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THE IMPACT OF MARTIAL LAW ON MANAGEMENT DECISIONS REGARDING ENSURING THE FINANCIAL SECURITY OF ENTERPRISES

ABSTRACT

The aim of this article is to present an approach to assessing the most significant negative factors that have arisen as a result of the introduction of martial law on the decision-making system and the implementation of managerial decisions in the context of ensuring the financial security of a modern enterprise. For this purpose, the object of research is the financial security of machine-building enterprises. A review of the literature has shown that a significant number of scientific papers today aim to present ways to increase the level of financial security, but not all of them understand that the most significant need of the subjects of financial support of machine-building enterprises is the assessment and consideration of negative factors in decision-making. Thus, the scientific task was to present a theoretical and methodological approach to assessing the negative factors of martial law on the management of financial security of a modern Ukrainian enterprise in the field of mechanical engineering. The problem was solved using the methods of system and hierarchical analysis, graph theory and on the basis of expert assessments. As a result, we presented step-by-step instructions on how to assess the negative factors and identified the most significant of them, the consideration of which is critically important in the process of managing the financial security of a modern Ukrainian machine-building enterprise. Prospects for further research will be based on expanding this list and narrowing the focus on the internal processes of machine-building enterprises.

Keywords: financial security, modeling, machine-building enterprises, development strategy, management, negative factors, hierarchical analysis, domestic market

JEL Classification: L53, C50, G01

INTRODUCTION

Ukrainian machine-building enterprises have always had a significant impact on the financial and economic security of the state. Their influence is hard to overestimate. However, they are extremely sensitive to any changes in the external operating environment. During the active phase of the COVID-19 pandemic, several problems were observed in the financial and economic activities of these open socio-economic systems. Today, for Ukrainian machine-building enterprises, the post-pandemic period coincides with the escalation of military actions due to the full-scale invasion by the Russian Federation. Now, with missile strike targets not geographically limited, every Ukrainian machine-building enterprise is under real threat. Nevertheless, as of today, the experience gained from operating under COVID-19 conditions and during military actions strengthens their security and temporarily shifts the priority of target orientation, while the constant relevance of considering trends in the domestic market remains.

It should be noted that ensuring the financial security of an enterprise during a state of war due to a full-scale invasion by the Russian Federation differs from how this type of security was maintained before. The imposition of martial law in Ukraine has led to significant disruptions in stability. The problems have arisen at all levels of management: from personnel management to logistics management. In such conditions, characterized



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by rapid changes in the resource base and fluctuations in the prices of production factors, the primary task of the financial security management system is to protect the "living space" of the enterprise. Establishing financial security during war involves protection against destabilizing influences, both internal and external threats, necessary for maintaining operational functionality. Without neutralizing threats, effective functioning becomes unattainable, leading to a potential decrease in the values of key functional parameters. The question arises as to which threats or factors to respond to first and which to merely adapt to. It is well known that financial security determines an enterprise's ability to maintain stability and minimize vulnerability to internal and external threats, achieve a high level of competitiveness at both the national level and in the global economic environment, and sustain development. However, in a state of war, this does not work as usual. Stability and sustainable development are no longer discussed, as they are simply not possible under such conditions. In such conditions, the management system must be flexible and constantly respond to any changes in the enterprise's operating environment. There are many threats from the actions of the aggressor country. The destructive impact of three years of full-scale war and ten years of military confrontation with the Russian Federation on the national and local economies in particular has significantly increased. Concentrated attacks on critical infrastructure, the use of hybrid influence tools, and growing economic disparities require active and adaptive management actions.

