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# ASSESSMENT OF EXTERNAL DETERMINATIVES AFFECTING THE FORMATION AND FINANCING OF MARKETING STRATEGIES IN THE FIELD OF INFORMATION TECHNOLOGY

## ABSTRACT

The purpose of this article is to substantiate the key determinants of the external environment, which significantly affect the formation and financing of modern marketing strategies in the field of information technology. The study analyzes the system of financing marketing strategies in the field of information technology in Ukraine. According to the results of the literature review, the synergistic effect of the influence of determinants on the policy of formation and financing of marketing strategies in the field of information technology is identified. For this purpose, the method of economic analysis was used to assess the strength of the relationship between different determinants, the synergetic method, which revealed a possible group effect on the formation and financing of marketing strategies. In addition, the method of multiple regression analysis was used to reflect the influence of factors on the level of financing of marketing strategies in the field of information technology. The innovativeness of the obtained results is disclosed through the developed scientific approach to assessing the relationship of certain determinants in the field of formation and financing of modern marketing strategies in the field of information technology by identifying the common effect of influence. The results of the study substantiate the fact that martial law has a negative impact on the formation and financing of modern marketing strategies in the field of information technology. The results of the calculations showed that the development of information technology is explained by significant changes in the external environment. The study has limitations in the form of taking into account only the field of information technology and not taking into account other factors that also indirectly have an impact. Prospects for further research will be aimed at studying the determinants of the post-war period.

**Keywords:** determinants of influence, marketing strategies, information technology, influence on the level of funding, state of war

**JEL Classification:** B26, B22, O31

## INTRODUCTION

Marketing policy is a special form of activity that requires a comprehensive and at the same time integrated approach, allowing the company to obtain the desired socio-economic effect. At the same time, marketing as a separate scientific branch has grown and is constantly being supplemented with new research. It should be noted that one of the key problems is a strategic approach to marketing activities. The fact is that most Ukrainian enterprises find themselves in a hyperdynamic external environment, where change is a normal phenomenon. In such conditions, sustainable forecasting and the formation of a sustainable development strategy are unlikely.

The dynamic development of the information technology industry and fierce competition require companies to constantly improve their marketing strategies. This is especially true for the management of sales channels and innovative activities of companies operating in the information technology market. At the same time, the transformation of market relations between the main subjects of the IT sector, increasing the competitiveness and efficiency of IT enterprises is directly related to the development of marketing and the internal market. It is obvious that in the context of active processes of

globalization, digitalization and increased competitive pressure, it is necessary to take special control over the influence of factors in the marketing environment on production and sales activities and formulate marketing strategies that help increase the competitiveness of IT products and create conditions for enterprises to enter foreign markets. It should be noted that the IT sector is unique and has no physical boundaries. An IT company in Ukraine may be geographically located within the country but will operate, for example, in the French market. This requires a special marketing approach. At the same time, the process of forming a marketing strategy is influenced by low factors and determinants that determine the vector of building the strategy itself and even the volume of its financing. The IT sector is no exception, especially given the conditions of the war that continues in Ukraine. If, for example, before the start of a full-scale war, such Ukrainian IT companies as GSG-World formed their marketing campaign with a focus on the Russian market, now it is completely excluded from the strategy. This is just one example, but it demonstrates how various factors can significantly change the marketing prospects of an IT enterprise. As a result, it is necessary to highlight the most modern determinants that today influence the formation and financing of marketing strategies in Ukraine.

## LITERATURE REVIEW

Today, the issue of forming and financing marketing strategies in the field of information technology is a pressing topic for scientific research. As noted by Azzam et.al. (2023) today, an effective marketing strategy allows you to sell a product with any qualitative and quantitative characteristics. However, from our point of view, in order to achieve this, it is necessary to take into account a significant number of factors and determinants. Regarding information technology, an interesting point was made by Gupta, et.al. (2020) that the information technology industry itself is dynamic since the rapid development of information technologies has caused a reduction in the life cycle of information products (over the past 10 years, the life cycle of information products has decreased by an average of 3 times, (from 3-5 years to 1 year). We also agree with the opinion of Ginevičius (2007) that it is information technologies in modern marketing that play a key role in solving strategic problems.

