

UDK 005.334:931.1:658.589
JEL Classification: L 74, M 11, O 33

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THE ENTERPRISE MANAGEMENT IN THE FORCE MAJEURE CONDITIONS OF ITS ACTIVITIES

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The latest spread of military conflicts globally became a prerequisite for choosing the goal of this scientific study: to develop recommendations for the use of an enterprise management tool under force majeure circumstances and of its activity and its approval. The scientific novelty was the proposal to use the tool of the theory of limitations of systems for the management of enterprises in force majeure conditions (war). The practical value is that the article proposes a universal management tool for any enterprise in force majeure conditions of operation, in which any enterprises of any countries may find themselves as a result of military aggression by invaders. In the scientific article, using the example of VUD LLC (Dnipro, Ukraine), which produces small-scale concrete products, economic indicators were analyzed, corresponding graphs were constructed, conclusions were drawn. These made it possible to find a “bottleneck” according to the theory of system limitations and develop practical recommendations for solving his problems in force majeure conditions of the organization’s activity. Therefore, the research carried out regarding the work of this enterprise during the war in Ukraine made it possible to expose such weak points and develop new opportunities and potential for development, which will make this enterprise more competitive. The management tool of operational management – the theory of system limitations provides entrepreneurs with a universal approach to finding problems arising in force majeure conditions. Therefore, the sequence of management actions by enterprises should be aimed at finding the “bottlenecks” and making efforts to expand them in any of its subsystems.

Keywords: enterprise management, force majeure, war, theory of system limitations, enterprise management tool, operational management, production of building materials.

DOI: 10.32434/2415-3974-2023-18-2-17-24

Introduction and formation of the problem

To date, during the war that began in February 2022, almost all areas of industry in Ukraine are undergoing drastic changes. Factors of the external environment of indirect influence, such as political, economic, technological and socio-cultural, in this difficult time for Ukraine, have a strong influence on entrepreneurial activity, especially in the production sphere. A change in the country’s political course requires a reorientation of the operational management

of manufacturing enterprises to the development of new management solutions. Enterprises in the construction sector are of particular importance due to the need to restore the destroyed infrastructure of cities. During the one and a half years of occupation of a part of the territory of Ukraine, the closure, or destruction, or removal of the fixed assets of many construction enterprises took place. The products of construction enterprises are now in great demand among the population and local authorities for the

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restoration of destroyed territories. The production load on construction enterprises has increased several times during this time. Such circumstances lead to frequent sudden equipment failure and reduce the organizational and technological reliability of the production operation. This leads to untimely fulfillment of orders within the terms of the contracts with partners.

In addition, many Ukrainians of working age are now defending and liberating Ukraine in the armed forces. Because of this, many manufacturing enterprises in the country suffered from labor losses. Employees of enterprises not called up for the defense of Ukraine have to work for their colleagues who are called up, and the fact of increased demand for construction products is also added to this. Recruiting new personnel is extremely difficult due to the fact that many able-bodied Ukrainians were drafted. New workers who can be recruited from the labor market do not have the necessary skills, knowledge and work skills that have been developed over the years. Their training can take a long time, and errors in work can taste great losses for manufacturing enterprises. Therefore, the operational activity of enterprises has become very complicated and stressful and makes it impossible for enterprises to work the same as before the war. In order for enterprises to get out of the existing state, it is necessary to change the approaches to enterprise management, to orient their economy to the path of production modernization. That is why the application of operational management methods for the purpose of adapting enterprises to the new conditions of conducting business activities is of particular importance.

Analysis and research of publications

Many scientific developments of many scientists and business specialists are devoted to issues of operational management at production enterprises.

Thus, domestic authors analyze the influence of the principles of operational management on the performance of enterprises, which is quite relevant in the modern conditions of economic development, internationalization of business and the need to change the operational strategy of enterprises [1]. But these developments do not take into account the conditions of the war in Ukraine.

The study of the cooperation of partners in the supply chain, operational and innovative efficiency and strategic commitments is reflected in the scientific work of a foreign scientist [2]. As a result, recommendations were developed to increase the efficiency of interactions between partners in the supply chain. However, the recommendations developed by the author take into account the specific economic

conditions of countries with stable evolutionary development, which contradicts the current Ukrainian realities.

