

MARKETING AND LOGISTICS IN THE ADAPTIVE MANAGEMENT OF ENTERPRISES IN THE CONDITIONS OF DIGITALIZATION

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ABSTRACT

Modern globalization challenges of the formation of a post-industrial society, changes in the processes of economic systems at various levels caused by the Covid-19 pandemic necessitate the development of conceptual principles for the application of marketing and logistics in the adaptive management of enterprises in the conditions of digitalization. The purpose of the study is to substantiate theoretical and methodological principles of evaluating the functioning of marketing and logistics processes at the enterprise in the conditions of digitalization. In terms of evaluating the functioning of marketing and logistics processes at the enterprise in the context of the implementation of the adaptive management principles in the conditions of digitalization, traditional functional roles of these management areas are taken into account, in particular, marketing as a system for organizing effective interaction of the enterprise as a market entity and logistics as a system for establishing effective movement of material and information flows in their time and cost dimensions relative to the compiled production program and the market situation. To evaluate the functioning of marketing and logistics processes at the enterprise in the conditions of digitalization, it is proposed to apply the method of stochastic factor economic-mathematical analysis through the analysis of the main components using the Varimax and Bartlett method. The proposed approach was tested in relation to the activities of ArcelorMittal Kryvyi Rih PJSC. The proposed method of stochastic factor analysis makes it possible to identify groups (components) of the most influential factors affecting relevant performance indicators, provide their quantitative assessment and assess the degree of interrelationship of these factors within individual component.

Keywords: *Marketing, Logistics, Adaptive Management, Digitalization Stochastic Factor Analysis, Principal Component Analysis Method*

1. INTRODUCTION

Modern challenges to the society development are determined by the emergence of post-industrial economic development. Today, post-industrial

society is not just a slogan, but an everyday reality due to the development of innovations, knowledge, digital technologies, creative management of various processes, development of intellectual capital, etc. Such global world trends make it necessary to adapt

economic systems of various levels to new, rapidly changing conditions of social development to ensure their sustainable development, which ensures the adaptation to adverse turbulent changes in the external environment. This determines the relevance of the application of adaptive management of enterprises, which provides the ability to adapt to a changing environment under the conditions of the use of logistics and marketing strategies, taking into account the development of information and communication technologies. The mentioned facts actualize the scientific search in the development of theoretical and conceptual foundations of the application of marketing and logistics in the adaptive management of enterprises in the conditions of digitalization.

Digitalization of economic processes makes it possible to partially eliminate space-time limitations by providing such properties as flexibility, substitutability, asynchrony, dynamism, and complementarity to the processes taking place at the enterprise due to the adaptive management application. The toolkit of the adaptive management is marketing and logistics activity, which makes it possible to apply creative solutions regarding the formation of supply chains, selection of suppliers, expansion of the sales market, formation of distribution networks, expansion of the circle of consumers, etc. due to the use of information and digital technologies.

Digitalization of social development has significantly affected management processes of economic systems. The adaptive management at enterprises is becoming more and more relevant in strategic management, which provides for the possibility of changes in the enterprise development strategies taking into account the effects of the external environment on the basis of constant monitoring and analytical processing of information, researching the experience of other enterprises and implementing new methods and technologies for making management decisions.

The adaptive approach in the enterprise management involves, on the basis of continuous detailed monitoring of the development processes of the business environment and projecting the impact of possible changes in the external environment, the introduction of new management concepts that provide.

The purpose of the study is to substantiate theoretical and methodological principles of evaluating the functioning of marketing and logistics processes at the enterprise in the conditions of digitalization. To achieve the goal, the authors proved the feasibility of applying the stochastic

factor economic-mathematical analysis using the method of principal components, as well as the Varimax component rotation method and the Bartlett method.

