено увагу на те, що всі окреслені питання вимагають визначення змісту ситуації та вибору між альтернативами, кожна з яких має свої переваги та недоліки. Автором акцентовано увагу на актуальності розумного вибору серед альтернатив, комбінаторика яких має ґрунтуватися на зваженому аналізі та оцінці кожної дилеми. Автором зроблені кроки у напрямку конкретизації наявних ситуацій виробничого менеджменту, альтернатив доступних рішень для її вирішення з урахуванням потреб національного ринку, ресурсних обмежень та специфічних технологічних змін виробництва. Відповідно метою статті є конкретизація дилемних питань вітчизняного виробничого менеджменту в умовах війни. У дослідженні доведено, що складні рішення або проблематичні ситуації, що виникають у сфері управління виробництвом під час війни, вимагають комплексних заходів щодо перетворення виробничих процесів, розподілу ресурсів, підходів до впровадження нових технологій, управління ризиками та іншого. Результати дослідження продемонстрували, що для досягнення балансу між якістю продукції та вартістю необхідний формат прийняття рішень, в якому менеджери забезпечують ефективність, якість та конкурентоспроможність, враховуючи існуючу ситуацію. У напрямку автоматизації та роботизації потрібен формат прийняття рішень, в якому менеджери досягають балансу між автоматизацією та збереженням робочих місць. У напрямку глобалізації та локалізації потрібен формат прийняття рішень, в якому менеджери забезпечують збалансоване поєднання локалізації та глобалізації. У напрямку постачання потрібен формат прийняття рішень, в якому менеджери мають доступ до необхідних сировинних матеріалів та компонентів для безперервного виробництва. У напрямку перетворення стратегії виробництва потрібен формат прийняття рішень, в якому менеджери вирішують дилему щодо формату стратегії виробництва.

Ключові слова: ситуації виробничого менеджменту, рішення виробничого менеджменту, дії менеджерів, ресурси, ланцюг постачання.

Problem statement. The conditions of war in Ukraine create complex situations or dilemmas that managers encounter in the process of managing the production activities of the enterprise. Among such dilemmas, the following have been identified: maintaining a

balance between quality and cost (in the new conditions, managers face the need to reduce production costs while ensuring the maximum level of product quality); the need to accelerate automation and robotization (due to a shortage of workforce, the implementation

of robots and automated processes instead of manual labor becomes critically important); the need for globalization and localization (in the new conditions, the development of global markets and competition continues, requiring measures towards the globalization of production); the need for constant transformation of supply chain management approaches (due to threats to transportation, possible need for changing suppliers and routes); the need for the transformation of production strategy (due to new conditions resulting from a fundamental change in domestic market demand, the need for specific technological production changes, and resource limitations of the company). It should be noted that all the outlined issues usually require defining the specifics of the situation and choosing between two or more alternatives, each of which has its advantages and disadvantages. Therefore, the question of making a wise choice among alternatives is quite relevant, and its combinatorics should be based on careful analysis and evaluation of each dilemma. This involves specifying the existing situations in production management, and the available alternative solutions for addressing them, taking into account the needs of the domestic market, resource constraints, and specific technological changes in production.

Analysis of recent research and publications. A significant number of domestic and foreign researchers have explored the issues of production management in wartime conditions. Notably, scholars such as Pshyk-Kovalska O. O., Kovalskyi O. I. [5], Bykova A. L., Lobza A. V., Pylhun A. R. [1] have focused on the problems of enhancing the effectiveness of socio-psychological levers in personnel management. Shkilniak M. M., Chykalo I. V. [7] have concentrated on the issues of property management of a production enterprise in a state of war. Therefore, it is evident that despite the scientific interest in the field of the outlined issues, in a state of war, the scope of dilemmas is much broader and requires comprehensive specification. Without this, it is impossible to delineate the situations, including their characteristic problems, that exist in production management, as well as the available alternative solutions that can be utilized to address them.

The purpose of the article is to provide a general specification of the dilemmas in domestic production management in wartime conditions.