It is appropriate to note Hoffman et.al. (2022) and Kolisnychenko et. al. (2023), whose research confirms that in the modern world, information technology is increasingly becoming a key element of a successful marketing strategy. With the rapid development of digital platforms and online tools, approaches to promoting products and services require constant adaptation. Companies that successfully integrate innovative technologies into their marketing strategies have the opportunity to increase their competitiveness and achieve greater efficiency in their interactions with customers. We agree with such statements and believe that the world is full of new information technologies and without marketing it is impossible to obtain a socio-economic effect from them today. Bondarenko, et. al. (2020) notes that in recent years in Ukraine, along with the growing role of marketing, the importance of marketing communications has increased. Marketing communications provide the opportunity to convey messages to consumers to make a company's products and services attractive to the target audience. Despite this, their role continues to grow every year. At the same time, most scientists (Nair, 2021; Kulish, 2023) have come to the conclusion that it is information technology that creates new opportunities for personalizing marketing campaigns and attracting target audiences. However, the rapid development of information technology is not the only challenge for marketers: the war in Ukraine and the consequences of the COVID-19 pandemic have left their mark on the introduction of economic activity. Therefore, as noted by Kryshchanovych et.al. (2022) and Yankovoi (2023) due to the war, the amount of funding for marketing strategies will be significantly reduced, and information technology will fade into the background.

In summary, this literature review reflects a wide range of perspectives and research findings, from strategic optimization and relationship marketing to the integration of advanced technologies such as AI, VR and AR into marketing strategy formulation. Collectively, these studies highlight the importance of adaptability, technology integration, customer-centric approaches, and sound financial planning in formulating and implementing effective information technology marketing strategies.

## AIMS AND OBJECTIVES

The main goal of the article is to substantiate the key determinants of the external environment, which have a significant impact on the formation and financing of modern marketing strategies in the field of information technology. Our task is to identify the synergistic effect of the influence of indicators on the policy of formation and financing of marketing strategies in the field of information technology.

## METHODS

The key method of the entire methodology is canonical analysis. This method allows us to assess the strength and nature of the relationships between various determinants influencing marketing strategies in information technology. At the same time, this method is classified as a statistical method. Its feature is the understanding of how multiple sets of independent variables are related to multiple sets of dependent variables. In our context, this allows us to analyze the complex interaction of various environmental factors (independent variables) and their influence on the formation and financing of marketing strategies (dependent variables). In this way, the study will discover certain canonical correlations that, once obtained, can be used to understand how combinations of external determinants influence marketing strategy. However, this is not the only method used in the article. Thus, we also used a synergetic approach, which cannot be attributed to the methods of the so-called "traditional" analysis. The fact is that the method is aimed at the influence of determinants as a whole, and not separately. Thus, it goes a long way in understanding how the combination of various factors influences marketing strategies in the IT sector. Using this approach, we seek to identify the synergy between different determinants - how much their overall effect exceeds the sum of their individual effects. However, in the course of the study, there is a real need to study the process of how specific determinants influence the level of funding in IT marketing strategies. To do this, we implement multiple regression analysis.

In our study, multiple regression helps to isolate the impact of each determinant on the financial aspects of marketing strategies. At the same time, we note the fact that by analyzing the regression coefficients, we can determine the strength and direction of these effects, offering valuable information about which factors are most influential and how they interact with each other in the context of information technology strategy marketing finance. It should also be noted that we use the method of analysis of the combined effect, which consists of studying not only individual or paired interactions but also examining how the entire set of determinants collectively influences the formation and financing of marketing strategies in IT.