The authors analyzed the relationships between production quality management, innovation and productivity [3]. The results showed a positive relationship between these gradual and radical processes, which affected the operational and financial performance of enterprises. But these studies do not take into account situations when the demand for the company's products and the corresponding volumes of production and sales rapidly grow threefold, and the net profit indicator tenfold. Such a load on the output production capacity leads to rapid wear and tear of equipment, breakdowns and a decrease in the reliability of its operation.

The author investigated the multi-objective optimization of the reliability of a multi-type production system that produces a variety of products that meet the requirements of modern systems [4]. Research takes into account the factor of combining different equipment by year of manufacture and brand. But such a combination of equipment is possible with relatively little physical wear and tear and a possible combination taking into account the permissible indicators of their throughput production capacity. These factors are acceptable for Ukrainian enterprises with a large scale of production, the presence of several branches and high financial capabilities.

The influence of production personnel management practices at enterprises on operational efficiency was studied in the scientific work of foreign scientists [5]. But this study took into account the high level of involvement of production personnel, which is a common practice in countries with a high level of competition among personnel. Today, Ukraine has the opposite situation – a lack of qualified personnel, especially production personnel.

But in Ukraine, the conditions of war have now developed, which require the use of operational management methods for the reorientation of industries to new approaches to the development of management decisions. Such solutions should contribute to the solution of production and personnel problems of enterprises. The availability of scientific research by the above-mentioned authors indicates the relevance of the chosen research direction of this article. However, the scientific and practical problem of applying existing methods of operational management to Ukrainian enterprises in wartime remains unresolved.

Purpose of the article

The purpose of the scientific work is to develop recommendations for the application of the enterprise management tool under force majeure circumstances

for its activity and its approval.

Presentation of the main material

The study of enterprises’ work during the war in Ukraine reveals their weak points, new opportunities and the potential for rapid development. The occupation of a part of the country’s territory created conditions when many enterprises left the market due to a number of reasons: closure of enterprises due to the seizure of local authorities, expropriation of property by the occupation authorities, destruction of the territories of enterprises and factories, removal of production capacities from the front-line and adjacent territories and their conservation. These facts indicate a violation of permanent partnership relations. At the same time, those enterprises that remained on the market are currently experiencing increased demand for their products. We are talking about enterprises that produce construction products, the need for which has now greatly increased due to the periodic destruction of territories due to war events and the need for their reconstruction.

Goldratt E. M. in 1947 developed the theory of constraints (TOC), which is now used by leading practitioners to manage enterprises [7]. Proponents

of this theory are looking for problematic “knots” in the enterprise according to a certain scheme and consistently eliminate them. Such problematic “bottlenecks” due to the negative impact of environmental factors, especially during the war in the country, can occur in many enterprises in any subsystem: production, personnel, marketing, organizational, innovation, logistics, etc. Therefore, managers need to use a reliable tool for managing enterprises in war conditions.

Scientific novelty that we proposed is the using of the theory tool of restrictions for the management of enterprises in war conditions.

Research was conducted on of the work of VUD LLC (Dnipro, Ukraine) as an example, which produces small construction products: concrete blocks (decorative cinder blocks, concrete blocks for fences, etc.), paving tiles, curbstone, wall and cross-section building blocks and decorative punched concrete blocks, formwork concrete blocks, facing bricks. It is for these products that the demand on the market has grown rapidly. Figure 1 shows the dynamics of changes in indicators of net income from product sales, cost of products sold, and net profit (loss) for 2020–2022.