An adaptive approach to management and the formation of a post-industrial society led to the use of information technologies in marketing and logistics, which essentially revolutionized the way enterprises manage supply chains and sell on the market. Information technology is used to optimize processes and reduce costs, from tracking deliveries to automating inventory management and selling goods on the market. The advantages of using information technology in logistics marketing include: firstly, increasing sales efficiency and at the same time improving the level of customer service thanks to the automation of processes such as tracking orders and shipments, companies can reduce the time spent on manual tasks and focus more on the main types of activities. Second, by using information technology in logistics, businesses can reduce costs associated with manual processes such as paperwork, phone calls, and data entry errors. Third, to increase the level of economic security, thanks to information technology, businesses can ensure that their supply chain operations are protected from cyber threats or attackers who may try to disrupt operations or steal sensitive data. This helps protect businesses from financial losses caused by data breaches or other security incidents. Fourth, improve management decision-making: By having access to real-time data about their supply chain operations, companies can make better decisions about inventory management, delivery schedules, and other related actions. This helps improve customer service while optimizing resources for greater efficiency and cost savings. Fifth, with the help of IT technologies, companies can reach a wider audience, improve the customer experience and increase their profits.

Therefore, analytical information is presented regarding the relevance of this topic of scientific research, since the use of modern information technologies makes it possible to change the effectiveness of the functioning of enterprises due to the implementation of adaptive management, and taking into account these changes requires the implementation of a methodological toolkit to determine the effectiveness of the functioning of marketing and logistics processes at the enterprise. This will be facilitated by the substantiation of the conceptual principles of using the method of deterministic factor analysis using the method of principal components, as well as the method of

rotation of Varimax components and Bartlett's method.

2. LITERATURE REVIEW

The company's strategy on the innovative development contributes to achieving competitive advantages and entering global markets. Modern digitalization trends require new approaches to the system of marketing and logistics activities and their adaptive management. Confirmation of the relevance and timeliness of the research direction is the presence of a significant number of publications by leading scientists.

The authors of the article [1] investigated the influence of the environmental marketing behavior of Chinese enterprises on the consumers' readiness for ecological consumption. As a conclusion, scientists note that the ecological marketing behavior of enterprises has a positive effect on consumers' intentions regarding ecological consumption, ecological awareness of consumers weakens the mediating role of perceived efficiency by consumers.

Within the scope of the study [2], the authors analyze the mediating role of aspects of environmental marketing orientation in the relationship between the stakeholder risk and new product success among European multinational enterprises. The authors believe that past research has mostly focused on the stakeholder pressure; however, this study focuses on the risks associated with these pressures and how these risks affect the success of new products.

The purpose of the paper [3] is to investigate the impact of marketing communication capabilities on sustainable competitive advantage by examining the mediating effect of the product development and sales capabilities. Within the article, the impact of the information technology turbulence on the relationship between marketing communication capabilities and the company's competitive advantage is analyzed.

As a result of the research [4], the study of the impact of the environmental strategy on dynamic capabilities based on digital literacy and the effectiveness of marketing innovations for micro, small and medium enterprises is presented. The authors believe that dynamic capabilities based on digital literacy consist of two important components, namely marketing competencies and research and development competencies.

The researchers [5] identified the prerequisites and implications of social media marketing for small and medium-sized enterprises and empirically

investigated whether SMM provides strategic competitive advantages to SMEs. The authors investigated that SMM has a positive effect on both the utilitarian and hedonic value.

Within the scope of the article [6], an empirical study was conducted to explain how marketing effectiveness can be improved through the ability to connect customers. The authors believe that the relationship capital, integrated marketing communication and relevant market intelligence have a significant positive impact on the customer's relationship performance and marketing effectiveness.

The scientists [7; 8; 9] are convinced that in the globalization era, digital marketing platforms play a significant role in increasing the customer's loyalty and indirectly affect economic growth of the community. Researchers have investigated the role of digital marketing platforms (online media) and their structural relationship with consumer satisfaction and loyalty in SMEs. Within the scope of the study, the authors assessed the role of the digital supply chain, consumer's satisfaction and loyalty in providing SME products with competitive advantages that contribute to the regional economic growth.

The authors of the papers [10; 11; 12] analyze the relationship between market orientation, innovation, and marketing effectiveness in a single mediation model by including an innovation mediation variable. Scholars have recommended that public policies encourage innovation in SMEs, and encourage SME's managers to pay more attention to and manage innovation to improve their marketing activities and operational efficiency.

Despite the existing publications, the study of issues of the adaptive management of marketing and logistics activities of enterprises in the conditions of digital transformations requires further research.

