



Financial Security Assessment in Enterprise Potential Management

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ABSTRACT

The peculiarities of financial activity and economic security of modern enterprises in the conditions of unstable environment are investigated. The eredeconds of economic security assessment are defined. The main factors that affect financial security and are the object of evaluation in the process of managing the potential of the enterprise are grouped. Models for assessing and analyzing financial security threats are proposed, which, based on factor analysis and structural modeling, allow us to identify the dominant threats and evaluate the consequences of their prolonged impact. The main stages are: assessment of the level of threats, construction of a model for assessing the significance of threats, determining the trend of change in the level of financial security of the enterprise.

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1. Introduction

In today's environment the role of effective management of financial activity and financial security of enterprises is growing. This is explained, first of all, by the fact that it is the financial activity that forms the financial support for the operating and investment activities of the enterprise, the introduction of scientific and technical achievements, improving the competitiveness of products, ensuring its stable functioning in the market.

In addition, the financial activity of the company is carried out taking into account the dynamic conditions of the environment. Transformational and integration international processes are characterized by uncertainty and risks. An increase in the level of uncertainty is associated with increased competition in commodity markets, a decrease in the life cycle of products, inflationary processes, instability of Ukrainian legislation, an increase in the volatility of the foreign exchange market, the lack of a developed sector of long-term bank lending, and a decline in the fund. Increasing the level of uncertainty in the external environment requires companies to be flexible in making financial decisions and adapting to changing conditions. The implementation of these solutions will reduce the amount of losses and losses caused by negative environmental influences, reduce the threats to the formation and realization of the potential of the enterprise: I. Blank (2004), M. Yermoshenko (2001), S. Ramazanov (2019), O. Sudakova (2008).

The interconnection and interdependence of finances and business results of enterprises was first mentioned in the eighteenth century by the founder of the school of physiocrats F. Kene (2019), and further explored by many foreign and domestic economists, such as A. Smith (2008), II. Yangul (2018), O. Gonchar (2017) and others.

Today, in the face of uncertainty, risk, external and internal threats, changes in macro, meso and microeconomic conditions, enterprises must make decisions, correlating risk and profitability, reducing risks and threats in such a way as to achieve strategic and tactical goals (V. Babenko (2019), M. Voynarenko (2014), O. Gonchar (2017)).

Enterprise security issues are urgent. There is a need for scientific and practical development of this problem, the definition of the essence of security in general and financial security as one of the prerequisites for realizing and developing the potential of the enterprise. The importance of applying economic and mathematical models to substantiate managerial decisions is increasing.

1.1. The use of economic and mathematical models for assessing the security of the enterprise

The presence of a significant number of threats to the sustainable functioning of the enterprise requires the development of mechanisms for identifying risks and ensuring the safety of its potential. The list of measures for managing the enterprise's potential in the face of financial risks should include: analysis of external and internal threats, assessment of the consequences of their impact on the financial activity of the enterprise and the formation of a complex of management decisions that allow to increase the speed of its adaptive response to negative environmental influences. Solving these problems is simplified by constructing economic and mathematical models.

1.2. Prerequisites for assessing economic security

Problems of their own economic security arise before every enterprise not only in times of crisis, but also when working in a stable economic environment, although the complex of tasks that are solved in this case has significant differences (M. Voynarenko (2019), A. Alekhin (2014), O. Gonchar (2017)).

In the mode of stable operation, the enterprise, in solving the problems of its economic security, focuses on maintaining a normal rhythm of production and marketing of products, on the prevention of material or financial damage, on the prevention of unauthorized access to official information and the destruction of computer databases, on combating unfair competition criminal manifestations (Krasnobaev et al. (2019), O. Sudakova (2008)).

In times of crisis, the greatest danger for the enterprise is the destruction of its potential (production, technological, scientific, technical and human resources) as a major factor in the life of the enterprise, its capabilities. In this case, the conditions of management are such that the capacity for reproduction is not ensured. Resources for this enterprise can only obtain based on the results of its activities, as well as through borrowing (O. Gonchar (2017)).

Thus, enterprises are constantly faced with the task of internal self-assessment and forecasting of their financial status, taking measures to restore it, that is, ensuring financial security of activities and capacity development from various manifestations of external and internal disturbances.

