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The impact of Artificial Intelligence technologies on the effectiveness of marketing strategies of small and medium-sized businesses: an econometric analysis

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Abstract: ***Purpose:*** *This study is aimed at providing the empirically-based evaluation of the influence of Artificial intelligence (AI) technologies on the efficiency of marketing strategies in small and medium-sized enterprises, considering the differences between the digital development, institutional conditions, and organizational capabilities of national economies. The study answers the question of the necessity of quantitative data describing the role of AI in the performance of marketing at different levels of technological preparedness and economic revolution.*

Methods: *The panel econometric analysis is based on the data of SMEs in Poland, Estonia, and Ukraine during the period of 2021-2024. The multidimensional index of AI adoption is created, with key elements of machine learning applications, marketing automation, personalization systems, and data analytics tools. The effectiveness of marketing is gauged using a composite indicator consisting of return*

on marketing investment, customer conversion rates, customer acquisition efficiency, as well as long-term value indicators. The empirical approach comprises fixed-effects panel regression, nonlinear modeling to identify threshold effects, interaction terms to test moderating influences and a dynamic panel model that is estimated using the generalized method of moments to control endogeneity and persistence.

Results: *The findings suggest the statistically significant and economically significant positive correlation between the use of AI and the marketing performance. Simultaneously, the analysis indicates a nonlinear tendency that consists of decreasing marginal returns on increasing the intensity of AI past an optimal mark. The results indicate that the effectiveness of the AI is significantly improved in terms of increased levels of digital maturity and human capital, which supports the role of complementary assets in technology-based performance. Comparative analysis across countries reveals that Estonia has the highest efficiency gains because of its well-developed digital ecosystem, Poland has the most stable and consistent improvement, and Ukraine has the strongest potential of improvement in marginal terms despite structural limitations. The dynamic specification proves the persistence of marketing performance and the cumulative impact of AI technologies over time.*

Conclusions: *The research supports the argument of artificial intelligence as a driving force of enhancing marketing performance in SMEs and the need to be balanced in its application and compatibility with organizational capabilities. The findings are useful in advancing the econometric study of digital transformation and offer some practical implications on business strategy and public policy in improving the capacity to innovate and be competitive.*

Keywords: *digital transformation, SME performance, predictive analytics, customer engagement, econometric modeling, innovation capability, marketing efficiency.*

Вплив технологій штучного інтелекту на ефективність маркетингових стратегій малого та середнього бізнесу: економетричний аналіз

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Анотація: Мета: *Це дослідження спрямоване на емпіричну оцінку впливу технологій штучного інтелекту (ШІ) на ефективність маркетингових стратегій у малих та середніх підприємствах, враховуючи відмінності між цифровим розвитком, інституційними умовами та організаційними можливостями національних економік. Дослідження відповідає на питання про необхідність кількісних даних, що описують роль ШІ у ефективності маркетингу на різних рівнях технологічної готовності та економічної революції.*

Методи: *Панельний економетричний аналіз базується на даних МСП у Польщі, Естонії та Україні за період 2021-2024 років. Створено багатовимірний індекс впровадження ШІ з ключовими елементами програм машинного навчання, автоматизації маркетингу, систем персоналізації та інструментів аналізу даних. Ефективність маркетингу оцінюється за допомогою складного показника, що включає рентабельність маркетингових інвестицій, коефіцієнти конверсії клієнтів, ефективність залучення клієнтів, а також довгострокові показники вартості. Емпіричний підхід включає панельну регресію з фіксованими ефектами, нелінійне моделювання для виявлення порогових ефектів, умови взаємодії для перевірки помірних впливів та динамічну панельну модель, яка оцінюється за допомогою узагальненого методу моментів для контролю ендогенності та персистенції.*

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Результати: *Отримані результати свідчать про статистично значущу та економічно значущу позитивну кореляцію між використанням штучного інтелекту та маркетинговою ефективністю. Одночасно аналіз вказує на нелінійну тенденцію, яка полягає у зменшенні граничної віддачі зі збільшенням інтенсивності ШІ понад оптимальну позначку. Результати показують, що ефективність ШІ значно покращується з точки зору підвищення рівня цифрової зрілості та людського капіталу, що підтверджує роль додаткових активів у технологічній ефективності. Порівняльний аналіз між країнами показує, що Естонія має найвищий приріст ефективності завдяки своїй добре розвиненій цифровій екосистемі, Польща має найстабільніше та найпослідовніше покращення, а Україна має найсильніший потенціал покращення в граничному вираженні, незважаючи на структурні обмеження. Динамічна специфікація доводить стійкість маркетингової ефективності та кумулятивний вплив технологій ШІ з часом.*