3. METHODOLOGY

The changes caused by the Covid-19 pandemic proved the existence of a significant limitation on the enterprise development, and at the same time highlighted the unlimited space and time of such a resource as information and the value of digitalization under the conditions of certain physical limitations of economic development. It is digital technologies and information that make it possible to adapt the company's resources and processes, giving them such properties as:

- flexibility – implies the flexibility of the assortment, price, production policy of the

enterprise, taking into account the rapidly changing factors of time and space);

- substitutability – consists in substitutability of materials, resources and their suppliers;

- asynchrony - consists in the asynchrony of the spatial location, which is expanded due to digital technologies in relation to the time of sales, production, implementation;

- dynamism - implies the dynamism of integrated structures through clusters, network groupings, supply chains, which makes it possible to reduce the risks and costs of enterprises;

- complementarity - consists in building new relationships between spatially interacting and complementary processes of the enterprise's functioning.

The construction of economic models for evaluating the effectiveness of the implementation of economic processes at the level of entrepreneurial formation requires a thorough analysis of the selected evaluation object to highlight the most significant internal relationships and interdependencies that significantly affect the representativeness of the modeling results. In terms of evaluating the functioning of marketing and logistics processes at the enterprise in the context of the implementation of the principles of the adaptive management, it is necessary to take into account the traditional functional roles of these management directions, in particular, marketing as a system for organizing effective interaction of the enterprise as a market entity (formation of competitive product parameters, pricing procedure, system channels distribution and the basic principles of the promotion policy), and logistics as a system for establishing effective movement of material and information flows in their time and cost dimensions relative to the compiled production program and the market situation. However, it should be noted that the evaluation of the mentioned processes in terms of the application of the adaptive management approaches requires a detailed analysis of the endogenous factors and dependencies inherent in these processes to ensure the comprehensiveness and utilitarianism of the obtained results. That is why, within the framework of this study, it is proposed to use the extended approach to assessing logistical aspects of the enterprise's activity, primarily as a system for ensuring optimal movement of the resource components of the organization's economic potential. The mentioned approach has gained wide development in theoretical and practical activities:

- firstly, in terms of relevant functional directions, supplementing traditional spheres of the logistics

management (purchasing, warehousing, transport, information logistics);

- secondly, such directions as production logistics (optimization of the processes of organizing the movement of the material resources in production processes);

- thirdly, financial logistics (ensuring effective management of cash flows at the enterprise within the framework of established internal and external financial relations);

- fourthly, personnel logistics (organization of the effective movement of personnel resources in the established logistics systems of the enterprise).

In turn, the evaluation of marketing activities also needs to focus on the internal aspects of their implementation, as a prerequisite for the formation of effective adaptive properties of the system, capable of promptly responding to external economic fluctuations. We would like to note that a natural addition to the formed conceptual evaluation model is the consideration of modern trends towards comprehensive digitalization of economic processes, which is the primary source of the resources mobilization for the growth and intensive development of the business structure, which should be reflected in the form of appropriate quantitative evaluation parameters of the proposed model.

Thus, the formation of a representative model for evaluating implementation processes of marketing and logistics activities of the enterprise in terms of adaptive management approaches requires the use of a methodological apparatus of the economic and mathematical analysis capable of providing a deep and multifaceted consideration of the existing quantitative relationships of the most influential parameters of the system, which is due to the complexity of the interaction of the key functional processes of these areas of the management activity. Based on this, within the framework of this study, it is proposed to apply the factor analysis method, which allows, based on the formed array of descriptive parameters of the system (marketing and logistics activities), identify groups (components) of the most influential factors affecting relevant performance indicators, provide their quantitative assessment, as well as assess the interrelation degree of these factors within individual components. Thus, the use of this method will allow, on the basis of the set of analyzed indicators, to reasonably systematize them according to the degree of influence and provide appropriate quantitative estimates of such influence.

In the applied plane of building economic models based on the factor analysis method, two possible options for its application can be distinguished - in

the form of deterministic or stochastic factor analysis.

The deterministic factor analysis method is implemented, if it is possible, to clearly identify stable quantitative relationships between the selected parameters of the analyzed phenomenon with the presence of the corresponding resulting variable.

At the same time, stochastic factor analysis is used in the process of analyzing phenomena, the interrelationship of internal quantitative parameters of which has an indirect nature, which makes it impossible to identify a stable (deterministic) mathematical dependence. Taking into account the above-mentioned facts, within the framework of building a model for evaluating the processes of implementing marketing and logistics activities of the enterprise in terms of the adaptive management approaches, using the example of ArcelorMittal Kryvyi Rih PJSC, it is proposed to use the method of the stochastic factor analysis.