It should also be noted that the extremely high activity in the spread of digital technologies defines the competitive position of each machine-building enterprise. There arises a number of needs, including the necessity to track and create conditions for the effective use of new opportunities. Therefore, there are many new factors that directly and significantly affect the financial security of a modern Ukrainian machine-building enterprise. The need to follow the digital transformation of the economy requires rethinking and making changes to the activities of machine-building enterprises. The situation for Ukrainian machine-building enterprises is complicated by the temporary lag in the digital transformation of the national economy, given the openness of the domestic market. This necessitates timely qualitative and quantitative changes in their financial security system, considering aspects of operation in tactical and strategic dimensions, to maintain and improve specific positions amidst further dynamic digital transformations at macro and micro levels. It should be noted that due to the war, especially its onset, the number of operating machine-building enterprises has practically reduced by 1500 units. This is extremely significant and once again demonstrates how sensitive they are to any crisis changes in the external environment and the factors that create these changes. It is from 2022 that one can observe a noticeable decrease in their number and financial results (Figure 1).

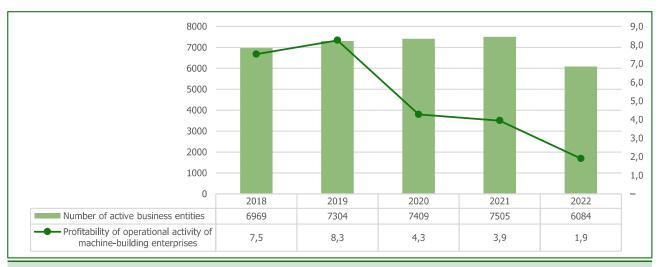


Figure 1. Dynamics of changes in the number of machine-building enterprises and their profitability for the period 2018-2022. (Source: State Statistics Service of Ukraine, 2023)

It should be noted that the issue of development for machine-building enterprises under martial law remains extremely critical. The fact is that during active hostilities, no development as such in the domestic market can be achieved. Consequently, the concept of development strategy itself does not work. Those responsible for managing financial security must rethink their strategies and respond most effectively to the negative impact of a significant number of factors, the number of which has increased substantially in recent times. It is important to recognize that the adoption and implementation of management decisions is a long-term process that must be based on specific information. One such piece of information is data on the list of the most significant negative factors affecting the financial security of the enterprise.



LITERATURE REVIEW

It should be noted that in general, the literature is extremely rich in new research on ensuring the financial security of an enterprise. And even in the context of mechanical engineering as an industry as a whole. For example, Khudoliei (2018) very effectively assessed the level of financial security of mechanical engineering enterprises and suggested doing this through an integral indicator. In our opinion, this has a place in practical application, but when it comes to management decisions, it is still necessary to understand what negative factors influence from the outside. Moreover, Mishchuk et al. (2022) examine how the current factors of the new Industry 5.0 affect the safety of enterprises. Even under martial law, the influence of new technologies (for example, technologies based on artificial intelligence) remains significant and should be taken into account.

Snishchenko and Krot (2021) delve into the management of economic security within the framework of coopetition—collaborative competition between businesses. Their findings indicate that recognizing and strategically managing competitive relationships can lead to enhanced resilience against external shocks, including those induced by martial law. At the same time, as Rodchenko notes, (2024) businesses in Ukraine did not realize all the consequences of the war at the beginning and, as a result, significant gaps in security, especially financial. We should agree with this, since, as shown by the dynamics in Figure 1, the impact on the domestic machine-building market is indeed extremely detrimental.

It should be noted that one of the most important stages in assessing financial security is the analysis of the very factors that in one way or another negatively affect and can change the level of security from positive and high to low and unacceptable. This is emphasized at the macro level by Haber, et al. (2018) and at the micro level by the security school scholars, Franchuk, et al. (2020).

In the context of external factors, a fairly good approach to assessment is proposed by Kryshtanovych, et. al. (2023) who note that those development strategies at enterprises that do not have an effective system for assessing the external environment are doomed to bankruptcy. Similar can be seen in the work of Krasko, et.al. (2019). Zybareva et al. (2022) contribute to the discourse by assessing spatial challenges in the economic security systems of industrial enterprises. Regarding the process of making and implementing effective management decisions in the context of ensuring safety at mechanical engineering enterprises, it is worth highlighting the research of Gridneva, et.al. (2020), which clearly describes how important it is to analyze changes in the external operating environment and take into account the help of third parties (for example, experts). Zlotenko et al. (2019) focus on the optimization of financing sources for implementing strategic guidelines to ensure the economic security of investment activities in industrial enterprises. In the end, we note that Nikonenko et.al., (2017) propose to consider the security aspect of a modern enterprise through a constant analysis of the external environment and change the strategic approach if there is a significant negative impact of various factors and threats. But despite this, a number of gaps remain in the literature (Table 1).