## RESULTS

It should be noted that the formation and financing of a marketing strategy today is influenced by a significant number of determinants of both the external and internal nature of the action. Of course, not all of them have an exclusively negative impact and are aimed at harming this process, however, due to hyperdynamic changes in the external environment, IT enterprises are increasingly faced with the negative impact of determinants (including martial law, foreign investment, official exchange rate, bank lending and external debt). It can be argued that each of the listed determinants has its own level of influence on what strategic decisions Ukrainian IT companies make today. At the same time, we note that ignoring such important determinants can lead to a lack of the desired socio-economic effect for IT enterprises. At the same time, it should be noted that in general most changes (and the catalyst for change are external determinants) may require rapid changes in marketing strategies, as IT companies may need to adapt to a new set of requirements or constraints. For example, during martial law, there is a real and significant increase in demand for cybersecurity products and services, which will require IT companies to adjust their marketing focus accordingly. Not to mention the fact that after the introduction of martial law in Ukraine, we experienced significant changes in the behaviour of most investors. For example, there has been a massive physical migration of IT businesses (such as GSG-World). The volume of foreign investment and the official exchange rate are decisive factors. Foreign investment brings capital, experience and often an international perspective, all of which can significantly improve IT companies' marketing strategies. It is common knowledge that an influx of foreign investment means increased resources for market research, product development, and good and sophisticated marketing campaigns required for a competitive IT industry. In addition, the exchange rate affects the cost structure of companies that rely on imported technology or seek to compete in global markets.

We should not forget about lending issues, which are part of the process of financing the marketing strategy of most IT enterprises. Easy access to credit allows companies to invest more in marketing efforts, from advertising to customer acquisition. But at the same time, a strong dependence on loans can play a cruel joke and become a real threat to financial security.

Considering that the introduction of martial law has a significant impact on the formation and financing of marketing strategies, we, based on canonical analysis, will determine the strength of the relationship between various external indicators that were influenced after the outbreak of war and the level of financing of modern marketing strategies in IT. Ultimately we got a quantitative estimate. The input data are 7 indicators, divided into two groups: 1) The volume of expenditures on military defence (an indicator of switching attention to the military industry, and not to new information technologies), changes in the indicators of the banking system (bank loans and the influencing official exchange rate) on

the volume of marketing financing, external investment (volume of foreign investment and external debt); 2) the amount of costs for marketing strategies in the IT field, as well as the level of investment in IT in Ukraine (Table 1).

**Table 1. Initial data for analysis, UAH billion.**

Year	1 group					2 group	
	Military spending	Volumes of bank lending	Official exchange rate	External investments	External debt	Amount of expenses for IT marketing strategies	Level of investment in IT in Ukraine
2018	4.2	55.1	27.3	21.1	92.1	77.1	131.1
2019	5.4	51.4	26.1	25.2	80.4	110	153.9
2020	5.9	44.1	26.9	29.2	83.2	188.1	155.5
2021	6.1	32.1	27.3	32.1	69.6	122.3	199.7
2022	44	38.2	33.1	28.1	149.5	68.3	150.5

The determinants we identified for our analysis, in our opinion, will best reflect the external environment of the functioning of IT enterprises today. At the same time, the internal aspects should be investigated in future works. Let us note that the first group includes determinants that are extremely important in the context of how the rethinking of the financial and economic security of Ukraine changes in wartime conditions. This should be understood when building a marketing strategy, even at the micro level. On the other hand, the second group of indicators is focused directly on the IT sector and includes expenses on marketing strategies and investments in IT in Ukraine. Exploring possible connections allows to make the right strategic decisions. Thus, the selected indicators provide a comprehensive framework for assessing the complex interaction between wartime conditions, economic dynamics and marketing strategy formulation in the IT industry.

The second group includes costs for the following three types of marketing strategies:

*Content marketing.* Content marketing is a strategic marketing approach aimed at creating and distributing valuable, relevant and consistent content to attract and retain a clearly defined audience and ultimately generate profitable revenue from customers. This type of marketing includes blog posts, white papers, case studies, infographics, videos, etc. However, we believe content marketing is popular because it can be relatively cost-effective compared to traditional advertising methods and has the potential for long-term impact.