A feature of the application of the stochastic factor analysis in the process of modeling economic processes is the probabilistic nature of the relationship of the analyzed set of factors, which allows to additionally take into account the influence of an uncontrolled set of factors on the analyzed phenomenon. As part of this type of analysis, the input array of data (quantitative parameters characterizing the phenomenon under study, without limitations in size, units of measurement or type of indicators) is first formed, on the basis of which the dimensionality of the selected number of factors is subsequently reduced, and the quantitative level of their influence is identified.

Taking into account the wide range of methods of implementing the stochastic factor analysis, within the framework of this study, the method of the main components analysis was chosen. This method allows you to identify available factors that determine the existence of a stochastic (probabilistic) relationship between them. At the same time, the method makes it possible to group the proposed set of factors between which a correlation is observed into principal components, at the same time, there is no such connection between these components. In addition, the degree of influence of each principal component on the analyzed phenomenon is determined, as well as the influence of individual parameters within the components. The representativeness of the constructed model according to this method also depends on the presence of a sufficient number of descriptive parameters of the studied phenomenon.

In general, the implementation of the stochastic factor analysis technique using the principal

components method is carried out according to the following algorithm of actions represented by formula (1):

$$X \rightarrow Z \rightarrow R(S) \rightarrow \left\{ \begin{matrix} A \\ U \rightarrow V \end{matrix} \right\} \rightarrow A \rightarrow F \quad (1)$$

where X - input data matrix, dimension is $m \times n$;

m - number of analyzed parameters;

n - number of researched objects (years);

Z - matrix of normalized values of the studied parameters, calculated according to the formula (2):

$$\frac{x_{ij} - x_j}{\sigma_j} \quad (2)$$

R - matrix of pairwise correlations ($r=1/n \times Z^{\wedge} Z$);

A - factor mapping matrix;

a_{rj} - weighting coefficients, components of the factor mapping matrix;

Λ - diagonal matrix of characteristic numbers. The above-mentioned matrix of characteristic numbers (Λ) is formed as follows, according to formula (3):

$$\Lambda = \begin{pmatrix} \lambda_1 & 0 & 0 & \dots & 0 \\ 0 & \lambda_2 & 0 & \dots & 0 \\ 0 & 0 & \lambda_3 & \dots & 0 \\ 0 & 0 & 0 & \dots & \lambda_m \end{pmatrix} \quad (3)$$

The level of indicators λ_m is calculated by finding a solution to the following equation (4):

$$|R - \lambda E| = 0 \quad (4)$$

where λ_j is the level of dispersion of a separate principal component (characteristic variation).

The final matrix of values of the obtained principal components can be determined according to one of the formulas (5-7):

$$F = A^{-1} Z' \quad (5)$$

$$F = \Lambda^{-1} A' Z' \quad (6)$$

$$F = \Lambda^{-1/2} V' Z' \quad (7)$$

where V - matrix of normalized characteristic vectors.

4. RESULTS

ArcelorMittal Kryvyi Rih PJSC was chosen as the research enterprise. Summarizing the above, in the course of researching the processes of the enterprise's marketing and logistics activities in the context of the adaptive management application on the example of ArcelorMittal Kryvyi Rih PJSC, an input data array was formed in the form of 25 indicators, which serve as the analytical basis of the future model. We would like to add that the presented indicators comprehensively characterize the most influential aspects of logistics, marketing and digitalization processes in the context of the formation of the adaptive management system at the enterprise. The formed array of input data for carrying out the stochastic factor analysis using the

principal components method is presented below in the Table 1.

The implementation of necessary calculation operations according to the selected factor analysis method using the principal components was implemented by using specialized software, namely IBM SPSS Statistics 20. Note that the following parameters were selected during the implementation of the necessary mathematical calculations: the Varimax component rotation method (this method

allows you to achieve the minimum number of variables characterized by a high level of factor loading while maintaining the orthogonality (independence) of the factors), Bartlett's method (allows to check the adequacy of the proposed model), the determined maximum number of iterations to obtain convergence is 25.