Table 1. Main gaps in modern literature on the topic of our article.			
Nō	The main aspects that have gaps in the literature	The essence	
1	Emphasis on economic security	Most scientific studies try to consider the negative impact of environmental factors in the context of economic security, leaving financial security as one of its components. In our opinion, it is necessary to distinguish between factors specifically related to financial security and separately consider those related to economic security	
2	Taking into account the current situation in the domestic market	Military actions have led to the fact that today's negative factors no longer correlate with those that will happen tomorrow. The hyperdynamics of the external environment require constant analysis	
3	Modern approach to assessment	There is a gap in understanding the process of assessing the negative impact of environmental factors on the financial security of enterprises	

Thus, we see that there are still a number of gaps and problems in the scientific and practical literature in assessing the impact of negative factors on the activities of modern enterprises. In most studies, the emphasis is on assessing the level of financial security, and this is positive. However, the level of financial security of an enterprise and the adoption of informed management decisions within the framework of the overall development strategy cannot be achieved without taking into account those factors that most negatively affect the functioning of these open socio-economic systems.



AIMS AND OBJECTIVES

This article aims to present an approach to assessing the impact of the most significant negative factors that have arisen due to the implementation of martial law on the system of decision-making and implementation of management decisions in the context of ensuring the financial security of a modern enterprise. The literature review showed that a significant number of scientific works today aim to present how to increase the level of financial security, but not all of them understand that the most significant need of financial security subjects of machine-building enterprises is to assess and consider negative factors during decision-making. Thus, the scientific task was to present a theoretical-methodological approach to assessing the negative factors of martial law on the management of financial security of a modern Ukrainian enterprise in the field of machine building.

METHODS

Our research used many methods. To begin with, it is necessary to highlight a list of the most significant negative environmental factors in wartime conditions.

In our view, to identify the key factors, an expert analysis should be conducted. The method of expert analysis itself involves conducting a survey until an optimal list of factors is determined. We selected over 30 experts in the field of machine-building. Through remote methods, the most significant negative factors of wartime were identified that affect the financial security of Ukrainian machine-building enterprises in the domestic market. But at the same time, to select the agreed list of factors, the Delphi Method was additionally used. The Delphi method is an important tool often used to collect and collate expert opinions through a series of structured surveys. The main purpose of the method is to achieve consensus among a group of experts on issues characterized by a high level of uncertainty or complexity.

The method of systems analysis, also known as the systems approach, is a method of transforming the complex into the simple, elevating from the abstract to the concrete. Systems analysis is the most consistent procedure for achieving a set goal.

Graph theory was used to establish the advantages and connections between negative factors. Graph theory is a branch of qualitative geometry. Graph theory is a branch of mathematics that studies the properties of graphs, abstract structures consisting of connected vertices and edges. Graphs are used to model various relationships and structures in many fields. Qualitative geometry operates with dimensionless quantities. Neither the concept of angle nor its units of measurement (degrees), nor the length of lines (meters, centimeters) are used here. The main thing in high-quality geometry is the presence of spatial elements - points, lines, surfaces, volumes and relationships (connections) between them. The main concept of graph theory is the concept of a graph.

Moreover, if such a connection exists, for example, $F1 \Rightarrow F2$, then it is possible for all variables (in our case, negative factors of the military state) to construct a matrix of dependence of such variables, and the following equality (1) is satisfied:

$$\mathsf{F}_{ij} = \begin{cases} 1, if \ i \ depends \ from \ j \\ 0, if \ not \end{cases} \tag{1}$$

where i is the negative factor to which the arrow is directed; j is a negative factor that has a direct connection with others.

