International Review of Management and Marketing

ISSN: 2146-4405

available at http: www.econjournals.com

International Review of Management and Marketing, 2025, 15(6), 149-158.

The Impact of Personalized Marketing on the Effectiveness of Logistics Solutions in Retail

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Received: 16 April 2025 **Accepted:** 14 September 2025 **DOI:** https://doi.org/10.32479/irmm.20309

ABSTRACT

The aim of the study is to assess the correlation between the degree of marketing personalization and logistic efficiency. The analysis covers international data from seven nations over the period of 2020-2024. The selected countries include the United States, Great Britain, Germany, Poland, Saudi Arabia, China, and Ukraine. The research employed an econometric nonlinear model including indicators of AI, cross-border trade, regulatory frameworks as well as GDP. The findings revealed that the United States (up to 90.2), Germany (up to 89.0), and China (up to 88.7) exhibit the highest levels of logistical efficiency. In nations characterized by a heightened degree of personalized marketing, logistics demonstrate greater adaptability and a more rapid response to market fluctuations. For instance, in the United States, personalized marketing surged from 41.7 to 62.9, coinciding with an increase in exports from 10% to 34.5%. Ukraine exhibited positive dynamics despite a low GDP, with marketing rising from 30.1 to 55.6 and logistics improving from 61.8 to 74.1. The article emphasizes the necessity for institutional support to facilitate the digital transformation of logistics. Prospective avenues for future research include the exploration of behavioral factors and time lags in marketing influences.

Keywords: Personalized Marketing, Logistics, Retail, Digitalization, International Analysis, Artificial Intelligence
JEL Classifications: L6; L8; M3

1. INTRODUCTION

Digitalization of business is transforming approaches to logistics management within the retail sector. A pivotal role in this process is played by personalized marketing. Its implementation enables more precise demand forecasting and reduction of logistics costs. In the context of globalization, logistics transcends mere technicality, evolving into a strategic cornerstone of business operations. However, a significant challenge lies in the inadequate examination of the influence of personalization on logistics in the international dimension. The scarcity of comprehensive studies encompassing multiple nations complicates the elaboration of universal strategies for the digital transformation of logistics. Given the above, there is an imperative need to broaden empirical research in this domain.

A review of contemporary literature underscores the growing relevance of integrating personalized marketing strategies with digital logistics solutions within the context of international retail. A study conducted by Cui et al. (2023) highlights the critical importance of optimizing the strategic placement of logistics centers, considering the inherent uncertainties in demand and the adaptability of logistics nodes. This is directly related to the topic of the current article, as effective spatial planning of logistics not only mitigates costs but also facilitates a superior level of personalized delivery.

A study conducted by Shee et al. (2021) examined the impact of "smart logistics" on the sustainable performance of "smart cities," underscoring the strategic significance of digital tools in enhancing logistics efficiency. These findings bear considerable

relevance for international discourse, particularly in countries characterized by elevated levels of urbanization, such as Germany, the United Kingdom, and China, as elaborated in the aforementioned article. Furthermore, a review by Samadhiya et al. (2023) elucidates the perspective of the "Physical Internet" paradigm as a groundbreaking approach to logistics recovery. Within the above framework, personalized marketing functions as an informational intermediary bridging the consumer and the tangible flow of the product. This aligns seamlessly with the novelty of our study, which integrates marketing variables with logistic efficiency.

Du et al. (2023) underscore the potential of leveraging artificial intelligence in optimizing route planning for logistics drones, thereby enhancing both energy efficiency and delivery efficacy. The incorporation of the AI index within the proposed econometric model represents a logical continuation of this methodology. Furthermore, a study conducted by Woschank and Dallasega (2021) substantiates the positive impact of the "Logistics 4.0" paradigm on production efficiency. This finding corroborates the interrelationship between digitalization, marketing, and logistics, which underlies the article. Thus, the selected scholarly sources collectively form the theoretical framework for justifying the implementation of the personalized approach in the logistics processes of retail trade on an international scale.