Table 1: Input data for carrying out the stochastic factor analysis by the principal components' method.

№	Indicator	Year			
		2018	2019	2020	2021
1	Autonomy coefficient, %	0,462	0,465	0,721	0,721
2	Equity maneuverability ratio, %	-0,076	0,072	0,071	0,289
3	Current liquidity ratio, %	0,502	0,923	0,864	2,487
4	Absolute liquidity ratio, %	0,000	0,006	0,005	0,005
5	Critical liquidity ratio, %	0,159	0,215	0,037	0,065
6	Total solvency ratio, %	2,004	0,203	0,145	0,144
7	Growth rate of accounts payable turnover, %	60,416	100,661	141,938	87,742
8	Growth rate of turnover of receivables, %	71,961	33,291	51,199	126,397
9	Return on assets, %	0,065	-0,436	-0,074	1,506
10	Return on equity, %	-8,690	-1,249	-0,131	3,008
11	Profitability of sold products, %	13,739	13,414	2,294	3,650
12	Profitability of production assets, %	-7,019	-0,991	-0,117	2,851
13	Growth rate of the volumes of sold products, %	72,116	190,219	138,921	121,935
14	Depreciation rate of fixed assets, %	42,755	48,956	49,897	50,398
15	Growth rate of labor productivity, %	77,379	192,392	127,886	108,081
16	Growth rate of the armed forces, %	15,748	21,473	22,412	22,160
17	Growth rate of fund return, %	0,307	0,601	1,142	1,731
18	Reception staff turnover rate, %	0,080	0,081	0,163	0,188
19	Turnover rate from personnel attrition, %	0,133	0,124	0,089	0,093
20	Coefficient of the personnel training for new professions, %	0,004	0,056	0,062	0,063
21	Coefficient of the staff qualification improvement, %	0,080	0,052	0,047	0,106
22	Growth rate of gross investment in fixed capital, %	72,100	39,592	650,826	0,000
23	Growth rate of spending on digital innovations, %	0,000	52,723	167,679	0,000
24	Growth rate of digitalization costs, %	1326,640	0,000	11247,600	0,000
25	Growth rate of digital software spending, %	0,000	0,000	72,100	0,000

Source: compiled by the authors based on calculations based on company data

The obtained results of calculations based on the parameters listed above made it possible to form a matrix of full explained variance, which demonstrates a mathematically justified number of main components (factors) and corresponding numerical indicators of their influence on the studied phenomenon. The matrix of the complete explained variance in tabular form is presented in Table 2 below.

To ensure greater clarity of the results of the calculations, we suggest considering the graph of the simple normalized stress and the graph of the components in the rotated space, presented in Fig. 1.

Based on the results of the calculations presented in the Table 2 and Fig.1, the analyzed array of input parameters (Table 1) can be grouped into 3 main components, while the influence of the first component is 54%, the second – 27.7%, and the third – 18.3%. Convergence was achieved in 6 iterations.

Table 2: Total explained variance.

Component	Initial eigenvalues			Sums of squares of extraction loads			Sums of squares of rotation loads		
	Total	Dispersions, %	Cumulative, %	Total	Dispersions, %	Cumulative, %	Total	Dispersions, %	Cumulative, %
1	13,496	53,984	53,984	13,496	53,984	53,984	9,118	36,471	36,471
2	6,923	27,694	81,677	6,923	27,694	81,677	8,836	35,342	71,813
3	4,581	18,323	100,000	4,581	18,323	100,000	7,047	28,187	100,000

Source: compiled by the authors based on calculations using IBM SPSS Statistics 20