Next, hierarchies are analyzed using the matrix method. The hierarchy analysis method, based on the work of Thomas Saaty, allows different alternatives to be ranked based on their importance through pairwise comparisons. In conditions of uncertainty, it is necessary to apply mathematical models taking into account game theory or simulation modeling. Therefore, one of the optimal ways to solve economic problems is to use a game theory model, in particular, the method of analyzing hierarchies, since it is easy to use and requires a minimum of input data.

RESULTS

To begin with, it should be noted that as a result of an expert study, we identified the 10 most significant negative factors of martial law that influence the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises. According to (1), the mathematical designation for each factor we have will be F (Table 2).

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Table 2. The main negative factors of martial law that have the greatest impact on the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises.

F	Factors
1	Decrease in investment attractiveness
2	Mass migration of skilled workers
3	Risk of physical harm
4	Increased operating expenses
5	Supply chain disruptions
6	Decrease in innovation activity
7	Dependence on the import of raw materials
8	Lack of stability in the domestic market
9	Difficulties with the reservation system in the machine-building industry
10	Increased corruption in this sector of the economy after the introduction of martial law

It should be noted that by analyzing the set of negative factors of martial law, we can establish and determine the connections between them and represent them in the form of a corresponding graph Figure 2). Moreover, where there is a connection, equality (1) can be satisfied, which in turn allows us to further construct the corresponding matrix equations.

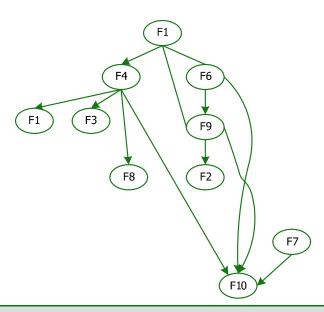


Figure 2. Graph of connections between certain negative factors of martial law that have the greatest impact on the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises.

Next, the corresponding matrix equation should be formed, filled in according to (1) and the connection graph presented in Figure 3. We obtain a matrix equation of the relationship between certain negative factors of martial law that have the greatest influence on the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises (2):

(2)



Let us denote this matrix equation (2) as MR; a binary matrix equation should be formed in which the unit matrix AR will be involved. Thus, we have the following (AP+MR). At the same time, we bring all this to power and we have the following: $(AP+MP)^{\kappa+1}$. In this case, this will be a matrix equation of reach with a clear rule (3):

As a result, we have a matrix equation of reach between certain negative factors of martial law that have the greatest impact on the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises (4):

In this case, matrix equations (2) and (4) will serve as the basis for constructing iteration tables. This is the basis of the hierarchy analysis toolkit. When there is a straight arrow indicating dependence from one factor to another, we denote it as $A(F_n)$. And those factors that are so-called predecessors will make up $P(F_n)$. Moreover, if there is a so-called section of a subset of such factors, then we denote this as $X(F_n)$. Therefore, we have the following equality (5):

$$X(F_n) = A(F_n) \cap P(F_n)$$
 (5)

where n - this is the number of negative factors of martial law that have the greatest influence on the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises.

Moreover, if the following equality is satisfied: $X(F_n) = P(F_n)$ then we have the first level of hierarchies among the list of negative factors of martial law determined by us and experts, which have the greatest influence on the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises (Table 3).

Table 3. Iterative table for determining the level of hierarchical position among the list of negative factors of the state of war that have the greatest influence on the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises.