*Search engine optimization (SEO).* SEO is the process of optimizing a website to improve its visibility on search engine results pages (SERPs). This includes both on-page and off-page tactics to increase organic traffic. SEO is popular because it can generate consistent, high-quality website traffic over time without the ongoing expense of paid advertising. An SEO budget can include costs for keyword research, website optimization, content creation, link building, and ongoing monitoring and adjustments.

*Social media marketing.* According to statistics, every day 95% of all Internet users go to social networks and, in particular, discuss products, companies, and services, and share their thoughts and impressions. However, the form of financing includes costs for content creation, paid advertising campaigns, social media management tools, tracking analytics, and hiring social media specialists or agencies.

Canonical analysis helps determine which environmental factors cause changes in another group, allows you to analyze subgroups of variables and identify cause-and-effect characteristics. To carry out the analysis, the statistical package Statistica 10 was used (Table 2).

**Table 2. Chi-square tests with distant successive roots.**

Chi-square tests with distant successive roots						
Root	R	R-sqr	Chi-sqr	df	p	Lambda Prime
0	0.89	0.79	35.4	10	0.001	0.109
1	0.68	0.46	9.8	4	0.044	0.54

In the context of Chi-square tests with distant serial roots, the following terms are commonly encountered:

1. Root. This is the original variable analyzed in the Chi-square test. It represents analyzed data or categories that are tested for relationship or independence.
2. R mathematically stands for correlation coefficient. Moreover, it can be indicated by other symbols, but we adhered to the classical approach. In the context of Chi-square tests, R indicates the strength of the relationship between observed and expected frequencies.
3. R-square (R-sqr). R-squared is also known as the coefficient of determination. It quantifies the proportion of variation in a dependent variable (expected frequencies) that is explained by the independent variable (expected frequencies) in a Chi-square test. This indicates the degree of fit of the model to the data.
4. Chi-square (Chi-sqr). Chi-sqr ( $\chi^2$ ). This is essentially what is called a statistical test. It measures the degree of discrepancy between observed and expected frequencies in categorical data. It evaluates whether there is a significant relationship between the variables or factors being analyzed.
5. Steps of freedom (df). It should be noted here that in the context of Chi-square tests, df is calculated as the difference between the number of categories or levels of variables minus 1 that are analyzed.
6. P-value (p). In Chi-square tests, the p-value indicates the level of significance of the relationship between variables or factors. A low p-value suggests that the observed association is unlikely to have occurred by chance.
7. Lambda Prime ( $\lambda'$ ). Represents the so-called degree of association and indicates the strength of the relationship between variables. Lambda Prime ranges from 0 to 1.

According to Table 3, the canonical correlation between the two sets of variables is 0.9, indicating a strong relationship between them. The Chi-square value of 35.4 at a significance level of  $p < 0.05$  confirms the statistical significance of the correlation coefficient R. The canonical root R2 with a value of 0.79 indicates the high adequacy of the developed model.

**Table 3. Results of canonical analysis.**

<b>N=21</b> <b>Canonical R: ,89</b> <b>Chi(10)=35,4 p=,0001</b>		
	Left group	Right group
No.	5	2
Variability	34.4%	100%
Total	24.6%	64.1%
Variables:		
1		
2		
3		
4		
5		