1.3. Financial security in managing the potential of the enterprise in the conditions of globalization

Market economy conditions, transformation of the existing economic system, increased competition and the development of competitive methods, lack of established business rules, weakness of the state legal system and, as a consequence, increased levels of uncertainty in decision making, have led to increased attention to the problems of ensuring the security of enterprises. In these circumstances, both the state, the regions and the enterprises have been faced with the need to develop fundamentally new approaches to solving this problem.

According to the results of the conducted researches, we believe that under the economic security it is necessary to understand the qualitative characteristic of the economic system of the enterprise, which determines its ability to maintain normal working conditions, capacity development within the defined goals, and in case of various threats (external and internal) the system's ability to withstand them and restore their performance.

Several levels of economic security need to be identified:

- international security (global, regional);
- national security (state, industry, region, society);
- private (business, household or individual).

On the other hand, financial security is an essential part of the economic security of an enterprise because only those enterprises that successfully manage financial resources ensure successful strategic development.

2. Materials and methods

The materials presented are the result of teamwork. In the course of the research the hypothesis about the peculiarities of the influence of various factors on the financial security of the enterprise and the possibility of its potential development were substantiated. As a result, the classification of financial security threats is substantiated and a model of financial security assessment is developed. The recommendations were tested at light industry enterprises.

3. Results and discussion

3.1. Key factors affecting financial security that are the object of evaluation in the enterprise capacity management process

In market conditions, the activity of enterprises is a complex of interdependent economic processes that depend on many different factors and determine the realization of entrepreneurial potential. Typically, these factors are interdependent and in different directions affect the performance of the enterprise, as well as its financial stability. External factors affecting the financial activity of the enterprise are divided into economic, political, demographic and scientific and technical (M. Yermoshenko (2001), A. Smith (2008), Il. Yangul (2018), O. Gonchar (2017)).

Among the economic factors are the state of crisis in the country, the overall decline or output, inflation, instability of the financial system, changes in prices for resources, changing market conditions, insolvency and bankruptcy of partners, the level and validity of the taxation system.

Political factors affecting the financial system of the enterprise include: the level of political stability of society; foreign economic policy of the state; the effectiveness of existing economic links and markets; change of conditions of export and import; the degree of perfection of legislation in the field of economic law, antitrust policy, business activity and other manifestations of the regulatory function of the state.

Demographic factors include the composition of the population, the level of well-being of the population, the cultural structure of society, which determine the size, structure of needs and the effective demand of the population.

Scientific and technical factors include scientific and technological progress and, as a consequence, increased international competition.

Internal factors affecting the financial activity of the enterprise, directly depend on the organization of work of the enterprise itself. These include: product nomenclature and production technology (which determines the value of the enterprise costs, and therefore financial results), the optimal composition and structure of assets, methods of asset management (sustainability and performance of the enterprise largely depend on the effectiveness of asset management, intensity attraction of working capital, value of stocks and cash assets), composition and structure of financial resources, methods of managing them (the more own financial resources, the more stable the enterprise) and others (G. Blakya (2018), M. Voynarenko (2019), Brutman, A. B. (2014)).

The determining internal factors that influence the financial activity of the enterprise are the following V. Babenko (2019):

- branch of enterprise;
- the structure of production of products or services produced by the enterprise, its share in the total solvent demand;
- the size and structure of costs, their dynamics in comparison with cash income;
- composition of property and financial resources, including reserves and reserves, their composition and structure.

In addition, the impact of these factors on the financial activity of the enterprise depends not only on the influence of factors and the relationship between them, but also on the stage of the life cycle of the enterprise, compliance with its management actions to ensure normal financial activity.

The current conditions of functioning of Ukrainian enterprises are characterized by a significant number of factors that have a negative impact on its financial activity (Blakya, G., Ganushchak, T. (2018), A. Alekhin (2014)). The general cause of the financial destabilization of the Ukrainian economy is a significant decline in the production of gross domestic product, with a general drop in the physical volume of commodity products and services, which is associated with a low level of their competitiveness. In the downturn, the weakening of microfinance finance has led to crisis trends in the financial sector at the macro level. As a result, there is an imbalance between the real structure of the economy, its qualitative characteristics, and the main macroeconomic regulators of structural and financial relations - price, money, credit, budgetary, tax. The financial crisis in Ukraine is related to the inflationary processes caused by the deformation of the national monetary and credit circulation system, the artificial narrowing of the internal market capacity, with the unreasonable restriction on the income of most legal entities and individuals. The current situation is primarily caused by the precipitous decline in Ukrainian commodity production, weak import capabilities, imperfection of the state policy of regulating the market equilibrium and activity of the banking, credit and financial systems (Perevozova et al. (2019), M. Voynarenko (2019)).

