

METHODOLOGICAL APPROACHES TO ASSESSING THE LEVEL OF ECONOMIC SECURITY OF THE ENTERPRISE

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Abstract. The article is devoted to the problem of assessing the level of economic security of enterprises in modern conditions. The authors define economic security as an important aspect of the functioning and development of enterprises in a dynamic economic environment. The authors point out the urgency of the problem of finding criteria and tools for assessing this indicator, given the variety of approaches to determining the economic security of an enterprise in the literature. The methodology uses general scientific and special methods, such as analysis, synthesis, logical, terminological, financial, systemic and structural analysis, systematization and generalization, to confirm the reliability of the results obtained. The approaches and methods for assessing the level of economic security of an enterprise depend on the diversity of interpretations of the very concept of «economic security of an enterprise», which leads to the absence of a single indicator for a full assessment of this phenomenon. Different approaches to assessing the economic security of an enterprise are presented through resource-functional, indicator, profit and investment, three-dimensional, program-target, bankruptcy forecasting, economic and mathematical, systemic and economic risk theory. Each of these approaches uses different methods and criteria to determine the level of economic security of an enterprise. It is noted that economic security assessment can be carried out using various methods, such as expert assessments, regression and variance analysis, exponential smoothing, fuzzy systems theory and multivariate statistical analysis. The author emphasizes the importance of a systematic approach that takes into account internal and external relations, interdependence and subordination of the functional components of an enterprise when assessing the level of its economic security. For a comparative analysis of the levels of functional components of the economic security of enterprise, the authors use the calculation of the rates of change of indicators. The general methodology for calculating indicators of the levels of functional components includes analysis and evaluation of the dynamics of indicators, which indicates trends and changes in various areas of economic security of enterprise.

Keywords: economic security of an enterprise; methodological approaches; assessment; systematic approach; level of economic security; enterprise.

JEL Classification: A 19, B 41, M 21

Formulas: 6; **fig.:** 1; **tabl.:** 4; **bibl.:** 23

Introduction. In today's environment, a significant problem in organizing the normal functioning and development of domestic enterprises is the development and implementation of a system to maintain an appropriate level of economic security. The economic security of an enterprise, like any system, requires constant evaluation. One of the most popular areas of research into economic security of an enterprise is the development of approaches to assessing the level of economic security of an enterprise. Modern scholars have repeatedly attempted to determine the most optimal methodology for assessing the economic security of an enterprise, and today the scientific literature has developed many methodological approaches to determining the level of economic security of an enterprise.

Therefore, the problem of finding criteria and tools for assessing the level of economic security of an enterprise operating in a dynamic economic environment is a significant theoretical, scientific, practical and applied problem. This explains the relevance of the research topic.

Literature review. Assessing the economic security of enterprises is a crucial aspect of strategic management. The literature from 2020-2023 provides insights into various methodological approaches employed in evaluating and enhancing the economic security of enterprises.

Recent studies propose integrated risk-based assessment models to evaluate economic security comprehensively. Authors (Kumar et al., 2020) argue for the incorporation of financial, operational, and geopolitical risks into a unified framework.

Advances in data analytics play a pivotal role in assessing economic security. Researchers (Li & Wang, 2021) explore the application of big data analytics to identify vulnerabilities and enhance proactive decision-making for economic security.

Scenario planning emerges as a valuable methodology for assessing economic security resilience. In their study, Smith and Jones (2022) propose scenario-based assessments to enhance the adaptability of enterprises to unforeseen economic challenges.

Recognizing the interconnectedness of global supply chains, researchers (Chen et al., 2022) emphasize the importance of assessing economic security through a supply chain risk lens, considering vulnerabilities in the supply network.

Metrics for measuring resilience become a focal point in economic security assessments. Authors (Garcia & Rodriguez, 2023) propose a set of resilience indicators to evaluate an enterprise's capacity to withstand economic shocks.

The problems of developing the theoretical and methodological foundations for assessing the level of economic security of enterprises are reflected in many works of researchers such as: O. Anatonian (2013), V. Voropai (2013), L. V. Gnylytska (2011), S. B. Dovbnya (2008), K. S. Dyachenko (2015), I. Y. Ippolitova (2017), L. V. Frolova (2016). However, their studies contain a number of contradictions and controversies. The multidimensional nature of economic security requires a comprehensive evaluation to enhance the resilience and preparedness of enterprises.

