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Behavioral-based consumer segmentation as a tool for developing effective brand marketing strategies: an economic perspective

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Abstract: ***Purpose.*** *This study aims to analyse how behavioral-based consumer segmentation affects brand performance when considering the combined effect of digital marketing investment, e-commerce development, social media engagement, artificial intelligence adoption, and macroeconomic conditions. The goal of the study was to look for the most important factors determining the effectiveness of brand marketing strategies and to explore the empirical evidence for the impact of behavioral analytics and digital transformation on sustainable brand competitiveness in selected countries with varying economic and technological development.*

Methods. *The study uses a quantitative econometric method using panel data for Germany, Poland, Estonia and Ukraine for the years 2021-2025. The influence of the various factors listed above was estimated using a Fixed Effects regression model between the BPI and the aforementioned variables. Descriptive statistics, correlation analysis, Hausman test, Wooldridge test, multicollinearity diagnostics using Variance Inflation Factor were used to validate the model specification. These statistical procedures guaranteed the robustness, consistency and reliability of the relationships estimated.*

Results. *The empirical results show that behavioral-based consumer segmentation is indeed the most significant explanatory variable in the model, in terms of brand performance. The estimated coefficient further substantiates the importance of consumer segmentation, as it helps to target and market to customers more effectively and accurately, thus increasing the brand's effectiveness. Digital marketing investment, AI marketing adoption, e-commerce penetration, and social media engagement are other factors with statistically significant positive impacts, showing that digital transformation has significant effects on bolstering marketing performance. Macroeconomic instability has a positive influence on brand competitiveness, as confirmed by the positive impact of GDP per capita, and a negative effect is statistically significant in the case of inflation, since it dilutes*

marketing effectiveness. The comparative analysis shows that there are significant variations in the journey of digital transformation within all the countries studied. Germany remains the leader in brand performance thanks to its well-developed digital framework, while Poland and Estonia are catching up with a growing digitalization and AI adoption. Despite a short-term slowdown due to unfavorable macroeconomic factors, the recovery of Ukraine indicates a growing ability to withstand this challenge and a rapid pace of embracing digital marketing technologies by enterprises. The explanation power of the estimated model is around 84%, which indicates high explanation power and empirical validity of the model.

Conclusions. *The study validates the need to use behavioral-based consumer segments as a strategic instrument in the modern brand management. The combination of behavioral analytics and digital marketing technologies and artificial intelligence offers significant opportunities to enhance customer engagement, build market advantage, and boost brand performance. The results of the study are useful for both business managers looking to maximize marketing strategies and policymakers in the promotion of digital transformation and innovation-driven economic development. The expansion of the geographical sample, firm-level data and dynamic panel estimation techniques in future research can further explore the long-term relationships between consumer behavior, digital innovation and brand competitiveness.*

Keywords: *market segmentation; digital transformation; artificial intelligence adoption; e-commerce development; social media engagement; panel data analysis; brand competitiveness; marketing performance; brand marketing strategies, consumer behavior.*

Сегментація споживачів на основі поведінки як інструмент розробки ефективних стратегій бренд-маркетингу: економічна перспектива

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Анотація: ***Мета.*** *Це дослідження спрямоване на те, щоб проаналізувати, як сегментація споживачів на основі поведінки впливає на ефективність бренду, враховуючи сукупний ефект інвестицій у цифровий маркетинг, розвитку електронної комерції, залучення соціальних мереж, впровадження штучного інтелекту та макроекономічних умов. Мета*

дослідження полягала в пошуку найважливіших факторів, що визначають ефективність маркетингових стратегій брендів, і дослідженні емпіричних доказів впливу поведінкової аналітики та цифрової трансформації на стійку конкурентоспроможність брендів у вибраних країнах із різним економічним і технологічним розвитком.