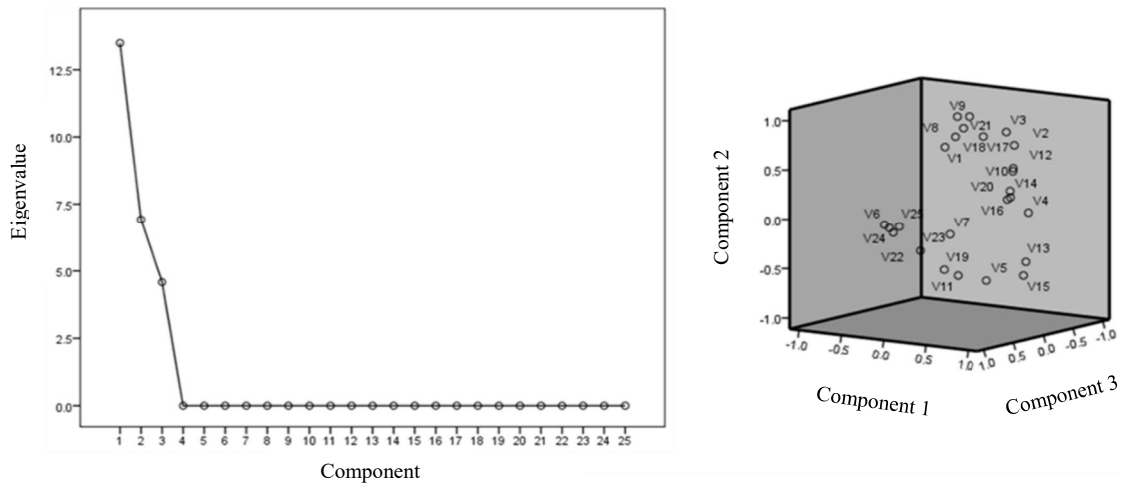


Figure 1: Plots of simple normalized stress and component in rotated space

Source: compiled by the authors based on calculations using IBM SPSS Statistics 20

It is worth noting that the tool of the factor analysis allows to additionally identify the level of influence of endogenous parameters within each of the isolated components in their quantitative measurement. That is why we propose to consider the distribution of predefined parameters for evaluating marketing and logistics activities of

ArcelorMittal Kryvyi Rih PJSC in the context of the implementation of the adaptive management approaches in three components. The distribution of endogenous evaluation parameters according to the selected main components is presented below in the Table 3.

Table 3: Matrix of rotated components.

Changeable	Component		
	1	2	3
V1	,313	,792	,524
V2	,646	,744	-,170
V3	,445	,835	-,323
V4	,988	,132	,079
V5	-,016	-,765	-,643
V6	-,941	-,235	-,245

V7	,578	-,025	,816
V8	-,144	,930	-,339
V9	,027	,954	-,299
V10	,832	,542	,119
V11	-,316	-,738	-,596
V12	,818	,567	,093
V13	,923	-,384	,029
V14	,894	,368	,255
V15	,839	-,542	-,049
V16	,903	,291	,315
V17	,491	,861	,133
V18	,323	,874	,362
V19	-,456	-,688	-,564
V20	,912	,307	,273
V21	-,249	,766	-,593
V22	,035	-,037	,999
V23	,308	-,203	,930
V24	-,010	,007	1,000
V25	,102	,031	,994

Source: compiled by the authors based on calculations using IBM SPSS Statistics 20

The data presented above show that the second component is the most numerous in terms of the number of covered parameters (11 indicators), the first component includes 9 indicators, the third component is the smallest in number (5 indicators).

Next, we propose to systematize the obtained calculation results by ranking individual endogenous parameters within each of the selected components according to their influence level (Table 4).

Table 4: Systematization of constituent parameters of the main components by the influence level.

Component								
I			II			III		
53,984%			27,694%			18,323%		
Variable name	Changeable	Influence	Variable name	Changeable	Variable name	Variable name	Changeable	Influence
Absolute liquidity ratio, %	V4	0,988	Return on assets, %	V9	0,954	Growth rate of digitalization costs, %	V24	1,000
Total solvency ratio, %	V6	0,941	Growth rate of turnover of receivables, %	V8	0,930	Growth rate of gross investment in fixed capital, %	V22	0,999
Growth rate of the volumes of sold products, %	V13	0,923	Reception staff turnover rate, %	V18	0,874	Digital software spending growth rate, %	V25	0,994
Coefficient of the personnel training for new professions, %	V20	0,912	Growth rate of fund return, %	V17	0,861	Growth rate of spending on digital innovations, %	V23	0,930
Growth rate of the armed forces, %	V16	0,903	Current liquidity ratio, %	V3	0,835	Growth rate of accounts payable turnover, %	V7	0,816
Depreciation rate of fixed assets, %	V14	0,894	Coefficient of autonomy, %	V1	0,792			
Growth rate of the labor productivity, %	V15	0,839	Coefficient of the staff qualification improvement, %	V21	0,766			