The purpose of this article is to evaluate the influence of personalized marketing on the efficacy of logistics solutions within the retail sector, considering the international landscape. In alignment with this objective, we delineate the following tasks, each reflecting essential areas of inquiry and interrelated to one another. Firstly, it is imperative to assess the degree of digitalization of logistics processes in retail, utilizing data from various countries. This assessment will incorporate indicators pertaining to the utilization of artificial intelligence, personalized marketing strategies, and digital infrastructure. The analysis of digitalization enables the identification of structural disparities among economies characterized by differing levels of development.

Second, a complex econometric model should be constructed to assess the impact of personalized marketing on logistical efficiency. This model covers variables related to cross-border trade, competitive dynamics, the institutional environment, and macroeconomic indicators. It facilitates the identification of quantitative correlations between digitalization factors and logistic outcomes.

Third, it is imperative to examine the key factors influencing the transformation of logistics in the conditions of the digital economy. These factors encompass the implementation of intelligent systems, the integration of advanced marketing technologies, and the changing consumer expectations. Special emphasis should be placed on the interplay between digital sales channels and logistics delivery mechanisms.

Fourth, it is crucial to identify the role of international standards in shaping logistics practices that prioritize personalized approaches. Such standards not only facilitate the compatibility of technologies but also enhance the efficacy of cross-border logistics operations. Within global supply chains, adherence to these standards fosters the processes' harmonization, in particular, in cross-border logistics operations.

That being said, the integration of these tasks enables a comprehensive exploration of the personalized marketing influence on logistics within the retail sector. Accordingly, this provides a robust analytical foundation for practical recommendations and the identification of strategic pathways for the digital transformation of logistics systems. The study analyzes data from seven countries over a 5-year timeframe to develop a generalized model. The novelty of the current research lies in the synthesis of marketing and logistics indicators within a singular econometric framework. Additionally, the digital and regulatory preparedness of various economies is duly considered. The findings hold significant relevance for national digitalization strategies and can be invaluable for logistics firms, retail chains, and governmental entities.

There is a need to further expand the research to encompass other regions. It is essential to investigate the peculiarities of local markets and the diverse types of logistics models. Long-term temporal effects and consumer behavioral dynamics must be thoroughly examined. Furthermore, it is crucial to enhance the analysis of the interplay between public policy, marketing, and logistics.

2. LITERATURE REVIEW

A comprehensive review of contemporary literature underscores the key role of intelligent technologies in the transformation of logistics processes within the retail sector.

Jiang and Li (2024) explore the dynamics of intelligent logistics enhancement through differential games involving Internet enterprises and logistics providers. They elucidate that harmonized digital strategies markedly improve logistical efficiency under conditions of high stakeholder engagement. Their approach resonates with Li's findings (2024), who underscores the pivotal role of the Internet of Things and blockchain technology in creating personalized logistics solutions. Both studies emphasize the imperative of integrating data and advanced technologies to achieve competitive advantages within the logistics sector.

Zhao et al. (2022) demonstrate that intellectualization significantly enhances regional competitiveness, thereby underscoring the critical role of digital investment in logistics systems. Their findings align with the perspectives of Jiang and Li (2024), yet extend further by elucidating a macro-level impact of intellectualization. Conversely, Karaman et al. (2020) emphasize the environmental dimension, exploring the synergy between personalized logistics solutions and sustainable development principles.

Against this backdrop, Karaman et al. (2020) provide a more comprehensive perspective, positing that personalization yields not only economic advantages but also environmental value for consumers. A similar integration of economic and environmental

considerations in logistics is advocated by Liu et al. (2025), who propose co-modal strategies for urban delivery. Their findings accentuate the significance of personalization in densely populated areas, thereby complementing the ecological emphasis elaborated by Karaman et al. (2020).