3.2. Methods and models of financial security analysis of the enterprise

The analysis of literary sources on financial security problems allowed to distinguish two main groups of methods and models of assessment and analysis of financial security of the enterprise (I. Blank (2004), M. Yermoshenko (2001), O. Gonchar (2017), O. Sudakova (2008)):

- 1) methods and models of direct assessment of financial security;
- 2) methods of assessment and analysis of financial security based on methods of assessing the propensity of bankruptcy.

The first group of methods that we deem necessary to apply include the following:

- financial security rating model;
- model of express-assessment of financial security;
- J. Depalyan financial security assessment model;
- model of financial security assessment of an enterprise in terms of its economic security;
- econometric model of assessment of financial security of the enterprise;
- programmatic management and development methods for assessing financial security;
- expert model of financial security assessment;
- financial security analysis model based on STEP analysis;
- a model of financial security analysis based on SWOT and SPACE analysis.

3.3. A comprehensive model for assessing and analyzing threats to the financial security of an enterprise

The study of the impact of factors on the financial security of the enterprise has a complex structure and subordinate nature. Threats are the set of conditions, processes, factors that impede the implementation of the priority financial interests of the enterprise. Thus, threats in the technical and technological sphere, which are manifested in the high level of equipment wear and tear, can lead to an increase in the level of threats in the social sphere and appear in an increase in labor costs. The growth of threats in the social sphere, in turn, can lead to a decrease in the level of profitability of the activity, ie an increase in the level of threats to financial security.

The threat of liquidity loss in the event of poor localization can lead to a shortage of own working capital, the need to attract additional financial resources, an increase in the level of financing costs and, as a consequence, an increase in the threat of reduced profitability.

In view of this, we consider it necessary to apply a comprehensive approach when assessing threats. An analysis must be made of the relationships of individual factors, both temporally and spatially.

Based on the results of our research, we have developed a model of assessment and analysis of threats to the financial security of the enterprise, which includes the following steps:

- 1) assessment of the threat level;
- 2) building a model for assessing the significance of the threat;
- 3) determining the trend of change in the level of financial security of the enterprise.

In the first stage, the selection of the most significant threats to the financial security of the enterprise is carried out, the classification of external and internal threats by the spheres of their occurrence, integral indicators of the level of threats are formed. Consider the content of the steps in this step.

In the first stage, a preliminary list of threats to the financial security of the enterprise is formed as a result of the analysis of literary sources and the expert survey. It is necessary to distinguish classes of external and internal threats due to different tools for their localization. In addition, internal and external threats are considered threats to the social, financial, marketing and technical and technological sphere, which will allow to take into account the specifics of different types of activity of the enterprise in the formation of measures aimed at their neutralization.

The second step is to analyze the information space of threat indicators in order to select the most significant ones. As mathematical tools for such analysis, we recommend methods of correlation-regression and factor analysis.

Correlation-regression analysis is used to statistically confirm the hypothesis of the composition of the most significant threats to the financial security of the enterprise. For this purpose, the correlation coefficients between threat indicators and indicators of financial security of the enterprise are determined by the formula:

$$r_{ij} = \frac{\sum x_j \cdot x_i - \frac{\sum x_j \cdot \sum x_i}{m}}{\sqrt{\left[\sum x_j^2 - \frac{(\sum x_j)^2}{m} \right] \left[\sum x_i^2 - \frac{(\sum x_i)^2}{m} \right]}} \quad (1)$$

where, x_j - value of indicators of threats to financial security of the enterprise;

x_i - value of financial security indicators of the enterprise;

m - number of financial situations considered.