Presentation of the main material. When considering complex decisions or problematic situations arising in the field of production management during the war (including resource scarcity, decreased production capacity, logistics, and

supply complications, labor mobilization issues, changing societal consumption needs, and others, as shown in Table 1), attention is drawn to the fact that they require comprehensive actions to transform production processes, resource allocation, approaches to implementing new technologies, risk management, and more.

Based on the results of specifying the problematic situations that arise in the field of domestic production management during wartime, it should be noted that the synthesized actions of managers are situational. They are associated with the ongoing search for ways to enhance the efficiency of the functioning of the production enterprise. Confirmation of the stated thesis can be seen in the actions of managers at the Arsenal Factory in Kyiv, specializing in armored vehicles and weapons production. The conditions of armed conflict and changes in consumer needs required the managers of Arsenal to react and adapt to new circumstances. Some examples of situational actions taken by the enterprise's managers include:

- production reorientation (shifting focus to the production of armored vehicles, body armor, and other goods and services that are particularly needed in times of war);

- supply optimization (managers are currently seeking alternative sources of raw materials and components, taking into account potential transportation constraints and risks).

Based on the outlined specifics, within the scope of this research, the category of situational decisions in production management is interpreted as the process of choosing one or multiple courses of action or different paths of activity to achieve a specific goal or solve a particular problem. At the same time, the category of production management situations is regarded as a combination of various conditions, circumstances, and issues that production managers encounter in managing production. The interrelation between production management situations and decisions lies in the fact that production management situations stimulate the adoption of decisions to resolve or optimize them.

Indeed, the characteristics of production management situations (which create the need for decisions) include the following [1]:

1. Situations can arise due to changes in the market environment, technological or resource constraints, competitive situations, or changes in the enterprise's internal processes.

2. Situations can be of different natures: problems, challenges, opportunities, or crises that require the attention and intervention of production managers.

3. Situations can have varying levels of complexity and impact on the enterprise's activities.

Table 1

The results of specifying problematic situations arising in the field of domestic production management during war

Problematic	The specific nature of problem formation	Impact on the field of production management	Format of managerial actions
Insufficient resources	Military actions can lead to restrictions in accessing resources such as energy, water, and transportation. These access restrictions complicate production activities and supply chains.	Adapting the supply chain to unforeseen situations and risks associated with conflict.	Actions are shaped based on the characteristics of production management situations. Actions can have different natures or characteristics. Actions become possible after selecting optimal alternatives.
Complications in logistics and supply	Military actions introduce obstacles in ensuring the supply of raw materials, materials, and components for production. Effective logistics management becomes critical for maintaining uninterrupted production.	Adjusting to local constraints and instability amidst the development of global markets and competition.	
Changes in consumer needs of society	The wartime situation can lead to changes in consumer priorities, a decrease in consumer activity, an increased demand for goods and services for military use.	Adapting to local conditions and cost reduction while balancing quality and production cost.	
Reduction in production capacity	Military actions contribute to a reduction in a company's production capacity through infrastructure destruction, economic constraints, or loss of workforce.	Transforming production strategy in response to new conditions.	
Issues with mobilizing the workforce	Military actions may require the mobilization of the workforce for military tasks, creating challenges in maintaining an adequate number of skilled workers in production.	Continued operations necessitate the implementation of new technologies and production automation systems.	

Source: formed based on [1; 2; 6; 7]

Production management situations can be predictable or unpredictable and may require quick or long-term decisions.

The characteristics of production management decisions (which influence their further development) include the following [1]:

1. Decisions are responses to specific production management situations.
2. Decisions involve choosing optimal courses of action, strategies, and technologies to achieve set goals and solve problems.
3. Decisions can be made at various levels of production management, from operational to strategic.

In fact, according to the studies of leading scientists [1; 3; 4], the dilemmas of production management in the context of the war in Ukraine can be outlined by the decisions or situations depicted in Figure 1.