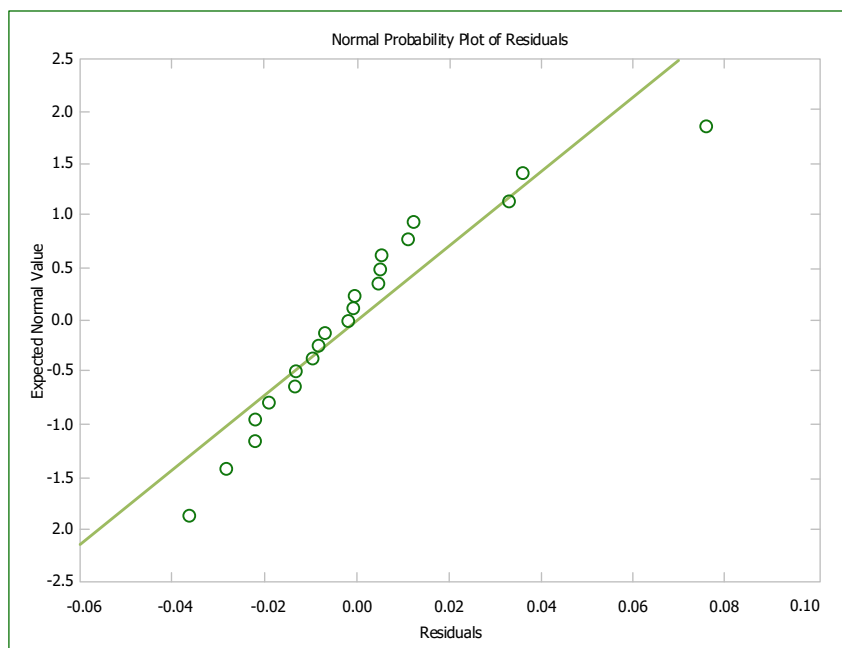
“The Total Redundancy Given Another Set” metric shows that changes in the left group explain 64.1% of the changes in the right group, while the inverse relationship accounts for only 24.6%. Thus, this model is dominated by the second group, with 61.1% of its variance explained by external factors such as the shift to military spending, bank loans, exchange rates, external debt and foreign investment. This interaction of several elements of the system, leading to changes in quantitative indicators, is called the synergistic effect. This information suggests that external factors play a significant role in shaping financing and marketing strategies, with the financing performance of marketing strategies varying widely and being predominantly influenced by external determinants. Understanding these relationships can help make informed decisions on financial and marketing strategies in response to changes in external economic conditions. It represents a situation where the combined effects of two or more interacting factors exceed the effect that would be expected from each factor separately. It is now important to examine how changes in these components affect the development and financing of marketing strategies in a country (Table 4).

**Table 4. Results of multiple regression analysis.** Note: \*Option 1 group; Beta. Standardized coefficient (also known as standardized beta coefficient); beta version Std. Err. standard error of the standardized coefficient; B. Unstandardized coefficient (also known as raw coefficient or regression coefficient); Std Err of B. Standard error of the nonstandard coefficient; those. t-value (t-statistic); p-level: p-value or level of significance.

	Beta	Std.Err of Beta	B	Std Err of B	t	p-level
Intercept			214.5	49.4	4.35	0.006
Var 1*	0.11	0.24	0.41	0.94	0.44	0.66
Var 2	-0.25	0.27	-0.49	0.53	0.092	0.37
Var 3	0.83	0.33	2.8	1.15	2.5	0.026
Var 4	-0.94	0.36	-1.16	0.43	-2.65	0.019
Var 5	-0.59	0.23	-2.2	0.8	-2.5	0.24

Using the method of multiple regression analysis, it was determined to what extent the dependent variable (the level of financing of the marketing strategy) changes in comparison with changes in individual factors. It also determines which of these determinants have a statistically significant influence and the nature of this influence (positive or negative). The R<sup>2</sup> coefficient of determination of 0.47 indicates a moderate relationship but confirms its existence. The statistical significance of the regression parameters was assessed using Student's t-test, comparing the calculated t value with the table value at a given significance level and number of degrees of freedom. If the calculated t value exceeds the table value, the difference between the group means is considered statistically significant. With 19 degrees of freedom (n-1) and a significance level of 0.05, the critical t value is 2.07 (Figure 1). However, given that these determinants have previously been found to influence the amount of funding for marketing strategies, we decided to retain all factor variables in the model. Thus, we obtain the multiple regression equation (1):

$$Y = 215,1 + 0,42Var1 - 0,48Var2 + 2,83Var3 - 1,2Var4 - 2,3Var5 \tag{1}$$



**Figure 1. Normal probability plot of regression analysis.**

It should be noted that the normal distribution graph does not show significant deviations, which confirms the adequacy of the model. Thus, the analysis of model (1) allows us to formulate the following conclusions regarding the influence of external determinants on the level of financing of modern marketing strategies in Ukraine:

1. There is an inverse relationship with the second factorial characteristic; if the volume of provided bank loans increases by 1% of the total volume of gross loans, the level of funding will decrease by 0.49%;
2. There is a directly proportional effect in terms of the dependence of the official exchange rate on the level of financing, namely by 2.82%;

- If attention to military affairs increases, the amount of funding for marketing strategies in the field of information technology will decrease.

## DISCUSSION

It should be noted that our study provides a detailed understanding of the factors influencing marketing strategies in the IT sector, especially in the Ukrainian context. However, at the same time, it is necessary to highlight the key differences in the results of the study to emphasize its relevance and scientific novelty. To do this, you should compare them with similar ones in this direction. Thus, Prokopenko et.al. (2023) and Theodoridis (2019) modelled how to optimize the use of digital tools, especially artificial intelligence, in marketing strategies. However, digital technologies and the specification of information technologies that should be used to formulate marketing strategies are one type of resource provision. In our opinion, financial resources play a big role. In this context, an interesting study by Bivainis et al. (2013), in which modelling of the influence of various factors on the formation of a marketing strategy and the amount of its financing was formed, but at the same time the specifics of information technology and the modern external environment were lost.

Note that there are a number of studies assessing the level of marketing attractiveness (Saher, et.al., 2020) and marketing activity as such (Ginevičius, et.al., 2013; Cheng, 2018), where a specific budget and strategies are selected. But at the same time, all this depended on internal processes and an extremely narrow list of indicators.

Note that the methods of synergy, segmentation and canonical analysis are not a unique phenomenon inherent exclusively to our study. Viselgaitė, (2011) and Wedel et al. (2020) demonstrated their effectiveness in their own studies using the solution. However, we have used this combined approach as an innovative method in shaping and financing marketing strategies. At the same time, we note that the assessment of the influence of a number of factors on marketing strategy is also observed in many modern works, for example, Alaoui, (2019) and Arsenijevic, (2019). Here it should be noted the importance of regional characteristics and the fact that the hyperdynamic nature of the environment dictates the need to constantly identify new determinants.

Let us highlight the more significant results of our study (Table 5).

<b>№</b>	<b>Results</b>	<b>Characteristic</b>
1	Identifying key external determinants and their synergistic effects	One of the main results of the study is the identification of the most important external determinants that significantly influence the formation and financing of marketing strategies in the IT sector. These include economic reasons, technological configurations, political conditions and sociocultural trends. More importantly, the study highlights the synergistic effect of these determinants, meaning that their combined impact is more significant than the sum of their individual effects. This understanding is vital to developing effective and sustainable marketing strategies that can adapt to a complex and changing external environment.
2	The impact of war on IT marketing strategies	The conducted research concerns the conditions of martial law in Ukraine, therefore its peculiarity is the consideration of this factor as one of the determining factors in the formation and financing of IT marketing strategies. This is an aspect of an extremely important paradigm of how various types of real and concrete political and social unrest can disrupt not only the immediate operational aspects of an IT business but also long-term strategic planning in marketing.
3	The role of advanced analytical methods in strategy formation	The study also notes the importance of using advanced analytical techniques such as canonical analysis and multiple regression analysis to understand and evaluate the relationships between different determinants. This methodological approach allows for a more complete and detailed understanding of how different factors influence financing and the development of marketing strategies. The innovation of this approach lies in its ability to quantify and model the complex interaction of factors influencing marketing strategies in the IT sector, providing a more robust basis for strategic decision-making.