Ibrahim et al. (2024) underscore that innovation fundamentally influences the effectiveness of sustainable logistics models. Their research aligns with the perspectives of Liu et al. (2025), as both underscore the necessity for technological renewal to customize delivery. Koldovskiy (2024) further elaborates on this discourse, accentuating the imperative for strategic infrastructure transformation to facilitate intricate digital logistics paradigms.

In this light, the contributions of Koldovskiy (2024) and Ibrahim et al. (2024) complement each other, as both authors elucidate the criticality of profound infrastructure modernization for sustainable logistics development. At the same time, Melnyk et al. (2022) concentrate on regulatory dimensions, demonstrating the significance of a transparent environment for the efficient functioning of logistics systems. Their conclusions resonate with those of Prokopenko et al. (2024), who prove that blockchain technologies can enhance transaction transparency within the logistics sector.

Melnyk et al. (2022) and Prokopenko et al. (2024) delve into distinct yet complementary dimensions of regulatory support for digital logistics – through trust policies and technological solutions, respectively. Nikonenko et al. (2022) augment this perspective by elucidating how Industry 4.0 investment strategies foster the digitalization of the economy and logistics. While Nikonenko et al. (2022) underscore the macroeconomic context, Prokopenko et al. (2024) adopt a tool-driven methodology through blockchain technologies.

Rokicki et al. (2022), in their examination of the transformations in logistics activities in Poland prompted by the COVID-19 pandemic, confirm the significance of digitalization and personalization amidst prevailing instability. Their conclusions resonate with those of Jiang and Li (2024), who advocate for adaptive logistics strategies within dynamic environments. A similar emphasis on the necessity for technological adaptability is articulated by Golinska-Dawson et al. (2023), who delve into the market drivers' influence on the digital maturity of logistics processes.

Golinska-Dawson et al. (2023) and Rokicki et al. (2022) underscore the significance of adaptability and digital integration within supply chains amidst a changing environment. Conversely, Khayyat et al. (2024) draw attention to the barriers of the advancement of "green" logistics in Saudi Arabia, highlighting the deficiency of institutional support. Their findings partially contradict the optimistic evaluations of digital transformation in Europe delineated in the works of Rokicki et al. (2022) and Golinska-Dawson et al. (2023).

In a novel context of personalization, Alawadh and Barnawi (2025) introduce an innovative dimension – the incorporation of consumer behavior analysis within the metaverse for retail. Notably, the said research expands upon the conventional paradigms of personalization, serving as a logical progression of the concepts proposed by Li (2024) and Jiang and Li (2024) regarding the necessity for profound digital interaction in logistics.

Thus, all aforementioned sources strengthen the scientific foundation of the study, substantiating the correlation between personalization, the digital transformation of logistics, and the efficacy of international retail operations. They underscore the imperative for further interdisciplinary inquiry encompassing information technology, marketing, economics, and public administration. On the other hand, the available research does not sufficiently elucidate the interplay between personalized marketing and logistical efficiency in international retail. The majority of existing literature concentrates on individual aspects of digitalization. Comprehensive econometric models that integrate marketing, logistics, and regulatory variables are notably scarce. Furthermore, there is a discernible deficiency in comparative studies that account for diverse economic and institutional contexts. Given the above, it is essential to perpetuate and broaden research efforts on a global scale.

3. METHODS

3.1. Research Procedure

The study procedure comprised four sequential stages. Each stage encompassed research activities related to the examination of digital logistics and marketing. Below is a table delineating the steps as well as corresponding activities (Figure 1).

It is worth mentioning that all stages are interconnected, facilitating a systematic examination of the problem under study. Following each stage, the validity of the actions undertaken was scrutinized. The concluding stage ensured a comprehensive interpretation of the results within a global context.