To evaluate the significance of the pairwise correlation coefficients, the Student's criterion is used, which is determined by the formula:

$$t_r = r \cdot \sqrt{\frac{m-2}{1-r^2}} \quad (2)$$

The calculated value of the criterion is compared with the limit (t_p) taken from the tables for the corresponding level of significance α and the number of degrees of freedom $k = m-2$. If it is $|t_r| < t_p$, then the probability that the error α is assumed is that the considered threat is not significant. Otherwise, the hypothesis of a significant impact of the considered threat on the level of financial security of the enterprise is accepted.

As the number of significant threats can be quite significant, the information space of indicators is analyzed using factor analysis methods, in particular the principal component method. The choice of this method is due to the fact that it allows to obtain aggregated indicators of the level of threats, which are similar in their characteristics. Thus, the result of applying factor analysis is the set of aggregate indicators that have the following properties:

- indicators are homogeneous in their characteristics;
- these indicators allow to obtain a comprehensive assessment of the level of intensity of exposure to threats, are similar in their characteristics and sources of occurrence.

The essence of the principal component method lies in the transition from the initial system of indicators X_1, X_2, \dots, X_t to the system of aggregated (principal components) U_1, U_2, \dots, U_p ($r < p$), which reflect the impact of homogeneous threats in their characteristics (I. Blank (2004), M. Yermoshenko (2001), O. Gonchar (2017), A. Alekhin (2014)). The procedure for building a system of principal components is to find linear orthogonal combinations of the resulting levels of threat indicators:

$$U_i = \sum_{j=1}^m a_{ij}x_j, \quad \sum_{i=1}^m a_{ij}^2=1, \quad \sum_{i=1}^m a_{ijaik}=0, \quad (3)$$

where $j,k=[1,p], j \neq k$.

The main components of U_i are chosen as follows: among all possible linear combinations of output indicators, the first major component of F_1 is the one with the highest variance. The next F_2 - which had the largest variance among all linear combinations of the remaining species, was uncorrelated with the first principal component. The following major components are selected using a similar scheme.

After finding all the major components, their minimum number is determined, which is required

to display all significant correlation relationships. To this end, the Kaiser test, or the cumulative variance test, is used.

The economic interpretation of the principal components obtained is carried out on the basis of the analysis of factor loadings, which are the correlation coefficients of the respective indicators X_i and the principal components of U_k . If the original principal components cannot be interpreted, then the initial matrix of factor loadings is transformed so that the new matrix corresponds to the same space of the principal components as the original matrix. At the same time, each of the indicators of threats the maximum module load factor should be with only one main component. Obtaining a system of interpreted principal components allows you to proceed to the third step.

The content of the third step is to analyze the values of the main components, which reflect the level of intensity of the impact of homogeneous sources of threat. Estimates of the principal components are obtained using the least squares method using the multiple regression analysis technique.

3.4. Simulation of the prolonged action of threats to the financial security of the enterprise

The implementation of the above methodology was carried out for the data of Khmelnitsklegprom-Plus LLC, as, as the analysis showed, this enterprise is characterized by low level of financial security. In accordance with the first stage of the proposed methodology, a preliminary list of financial security threats was formed. At the same time, as stated earlier, the threats were classified into external and internal, which in turn were divided into threats of social, technical, technological, marketing and financial nature.

The analysis of the matrix of paired correlation coefficients between threat indicators and indicators of financial security of the enterprise made it possible to conclude that the influence of the above internal and external threats on the level of financial security of the enterprise is significant.

4. Experimental

For the comprehensive assessment of threat level, the principal component method was used in accordance with the validated methodology. Factor analysis of the information space of indicators characterizing external marketing threats, allowed to form the main component - the integral indicator of the level of marketing threats (U_{sb}) (table 1).

Table 1. Results of factor analysis of marketing threats

| Indicator | Factor loads | The values of the coefficients in the equations of the principal components | The values of the coefficients in the equations of threat indicators |
|---------------------------------------|--------------|---|--|
| The volume of production | 0,745694 | 0,670517 | 0,556059 |
| The share of unprofitable enterprises | -0,745694 | -0,670517 | 0,556059 |

The analysis of factor loadings (Table 1) made it possible to conclude that the threat of reducing the market capacity and the threat of reducing the purchasing power of consumers of products have an equal intensity of influence on the level of financial security of the enterprise.

Factor analysis of external financial threats allowed us to distinguish two main components - integral indicators of the level of financial threats (U_{f1} , U_{f2}).