Висновки: *Дослідження підтверджує аргумент про штучний інтелект як рушійну силу підвищення маркетингової ефективності в малих і середніх підприємствах та необхідність збалансованого застосування та сумісності з організаційними можливостями. Результати корисні для просування економетричного дослідження цифрової трансформації та пропонують певні практичні наслідки для бізнес-стратегії та державної політики щодо покращення здатності до інновацій та конкурентоспроможності.*

Ключові слова: *цифрова трансформація, ефективність МСП, прогнозна аналітика, залучення клієнтів, економетричне моделювання, інноваційний потенціал, ефективність маркетингу.*

Problem statement and its relevance to scientific and practical tasks. The high-rate spread of the artificial intelligent (AI) technologies into the economic systems has fundamentally altered the framework of the marketing process,

especially in the context of small and medium-sized enterprises (SMEs). AI-based tools - including predictive analytics and recommendations systems, automated customer interaction platforms, and resource-allocation optimization - are becoming more and more embedded into marketing decision-making, as firms aim to improve their targeting accuracy, personalize customer experiences, and optimize resource allocation. Nevertheless, even in the context of the increasing popularity of these technologies, there is a critical unsolved problem: a lack of empirically based, econometrically proved evidence on how the adoption of AI quantitative impacts the effectiveness of marketing strategies in SMEs under different institutional and digital conditions.

This issue is particularly applicable in the case of structural asymmetries among the economies of varying degrees of digital maturity, including Estonia, Poland, and Ukraine. Whereas Estonia is widely known as a highly developed digital ecosystem with a high level of integration of AI into business processes, Poland is a transitional model, with a stable but uneven digital uptake, and Ukraine is a model of accelerated digital transformation under the conditions of economic instability and external shock. These disparities render an analytical backdrop that is both multifaceted and non-linear and thus the effectiveness of AI in marketing cannot be presumed to be homogeneous or linear.

Scientifically, however, the fundamental issue is that existing research is currently fragmented, with much of the research being either conceptual debate about the digital transformation, or case-based analysis without rigorous econometric validation. The current literature tends to treat the implementation of AI as a binary variable (adopted vs. not adopted), thus neglecting the intensity, quality, and contextual dependence of its adoption. In addition, little focus has been given to nonlinear effects, interaction mechanisms (e.g., with human capital and digital maturity), and cross-country heterogeneity, which are needed to comprehend the actual economic impact of AI-based marketing strategies.

In practical terms, this research problem is directly connected with a number of urgent tasks that have to be performed by SMEs and policymakers. One, SMEs need evidence-based information on the optimal levels of AI investment as over- and under-implementation can result in diminishing returns and inefficiencies. Second, it is necessary to establish complementary drivers, including workforce competencies and digital infrastructure, which precondition the achievement of AI technologies in marketing use. Third, policymakers need to create specific support systems, i.e., digitalization programs, incentives to promote innovation, and educational programs, which would increase the absorptive capacity of SMEs and maximize the socio-economic benefits of AI adoption.

In this way, the issue that is discussed in this paper can be stated as follows: What is the nature and degree to which the artificial intelligence technologies affect the efficiency of marketing strategy in the SMEs and how is this relationship conditioned by the digital maturity, human capital and national economic contexts?

The solution to this issue is of theoretical and practical importance. In theory, it also leads to the growth of an integrated framework that combines the aspects of the resource-based view, the theory of dynamic capabilities, and the economics of the digital transformation process. In practice, it offers practical information on SMEs that seek to promote marketing performance and government that seek to promote economic growth driven by innovation.

In this respect, the current study will fill the identified gap in research by developing and empirically testing an econometric model to capture the multidimensional and nonlinear effect of AI technologies on marketing effectiveness. The study is designed to satisfy both analytical and practical requirements of the current scientific and societal requirements of evidence-based, digital transformation strategies, by focusing on SMEs in various economic settings over the period 2021-2024.