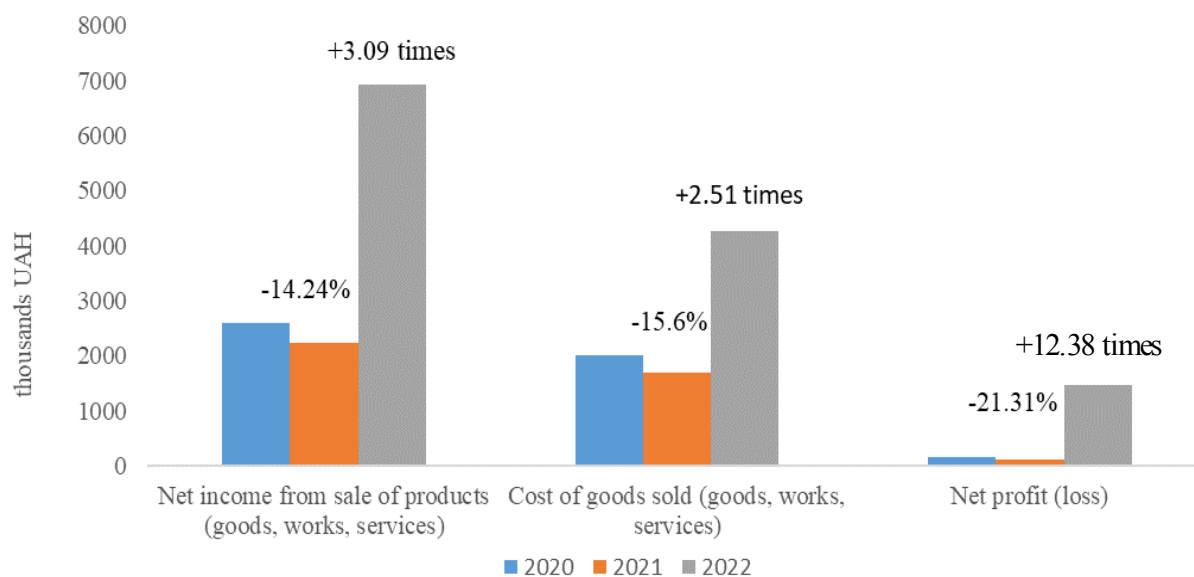


Fig. 1. Fluctuations of the indicators of net income from product sales, cost of sales and net profit (loss) for 2020-2022
 Source: built by the authors

The economic indicators of VUD LLC for 2020–2022 show that in 2020–2021, the volume of sales of the company’s products decreased by 14.24%, and then increased by 3.09 times; the cost of goods sold increased by 15.6%, and then increased by 2.51 times; resulting in a 21.31% decline in net profit net profit followed

by a 12.38x growth.

In 2021–2022, the company’s assets increased by 2.89 times, which is associated with an increase in the volume of activity. However, the increase in assets in 2020–2021 by 11.76% did not lead to a positive increase in sales volume and profit.

The characteristics of the enterprise's business activity in terms of the growth rates of absolute indicators involves a comparison of the growth rates of economic activity indicators according to the ratios of the "golden rule of economics":

$$100 < T_a < T_{in} < T_p, \quad (1)$$

where T_a is the growth rate of the company's assets, %; T_{in} – growth rate of net income from product sales, %; T_p – profit growth rate, % [8].

In 2020–2021, the ratio of the "golden rule of economy" was not fulfilled by the enterprise, namely: $100 < 111.76 > 85.76 < 90.32$. In 2021–2022, the enterprise rationalized its activities, ensuring compliance with the "golden rule of economics": $100 < 232.07 < 309.92 < 494.41$ (Fig. 2).

The analysis of the implementation of the inequality $100 < T_a$ shows that the enterprise increased the amount of capital used, ensured the growth of economic and resource potential, and increased the scale of activity.

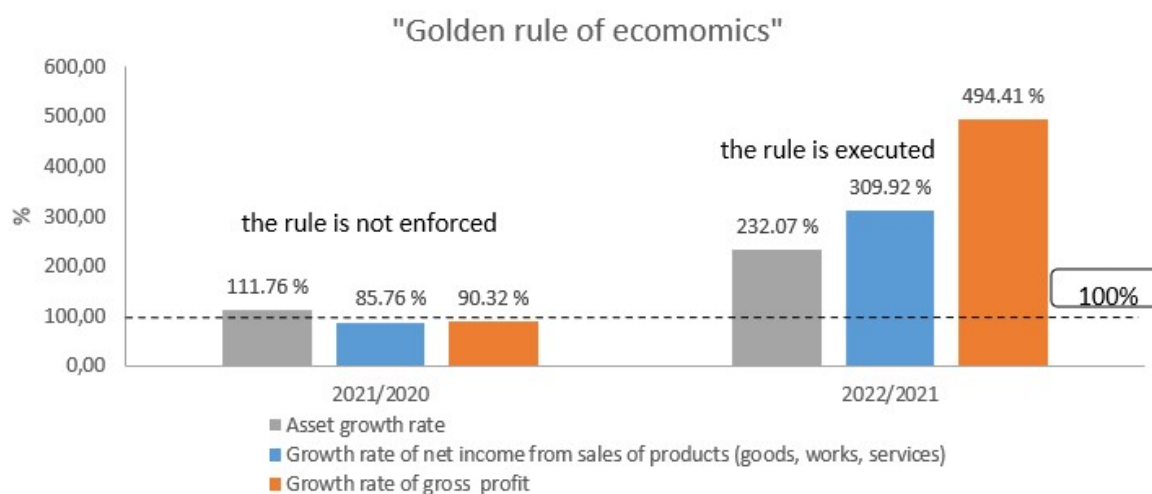


Fig. 2. Implementation of the "golden rule of economics" at VUD LLC for 2020–2022