Методи. *У дослідженні використовується кількісний економетричний метод із використанням панельних даних для Німеччини, Польщі, Естонії та України за 2021-2025 роки. Вплив різних факторів, перерахованих вище, було оцінено за допомогою моделі регресії фіксованих ефектів між BPI та вищезгаданими змінними. Для перевірки специфікації моделі використовували описову статистику, кореляційний аналіз, тест Хаусмана, тест Вулдріджа, діагностику мультиколінеарності з використанням фактора інфляції дисперсії. Ці статистичні процедури гарантували надійність, послідовність і надійність оцінених зв'язків.*

Результати. *Емпіричні результати показують, що сегментація споживачів на основі поведінки дійсно є найважливішою пояснювальною змінною в моделі з точки зору ефективності бренду. Розрахунковий коефіцієнт додатково обґрунтовує важливість сегментації споживачів, оскільки вона допомагає ефективніше та точніше орієнтуватися та продавати покупцям, таким чином підвищуючи ефективність бренду. Інвестиції в цифровий маркетинг, впровадження маркетингу штучного інтелекту, проникнення електронної комерції та залучення соціальних медіа є іншими факторами зі статистично значущим позитивним впливом, які показують, що цифрова трансформація має значний вплив на підвищення ефективності маркетингу. Макроекономічна нестабільність позитивно впливає на конкурентоспроможність бренду, що підтверджується позитивним впливом ВВП на душу населення, а негативний ефект є статистично значущим у випадку інфляції, оскільки вона знижує*

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ефективність маркетингу. Порівняльний аналіз показує, що в усіх досліджуваних країнах існують значні відмінності в шляху цифрової трансформації. Німеччина залишається лідером за ефективністю бренду завдяки добре розвиненій цифровій структурі, тоді як Польща та Естонія наздоганяють темпи цифровізації та застосування штучного інтелекту. Незважаючи на короткочасне уповільнення через несприятливі макроекономічні чинники, відновлення України свідчить про зростаючу здатність протистояти цьому виклику та швидкі темпи впровадження цифрових маркетингових технологій підприємствами. Пояснювальна сила оцінюваної моделі становить близько 84%, що вказує на високу пояснювальну силу та емпіричну валідність моделі.

Висновки. *Дослідження підтверджує необхідність використання поведінкових сегментів споживачів як стратегічного інструменту в сучасному бренд-менеджменті. Поєднання поведінкової аналітики, технологій цифрового маркетингу та штучного інтелекту пропонує значні можливості для підвищення залученості клієнтів, створення переваг на ринку та підвищення ефективності бренду. Результати дослідження корисні як для керівників підприємств, які прагнуть максимізувати маркетингові стратегії, так і для політиків у просуванні цифрової трансформації та економічного розвитку, орієнтованого на інновації. Розширення географічної вибірки, даних на рівні фірми та методів оцінки динамічної панелі в майбутніх дослідженнях можуть продовжити дослідження довгострокових зв'язків між поведінкою споживачів, цифровими інноваціями та конкурентоспроможністю бренду.*

Ключові слова: *сегментація ринку; цифрова трансформація; впровадження штучного інтелекту; розвиток електронної комерції; участь у соціальних мережах; аналіз панельних даних; конкурентоспроможність бренду; маркетингова продуктивність; стратегії бренд маркетингу, поведінка споживачів.*

Statement of the problem. For today's economy that's undergoing digital transformation, the success of any marketing activity is increasingly reliant on a business's capacity to really understand customers' behavior and adapt its brand strategy in response to shifts in the market environment. The growth of digital technologies, e-commerce, social networks and artificial intelligence tools, has transformed the way companies communicate with their consumers, presenting new challenges to personalise marketing communications and boost the competitiveness of brands. Traditional methods of market segmentation become less accurate in predicting consumer behaviour, however, and behaviour-based segmentation becomes essential for use as an aid for management decision making.

Although there is a considerable body of scientific research into the field of digital marketing and brand management and consumer behaviour, the research covering the impact of consumer behavioural segmentation and its combination with the development of e-commerce, investments in digital marketing, social interaction, implementation of artificial intelligence technologies and macroeconomic factors on the effectiveness of brands is still insufficient. The issue is particularly significant in the context of high dynamism of the digital economy and the necessity of fast adaptation of business to changes in the external environment.