The most significant factor loadings in the first principal component (U_{f1}) have such indicators as money supply (M3 unit) (-0.984231), loans to banks (-0.984231), interest rates on loans (0.889227). Thus, the first major component reflects the possibility of attracting financial resources. In the second principal component (U_{f2}), a significant factor load has an indicator of receivables and payables (-0.979591). That is, the second component reflects the possibility of reducing consumer solvency.

Factor analysis of indicators of external technical and technological threats allowed to form the main component - an integral indicator of the level of technical and technological threats (Ut).

The obtained principal component (Ut) indicates that 64.29% of the variation of the original system of indicators is posed by technical and technological threats. Factors such as the volume of scientific and technical work performed by the enterprise's own resources (0.9552124), investments in fixed capital (0.892921) have significant loads. Thus, this main component reflects the threat of low compared to competitors the amount of research costs and the formation of an innovative component of the enterprise's potential.

The above factor analysis of the information space of threat indicators allowed us to form a system of integral indicators of the level of external threats to the financial security of the enterprise, given in table. 2.

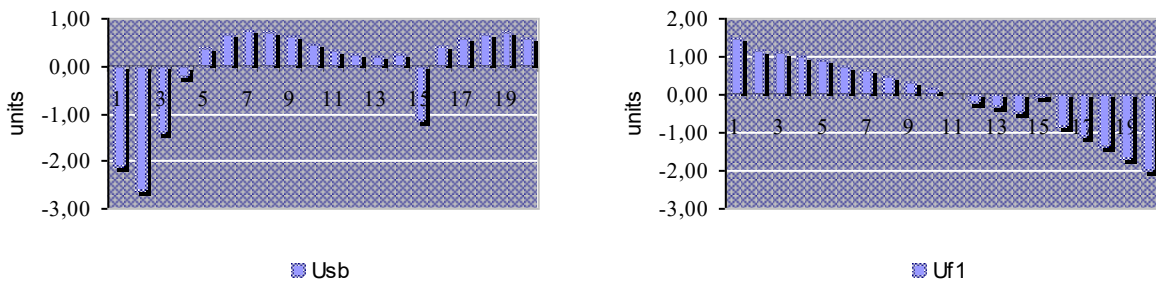
A fragment of the dynamics of changes in the values of the integral indicators of the level of external threats is shown in Fig. 1.

Table 2. List of integral indicators of the level of external threats to the financial security of the enterprise

| Threat Level Indicators | The name of the integrated threat level metrics | Threat Level Indicators | The name of the integrated threat level metrics |
|-------------------------|---|-------------------------|--|
| Usb | Indicator of the threat level of market capacity decrease | Us1 | Indicator of level of threat of growth of social payments |
| Uf1 | Indicator of the level of threat of inability to attract external financing | Us2 | Indicator of the level of threat of insecurity of labor resources |
| Uf2 | Indicator of threat level of consumer solvency decline | Ut | The indicator of the level of threat is low in comparison with the competitors of the amount of expenses on research works and formation of innovative potential |

As can be seen from Fig. 1, there is an increase in the level of threats to the decline in market capacity, which is low compared to competitors in the amount of research costs.

A similar analysis was conducted on indicators of internal threats. The analysis made it possible to form the main component - an integral indicator of the level of internal marketing threats (Usb (vn)). The most significant in this group of threats was the inefficient marketing and credit policy of the enterprise.



a) The dynamics of the indicator of the threat level of market capacity decrease

b) Dynamics of the level of threat of impossibility of attracting external financing

Fig.1. Dynamics of indicators of the level of external threats to the financial security of the enterprise

The second major component (Uf (vn) 2) is to assess the level of threats posed by inefficient investment policies.

The factorial analysis of the information space of indicators of internal threats made it possible to form a system of integral indicators of the level of threats.

As it was revealed, there is an increase in the level of threat of decrease in the effectiveness of marketing policy, ineffective personnel policy, the threat of high wear of equipment.

Thus, the result of the implementation of the first stage of the proposed methodology is to assess the level of external and internal threats to the financial security of the enterprise.

In the second stage, a model of threat significance assessment was constructed. According to the developed algorithms in the first step of the stage, the analysis of causal relationships of threat indicators was conducted, covering the following areas: analysis of causality relations of indicators of external and internal threats; analysis of cause and effect relationships of indices of internal threats, different in the fields of origin; analysis of cause and effect relationships of internal threats and financial security indicators of the enterprise.