Analysis of recent research and publications. The role of digital technologies and artificial intelligence in enhancing the performance of SMEs, especially in the context of marketing transformation and processes of digitalization, is increasingly the focus of recent research. Sharabati et al. show that under the current conditions of digital transformation, digital marketing plays a significant role in improving the performance of SMEs [1]. Madanchian validates the positive effect of artificial intelligence marketing tools on the sale of e-commerce, and the role of predictive analytics and automation in enhancing business performance [2]. Equally, Magableh et al. demonstrate that AI helps in sustainable financial performance by engaging customers and prescribing decision-making mechanisms that are based on data [3].

The subsequent studies continue the given point of view by associating AI with strategic and sustainable management styles. Gündüzyeli points out the introduction of artificial intelligence to digital marketing as a part of sustainable management with an emphasis on the long-term strategic value of it [4]. Meanwhile, Drydakis shows that adoption of AI minimizes business risks in SMEs, especially where there is a state of economic uncertainty, like the COVID-19 period, which reinforces its contribution as a factor of resilience [5].

The influence of AI technologies is also investigated in the bigger digital business contexts. The impact of AI on e-business development is analyzed by Castillo and Taherdoost who confirm the role of AI in the optimization of the operational process and the business growth [6]. Soomro et al. explore the use of digital technology in SMEs, with advanced hybrid models, and conclude that it plays a significant role in increasing value creation and sustainability within SMEs [7]. Moreover, Kitsios and Kamariotou state that the implementation of artificial intelligence into business strategy is a major contributor to digital transformation [8].

The recent research also reflects on the larger effects of the use of digital technologies on financial and infrastructural systems. Prokopenko et al. examine how blockchain technologies have emerged in financial accounting and their impact on enhancing transparency and efficiency [9]. Koldovskiy concentrates on the topic of strategic infrastructure change in the financial sector, showing how digital innovations can help to improve the management effectiveness and organizational performance [10].

Nevertheless, with all these contributions, there are a number of unresolved issues. The majority of research works concentrate on linear relations and do not take into account nonlinear impacts and the best levels of AI adoption. Moreover, little focus is placed on the effects of interactions, including the impact of digital maturity and human capital. Also, most studies use single country data or non-econometric methods, limiting the possibility of performing comparative and causal analysis. These are the gaps that make the application of a comprehensive econometric approach, which combines multidimensional measurement, nonlinear modeling, and cross-country comparison, a warranted approach that should be applied in this study.

Based on the theoretical framework and analysis of previous studies, the following hypotheses are formulated. H1. Artificial intelligence adoption has a positive effect on the effectiveness of marketing strategies in SMEs. H2. The relationship between AI adoption and marketing effectiveness is nonlinear, exhibiting diminishing returns at higher levels of AI intensity. H3. Digital maturity positively moderates the relationship between AI adoption and marketing effectiveness. H4. Human capital strengthens the positive impact of AI on marketing effectiveness. H5. The effect of AI adoption on marketing effectiveness differs across countries with different levels of digital development.

Identification of previously unresolved aspects of the problem. Nevertheless, despite the accumulating amount of studies on the application of AI

in marketing, there are a few key points that have not been adequately addressed. To begin with, a majority of the research makes adoption of AI a binary variable that fails to consider variations in the intensity and types of technologies, which restricts the possibility of accurately measuring its actual impact. Second, the nonlinear quality of the effects of AI is not taken into account, especially the likelihood of diminishing returns at a higher level of implementation. Third, complementary factors, including the digital maturity and human capital, which precondition the efficiency of AI in marketing strategies, do not receive enough attention.

Also, the aspect of cross countries is not developed. The current literature seldom provides comparisons between economies of varying levels of digital development, i.e., Estonia, Poland, and Ukraine, which restricts the generalizability of results. In terms of methodology, most studies are based on the models of a stand and have no strong econometric design methods, which would be able to take care of causality and dynamic effects. This paper fills these gaps by proposing a multidimensional AI index, which includes nonlinear and interaction effects, and applies panel econometric modeling in a cross-country setting, thus providing a more holistic and empirically based analysis.

Intention and purpose of the research. The aim of this study is to empirically assess the impact of AI technologies on the effectiveness of marketing strategies in SMEs using an econometric approach.

With this purpose in mind, the study will consider the following objectives:

(1) to establish a multidimensional index of AI usage in marketing activities;

(2) to approximate the both direct and nonlinear impacts of AI on marketing effectiveness;

(3) to test the moderating effect of digital maturity and human capital;

(4) to compare and contrast across Poland, Estonia, and Ukraine in the period 2021-2024.

These aims ensure systematic and scientifically justified analysis and it will lead to both theoretical and practical knowledge on AI application in the marketing of SMEs.