Based on the established interrelation between production management decisions and situations, it is evident that a wide range of action combinations (or solutions to complex choice tasks from a significant number of alternatives) needs to be formed for them. The identified need includes let us examine in detail each of its dilemmas in the context of the war in Ukraine. So, in the direction

of balancing the quality and cost of the produced goods, management focuses on a situation ensuring the proper quality of products and services is essential to support efficiency and safety while rationalizing costs. In this situation, the alternatives for addressing it could be [1; 3; 4]:

1. The production processes decision focuses on reviewing production stages, optimizing resource utilization techniques (provided that cost reduction does not compromise product quality), and so on.
2. The innovation procurement decision focuses on reviewing the implementation specifics of technologies and methods that allow for achieving quality indicators with lower costs.
3. The supplier selection focuses on reviewing collaboration specifics decision (giving preference to reliable local suppliers, provided they can deliver quality goods and services at an optimal price). It is important to consider that the decision to use high-quality materials and processes may lead to increased costs, while opting for cheaper alternatives may affect the quality.

4. The quality improvement decision (based on its analysis and evaluation) focuses on addressing current issues in production technologies and supply processes.

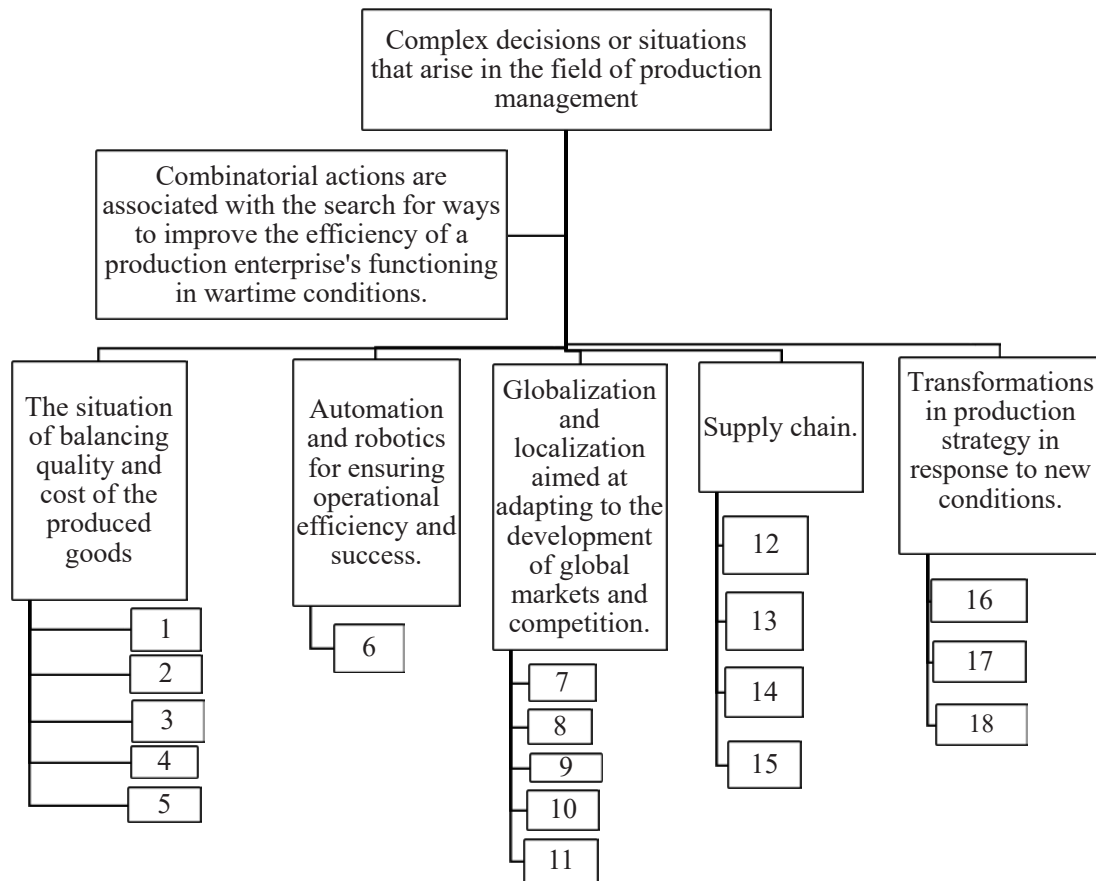


Figure 1. Dilemmas of production management in the conditions of war in Ukraine

Note:

(1) Decisions regarding the optimization of production processes. (2) Decisions regarding innovation supply. (3) Decisions regarding suppliers. (4) Decisions regarding continuous quality improvement. (5) Decisions regarding maximizing savings on secondary processes. (6) Decisions regarding the use of robots and automated processes instead of manual labor, including their peculiarities and directions. (7) Decisions regarding increasing production flexibility. (8) Decisions regarding production directions. (9) Decisions regarding collaboration formats. (10) Decisions regarding risk management formats. (11) Decisions regarding innovation and efficiency. (12) Decisions regarding vertical integration of the supply chain. (13) Decisions regarding cooperation with other suppliers. (14) Decisions regarding diversification of the raw material portfolio. (15) Decisions regarding improving demand forecasting systems. (16) Decisions regarding product assortment. (17) Decisions regarding the format of production processes. (18) Decisions regarding the format of the production structure.

Source: formed based on [1; 3; 4]

5. The cost savings in secondary processes decision focuses on adjusting expenses related to administrative and non-production processes.

Based on the above, the chosen decision format (from the available set of alternatives) should enable production managers to balance efficiency, quality, and competitiveness, including the existing situation and potential constraints regarding costs and logistics associated with changes in wartime conditions.

In the direction of automation and robotics, situations are formed to ensure efficiency and operational success, within which the continuation of operations is impossible without the implementation of new technologies and production automation systems. Therefore, the

alternative solutions for such a situation involve the specifics and directions of utilizing robots and automated processes instead of manual labor. Based on the above, the chosen decision format (from the available set of alternatives) should enable production managers to find a balance between automation and job preservation, as well as ensure effective training of personnel to utilize new technologies.

In the direction of globalization and localization, situations are formed by adapting to local constraints and instability exists against the backdrop of global market development and competition. The outlined situation requires production managers to consider alternative solutions regarding the directions and specifics of adapting to market

conditions and competition. We believe that the main alternatives in this direction could be:

1. The increased production flexibility decision. Managers can initiate changes in production directions and specifics (based on local constraints and changes in global markets). It may include changing suppliers, technologies, relocating production, and so on.

2. The production directions decision. Managers can initiate an analysis of global markets and competition to identify potential alternative production directions. It is important to explore new markets and opportunities within the constraints.

3. The collaboration format decision. Managers can initiate discussions on potential collaboration opportunities with local partners or suppliers to adapt to local conditions and ensure production stability.

4. The risk management format decision. Managers can initiate changes in risk management approaches related to globalization and localization of production. It may include supplier diversification, creating alternative supply sources, and analyzing potential threats.

5. The innovation and efficiency decision. Managers can initiate changes in technologies, process automation, and supply chain design if it is cost reduction and improved quality leads. It may involve actions such as implementing new technologies, refining work processes, developing innovative products, and so on.

Based on the above, such a decision format (from the available set of alternatives) should be chosen, which enables production managers to adapt to the conditions of local and global markets. It is important to ensure a balanced combination of localization and globalization to maintain competitiveness and adapt to market changes.

In the supply direction, situations are formed through the adaptation of the supply chain to unforeseen circumstances and risks associated with the conflict. The outlined situation requires production managers to consider alternative solutions regarding ways to ensure an adequate supply of raw materials and components for production. We believe that the main alternatives in this direction could be:

1. The vertical integration of the supply chain decision. Managers can consider the possibility of creating their own supply of key materials and component companies, which would ensure control over the supply and reduce the risk of shortages.

2. Collaboration with other suppliers' decisions. Managers should initiate the establishment of strong and long-term relationships with suppliers. It may involve information exchange, supply planning based on shared forecasts, and regular communication to address potential issues.