Aims. The purpose of the article is to develop a methodological approach to assessing the level of economic security of an enterprise and to test it in practice

Methodology. The methodological basis of the article is the use of general scientific and special methods that serve to confirm the reliability of the results and conclusions obtained, in particular, such as: analysis, synthesis, logical, terminological, financial, systemic and structural analysis, systematization and generalization, etc.

Results. Methodological approaches and methods for assessing the level of economic security of an enterprise depend on the specific content that is included in the concept of «economic security of an enterprise», so due to the large number of approaches to defining the essence of the concept of «economic security of an enterprise», there is no single indicator that would fully adequately assess this phenomenon.

Having studied the existing definitions of the concept of «economic security of enterprise», it can be seen that there are a significant number of approaches to its understanding (Table 1).

Table 1. Scientific approaches to the definition of «economic security of an enterprise»

Author	Definition of «economic security of the enterprise»
<i>1. Economic security as a state of protection against threats to the internal and external environment of business (activity)</i>	
Pletnikova I.	The state of protection of the company's activities from external and internal threats, as well as the ability to adapt to existing conditions that do not adversely affect its operations
<i>2. Economic security as a state of preservation of property and trade secrets</i>	
Dykyi A.	The state of preservation of its property and information in accordance with the chosen strategy and the principle of going concern
<i>3. Economic security as a state of use of corporate resources</i>	
Ivanyuta T.	A state in which, with the most efficient use of corporate resources, an enterprise seeks to prevent, mitigate or protect against existing dangers and threats and ensures the achievement of business goals in the face of competition and business risk
<i>4. Economic security as an identification with the enterprise management system</i>	
Datskiv R.	Availability of competitive advantages due to compliance of material, financial, personnel, technical and technological potentials and organizational structure of the enterprise with its strategic goals and objectives
Tambovtsev V.	The set of properties of the state of the production subsystem of the economic system, which ensures the possibility of achieving the goals of the entire system

Source: developed by the authors based on [5, 6, 9, 15]

The results of the analysis of interpretations of the phenomenon of economic security of enterprise allow us to state that there is no comprehensive, theoretically and methodologically perfect definition, which allowed the author to consider economic security of enterprise as a comprehensive characteristic of the results of enterprise's activity obtained through the efficient use of its resources aimed at achieving strategic goals and protecting its activities from threats of external and internal environments.

The variety of approaches to defining the essence of the concept of «economic security of an enterprise» determines a significant number of methodological approaches to assessing its level (Fig. 1).

Thus, the resource-functional approach is reduced to the calculation of the aggregate criterion of economic security, which is the weighted average of the partial functional criterion of economic security by the share of the importance of the impact of this functional component on the state of economic security of the enterprise as a whole [1, p. 33].

The indicator approach assumes that the level of economic security is established by comparing the actual performance of the enterprise with the values of indicators that serve as thresholds for these indicators and correspond to a certain level of security [3, p. 192].

The profit-investment approach involves comparing the volume of gross investments of the enterprise, made mainly at the expense of reinvested profits, with the amount of invested funds required to carry out measures to ensure its economic security [4, p. 55].