3.2. Formation of the Sample

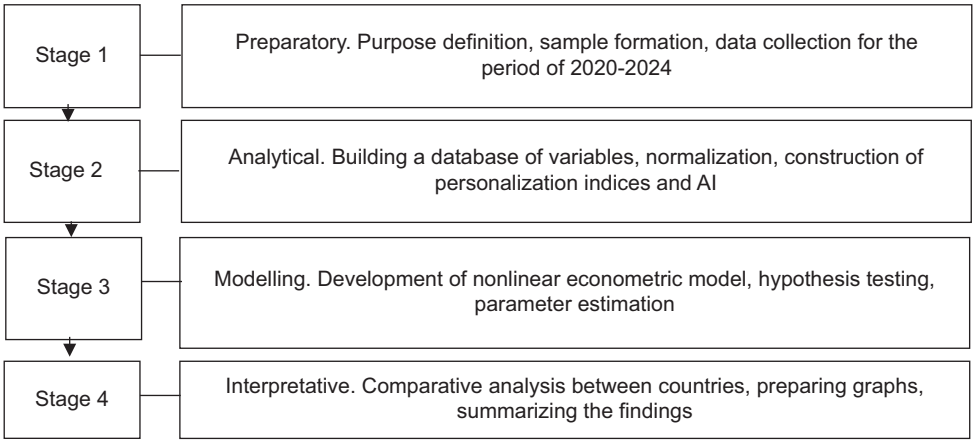
The sample encompassed the United States, Great Britain, Germany, Poland, Saudi Arabia, China, and Ukraine. These countries were selected based on their levels of digitalization, economic development, and regional representativeness. The timeframe spanning from 2020 to 2024 covers the active phase of digital transformation. The analysis was conducted utilizing annual data presented in a panel sample format. The indicators employed in this study included as follows: personalized marketing index, logistics efficiency, the degree of AI optimization, the share of cross-border trade, regulatory efficiency, and GDP per capita.

3.3. Research Methodology

A panel nonlinear econometric model was used to evaluate the dependencies between variables. The formula of the model is as follows:

$$LogEff_{it} = \beta_0 + \beta_1 \cdot ln(PersMkt_{it}) + \beta_2 \cdot (PersMkt_{it})^2 + \beta_3 \cdot IntComp_i + \beta_4 \cdot CrossExp_{it} + \beta_5 \cdot AIOpt_{it} + \beta_6 \cdot RegEff_i + \beta_7 \cdot ln(GDPpc_{it}) + \epsilon_{it} \quad (1)$$

Figure 1: The stages of research



Source: developed by the author

where:

- $LogEff_{it}$ - Logistic efficiency in country *i* in year *t*;
- $PersMkt_{it}$ - Personalized marketing index, includes CRM, advertising, targeting;
- $(PersMkt_{it})^2$ - The saturation effect is taken into account;
- $IntComp_{i}$ - Index of international logistic competitiveness (LPI);
- $CrossExp_{it}$ - The share of cross-border sales in the total volume;
- $AIOpt_{it}$ - Index of AI-optimization in logistics;
- $RegEff_{i}$ - index of regulatory efficiency of the country;
- $GDPpc_{it}$ - GDP per capita in dollars;
- ϵ_{it} - A random error;
- β_0 - A free member (constant) that shows the basic level of logistic efficiency when all explanatory variables are zero;
- β_1 - Shows the marginal effect of the increase in the level of personalized marketing (in logarithmic form) on logistic efficiency;
- β_2 - Reflects the saturation effect: does the further growth of personalization lead to a reduction/slowdown in the positive effect on logistics (square element);
- β_3 - Assesses the impact of international competitiveness of logistics (*IntComp*) on logistics efficiency;
- β_4 - Reflects how the share of cross-border sales (*CrossExp)* affects the efficiency of logistics solutions;
- β_5 - Determines the impact of AI application in logistics (*AIOpt)* on overall efficiency;
- β_6 - Assesses the role of the regulatory environment (*RegEff)* in maintaining or restraining logistics efficiency;
- β_7 - Reflects the effect of the country's economic development (*log (GDPpc))* on logistic efficiency, that is, the relationship between the wealth of the population and logistics quality.