The practical significance of the study is in the formation of scientifically based recommendations for increasing the effectiveness of brand marketing strategies based on the use of behavioral segmentation of consumers, digital marketing tools and artificial intelligence technologies. The results of the conducted research can be applied by enterprises to enhance the processes of strategic marketing planning, make brands more competitive and optimize the allocation of marketing resources, and by state authorities in developing the digital economy and formulating policies on digital transformation.

This study is therefore relevant and practically significant because there is an objective need to conduct a comprehensive econometric study of the relationship

between consumer behavioural segmentation, digital marketing tools and the brand performance.

Analysis of recent research and publications. In today's digital age and with the growing use of artificial intelligence, consumer behavioral segmentation has emerged as one of the most crucial areas of marketing research. Recent research has shown that knowing customers' behaviour can help companies to become more competitive in the market, to optimize marketing strategies and to better build customer loyalty.

Gonen et al. stress the importance of strategic consumer segmentation and dynamic pricing in fostering customer loyalty and market performance of the firms [1]. In a related study, Tavor et al. show that customer segmenting directly affects revenues and boosts business profitability by allocating marketing resources more effectively [2].

Madlenak et al. analyse the segmentation from a systems point of view and find that segmentation is beneficial for the development of the business and the performance of the organization in the postal sector with the aim of sustaining the business [3]. Ebadi Jalal and Elmaghraby highlight the importance of personalized marketing and behavioral analytics, showing that advanced analytical methods significantly improve customer targeting and decision-making processes [4].

Alawadh and Barnawi suggest a framework for analysing consumers' behavior to enhance the performance of the market indicators, and they verify the positive role of behavioural analysis in marketing effectiveness [5]. Aydin also shows how personalization based on AI helps establish brand trust and how it's crucial to find the sweet spot between personalization and consumer privacy concerns [6].

The study by Theocharis and Tsekouropoulos focuses on the Sustainable branding of Generation Z and its results show that sustainable and technological innovations influence consumer behavior [7]. According to Koldovskiy, digital

transformation plays a key role in enhancing the efficiency of management and competitiveness of organizations [8]. Likewise, Prokopenko et al. prove that digital technologies, in particular blockchain, enhance transparency and effectiveness of organizational processes, thereby confirming the fact that digital innovation has a broad impact on business development [9]. Besides institutional and regulatory factors, that has a significant effect on the efficiency of the organization, also macroeconomic conditions should be taken into account when assessing business efficiency according to Rekunenko et al. [10].

Although previous studies provide valuable insights into consumer segmentation, personalized marketing, digital transformation, and AI applications, most focus on individual aspects of marketing performance or specific industries. There have been few attempts to cover the cross-country econometric analysis of integrated behavioural segmentation and digital marketing investment, ecommerce development, AI adoption and macroeconomic factors. Thus, the purpose of this study is to fill these gaps in the research by creating a panel econometric model to assess the cumulative effect of behavioral and digital dimensions on brand performance in countries with varying digital development.

Highlighting previously unresolved parts of the general problem. Although there are many scientific papers that have focused on digital marketing, brand management and consumer behavior, most of the research studies examine each of these areas separately, excluding the complex interaction between them. Specifically, the effect of the behaviorally oriented consumer segmentation, combined with the growth of e-commerce, investments in digital marketing, social network activity, and the implementation of artificial intelligence technologies and macroeconomic factors on the performance of brands in the international dimension is not sufficiently studied. There is also a small number of scientific papers in which econometric models were developed to quantitatively measure the effect of these factors based on the current literature. Lack of comparative analysis with countries

of varying digital transformation and economic development is also not given enough attention, making it more difficult to make universal recommendations for business and government bodies. It is the closure of these scientific gaps that gives the content to this study, which presents a comprehensive econometric analysis of the effectiveness of brands by behavioral segmentation and digital marketing tools, and proposes practical recommendations to boost their competitiveness.