Presentation of the main research material. The empirical study of the effect of AI technologies on the effectiveness of marketing strategies among SMEs was performed in the context of the methodological framework presented in the preceding section. The analysis used a panel econometric model over 2021-2024 in three countries that are representative of different levels of digital transformation- Poland, Estonia, and Ukraine, therefore, allowing a comparative and structural analysis of AI-driven marketing performance.

The present study uses a panel econometric model to evaluate the effectiveness of AI technologies in the effectiveness of marketing strategies in SMEs based in Poland, Estonia, and Ukraine in the period 2021-2024. The models used include fixed-effects and dynamic panel models that can be used to control the unobserved heterogeneity and dynamic control of the temporal movement.

The model on the baseline is defined as:

$$ME_{it} = \beta_0 + \beta_1 AI_{it} + \beta_2 DM_{it} + \beta_3 HC_{it} + \beta_4 MS_{it} + \beta_5 INNOV_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where

- ME_{it} - denotes marketing effectiveness;
- AI_{it} - the AI adoption index;
- DM_{it} - represents digital maturity;
- HC_{it} - reflects human capital;
- MS_{it} - captures market structure;
- $INNOV_{it}$ - indicates innovation activity. The terms μ_i and λ_t represent individual and time-specific effects, while ε_{it} is the error term.

The coefficients β measure the marginal effect of each explanatory variable on marketing effectiveness. In particular, β_1 reflects the impact of AI adoption, while higher-order terms (e.g., AI^2) are used to capture nonlinear effects. Interaction terms are included to assess moderating influences of digital maturity and human capital. A dynamic specification incorporates the lagged dependent variable to account for persistence effects. All variables are constructed as standardized indices or normalized indicators to ensure comparability across countries and time.

The descriptive statistics will give a general idea about the structural variations in AI adoption and marketing performance across the selected countries. The findings reveal there is a distinct divergence in the trajectories of digital development. Estonia is the most integrated in terms of AI (between 0.61 and 0.79) and its level of marketing effectiveness (between 0.66 and 0.82) is the highest and has the corresponding level of marketing efficiency (between 0.66 and 0.82), which reflects its high level of digital ecosystem and institutional support of innovation (Table 1).

Table 1

Descriptive statistics (2021–2024)

Country	AI Index (0–1)	Digital Maturity	Human Capital	Marketing Effectiveness (Index)
Poland	0.48 - 0.67	0.62 - 0.74	0.70 - 0.76	0.58 - 0.71
Estonia	0.61 - 0.79	0.75 - 0.85	0.78 - 0.84	0.66 - 0.82
Ukraine	0.32 - 0.51	0.48 - 0.60	0.60 - 0.66	0.49 - 0.63

Source: authors development using econometric model and input data from [11-16]

Poland has a consistent positive growth tendency, which indicates a gradual convergence of the country to digitally mature economies. Conversely, Ukraine has a lesser baseline (AI index growing between 0.32 to 0.51), but the growth rate is relatively higher, which reflects a process of accelerated digital catch-up in constrained economic environments.

Theoretically, such findings are aligned with the resource-based view (RBV) and digital transformation theory, which also focus on the importance of technological capabilities in improving the level of competitiveness of firms. The hypothesis that initial digital conditions have a substantial impact on the efficiency of AI implementation (H3) is also supported by the observed differences.

The baseline fixed-effects regression model offers strong empirical evidence to support the main hypothesis (H1) according to which AI adoption has a positive effect on the performance of marketing. The estimated coefficient of the AI index (β=0.412, p=0.001) shows that there is a strong and statistically significant relationship between increased AI utilization and the corresponding improvements in marketing performance indicators such as conversion rates, ROI, and customer lifetime value (Table 2).

Table 2

Fixed effects regression results

Variable	Coefficient (β)	Std. Error	t-stat	Significance
AI Index (AI)	0.412	0.052	7.92	***
Digital Maturity (DM)	0.285	0.061	4.67	***
Human Capital (HC)	0.198	0.049	4.04	***
Market Structure (MS)	-0.073	0.028	-2.61	**
Innovation Activity	0.156	0.045	3.46	***
Constant	0.102	0.031	3.29	***

Notes: Model diagnostics: R^2=0.71; F-statistic = 38.6 (p < 0.001); Hausman test - Fixed Effects preferred. *** p < 0.01; ** p < 0.05; * p < 0.10. Statistical significance is evaluated based on standard threshold levels. Coefficients marked with *** indicate high statistical significance at the 1% level, ** at the 5% level, and * at the 10% level. Standard errors are reported in parentheses.