Source: built by authors

The inequality $T_a < T_{in}$ indicates that in 2021–2022, compared to the growth of the volume of used resources, the enterprise ensured higher rates of growth of sales volumes and more efficient use of resources.

From the inequality $T_{in} < T_p$, it can be concluded that in 2021–2022, profit grew at an anticipatory pace, which indicates a relative decrease in production and circulation costs as a result of actions aimed at optimizing the technological process and relations with competitors.

Despite the high rates of growth of the company's results, fixed assets show insignificant changes, namely: an increase of 4.54% and a decrease of 0.36%, respectively. Minor changes in the initial cost of fixed assets indicate the adequacy of the capacity of the existing equipment to fulfill the volume of orders and the absence of measures to renew fixed assets at the enterprise. Under such conditions, the physical and moral wear and tear of fixed assets in the process of operation will lead to a gradual decrease in equipment productivity and production efficiency. Additionally, the inconsistency of the technical and economic characteristics of the equipment with the modern

requirements of scientific and technical progress and trends existing in the competitive environment will lead to a decrease in the competitiveness of the enterprise and loss of its market positioning.

A positive trend at the enterprise is the shortening of the operating and financial cycles in 2021–2022 (Fig. 3).

The operating cycle, which is the time interval between the purchase of raw materials and the receipt of funds from the sale of manufactured products, decreased by 26.71% and is 75 days; the financial cycle – the time during which money is withdrawn from the circulation of the enterprise and functions in the form of goods and material values – decreased by 32.61% and is 47 days.

In 2022, the enterprise employed 2 teams of 8 workers who worked in 2 shifts. In 2023, 4 production personnel were drafted into the armed forces of Ukraine to defend and liberate the country. Therefore, now in 2023, there are 4 production personnel working in 1 shift at the enterprise. Production volumes, accordingly, decreased rapidly, but the demand for products remained

the same. As a result, orders are not fulfilled on time, the company wasted potential net profit.

In addition, the enterprise now uses a line of production equipment for the manufacturing of small concrete products, model KR-282, on which the workers. This manufacturing equipment is outdated and loaded at full capacity. Preventive and scheduled repair work was not performed, which lead to the equipment being

out of service, and its repair was carried out ad-hoc. Among the breakdowns of outdated equipment, the following are noted: breakdowns of nodes, bearings and shafts, wear of seats under the bearings. In addition, manual labor is used on the old equipment, namely the method of stacking finished products.

In the manufacturing process, the following “bottlenecks” are known as supply of raw materials/