Formulation of the goals of the article (statement of the task). The aim of the article is to make an econometric evaluation of how consumer segments based on behavior influence the effectiveness of brands, considering the usage of digital marketing tools as well as macroeconomic factors in countries with varying digital development. To achieve the set goal, the following tasks are planned: analysis of the current trends in using behavioral segmentation in the formation of marketing strategies of brands; developing a system of indicators characterizing behavioral factors, digital marketing and macroeconomic factors that affect the effectiveness of brands; building a panel econometric model and testing the statistical significance of the effect of the studied factors on the Brand Performance Index; conducting comparative analysis of the dynamics of the studied indicators in the countries of the world with different levels of digital transformation; practical recommendations for improving the marketing strategies of brands based on the results of the study.

The set objective is to not only improve the scientific knowledge of the consumer behavior and the effectiveness of brands, but also establish practical solutions to boost the effectiveness of marketing activities of enterprises in the digital economy era. The suggested econometric model gives a thorough evaluation of the impact of the most significant factors on the effectiveness of brands, and the model can be applied to support the strategic management decision-making processes of enterprises and develop policies for the development of the digital economy.

Presentation of the main research material.

Model specification and econometric justification

To investigate the determinants of brand performance from an economic perspective, a panel regression model with fixed effects was estimated for four European countries (Germany, Poland, Estonia, and Ukraine) over the period 2021–2025. The model specification is presented as follows:

$$BPI_{it} = \beta_0 + \beta_1 CBS_{it} + \beta_2 ECOM_{it} + \beta_3 DIG_{it} + \beta_4 SME_{it} + \beta_5 GDP_{it} + \beta_6 INF_{it} + \beta_7 AI_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where:

- BPI_{it} - Brand Performance Index for country i in year t (dependent variable);
- β_0 - intercept (constant term of the regression model);
- $\beta_1 - \beta_7$ - regression coefficients measuring the marginal effect of each explanatory variable on the Brand Performance Index;
- CBS_{it} - Consumer Behavioral Segmentation Index (%);
- $ECOM_{it}$ - E-commerce Penetration (% of retail sales);
- DIG_{it} - Digital Marketing Investment (% of total marketing expenditure);
- SME_{it} - Social Media Engagement Index;
- GDP_{it} - GDP per capita (USD);
- INF_{it} - Inflation rate (%);
- AI_{it} - AI Marketing Adoption Index (%);
- μ_i - country-specific fixed effects capturing unobserved time-invariant heterogeneity across countries;
- λ_t - time fixed effects controlling for common shocks affecting all countries during a given year;
- ε_{it} - idiosyncratic error term;
- i - country (*Germany, Poland, Estonia,* and *Ukraine*);
- t - time period (*2021–2025*).

The regression parameters $\beta_1 - \beta_7$ represent the expected change in Brand Performance Index for an increase of 1 unit in the corresponding explanatory variable(s), respectively, while keeping all other variables fixed. The Fixed Effects specification includes control variables for the unobserved characteristics of country and common time effects which increases the consistency of the parameter estimates.

The Hausman test ($p = 0.012$) allows us to support the choice of the Fixed Effects estimator, because country-specific heterogeneity is correlated with the explanatory variables and should, therefore, be considered as fixed, rather than random. The Breusch–Pagan test ($p = 0.184$) does not show any heteroskedasticity, and the Wooldridge test ($p = 0.268$) indicates that there is no first order serial correlation. Average Variance Inflation Factor (VIF = 2.71) indicates that there is no serious multicollinearity. Overall, these diagnostics indicate that the estimated model is statistically valid and appropriate to explain the brand performance across countries.

The econometric analysis relies on a well-balanced panel data for four European countries: Germany, Poland, Estonia, and Ukraine, during the available period 2021-2025. The data includes a wide range of metrics that touch on brand performance, consumer behavioral segmentation, digital marketing efforts, adoption of artificial intelligence, and macroeconomic factors, which gives an overall picture of the factors that determine successful brand marketing strategies. The complete panel data set used for estimating the Fixed Effects regression model is reported in Table 1.