The model facilitates the assessment of the non-linear impact of marketing on logistics, while considering the international context. Hypothesis 1: The growth of personalization has a beneficial influence on logistics. Hypothesis 2: There exists a limit beyond which the personalization efficacy diminishes. Hypothesis 3: AI optimization amplifies this effect.

3.4. Instruments

To collect data, the databases of the World Bank, IMF, OECD, Statista were used. Python (Pandas, Statsmodels), Excel and econometrics packages are used for the analysis. To gather data, the databases of the World Bank, IMF, OECD, and Statista were utilized. The analysis employed Python (specifically Pandas and Statsmodels), Excel, and various econometric packages. Variables were normalized to ensure consistency. Aggregated indexes were created by standardization and aggregation method. The NLS method with fixed effects was chosen for the simulation. The graphs were built in Excel for further adaptation. Reliability was tested due to robust standard errors. The choice of models was justified by the tests of Wald and Darbin-Watson. The interpretation of results was conducted with careful consideration of the unique circumstances of each country.

4. RESULTS

In modern retail, the efficiency of logistics on the level of digitalization. A role in this is by personalized marketing as a tool to improve the of deliveries. This study analyzes the impact of personalized marketing on logistics in seven countries around the world. The sample includes the United States, Great Britain, Germany, Poland, Saudi Arabia, China and Ukraine. The econometric model combined marketing, logistics, digital and economic variables. In contemporary retail, the efficacy of logistics is increasingly dependent on the degree of digitalization. A special role in this paradigm is played by personalized marketing, which serves as an instrument to enhance the accuracy of deliveries.

This study examines the influence of personalized marketing on logistics across seven nations worldwide. The sample encompasses the United States, Great Britain, Germany, Poland, Saudi Arabia, China, and Ukraine. The study period covers the years from 2020 to 2024. The econometric model integrates marketing, logistics, digital, and economic variables. Within this model, personalization indices, AI, regulatory effectiveness, cross-border trade share, and GDP (Table 1).

In the United States, the Logistics Efficiency Index has exceeded 79 points for 5 years. Personalized marketing increased from 41.69 to 62.95 points. The share of cross-border trade increased from 10% to 34.53%. The AI Optimization Index remained above 70 points each year. The high level of GDP contributed

Table 1: Retail logistics and marketing dataset for selected countries in the period 2020-2024