Return on equity, %	V10	0,832	Critical liquidity ratio, %	V5	- 0,765			
Profitability of production assets, %	V12	0,818	Equity maneuverability ratio, %	V2	0,744			
			Profitability of sold products, %	V11	- 0,738			
			Turnover rate from personnel attrition, %	V19	- 0,688			

Source: compiled by the author based on calculations using IBM SPSS Statistics 20

So, the results of the factor analysis using the principal components method presented above allow us to interpret the obtained data in terms of the components of each component and the nature of their influence on the implementation of marketing and logistics activities of PJSC Arcelormittal Kryvyi Rih in the context of the implementation of the adaptive management approaches in the conditions of digitalization. Next, we suggest analyzing the identified components.

Component I. The analysis of the components of the endogenous parameters of the first component shows that the greatest impact on the effective implementation of marketing and logistics activities of ArcelorMittal Kryvyi Rih PJSC in the context of the implementation of the adaptive management approaches is exerted by financial (indicators of liquidity, solvency, profitability) and production logistics (indicators equipment, depreciation, labor productivity, profitability of production assets). At the same time, from the standpoint of the marketing policy, the product policy and promotion policy of ArcelorMittal Kryvyi Rih PJSC have a predominant influence, which is confirmed by the high level of influence of indicators of the dynamics of sales volume and profitability.

Thus, it can be stated that in the integration process of the adaptive management approaches, the issues of financial and production direction are of primary importance (54%), focused on the construction of the marketing strategy relevant to the current state of the market situation from the point of view of the solvent demand level and the effectiveness of the selected product promotion tools.

Component II. The second component is the most numerous in terms of the number of endogenous parameters, which in total make up 27.7% of the weight of influence on the phenomenon under study. It should be noted that this set of indicators mainly covers personnel logistics issues (recruitment staff turnover, staff qualification improvement, staff recruitment and exit turnover), as well as certain elements of marketing activities in terms of the distribution policy (growth rate of receivables) and

the pricing policy and promotion (profitability and liquidity indicators as the ability of the existing marketing strategy to quickly convert existing assets into cash).

Thus, this component demonstrates the importance of the influence of the efficiency degree of the internal movement of human resources, together with the ability of the enterprise to build an objective, appropriate to the existing external conditions system of the price formation and direct delivery of PJSC ArcelorMittal Kryvyi Rih products to the consumer.

Component III. Within the framework of the third component, the indicators of the digitalization dynamics of economic processes of PJSC Arcelormittal Kryvyi Rih, in particular, the dynamics of costs for digitalization, digital software and digital innovations, are the key source of managerial influence on the development of adaptive properties. It is worth noting that the obtained results also emphasize the importance of attracting and effective use of credit and innovative resources of the enterprise in their relationship with the corresponding digitalization processes.

Based on this, it can be stated that the overall impact of digitization processes on the effectiveness of implementing the adaptive management approaches in the marketing and logistics activities of ArcelorMittal Kryvyi Rih PJSC is 18.3%.

It should be noted that marketing and logistics in the adaptive management of enterprises in the conditions of digitalization enables enterprises to:

- ensure sustainable development and profit growth through the introduction of new business models with the adaptive management and consideration of current consumer challenges in the market, including through the introduction of new services and products;

- increase the efficiency of the enterprise as a result of the introduction of digital technologies in various areas of the enterprise, including: use of digital technologies in business and production processes, optimization of supply chains and the use of resources, increasing the efficiency of control and

the application of new principles of remote control of operations and processes at the enterprise, etc.;

- increase labor productivity by improving management decision-making with adaptive management, introduction of digital technologies and new automated systems at workplaces;

- increase sales volumes by finding new customers, ensuring a high degree of personalization of goods and services, taking into account the possibilities of physical and digital space.

4. DISCUSSION

Considering the paper to be of practical importance [13], we want to emphasize the relevance of the research on the impact of entrepreneurship, marketing capabilities, relational capital, and empowerment on innovation and productivity. We support the authors' view that innovation and efficiency can be enhanced through the development of entrepreneurship, marketing capabilities, relational capital, and empowerment. Supporting the opinion of scientists, it should be noted that in modern conditions, the logistics sphere is the basis of socio-economic activity [14].