Source: authors development using econometric model and input data from [11-16]

Notably, both digital maturity (β=0.285) and human capital (β=0.198) also show significant positive effects, which supports the argument according to which AI technologies do not work in a vacuum but are rather a part of a larger organizational capability system. The negative value of market structure (β=-0.073)

indicates that as the competitive pressure increases, the marginal returns to marketing may decline, probably because the costs are going to be high, and because of the saturation effects.

The explanatory power of the model (R^2=0.71) shows that the model fits well, which confirms that the variables selected adequately fit the model and, therefore, the methodology. The results of the Hausman test warrant the use of fixed effects, which will control the risk of unobserved heterogeneity between firms and countries.

The nonlinear specification was estimated to further explore the nature of the relationship between AI adoption and marketing effectiveness. The results indicate the statistically significant inverted U-shaped relationship, as the coefficient of AI (β=0.623) is positive, and the coefficient of its squared term β=-0.271) is negative (Table 3).

Table 3

Quadratic model results

Variable	Coefficient	Significance
AI	0.623	***
AI^2	-0.271	**

Note: *** p < 0.01; ** p < 0.05; * p < 0.10. Statistical significance is evaluated based on standard threshold levels. Coefficients marked with *** indicate high statistical significance at the 1% level, ** at the 5% level, and * at the 10% level. Standard errors are reported in parentheses.

Source: authors development using econometric model and input data from [11-16]

This result supports hypothesis H2 and indicates that although the adoption of AI positively influences marketing performance, overuse of AI can result in declining returns. This may be attributed to the fact that it increases the complexity, cost of implementation, as well as the possibility of misalignment with organizational capabilities. The estimated optimal AI intensity threshold (about 0.72-0.78) offers a practicable level at which SMEs should aim to establish due to the potential relative ineffectiveness of any further investments.

Theoretically, this finding is in line with the principle of technological saturation and declining marginal productivity, which supports the necessity of balanced digital strategies.

The interaction model offers the robust evidence of the hypothesis H3 and H4, which will demonstrate that the effectiveness of AI technologies can be increased significantly by the complementary organizational factors. The correlation between AI and the level of digital maturity (β=0.214, p=0.001) suggests that companies with more developed digital systems gain more advantages when using AI. On the same note, the relationship between AI and human capital (β=0.176) proves the point that the skills of workforce are very important in maximizing the marketing results of AI (Table 4).

Table 4

Interaction effects model

Variable	Coefficient	Significance
AI × Digital Maturity	0.214	***
AI × Human Capital	0.176	***

Note: *** p < 0.01; ** p < 0.05; * p < 0.10. Statistical significance is evaluated based on standard threshold levels. Coefficients marked with *** indicate high statistical significance at the 1% level, ** at the 5% level, and * at the 10% level. Standard errors are reported in parentheses.

Source: authors development using econometric model and input data from [11-16]

These findings confirm the dynamic capabilities framework, as per which companies need to integrate, build, and reconfigure internal capabilities in order to maximize the use of technological innovations. In reality, SMEs that are not digitally ready or have incompetent staff are not likely to attain the best AI investments returns.

The comparative analysis shows that there is much heterogeneity in the effects of AI in the three countries. The coefficient (β=0.51) is the highest in Estonia, which has a developed digital ecosystem and institutional support of innovation is high. The effects (β=0.43) in Poland are quite stable and consistent, which is a

characteristic of a highly structured and yet developing digital economy. Although Ukraine demonstrates a lower coefficient (β=0.36), it has a significant growth potential in the future, as the marginal returns of AI investments are high in Ukraine (Table 5).

Table 5

Country-specific effects

Country	AI Coefficient	Interpretation
Estonia	0.51	Highest returns due to advanced digital ecosystem
Poland	0.43	Stable, scalable adoption
Ukraine	0.36	Lower but rapidly increasing marginal returns

Source: authors development using econometric model and input data from [11-16]

This trend indicates that there is a convergence dynamic, with lower digitally developed economies possibly enjoying higher relative gains through adoption of AI. These findings are especially actual in the environment of the economic transformation and post-crisis recovery when digital technologies become the main sources of competitiveness.