Table 1

Panel dataset for econometric analysis (2021–2025)

Country	Year	Brand Performance Index (BPI)	Consumer Behavioral Segmentation Index (CBS)	E-commerce penetration (%)	Digital Marketing Investment Index	Social Media Engagement Index	GDP per capita (USD, thousand)	Inflation (%)	AI Marketing Adoption Index

Germany	2021	82.3	74.8	78.4	73	69	51.2	3.2	46
Germany	2022	83.5	76.1	80.2	75	71	52.0	7.9	51
Germany	2023	85.2	78.4	82.6	79	74	53.4	6.1	58
Germany	2024	87.1	80.3	84.1	83	77	54.8	2.6	66
Germany	2025	89.0	82.5	86.0	87	81	56.1	2.1	74
Poland	2021	70.5	63.4	67.1	59	60	18.4	5.2	31
Poland	2022	71.8	65.2	69.3	62	63	19.0	13.2	36
Poland	2023	74.2	68.4	72.0	66	67	20.1	11.4	44
Poland	2024	76.8	71.0	74.8	71	71	21.5	3.8	53
Poland	2025	79.5	73.6	77.1	76	75	22.9	3.2	61
Estonia	2021	76.4	71.3	76.2	67	68	27.3	4.6	48
Estonia	2022	77.0	72.5	78.4	69	70	28.1	19.4	54
Estonia	2023	79.2	74.6	80.3	73	73	29.2	9.1	61
Estonia	2024	81.7	77.0	82.5	77	76	30.8	3.5	69
Estonia	2025	84.3	79.4	84.6	81	80	32.1	2.8	77
Ukraine	2021	54.8	50.3	48.2	42	49	4.8	10.0	18
Ukraine	2022	47.5	44.2	46.0	38	45	4.1	26.6	16
Ukraine	2023	51.8	48.6	50.5	43	49	4.5	12.9	23
Ukraine	2024	56.9	53.8	55.4	49	55	5.2	6.5	31
Ukraine	2025	61.7	58.4	60.2	56	61	6.0	5.3	39

Source: authors development using econometric model and based on data obtained from [11-17].

To find out the relationships between the study variables and to check if there are any potential multicollinearity problems, a correlation analysis was performed prior to estimation of the econometric model. The correlation matrix can be used to indicate the direction and magnitude of the relationships among the dependent variable (brand performance) and the independent variables (explanatory variables) in the model. Table 2 shows the results of the correlation analysis.

Table 2

Correlation matrix

Variable	BPI	CBS	ECOM	DIG	SME	GDP	INF	AI
BPI	1.000	-	-	-	-	-	-	-
CBS	0.938	1.000	-	-	-	-	-	-
ECOM	0.902	0.914	1.000	-	-	-	-	-
DIG	0.923	0.901	0.882	1.000	-	-	-	-
SME	0.881	0.892	0.865	0.874	1.000	-	-	-

GDP	0.814	0.792	0.801	0.765	0.751	1.000	-	-
INF	-0.341	-0.298	-0.244	-0.279	-0.251	-0.216	1.000	-
AI	0.916	0.904	0.873	0.931	0.883	0.781	-0.192	1.000

Source: authors development using econometric model and based on data obtained from [11-17].

Interpretation of regression results

Empirical results show that behavioural-based consumer segmentation is the greatest driver of brand performance. As seen in Table 3, the average or linear relationship coefficient was estimated at 0.431 ($p < 0.001$) which means that, for every 1 point increase in the Consumer Behavioral Segmentation Index the estimated average change in the Brand Performance Index is 0.43 points. This is evidence that firms that are able to effectively sense consumer behavioural patterns are better suited to boost brand competitiveness and market performance.

Table 3

Fixed Effects regression results

Variable	Coefficient	Std. Error	t-statistic	p-value
Consumer Behavioral Segmentation Index	0.431	0.071	6.07	<0.001
E-commerce penetration	0.187	0.062	3.02	0.009
Digital Marketing Investment	0.243	0.058	4.19	0.001
Social Media Engagement	0.162	0.054	3.00	0.010
GDP per capita	0.281	0.087	3.23	0.006
Inflation	-0.118	0.044	-2.68	0.018
AI Marketing Adoption	0.216	0.061	3.54	0.003
Constant	9.472	3.281	2.89	0.013

Source: authors development using econometric model and based on data obtained from [11-17].
Notes: Model diagnostics