F	Results
1	$\begin{bmatrix} A(Fn) & P(Fn) & X(Fn) \\ 1 & 1;4;5 & 1 \end{bmatrix}$
2	$\begin{bmatrix} A(\text{Fn}) & P(\text{Fn}) & X(\text{Fn}) \\ 2; 10 & 2; 5; 6; 9 & 2 \end{bmatrix}$
3	$\begin{bmatrix} A(Fn) & P(Fn) & X(Fn) \\ 3;8 & 3;4;5 & 3 \end{bmatrix}$
4	$\begin{bmatrix} A(Fn) & P(Fn) & X(Fn) \\ 1; 3; 4; 8; 10 & 4; 5 & 4 \end{bmatrix}$
5	[A(Fn) P(Fn) X(Fn) 1; 2; 3; 5; 6; 8; 9; 10 5 5 5]
6	$\begin{bmatrix} A(Fn) & P(Fn) & X(Fn) \\ 2; 6; 9; 10 & 5; 6 & 6 \end{bmatrix}$
7	$\begin{bmatrix} A(Fn) & P(Fn) & X(Fn) \\ 7;10 & 7 & 7 \end{bmatrix}$
8	$\begin{bmatrix} A(\operatorname{Fn}) & P(\operatorname{Fn}) & X(\operatorname{Fn}) \\ 8 & 3; 4; 5; 8 & 8 \end{bmatrix}$
9	[A(Fn) P(Fn) X(Fn)] [2; 9; 10 5; 6; 9 9]
10	$\begin{bmatrix} A(Fn) & P(Fn) & X(Fn) \\ 10 & 2; 4; 5; 6; 7; 9; 10 & 10 \end{bmatrix}$

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As can be seen from Table 3, equality holds for factors F7 and F5. Accordingly, they will constitute the lowest level in the hierarchy of the most significant ones in the context of managing the financial security of a machine-building enterprise. They are removed and this continues until the last ones remain. Lowering the volume of the reflection of this process, we will present the final version of the priority of the influence of negative factors of martial law, which have the greatest influence on the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises (Figure 3).

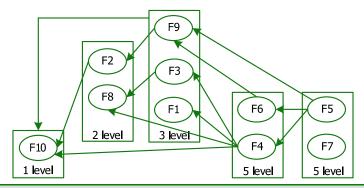


Figure 3. A model of the priority of the influence of certain negative factors of martial law that have the greatest impact on the adoption and implementation of management decisions in the field of ensuring the financial security of modern machine-building enterprises.

The growth of corruption in the economic sector during martial law is one of the most important factors influencing management decisions in machine-building, especially in terms of financial security. Both the military and industrial sectors demonstrate how actively corruption began to flourish in Ukraine after the introduction of martial law. This is a direct threat to ensuring not only the financial security of an individual machine-building enterprise but also the industry as a whole,

DISCUSSION

Like any other study, the results should be compared with similar ones in this scientific and practical area. As already noted in the literature review, the issue of financial security is extremely popular among scientists and practitioners. In our study, we developed a theoretical and methodological approach to assess the impact of martial law on the financial security of Ukrainian machine-building enterprises. But for example, Beningo, (2013) examines the factors causing the financial crisis solely through the prism of all enterprises without emphasizing a specific industry. It should be noted that the approaches proposed by Vilknianska, et al. (2021) and Fakiha (2021) also involve assessing the negative impact of external environmental factors, but the lack of expert analysis and the incorrect application of modelling introduce ambiguity. In our research, we have attempted to describe the entire evaluation process in as much detail as possible. Neglecting expert opinions is, in our view, a significant oversight. Our research contributes to this discourse by specifically examining the distinct impact of martial law, offering a detailed analysis that refines and extends the general crisis models outlined by Blakyta et al. (2021). This approach not only enriches our understanding but also ensures a more comprehensive interpretation of the crisis dynamics at play.

It should be noted that Rushchyshyn, et.al. (2021) very effectively assessed how changes in the domestic market affect the level of financial security not only of an individual enterprise but also of the country as a whole. But at the same time, it is extremely difficult to effectively assess negative factors if you do not take a specific type of activity. Krasko et al. (2019) discuss the application of anti-crisis management to enhance financial security, using a broad array of management strategies to mitigate crisis impacts. Our study aligns with their emphasis on proactive crisis management but advances the conversation by introducing a methodological framework specifically designed to navigate the intricacies of martial law, thereby adding a specialized tool to the arsenal that financial security managers might employ during such specific crises. At the same time, Rabskyi and Solonko, (2018) note that every mechanism for ensuring the financial security of an enterprise today must include and provide for a system for assessing external negative influence factors. Kryshtanovych et al. (2022) focus on presenting an effective model that also uses pairwise comparison but with the possibility of negative counteraction. The factors they selected are exclusively those that, in their opinion, are appropriate. In contrast, we involve relevant experts.