The final direction of the analysis of cause and effect relationships of threats should be the analysis of cause and effect relationships of internal threats and indicators of financial security of the enterprise. The list of financial security indicators of the investigated enterprise - Khmelnitsklegprom-Plus LLC - highlighted at the stage of information and expert analysis (Table 3).

Table 3. Financial security indicators of Khmelnitsklegprom-Plus LLC

| Legend | Indicator | Legend | Indicator |
|--------|------------------------------------|--------|--|
| X1 | Ratio of receivables and payables | X7 | The ratio of operating profitability of sales |
| X2 | Absolute liquidity ratio | X8 | Coefficient of financial stability |
| X3 | Urgent liquidity ratio | X9 | Capital maneuverability factor |
| X4 | Current ratio | X10 | Financial leverage ratio |
| X5 | Return on equity ratio | X11 | The ratio of inventory and expense to own sources of formation |
| X6 | Gross profitability ratio of sales | | |

A higher model accuracy is provided by the exponential smoothing model with the damping trend selection. The predicted values of the threat of reducing the capacity of the market are shown in Fig. 2.

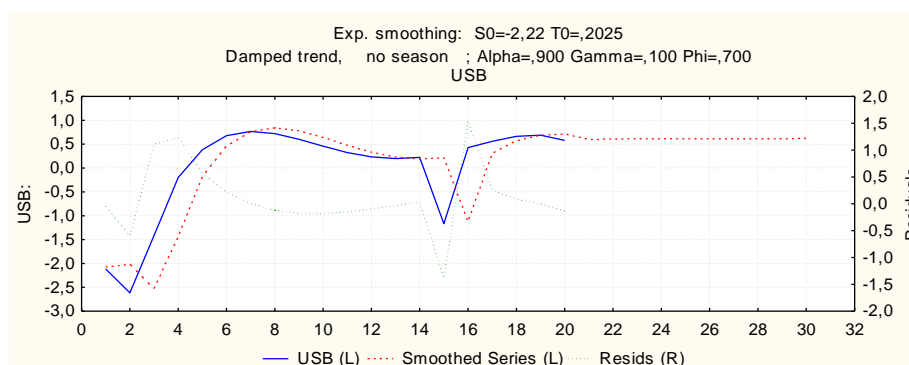


Fig.2. Predictive values of the threat of market capacity decline

Similarly, models for predicting the level of external financial, technological and social threats were developed. Based on the obtained predicted values of financial security indicators of the enterprise in accordance with the proposed methodology and obtained a set of logit-models, the level of financial security of the analyzed enterprise was carried out.

Thus, the projected level of financial security of the enterprise is assessed as low. It should be noted that there is an increase in the probability of transition of the company to crisis both in the dynamic section and in the sector. Under these conditions, the main factors to reduce the negative

impact of which management decisions to improve the security of the enterprise should be determined.

5. Conclusions

Thus, understanding financial security as an object of study in the process of managing an enterprise's potential should be based on an understanding of the nature of the financial system, not limited to such traditional functions of that system as the distribution, redistribution and accumulation of funds. As a system of financial security includes the specific characteristics of financial instruments, shapes the movement of capital, their distribution within the framework of the implemented monetary and credit and financial policies.

The assessment of the level of threats to the financial and economic security of an enterprise in the process of managing its potential should be done using the principal component method. This allows, based on the analysis of the information space of threat indicators, to form integral indicators of the intensity of impact homogeneous in their characteristics of threats. The following classes of threats are considered: external and internal, each of which is divided into marketing, financial, social and technical and technological. The use of this classification allows to take into account the specifics of different areas of activity of the enterprise when choosing tools for localization of threats to its financial security.

To assess the significance of threats, a structural model of financial security indicators of the enterprise was developed, which reflects the cause and effect relationships of external and internal threats and the speed of crisis formation in the financial activity of the enterprise under the influence of threats. The analysis of model coefficients allows to determine changes in the level of financial security when changing the level of threats, as well as to form limit values of the level and indicators of internal threats, which testify to the safe mode of functioning of the financial system of the enterprise and to substantiate effective management decisions.

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