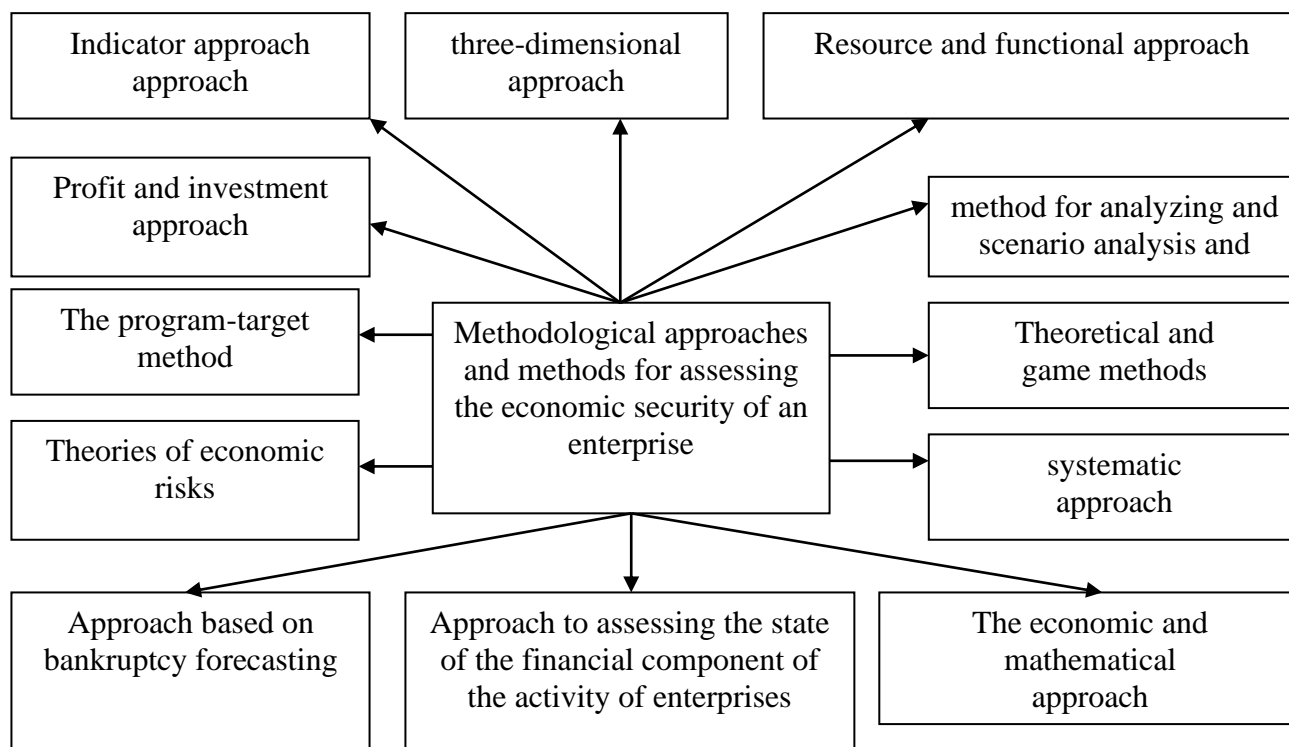


Figure 1. Methodological approaches and methods for assessing the level of economic security of an enterprise

Source: developed by the authors based on [1; 3-4; 5-11; 14-15]

The three-dimensional approach is based on the calculation of the weighted average value of the level of current, tactical and strategic security, which characterizes the overall level of economic security of the enterprise [7, p. 90].

The program-targeted approach is based on the integration of a set of indicators that determine the level of economic security of an enterprise. It uses several levels of

integration of indicators and such methods of their analysis as cluster and multivariate analysis [9, p. 35].

Bankruptcy forecasting methods are mainly reduced to identifying the symptoms of an enterprise's financial crisis. Assessment of the level of economic security of the enterprise is carried out taking into account the level of current solvency [11, p. 97].

The approach to assessing the state of the financial component of the enterprise's activity involves determining the level of economic security based on an assessment of the economic condition of the enterprise and the efficiency of its resources [11, p. 97].

The assessment of the level of economic security of an enterprise by the economic and mathematical approach is carried out on the basis of the functional dependence of the level of economic security of an enterprise on the relevant indicators of its activity. Among the main economic and mathematical methods are: the method of expert estimates, methods of regression and variance analysis, methods of exponential smoothing, methods of fuzzy systems theory, methods of multivariate statistical analysis [13, p. 40].

The systemic approach involves the use of static and dynamic analysis of the enterprise's state in combination. Assessment of the level of economic security of the enterprise is carried out taking into account all internal and external relations, interdependencies and subordination of the functional components of the enterprise.

An approach based on the theory of economic risks, which is based on building a mechanism of economic security of the enterprise based on modeling possible threats and their analysis. Risk, uncertainty or probability is calculated for different threats [16, p. 202].

To assess the level of economic security of an enterprise, the author uses the method of analysis and processing of scenarios, which is intended for forecasting various options for the development of the situation; the optimization method – for selecting the option which achieves the most desirable result; game theoretic methods – for determining the options for the development of an enterprise in an unpredictable external environment; the theory of artificial neural networks – for modeling nonlinear dependencies in solving the problem of ensuring economic security of an enterprise.