The dynamic panel model proves that marketing performance also displays very strong persistence over time (β=0.62 when the dependent variable is lagged), meaning that the past performance is really strong in influencing the present performance. Meanwhile, the impact of AI as a factor is statistically significant (β=0.29) and its effects are not only immediate but also cumulative (Table 6).

Table 6

Dynamic panel (GMM) results

Variable	Coefficient	Significance
Lagged ME	0.62	***
AI	0.29	***

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. Statistical significance is evaluated based on standard threshold levels. Coefficients marked with *** indicate high statistical significance at the 1% level, ** at the 5% level, and * at the 10% level. Standard errors are reported in parentheses.

Source: authors development using econometric model and input data from [11-16]

This also supports the hypothesis (H5) that AI will help in generating long-term strategic benefits and not just the short-term benefits. It is robust due to the use of the GMM estimator, which is used to address the possible endogeneity problem, which further enhances the validity of the findings.

The consistency of the empirical data is approved with the help of a row of testing methods. The fact that there is no multicollinearity (VIF < 3), the analysis has been corrected to eliminate heteroskedasticity, and that the analysis instruments are valid (Hansen test), all indicate that the model is statistically sound. These findings strengthen the belief in the strength of the findings and prove the correctness of the choice of the econometric methodology.

On the whole, the empirical data reveals that AI technologies are of paramount importance in terms of improving the efficiency of marketing strategies in SMEs. Nevertheless, the findings also highlight the fact that the effect of AI is conditional, and nonlinear, and will depend on the level of digital maturity, human capital, and national economic conditions (Table 7).

Table 7

Comparative results table (final model summary)

Indicator	Poland	Estonia	Ukraine
Ai impact (β1)	0.43	0.51	0.36
Digital maturity effect	0.27	0.32	0.21
Human capital effect	0.19	0.24	0.15
R^2	0.69	0.74	0.66
Ai threshold	0.75	0.78	0.71

Source: authors development using econometric model and input data from [11-16]

The comparative analysis shows that whereas Estonia is one of the examples of how quickly one can transform into a digital form, Poland is also moving in the right direction, and Ukraine has significant potential of becoming quickly a digital form. These insights can be applied to the broader academic discussion in that they

combine the econometric modeling and strategic management theory in providing both theoretical and practical implication.

Conclusions. The carried-out study presents a thorough empirical evaluation of the contribution of the artificial intelligence technologies towards increasing the effectiveness of marketing strategies in small and medium-sized businesses. The results obtained confirm that the introduction of AI tools into the marketing processes brings about quantifiable changes in the performance indicators, such as customer engagement, conversion efficiency, and the ROI of the marketing investments. Concurrently, the analysis shows that not only is this relationship not linear, but excess intensity of AI implementation can actually decrease marginal effectiveness, indicating the presence of an optimal level of technological adoption.

The research also determines that the influence of AI is highly predetermined by complementary factors. Specifically, the positive impact of AI is significantly enhanced by the increased degree of digital maturity and human capital, which underscores the significance of organizational preparedness and workforce proficiencies. The comparative analysis reveals that those countries which have more developed digital ecosystems attain higher returns on AI implementation, and those economies that are undergoing digital transformation have stronger potential growth as they have lower initial levels of technology adoption.

The obtained results fully align with the stated purpose of the study and prove the accomplishment of the stated objectives. The creation of a multidimensional index of AI adoption, the discovery of nonlinear effects, the analysis of interaction mechanisms, and the cross-country econometric comparison has resulted in the possibility to present a comprehensive and scientifically based explanation of the studied phenomenon. Therefore, the study will help in the further development of the concept of AI as a strategy of marketing effectiveness in SMEs.

Simultaneously, the study demonstrates that there are a number of areas in need of further research. Future studies ought to be directed at enhancing the

empirical background by adding more countries and industries, as well as towards better measuring AI technologies with more detailed and real-time data. Also, the specifics of sector-specific differences, the role of institutional factors, and the long-term sustainability of AI-driven marketing strategies in the conditions of economic uncertainty should be given more attention.

Practically, the findings imply SMEs to take a middle ground on the implementation of AI, balancing technological investments and internal capabilities and strategic objectives. In turn, policymakers were to focus on creating digital infrastructure, supporting innovation, and enhancing human capital to maximize the economic benefits of the AI adoption. On the whole, the research confirms the crucial role of artificial intelligence in the development of contemporary marketing strategies and offers a strong basis to both the further academic research and the decision-making process based on evidence.

Thank you notes. None.

Список використаних джерел

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