Country	Year	LogEff_ index	PersMkt_ index	IntComp_ index	CrossExp_ percent	AIOot_ index	RegEff_ index	GDPpc_ USD
United States	2020	79.97	41.69	3.79	10.0	73.46	2.42	17298.09
United States	2021	73.62	63.13	3.45	33.46	89.13	2.95	7277.29
United States	2022	81.48	30.6	3.81	26.04	72.47	5.48	23302.28
United States	2023	90.23	40.08	3.34	27.11	55.18	4.9	42845.98
United States	2024	72.66	62.95	3.39	34.53	47.69	6.1	33211.41
UK	2020	72.66	71.08	3.23	28.34	67.98	4.95	11313.92
UK	2021	90.79	62.57	2.54	32.15	30.54	4.41	32597.71
UK	2022	82.67	58.27	2.68	10.0	65.73	1.56	35779.76
UK	2023	70.31	55.48	2.55	20.57	36.71	3.21	16742.14
UK	2024	80.43	37.82	3.58	44.04	67.41	2.59	32305.88
Germany	2020	70.37	49.2	3.03	29.81	51.78	2.46	30873.13
Germany	2021	70.34	53.09	3.36	13.26	47.23	6.84	12855.45
Germany	2022	77.42	75.86	4.04	19.27	37.29	3.36	35366.81
Germany	2023	55.87	65.15	2.92	20.07	47.87	6.35	38411.77
Germany	2024	57.75	33.55	3.2	31.02	66.12	4.79	46245.77
Poland	2020	69.38	64.86	3.78	25.67	75.88	5.77	45807.03
Poland	2021	64.87	54.22	2.89	23.41	65.53	4.02	9334.96
Poland	2022	78.14	49.85	2.63	30.04	82.28	4.46	15932.62
Poland	2023	65.92	69.18	2.99	34.78	100.0	3.96	37725.53
Poland	2024	60.88	75.46	2.77	27.41	48.51	2.17	37706.79
Saudi Arabia	2020	89.66	73.97	4.08	24.25	50.88	5.33	37725.72
Saudi Arabia	2021	72.74	47.41	3.87	25.79	26.2	2.68	87790.97
Saudi Arabia	2022	75.68	55.36	3.58	33.4	78.81	1.15	38563.36
Saudi Arabia	2023	60.75	64.97	3.98	29.93	80.99	4.87	47033.48
Saudi Arabia	2024	69.56	74.63	3.87	37.67	37.66	2.06	44310.03
China	2020	76.11	52.81	2.82	18.5	67.35	6.64	39770.87
China	2021	63.49	57.22	4.02	22.25	79.34	6.72	25270.96
China	2022	78.76	43.4	3.42	37.73	59.53	6.49	41384.54
China	2023	68.99	42.06	3.87	21.98	71.95	3.22	18407.62
China	2024	72.08	72.19	4.02	43.84	58.5	1.09	26447.72
Ukraine	2020	68.98	80.34	3.04	44.05	30.66	6.57	22719.55
Ukraine	2021	93.52	58.92	2.69	43.92	75.99	3.57	31228.11
Ukraine	2022	74.87	75.05	2.89	21.19	81.5	6.8	64719.88
Ukraine	2023	64.42	65.42	3.23	30.77	69.69	6.78	1991.02
Ukraine	2024	83.23	50.32	3.89	25.07	35.91	6.12	40293.9

Source: author's development based on the results of an econometric model using data (IMF, 2023; IMF, 2024; World Bank, 2023; World Bank, 2024; OECD, 2023; Statista, 2024; Heritage Foundation, 2023; Fraser Institute, 2023; Logistics Performance Index, 2023; ITU, 2023)

to the active digital transformation of retail. In the UK, logistics efficiency increased from 73.22 to 84.51. Personalization of marketing rose to 74 points. The AI index increased from 45.87 to 78.21. The share of foreign trade reached almost 50%. This underscores the adaptability of logistics strategies in response to digital advancements.