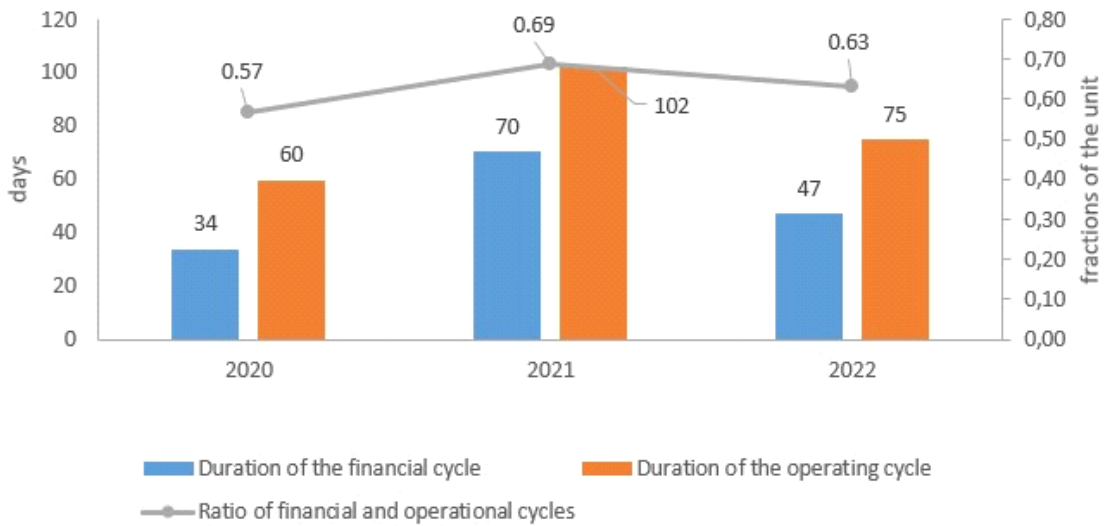


Fig. 3. The operational and financial cycle terms in 2021–2022

Source: built by authors

materials, processing of raw materials/materials into a finished product, product quality, timing of orders, sales. Therefore, for this enterprise, it is necessary to use a management tool – the theory of limiting systems to expand the “bottleneck” – production as a technological process.

As part of this recommendation, it is proposed to purchase a new manufacturing line for the production of concrete small-piece products – the Zenith-940SC vibration press, containing the BETTA packaging

machine in the package. Manufacturer – Polish company ESBRO – official representative and distributor of the German company ZENITH in Poland, which is a manufacturer of vibropresses – one of the long-standing world leaders in this market [9].

Table 1 shows a comparison of the characteristics of the existing and proposed vibration presses.

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Table 1

Comparison of existing and proposed vibration presses

№	Technical characteristics	Equipment name	
		Vibropress KR-282 (existing equipment)	Vibropress Zenith-940SC (proposed equipment)
1	Dimensions of wooden pallet, mm	750×550×40	Not used
2	Mold area dimensions, mm	700×510	1240×1000
3	Layer thickness, mm	50...200	40...250
4	Molding area, sq.m	0,357	1,24
5	Forming area of pallet, m2	0,32...0,35	Not used
6	Formation cycle, s	30...50	30...40
7	Installed power, kW	11	48
8	Overall dimensions, m	4,5×4,5×3,3	6,38×2,54×3,7
9	Weight, tones	2.1	15,5

Source: compiled by the authors based on the data of the enterprise, the source [9]

The equipment that offered for purchase has many advantages:

– first, small-format products (paving slabs, wall blocks, etc.) in the manufacture can be stacked in a row: each row of stone is divided and protected by a film or a thin layer of sand. Therefore, immediately after hardening, the stone bag can be packed, which provides significant time savings and quality improvement;

– second, the high quality of ZENITH vibration press equipment and their reliability are known in this market as a guarantee of a trouble-free production process. Convenient, simple and visual operating Touch Panel provides easy and convenient operation: parameters, product shapes and production recipes which are set and stored in the visual menu. Siemens SPS technology is also used in digital control;

– the guides of the punch have a large diameter, a wide drive chain and a lever, which guarantees a stable and accurate movement of the mold and punch. In the options, using a linear digital meter, you can set the installation of a system for measuring the

stroke of all major movements;

– the main movements of the machine (vibration table, punch, mold and loading trolley) are driven by hydraulic cylinders controlled through proportional valves. Therefore it is possible to plant stones with adjustable speed at stripping;

– the core plate of the punch can be equipped with a quick replacement/rotation of the die with a hydraulic mechanism;

– quick filling of the mold in the loading trolley with concrete is provided by hydraulic grizzlies. This is recommended in the manufacture of high-size products and hollow blocks with a very small wall thickness;

– in the manufacture of facing concrete, the equipment can additionally be equipped with a device for making blocks with a polystyrene insert and a brush that will rotate to clean the surface of the stone.

Table 2 systematizes the problems of the enterprise under force majeure circumstances and suggests ways to solve them using the theory of system limitations.

Table 2

Systematization of enterprise problems under force majeure circumstances and ways to solve them using the theory of system limitations