Supporting the opinion of scientists, it should be noted that in modern conditions, the logistics sphere is the basis of socio-economic activity [14]. From the point of view of the digital transformation of logistics enterprises, it is really appropriate to distinguish [15] three levels of the logistics value chain, delicate development of operations and digital logistics activities. We share the vision of scientists regarding the use of the most trending digital technologies at logistics enterprises.

Considering the research of the authors [16] as relevant, we would like to draw attention to the interview conducted by the authors with logisticians of small and medium-sized enterprises in order to investigate issues related to the introduction of new technologies. The researchers propose a conceptual framework for tracking technological learning as a guide for management to support a modern logistics initiative at the company level with a bottom-up approach.

Positively evaluating the research [17; 18], attention should be paid to the conducted assessment of the main trends in the use of logistics in the foreign economic activity of the enterprise, modern approaches to management accounting, economic conditions and opportunities for the use of logistics. The authors developed a model and methodology for evaluating the effectiveness of managing financial processes in the logistics systems of industrial enterprises [19; 20] deserves the attention of

scientists. Based on methods of standardization and updating of data, the authors formed groups of factors that determine the key criteria for managing financial processes at industrial enterprises in the context of economic logistics, which, in our opinion, is appropriate in this direction of research.

However, we would like to note that, unlike the existing work of scientists, the article substantiates the theoretical and methodological principles of evaluating the functioning of marketing and logistics processes at the enterprise in the conditions of digitalization, which was not paid enough attention before.

5. CONCLUSIONS

Summarizing the above results of the factor analysis using the principal components method, it can be stated that the organization of the effective functioning of marketing and logistics activities, based on the adaptive management approaches in the conditions of digitalization, can be systematized into three main directions according to the influence degree:

- firstly, establishing effective processes of financial and production logistics in their close relationship with issues of the promotion and product marketing of manufactured products (54%);

- secondly, optimization of the internal movement of personnel resources as a component of effective personnel logistics, together with the creation of effective mechanisms for pricing and distribution of manufactured products (27.7%);

- thirdly, implementation of active digitalization of business processes at the enterprise with the possible involvement of credit and investment resources (18.3%).

The scientific novelty of the obtained results lies in the substantiation of theoretical and methodological principles of evaluating the functioning of marketing and logistics processes at the enterprise in the conditions of digitalization, which involves: firstly, taking into account such specific properties of processes at the enterprise under the influence of digitalization as: flexibility, variability, asynchrony, dynamism, complementarity; secondly, the application of stochastic factor economic-mathematical analysis, namely the analysis by the principal components method; thirdly, the use of the Varimax component rotation method and Bartlett's method, which ensure the achievement of the minimum number of variables characterized by a high level of factor loading while maintaining the orthogonality of the

factors and allows checking the adequacy of the proposed model.

The proposed theoretical and methodological approach for evaluating the processes of the implementation of marketing and logistics activities of the enterprise in terms of adaptive management approaches, which was tested on the example of the implementation of adaptive management approaches in the marketing and logistics activities of ArcelorMittal Kryvyi Rih PJSC, makes it possible to obtain a thorough and multifaceted consideration of existing quantitative relationships of the most influential parameters of the system, which is due to the complexity of the interaction of key functional processes of these areas of management activity and to evaluate the effectiveness of these management approaches.

The obtained results of the factor analysis using the method of main components allow to interpret the calculated data in terms of the components of each component and the nature of their influence on the implementation of marketing and logistics activities in the context of the implementation of adaptive management approaches in the conditions of digitalization as a result of the application of the proposed stochastic factor economic-mathematical analysis using the method of main components component, as well as the Varimax component rotation method and the Bartlett method.

The use of this method allows, on the basis of a complex of analyzed indicators, to reasonably systematize them according to the degree of influence on the performance of the enterprise and to provide appropriate quantitative estimates of such influence.

However, it should be noted that the proposed approach, like any method of factor analysis, has certain disadvantages, which include the constant change of influencing factors on the final result of the operation of the enterprise, which requires the adoption of adaptive management decisions in accordance with the emergence of new threats and risks, which, in turn, requires the adaptation of the proposed methodical approach to new conditions and a review of factors affecting the effectiveness of marketing and logistics activities.

The issue of increasing the effectiveness of marketing activities using digital technologies to increase the competitiveness of enterprises on the international market requires further research.

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