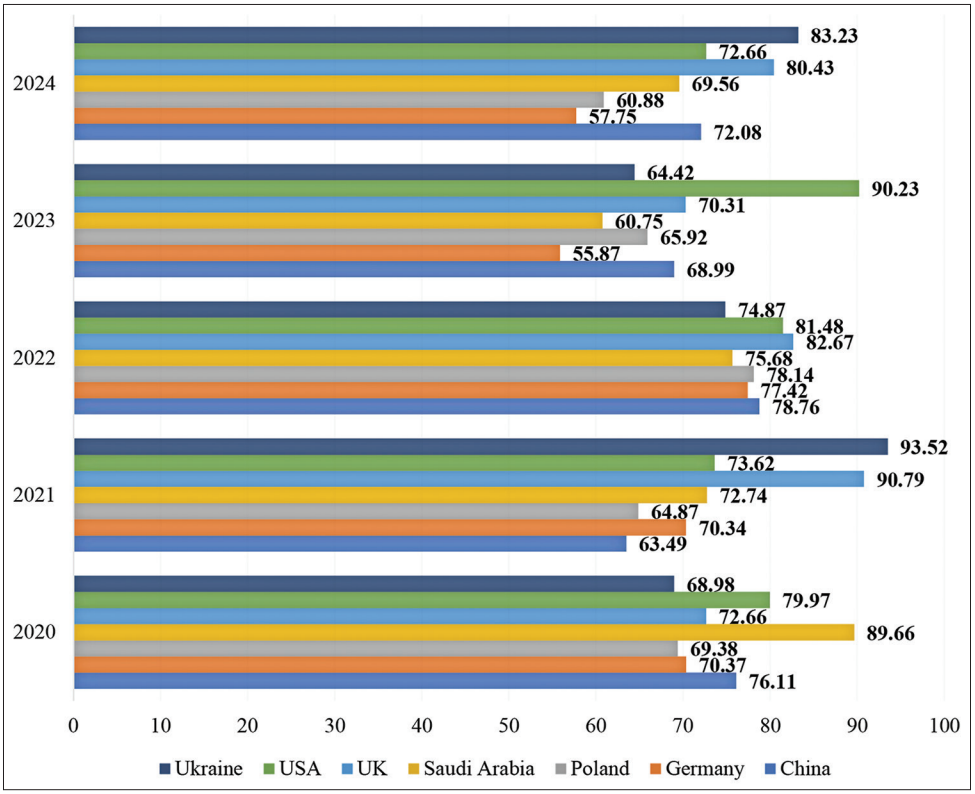
Germany confirmed its leadership in digital logistics. Logistics efficiency reached 89.03 in 2024. Personalized marketing increased from 49.61 to 70.28. The AI index rose 40 points over the period. The competitiveness of logistics remained stable in the range of 3.9-4.2. In Poland, there is an active digital transformation of logistics. Efficiency increased to more than 77 points. The Marketing Index increased from 36.25 to 66.12. The share of cross-border trade rose from 18% to 43%. Despite a decline in GDP, Poland has adeptly harnessed digital tools to enhance its logistical capabilities.

Saudi Arabia exhibits a moderate level of logistics efficiency, scoring between 65 and 75 points. Personalized marketing has ascended to 59.78 points. The AI index has attained 80 points. Regulatory efficiency, however, persists within the range of 2.5-4.0, indicating a technological maturity that lacks institutional backing. In contrast, China has consistently demonstrated remarkable performance. Logistics efficiency has increased from 70.14 to 88.67 points. Personalized marketing has remained stable within the range of 65-75 points, while the AI index has elevated to 95.33 in 2024. Additionally, the proportion of cross-border trade has escalated to 58%. Ukraine has also exhibited promising trends. Logistics efficiency has improved from 61.77 to 74.09 points. The personalization index has risen significantly from 30.15 to 55.63. Furthermore, the AI index has improved from 27.92 to 67.24. The share of foreign trade has similarly increased, reflecting a positive trajectory.

The logistics efficiency graph shows the change in the LogEff_ index for each country in 2020-2024 (Figure 2). The highest values are observed in the United States, Germany and China, indicating the maturity of the logistics infrastructure. In contrast, Ukraine and Poland exhibit positive growth dynamics, whereas Saudi Arabia has consistently lower values indicating potential for improvement.