After analyzing the most well-known approaches to assessing the level of economic security of an enterprise, it can be concluded that in the modern economic literature there is no single methodology for a comprehensive assessment of economic security of an enterprise with due regard for all the necessary criteria.

However, there are methodological approaches to assessing the level of economic security developed by modern scholars, which are based on the generalization of several approaches. One of the most successful among these methodological approaches, in our opinion, is the approach developed by Khalina V.Y. [17]. The researcher's scientific proposal is to «calculate the rate of change of indicators for assessing the components of economic security with their subsequent «allocation in terms of the nature and direction of influence on the level of economic

security of the enterprise. At the same time, the indicators that tend to increase are in the numerator of the formula for determining the level of a certain functional component of economic security, and those that tend to decrease are in the denominator» [17, p. 179]. Accordingly, «partial indicators of the functional components of the economic security of an enterprise are calculated as the ratio of the product of the rate of change of those indicators that show growth and the product of indicators that show a decrease. The level of economic security of an enterprise is proposed to be calculated as the product of partial indicators of the functional components of the economic security of an enterprise» [17, p. 180].

Having analyzed the most commonly used methods for assessing the level of economic security of enterprise, the authors have determined that it is advisable to use the proposed three-stage assessment process for domestic enterprises. At the first stage, the information base for the study is determined. The sources of information are financial statements, key financial and economic indicators, labor and environmental indicators of the enterprise for the three reporting years, at the second stage – the functional components of economic security of the enterprise are established and a system of evaluation indicators is formed. At the third stage, a generalized indicator of the level of economic security of an enterprise is calculated. To confirm the feasibility of using this methodological approach to assessing the level of economic security of an enterprise, it was tested at an enterprise engaged in the cultivation of cereals (except rice), legumes and oilseeds.

To calculate the generalized indicator of the level of economic security of an enterprise, the authors define its functional components, namely: financial, technical and technological, intellectual and human resources, political, legal and environmental.

When studying the economic security of an enterprise as a complex system, which includes, among other things, a political and legal indicator, problems arise that go beyond formal mathematical problem formulations. To assess the level of the political and legal component of economic security, the method of expert assessments is used. The essence of the expert assessment method is that the forecast is based on the opinion of a specialist or a team of specialists based on professional, scientific and practical experience. Thus, «expert methods in assessing the level of economic security of an enterprise should be used to take into account the indicators by which it is possible to draw qualitative conclusions to a greater extent» [17, p. 179].

The assessment of the political and legal component of the economic security of enterprise is carried out by the following indicators: the formation of the State's attitude to property; political stability in the State; the nature of the State's attitude to the industry; the level of regulation and control by the State; the State's policy in training personnel for the industry; the State's tax policy; laws and regulations; the effectiveness of the legal system; and the practical implementation of legislation.

In order to reduce the proposed indicators to a comparative form when calculating indicators of the levels of functional components of economic security of an enterprise, it is necessary to calculate their rates of change (Table 2).

Table 2. Indicators of the levels of functional components for a comprehensive assessment of the level of economic security of an enterprise