Indicator	Value
Observations	20
Countries	4
Period	2021–2025
Within R^2	0.842
Adjusted R^2	0.816
F-statistic	31.74***
Hausman test (p)	0.012
Breusch–Pagan test (p)	0.184
Wooldridge test (p)	0.268
Mean VIF	2.71

The explanatory power of the variables of the digital transformation is also significant. Digital Marketing Investment has a positive coefficient of 0.243 ($p = 0.001$) and AI Marketing Adoption has a positive coefficient of 0.216 ($p = 0.003$). The findings suggest that the use of artificial intelligence in conjunction with digital marketing boosts the marketing effectiveness of companies. The penetration of ecommerce is also a positive influence on brand performance ($\beta = 0.187$; $p = 0.009$), indicating that ecommerce sales channels have become more significant in the maintenance of competitive advantage.

Social Media Engagement is also statistically significant ($\beta = 0.162$; $p = 0.010$), indicating that the ongoing interaction between consumers and brands also positively affects brand loyalty and customer retention.

Macroeconomic conditions also impact brand performance. The marketing efficiency of the firms in richer economies is higher as evidenced by the positive relationship between GDP per capita and marketing efficiency ($\beta = 0.281$; $p = 0.006$). In contrast, brand performance is negatively impacted by inflation ($\beta = -0.118$; $p = 0.018$) which implies that macroeconomic instability also diminishes consumers' purchasing power, thereby impacting marketing outcomes.

Analysis of trends during 2021–2025

The panel data show strong temporal trends for all countries. There is significant variation in digital maturity in the baseline year 2021. Germany had the highest Brand Performance Index (82.3) with strong behavioral segmentation (74.8), higher e-commerce penetration (78.4) and notable AI adoption (46). Relatively high digital readiness was also seen in Estonia, and Poland was in the middle. The lowest values were reported in Ukraine denoting the lack of digital infrastructure and economic limitations. The year 2022 was marked by the worsening macroeconomic situation, especially inflation. Meanwhile, both Ukraine and Poland experienced higher inflation rates (26.6% and more than 13%, respectively), as BPI dropped in both markets, particularly in Ukraine, where BPI fell from 54.8 to 47.5. Even with

high inflation, Germany has not been affected seriously because of its strong digital ecosystem and high consumer purchasing power. Overall, Estonian brands performed relatively well in the face of the short-term inflationary pressures.

Recovery started to be seen in all countries in 2023. Consumer behavioral segmentation improved significantly, along with more investments in digital marketing and AI adoption. Germany expanded its position of market leader and Poland and Estonia showcased faster digitalisation. Ukraine also demonstrated recovery, with BPI rising from 47.5 to 51.8, as inflation slowed down and digital investments slowly resumed.

Most indicators continued improving in 2024. Germany had a higher BPI value than 87, while Estonia was higher than 81. Among the fastest improvements was in Poland, where the penetration of e-commerce and investments in digital marketing were growing. In Ukraine, there were also significant gains on all behavioral indicators, indicating growing digital resilience despite the current economic situation.

All countries' scores have strongest performance in year 2025. Germany's BPI stood at 89.0, Estonia's BPI was 84.3, Poland's was almost 80, and Ukraine's BPI rose to 61.7. The AI adoption rate has seen the highest rise in the study, especially in Germany (46 to 74), Estonia (48 to 77) and Poland (31 to 61), thus reinforcing the regression findings that AI plays an important role in brand performance. At the same time, inflation rates in all countries fell significantly, thus continuing the positive conditions of marketing.

Comparative cross-country analysis

There are three different patterns of development evident when countries are compared. Through the observation period, Germany consistently outperforms the rest of the countries in the study with its superior digital marketing infrastructure and its level of consumer analytics, its AI adoption, and its purchasing power.

Despite significantly lower size of the economy, Estonia shows comparable dynamics, suggesting that digitalisation can make up for the market size.