Our research adds to the existing body of knowledge by providing a detailed analysis of the determinants influencing the formation and financing of IT marketing strategies, especially in challenging environments such as Ukraine. It reiterates and expands on themes outlined in the identified literature, highlighting the complexity and multifaceted nature of marketing strategy development in the fast-growing IT sector.

## CONCLUSIONS

To summarize, we note that with the deepening integration of information technologies in all areas of business, an important question arises about their impact on marketing strategies. Growing data volumes, changes in consumer behaviour

and high levels of competition are challenging traditional marketing methods, requiring attention to analyzing trends and identifying problems. At the same time, as a result of a full-scale invasion, the situation in the information technology market has changed significantly and this requires a new approach to both the system for assessing the formation of a marketing strategy and its financing. The study substantiates the key determinants of the external environment that significantly influence the formation and financing of modern marketing strategies in the field of information technology. At the same time, we are clearly aware that the list we propose is not exhaustive and may be supplemented or even changed in the future. However, this does not have a significant impact on obtaining the results of the study, since the task was to analyze the identification of the synergistic effect of the influence of determinants on the policy of formation and financing of marketing strategies in the field of information technology.

The results obtained are well reflected using multiple regression analysis, which we use to reflect the influence of factors on the level of financing of marketing strategies in the field of information technology. One of the results of the conducted analysis was the determination of the extent to which the dependent variable (the level of funding for the marketing strategy) changes in relation to changes in specific determinants presented in Table 1. Additionally, corresponding conclusions were drawn regarding the impact of external determinants on the level of funding for modern marketing strategies in Ukraine based on the analysis results. However, it should be noted that in the future, internal determinants and factors that affect the funding of the marketing strategy should be selected.

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## ADDITIONAL INFORMATION

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## ОЦІНЮВАННЯ ЗОВНІШНІХ ДЕТЕРМІНАНТІВ ВПЛИВУ НА ФОРМУВАННЯ ТА ФІНАНСУВАННЯ МАРКЕТИНГОВИХ СТРАТЕГІЙ У ЦАРИНІ ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ

Метою цього дослідження є обґрунтування ключових детермінантів зовнішнього середовища, що суттєво впливають на формування й фінансування сучасних маркетингових стратегій у царині інформаційних технологій. У роботі проаналізовано систему фінансування маркетингових стратегій у царині інформаційних технологій в Україні. За результатами огляду літератури, ідентифікований синергетичний ефект впливу детермінантів на політику формування та фінансування маркетингових стратегій у царині інформаційних технологій. Для цього використано метод канонічного аналізу для оцінювання сили взаємозв'язку між різними детермінантами; синергетичного методу, що виявив можливий груповий ефект впливу на формування й фінансування маркетингових стратегій. Окрім цього, використано метод множинного регресійного аналізу для відображення впливу факторів на рівень фінансування маркетингових стратегій у царині інформаційних технологій. Інноваційність отриманих результатів розкривається через розроблений науковий підхід щодо оцінювання взаємозв'язку визначених детермінантів у сфері формування й фінансування сучасних маркетингових стратегій у царині інформаційних технологій шляхом виявлення спільного ефекту впливу. Результати дослідження обґрунтовують той факт, що воєнний стан негативно впливає на формування та фінансування сучасних маркетингових стратегій у царині інформаційних технологій. Результати обчислень показали, що розвиток інформаційних технологій пояснюється суттєвими змінами в зовнішньому середовищі. Дослі-

дження має обмеження у вигляді врахування лише царини інформаційних технологій й неврахування інших факторів, які опосередковано також мають вплив. Подальші дослідження будуть спрямовані на вивчення детермінантів повоєнного часу.

**Ключові слова:** детермінанти впливу, маркетингові стратегії, інформаційні технології, вплив на рівень фінансування, воєнний стан

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