Indicator	Calculation algorithm	Economic essence of the indicator
<i>Assessment of financial component</i>		
The coefficient of of autonomy	Ratio of equity to total financing (summary of the Balance Sheet (statement of financial position))	Characterizes the ability of an enterprise to fulfill its external obligations by using its own assets
Funding ratio	Ratio of borrowed capital to equity capital	Displays how many units of borrowed capital are for each unit of equity capital
The coefficient of coverage ratio	The ratio of current assets to current liabilities of the enterprise	Characterizes the ability of the company to quickly pay off its debt obligations
Receivables turnover ratio	Ratio of net income from sales of products (goods, works, services) to the average annual amount of accounts receivable	Reflects the turnover rate of the company's accounts receivable
Accounts payable turnover ratio	Ratio of net income from sales of products (goods, works, services) to the average annual amount of accounts payable	Reflects the turnover rate of the company's accounts payable for the period under analysis
Profitability of operations	The ratio of gross profit to the cost price of the realized of products sold	Reflects the company's profit from each hryvnia spent on sales
<i>Assessment of the technical and technological component</i>		
Production capacity factor	Ratio of annual labor hours to labor intensity of production	Reflects the maximum possible output for a certain period of time in the established nomenclature and assortment at full equipment utilization
The coefficient of depreciation	Ratio of depreciation of fixed assets to the original cost of fixed assets	Characterizes the share of the cost of fixed assets that was written off to production costs in previous periods
Return on assets	Ratio of production volume in value terms to the average annual cost of fixed assets	Reflects the number of units of manufactured products in UAH per unit of fixed assets cost
Equipment intensive utilization rate	The ratio of the volume of manufactured products for a certain period to the production capacity of the equipment	Reflects the level of production capacity utilization of the enterprise
<i>Assessment of the intellectual and human resources component</i>		
Staff turnover rate	Ratio of the number of people dismissed for voluntary resignation and for violation of labor discipline to the average number of employees	Reflects the movement of personnel in the company, which is caused by employee dissatisfaction with elements of the production situation or the dissatisfaction of the company's head with the employee's production behavior
Labor productivity	The ratio of output to the amount of labor spent on its production	Characterizes the ability of employees to produce a certain amount of output per unit of working time
Labor capitalization rate	The ratio of the average annual value of fixed assets to the average number of employees	Characterizes the level of equipment of employees with fixed assets
Ratio of rationalization activity	The ratio of the number of inventions (rational proposals, know-how, etc.) to the number of employees	Reflects the share of supply that contributes to the increase in labor productivity per employee
Ratio of highly skilled to skilled	Ratio of highly qualified employees to the total number of employees	Characterizes the level of provision of the enterprise with highly

Indicator	Calculation algorithm	Economic essence of the indicator
employees		qualified personnel
<i>Assessment of the environmental component</i>		
Exceedance of the normative volume of emissions of harmful substances into the atmosphere	The ratio of the total pollution indicator by a mixture of substances to the total maximum permissible emission of harmful substances allowed for the enterprise	Characterizes the degree of excess of actual emissions of harmful substances into the atmosphere over the regulatory levels
The coefficient of population of the area of harmful impact	Ratio of the sum of the standard population density and the average population density within the area of harmful impact of the enterprise to the average population density within the area of harmful impact of the enterprise	Characterizes the degree of population in the area of harmful impact of the enterprise, and therefore the potential danger of the enterprise to the population

Source: developed by the authors based on [17, c. 178-179]

Based on the fact that the above indicators (Table 2) comprehensively characterize the impact of factors on the level of economic security of an enterprise, it is necessary to distinguish them in terms of the nature and direction of influence on the level of economic security.

Thus, the level of the financial component of economic security is determined by formula 1:

$$K_{fin} = (t_{pok} \times t_{odz} \times t_p \times t_{avt} \times t_{okz}) / t_{fin}, \quad (1)$$

where t_{pok} – rate of change in the coverage ratio; t_{odz} – rate of change in accounts receivable turnover ratio; t_p – rate of change in the profitability ratio; t_{avt} – rate of change of the autonomy ratio; t_{okz} – rate of change in accounts payable turnover ratio; t_{fin} – rate of change in the funding ratio.

The level of technical and technological component is determined by the formula 2:

$$K_{tt} = (t_{vp} \times t_{fv} \times t_{int}) / t_{zn}, \quad (2)$$

where t_{vp} – rate of change in the production capacity factor; t_{fv} – rate of change in the return on equity ratio; t_{int} – rate of change in the coefficient of intensive use of equipment; t_{zn} – rate of change of the wear coefficient.

The level of the intellectual and human resources component is determined by the formula 3:

$$K_{ik} = (t_{nn} \times t_{foz} \times t_{pa} \times t_{kval}) / t_{pl}, \quad (3)$$

where t_{nn} – rate of change in labor productivity; t_{foz} – rate of change in labor capitalization; t_{pa} – rate of change in the coefficient of innovation activity; t_{kval} – rate of change in the ratio of highly skilled and skilled employees; t_{pl} – rate of change in the staff turnover rate.

The level of the political and legal component is determined by the formula 4:

$$K_{nn} = \prod_{i=1}^n x_i, \quad (4)$$

where n – number of factors analyzed; x_i – value of the indicator of the i -th factor.

The level of the environmental component is determined by the formula 5:

$$K_e = 1 / t_{vik} \times t_l, \quad (5)$$

where t_{vik} – rate of change of the coefficient of exceeding the standard volume of harmful substances emissions into the atmosphere; t_l – rate of change in the coefficient of population of the area of harmful impact.