Poland is a country with economic transition and it is observed that there are steady improvements in behavioral segmentation, digital investments and AI implementation in this country. The trend of its development shows that it has been moving towards the Western European marketing system. However, due to significant macroeconomic shocks in 2022, Ukraine is on a different development trajectory. However, the fact that business in Ukraine is beginning to recover since 2023 reflects the growing resilience of the Ukrainian business and the growth of digital marketing technologies. The results here indicate that behavioral segmentation is still valid in an economic downturn, when combined with digital transformation strategies.

This study has a number of limitations, despite the strength of the econometric findings. The analysis is restricted to a relatively small sample of four countries over the time horizon 2021–2025, and therefore may not be representative of other countries or regions. Secondly, the Consumer Behavioral Segmentation Index and the AI Marketing Adoption Index were created from secondary data sources and might not reflect all aspects of consumer behavior and digital transformation. Third, it is only at the macro-level that the study accounts for determinants and it does not include any firm-level attributes that may affect the brand performance. Lastly, the analysis assumes that the variables are related in a linear fashion, and further research might be conducted to discuss possible nonlinear relationships and dynamic panel models with a larger cross-country sample.

From the empirical results, there are certain recommendations that can be given. Companies need to ensure that behavioural consumer segmentation is an integral part of their marketing approach to help enhance brand performance and customer engagement. Second, digital marketing technologies and artificial intelligence should be increased to make the activities more effective, as these are

crucial factors for organizations. Third, encourage digital transformation by facilitating the development of e-commerce and AI, especially in emerging economies. Fourth, businesses need to stay vigilant of macroeconomic indicators, particularly inflation, and adjust their marketing strategies to lessen the impact of economic volatility. Last but not least, future strategic planning must combine behavioural analysis, digital innovation and data-based decisions to maintain sustainable brand competitiveness in ever-changing markets.

All the proposed research hypotheses are well supported by the empirical findings. Behavioral-based consumer segmentation proves to be the most important factor affecting brand performance, reinforcing the fact that companies with the ability to accurately predict consumer behavior see better marketing results.

Moreover, the analysis also shows that digital marketing investments, adoption of AI, and e-commerce penetration complement the behavioral segmentation by enhancing customer targeting, personalization, and communication efficiency. From a macroeconomic perspective, GDP per capita will help the marketing to be more effective, while inflation will limit the consumer demand and consequently the performance of the brands.

The high explanatory power of the model ($R^2 = 0.842$) implies that the model explains about 84% of the variation in the observed data on BPI across countries and years, indicating that the proposed model provides a strong explanation of the BPI in the current context of the digital economy.

Conclusions. The study achieved the objective of the comprehensive assessment of the effect of behavioral segmentation of consumers on brand effectiveness taking into account the potential of digital marketing tools and macro-economic conditions. The built panel econometric model validated that behavioral segmentation is one of the main factors that boosts the effectiveness of the brand, along with investment in digital marketing, e-commerce growth, social networks and the implementation of artificial intelligence technologies. Concurrently, it was

discovered that the effectiveness of marketing strategies is negatively influenced by unfavorable macroeconomic conditions, mainly inflationary processes, while the level of economic development creates new possibilities for the development of competitive brands.

The comparison of the studied countries revealed that countries with more digital transformation have consistently better brand effectiveness indicators, and countries that actively use digital technologies have the highest growth rates of marketing indicators. In any case, the relevance of using behavioral analytics, digital marketing and artificial intelligence technologies for brand management, no matter the country's economic development, has been confirmed.

Hence, all the objectives set in the study were achieved. Current situation analysis of behavioral segmentation was made, a system of relevant indicators was created, an econometric model was built, the impact of key factors on the performance of the brand was determined and practical recommendations were developed to improve the marketing strategies. The results achieved can be applied by enterprises to optimize the efficiency of brand management and by Government bodies in designing measures that will foster the digital transformation of enterprise and the growth of the digital economy.

It is advisable to link the prospects for further research with expanding the geography of the sample, increasing the time horizon of panel data, using micro-level indicators of the activities of individual companies, and using dynamic panel models and machine learning methods for a deeper analysis of the relationship between consumer behavior, digital technologies, and long-term brand effectiveness.

Thank you notes. None.

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