3. Raw material portfolio diversification decision. Production managers should consider the possibility of using alternative raw materials or components that may be available under constraints. It will help ensure alternative sources of raw materials and reduce the risk of shortages.

4. The demand forecasting system improves decisions. Production managers should utilize advanced analytical tools and technologies to forecast demand for raw materials and components. It will assist in inventory management and ensure an adequate supply of materials for production.

Based on the above, such a decision format (from the available set of alternatives) should be chosen where production managers gain access to the necessary raw materials and components (of appropriate quality and in sufficient quantities) for uninterrupted production.

In transforming the production strategy direction, the emergence of complex situations related to the functioning of the manufacturing enterprise under new conditions is possible. The alternatives for decisions should be selected in a balanced combination of efficiency, innovation, and competitiveness. We believe that the main alternatives in this direction could be:

1. The product assortment decision. Production managers can consider the possibility of reviewing and adapting the product assortment to meet the new market demands. It may include developing new products, modifying existing ones, or discontinuing less popular product actions.

2. The production processes format decision. Production managers should consider the possibility of implementing new technologies and reviewing production processes if it contributes to increased efficiency and cost reduction. It may include implementing Lean approaches, improving logistics, and optimizing production scheduling actions.

3. The production structure format decision. Production managers can consider the possibility of making changes to the spatial organization of the production process, including the composition and size of production units, the forms of their interconnections, the capacity of equipment, and the location of departments.

Based on the above, the selected decision format (from the available set of alternatives) should enable production managers to resolve the dilemma regarding the production strategy format, taking into account market changes, competitive situations, technological changes, and resource constraints.

Conclusions. Within the scope of the research, attention has been drawn to the fact that complex decisions or problematic situations arising

in the field of production management in times of war require comprehensive actions involving the transformation of production processes, resource allocation, approaches to implementing new technologies, risk management, and more. Based on the research results, it has been proven that the combination of outlined actions should be as follows:

1. In terms of achieving a balance between product quality and cost, management focuses on situations where ensuring the proper quality of goods and services is important to support efficiency and safety while rationalizing costs. The alternatives for this situation include decisions regarding production processes, innovation sourcing, supplier selection, quality control, and cost savings in secondary processes. The necessary decision format should enable managers to balance efficiency, quality, and competitiveness while considering the existing situation.

2. In the direction of automation and robotics to ensure efficiency and operational success, situations arise where the continuation of operations is impossible without the implementation of new technologies and automation systems in production. The alternatives for such a situation include the specifics and directions of utilizing robots and automated processes instead of manual labor. The necessary decision format should provide managers with a balance between automation and job preservation.

3. In the direction of globalization and localization, situations are shaped by adapting to local constraints and instability that exist in the context of market development and competition. This situation requires managers to change their

production strategies according to market conditions through decisions regarding production flexibility, production directions, collaboration formats, risk management formats, innovation, and efficiency. The necessary decision format should enable managers to achieve a balanced combination of localization and globalization.

4. In the supply direction, situations are shaped by the adaptation of the supply chain to unpredictable circumstances and risks associated with the conflict. The situation requires managers to consider alternatives for ensuring an adequate supply of raw materials and components for production, through decisions related to: changing the supply chain and collaborating with other suppliers, diversifying the raw material portfolio, and forecasting demand. A decision format is needed for managers to gain access to the necessary raw materials and components for uninterrupted production.

5. In the direction of production strategy transformation, the emergence of complex situations is possible due to the functioning of the manufacturing enterprise in new conditions. The alternatives should ensure a balanced combination of efficiency, innovation, and competitiveness through decisions related to product assortment, the format of production processes, and the production structure. A decision format is needed for managers to address the dilemma regarding the format of the production strategy.

Further prospects in this direction lie in the utilization of the obtained results to enhance strategic planning and management of manufacturing enterprises in wartime conditions, ensuring their effective operation and adaptation to the changed circumstances.

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