Influence factors	Enterprise problems	Conclusions and propositions	Prospects of solved problems
Competitors from the occupied and front-line territories left the market due to restrictions on the termination of partnership relations	The increase of orders has led to an overload of the equipment	A "bottleneck" was found at the enterprise - this is a technological process which uses outdated equipment that is constantly out of order. The application of the operational management tool - is the theory of system constraints, as a means of enterprise management is proposed. It is proposed to upgrade the powerful production equipment to a new automated one with information software, which can be used by 4 workers: 2 shifts, 2 people in each shift	Execution of partnership orders, agreements and arrangements
The number of orders has increased	Frequent exit from the operating state of the equipment due to its overload. Increase in product shortages		Reliable equipment does not leave the working state. The output of the technological process to a new qualitative level, which will allow to increase the volume of executed orders. Product quality improvement up to 100%
Growth of the depreciation fund at the enterprise, continuous operation of equipment	Obsolete equipment is not repaired due to the high cost of components, which makes this process very expensive and not profitable due to the long payback period of the invested funds		The innovative production complex does not require investments in repairs
Half of the production staff (8 out of 4 people) are drafted into the armed forces of Ukraine to defend and liberate the country	Reduction of physical volumes of production by half due to work not in 2 work shifts, but in one. Failure to fulfill orders on time, fines paid to buyers		Renewal of the work schedule of the production staff in 2 working shifts. Reduction of labor intensity of performed works. No payment of fines to customers.

Source: built by authors

Thus, it can be argued that the application of such a tool as the theory of system limitations for enterprises in force majeure conditions (war) is appropriate and can be applied in such circumstances at any enterprise to solve problems of any nature.

Conclusions

Taking into account the world trends towards possibly other war, the purpose of the article was to develop recommendations for the use of the enterprise management tool in conditions of force majeure for its activity and its approval. As a scientific novelty, we proposed the application of the tool of the theory of constraints for the management of enterprises in conditions of war. The practical result is the universality of the application of the proposed management tool for any enterprise in force majeure conditions of activity, in which they found themselves at the time of the sudden military aggression of the invaders. Today, the global trend of military conflicts between countries is increasing. The study of the work of enterprises during the war in Ukraine reveals their weak points, new opportunities and the potential for rapid development. On the example of an enterprise that produces small concrete products, an analysis of economic indicators was performed, which made it possible to find its “bottleneck” and develop practical recommendations for solving its problems in force majeure conditions for its activity. The theory of system constraints is a management tool proposed to be used to provide entrepreneurs with a universal approach to solving problems arising in force majeure conditions. According to these recommendations, the sequence of actions of leaders and managers of enterprises should be aimed at finding “bottlenecks” and making efforts to expand them in any of its management subsystems: production, personnel, marketing, organizational, innovation, logistics, etc.

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Received 10.05.2023.

Revised 20.05.2023.

Accepted 10.06.2023.

Published 25.12.2023.

УПРАВЛІННЯ ПІДПРИЄМСТВОМ В УМОВАХ ФОРС-МАЖОРНИХ ОБСТАВИН ЙОГО ДІЯЛЬНОСТІ

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Направленість світової тенденції розповсюдження воєнних конфліктів між країнами стала передумовою обрання мети даного наукового дослідження: розробка рекомендацій щодо застосування інструменту управління підприємством в умовах форс-мажорних обставин його діяльності та його апробація. Науковою новизною статті полягає у застосуванні інструменту теорії обмежень систем для управління підприємствами в форс-мажорних умовах (війни). Практичною цінністю є те, що в статті запропонований до застосування універсальний інструмент управління будь-яким підприємством в форс-мажорних умовах діяльності, в яких можуть опинитись будь-які підприємства будь-яких країн в результаті військових агресій загарбників. В науковій статті на прикладі підприємства ТОВ «ВУД» (м. Дніпро, Україна), що виробляє дрібноштучні бетонні вироби, проаналізовані економічні показники, побудовані відповідні графіки, зроблені висновки, що дозволило знайти “вузьке місце”, згідно теорії обмежень систем та розробити практичні рекомендації для вирішення його проблем в форс-мажорних умовах його діяльності. Тому виконане дослідження стосовно питань роботи цього підприємства під час війни в Україні дозволило викрити такі слабкі місця та розробити нові можливості й потенціал для розвитку, що зробить аналізоване

підприємство більш конкурентоспроможним. Управлінський інструмент операційного менеджменту – теорія обмежень систем надає підприємцям універсальний підхід до пошуку проблем, що виникають в форс-мажорних умовах. Тому послідовність дій керівництва підприємств має бути спрямована на пошук саме «вузьких місць» та прикладання зусиль на їх розширення в будь-якій підсистемі управління підприємством.

Ключові слова: управління підприємством, форс-мажорні обставини, війна, теорія обмежень систем, інструмент управління підприємством, операційний менеджмент, виробництво будівельних матеріалів.

THE ENTERPRISE MANAGEMENT IN THE FORCE MAJEURE CONDITIONS OF ITS ACTIVITIES

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