This discussion underscores the importance of developing adaptable, robust management strategies that are capable of addressing not only generic crises but also very specific socio-political disruptions such as martial law. At the same time, when comparing, we see that every scientist and practitioner is trying to take their own look at the problem of ensuring enterprise security. Consequently, some forget or do not want to specify the sector of activity of enterprises, while others take a broader security problem, namely ensuring economic security.

CONCLUSIONS

As a result, a theoretical and methodological approach is presented, based on assessment technology, which is different due to the maximum consideration of the specific factors inherent in machine-building enterprises through the formation of a list of unique external factors in the process, as well as the constant updating of their list with the subsequent application of the method of hierarchy analysis, system analysis and graph theory. This ensures the building of a hierarchical order as the basis for the most rational activity of financial security subjects and their implementation of proactive management measures to prevent the formation of threats. This will contribute to the overall development strategy of machine-building enterprises in the domestic market. The technology for assessing the negative impact of factors differs from existing ones by the possibility of using an information base, which is formed based on the results of assessing and modelling the influence of key negative factors, which allows the most rational determination and resource support of the activity of financial security subjects. In fact, in the end, you can get a list of the most significant negative factors today that affect the financial security of machine-building enterprises and make appropriate informed management decisions. Separately, it should be noted that those negative factors that will be highlighted as part of our analysis and assessment may lose their significance and relevance in the future since the military state makes the external environment extremely hyperdynamic in which changes occur constantly. The practical application of the proposed approach will be useful to all Ukrainian machine-building enterprises that remain operating in the domestic market.

In conclusion, we note that the proposed approach to identifying the most significant factors affecting the activities and financial security of machine-building enterprises was the main task of our article. Of course, the most significant ones relate to the use of expert research, but it should be noted that we are talking about negative factors in the external environment, which is extremely difficult to navigate without the involvement of third parties. It should be noted that future research must consider not only external negative factors but also internal ones. Indeed, a company is highly dependent on changes in the external environment, but alongside this, it requires a detailed analysis and evaluation of internal factors as well. In our opinion, this will become the goal of further research.

ADDITIONAL INFORMATION -

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ВПЛИВ ВОЄННОГО СТАНУ НА УПРАВЛІНСЬКІ РІШЕННЯ ЩОДО ЗАБЕЗПЕЧЕННЯ ФІНАНСОВОЇ БЕЗПЕКИ ПІДПРИЄМСТВ

Метою цього дослідження є представлення підходу до оцінки найбільш суттєвих негативних факторів, що виникли внаслідок запровадження воєнного стану на систему ухвалення рішень і реалізації управлінських рішень у контексті забезпечення фінансової безпеки сучасного підприємства. Об'єктом цього дослідження є фінансова безпека машинобудівних підприємств. Огляд літератури показав, що значна кількість наукових праць сьогодні має на меті представити шляхи підвищення рівня фінансової безпеки, але не всі автори розуміють, що найбільш суттєвою потребою суб'єктів фінансового забезпечення машинобудівних підприємств є оцінка та врахування негативних факторів при ухваленні рішень. Таким чином, наукове завдання полягало в тому, щоб представити теоретико-методологічний підхід до оцінки негативних факторів воєнного стану на управління фінансовою безпекою сучасного українського підприємства в галузі машинобудування. Завдання виконане з використанням методів системного та ієрархічного



аналізу, теорії графів та на основі експертних оцінок. У підсумку ми поетапно представили, як оцінити негативні фактори, та встановили найбільш значущі з них, урахування яких є критично важливим у процесі управління фінансовою безпекою сучасного українського машинобудівного підприємства. Перспективи подальших досліджень ґрунтуватимуться на розширенні цього переліку та звуженні фокусу на внутрішніх процесах машинобудівних підприємств.

Ключові слова: фінансова безпека, моделювання, підприємства машинобудування, стратегія розвитку, управління, негативні чинники, аналіз ієрархій, внутрішній ринок

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