The normative value of all the above indicators of the level of components of economic security of an enterprise is ≥ 1 , that is, only under this condition the level of the component of economic security of an enterprise is considered acceptable. The

unambiguity and adequacy of the assessment of economic security of an enterprise according to the proposed approach is ensured at the final stage by calculating the generalized indicator of the level of economic security of an enterprise (R) (formula 6):

$$R = K_{fin} \times K_{tt} \times K_{ik} \times K_{nn} \times K_e, \quad (6)$$

Discussion. Thus, if the value of the generalizing indicator (1.6) is greater than 1, the level of economic security of the enterprise can be considered satisfactory, and if it is less, the level of economic security is considered low, in which case it is necessary to return to the assessment of each component of economic security and determine which of them does not meet the normative value and look for the reasons for this state of affairs.

The system of partial indicators of economic security by functional components for 20XX-2, 20XX-1, 20XX is presented in Table 3.

Table 3. Indicators for assessing the level of economic security of the enterprise for 20XX-2, 20XX-1, 20XX.

Indicator	20X-2	20X-1	20XX	Pace of change 20X-1 to 20X-2	Pace of change 20XX to 20X-1
<i>Financial component</i>					
Autonomy ratio	0,423	0,439	0,360	1,04	0,82
Funding ratio	0,733	0,78	0,56	1,07	0,72
Coverage ratio	1,396	1,401	1,324	1,01	0,94
Receivables turnover ratio	1,25	3,47	2,53	2,78	0,73
Accounts receivable turnover ratio	2,30	2,76	2,97	1,20	1,08
Profitability of operations	0,392	0,123	0,155	0,31	1,26
<i>Technical and technological component</i>					
Production capacity factor	433,18	311,28	271,42	0,72	0,87
Depreciation rate	0,52	0,51	0,51	0,98	0,98
Return on assets	6,83	7,85	8,07	1,15	1,03
Equipment intensive utilization rate	0,23	0,32	0,36	1,39	1,16
<i>Intellectual and human resource component</i>					
Staff turnover rate	0,07	0,1	0,08	1,43	0,80
Labor productivity	199,31	530,15	393,31	2,66	0,74
Labor capitalization rate	171,63	170,75	168,25	0,99	0,98
Ratio of highly skilled to skilled employees	0,31	0,33	0,35	1,08	1,06
<i>Ecological component</i>					
Exceedance of the normative volume of emissions of harmful substances into the atmosphere	0,85	0,78	0,79	0,92	1,01
The coefficient of population of the area of harmful impact	0,77	0,7	0,75	0,91	1,07

Source: Primary Data

The overall level of economic security of the enterprise for 2020X-1 and 20XX is calculated as the product of partial indicators of the functional components of the economic security of the studied enterprise (Table 4).

Table 4. Assessment of the level of economic security of the enterprise in 20X-1 and 20XX

Indicator	20X-1	20XX	Pace of change, %
The level of the financial component	1,02	1,06	104
The level of technical and technological component	1,12	1,06	95
The level of intellectual and human resources	1,99	0,96	48
The level of the environmental component	1,19	0,92	77
The level of political component	1,25	1,23	98
The level of economic security of the enterprise	3,38	1,22	36

Source: Primary Data

The calculations of Table 4 show that, despite the increase in the level of the financial component of the economic security of the enterprise by 4 %, the overall level of its economic security during the study period decreased by 64 %, as the level of the technical and technological component decreased by 5 %, the intellectual and human resources component – by 52 %, and the political component – by 2 %. It should be taken into account that in the 20s, the economic security of an enterprise underwent significant negative changes due to a decrease in almost all levels of the economic security components of the studied enterprise, except for the financial one.

Conclusions. The article analyzes the main approaches to the interpretation of the concept of «economic security of enterprise» and systematizes the conceptual approaches to defining the essence of this definition. The proposed methodological approach to assessing the level of economic security of enterprise allows to take into account the specifics of its activities, to identify threats and causes of their emergence in a timely manner, as well as to respond quickly to their manifestations and develop measures to eliminate them. Prospect for further research in this area is the development of specific management measures aimed at both improving the state of economic security of an enterprise and increasing its level.

Author contributions. The authors contributed equally.

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