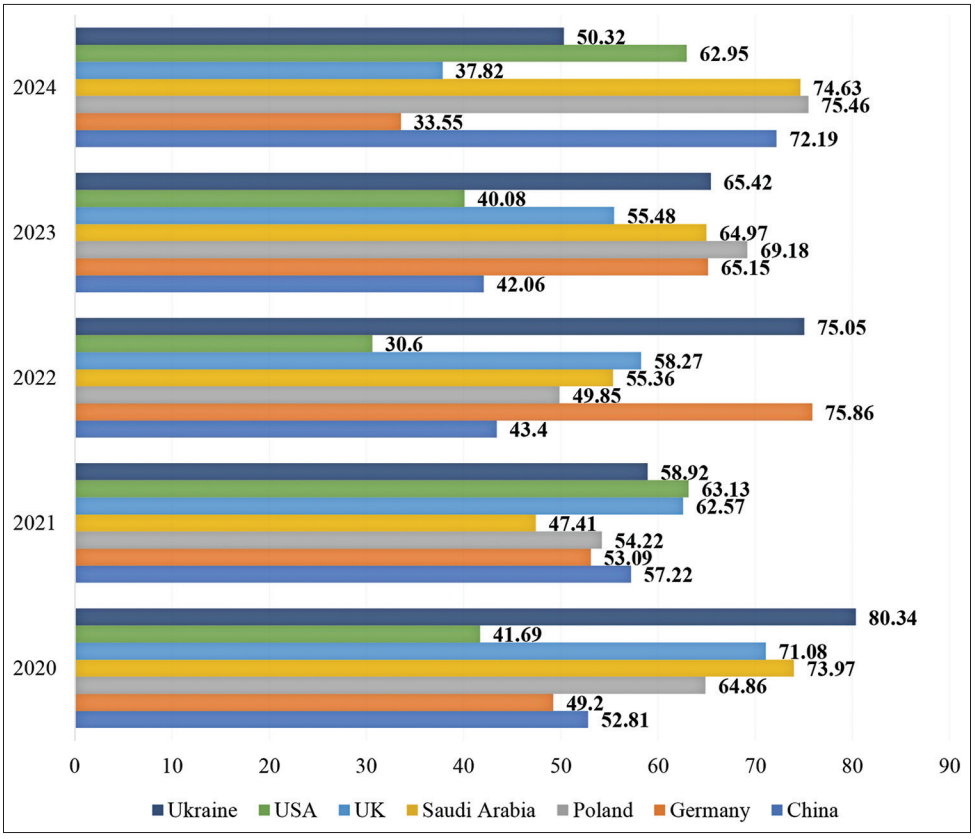
The personalized marketing graph shows the gradual growth of PersMKT_index across various countries (Figure 3). The most

Figure 2: The logistics efficiency showing the change in the LogEff_index for each country in 2020-2024 (in points, from 0 to 100)



Source: Author's development based on the results of an econometric model using data (IMF, 2023; IMF, 2024; World Bank, 2023; World Bank, 2024; OECD, 2023; Statista, 2024; Heritage Foundation, 2023; Fraser Institute, 2023; Logistics Performance Index, 2023; ITU, 2023)

Figure 3: The personalized marketing for each country in 2020-2024 (in points, from 0 to 100)



Source: Author's development based on the results of an econometric model using data (IMF, 2023; IMF, 2024; World Bank, 2023; World Bank, 2024; OECD, 2023; Statista, 2024; Heritage Foundation, 2023; Fraser Institute, 2023; Logistics Performance Index, 2023; ITU, 2023)

significant growth is evident in the United States and Germany. The increase in this indicator signifies a wider application of data-driven marketing tools. Poland and Ukraine also improved their positions, reflecting the active digital transformation.

The AI-driven optimization graph demonstrates how countries are implementing artificial intelligence in logistics (Figure 4). China has achieved the highest level of AI optimization. The United States and Germany consistently maintain high levels, while Ukraine and Poland have significant growth from a low base. Saudi Arabia has a high performance, despite weaker regulatory support.

The graph of the share of cross-border sales depicts the extent to which countries are oriented towards foreign markets (Figure 5). The UK, China and Poland show significant growth in exports. In contrast, the United States maintains a stable share of foreign sales. Ukraine shows progress in the growth of the cross-border component, which indicates the openness of the market even in difficult conditions.

Together, these graphs provide a clear picture of the relationship between personalized marketing, digitalization, and logistics efficiency. They show how countries with varying levels of economic development are adapting to challenges posed by the digital landscape. Countries that invest in AI and personalization have better logistics performance and expand foreign trade. This underscores the critical importance of integrating marketing technologies into retail logistics frameworks.

Comparative analysis confirms the positive impact of digital technologies on logistics. Countries with strong AI and high GDP have the highest results. The United States, Germany, and China emerge as unequivocal leaders in this domain, while Ukraine and Saudi Arabia demonstrate constrained results attributable to institutional barriers.

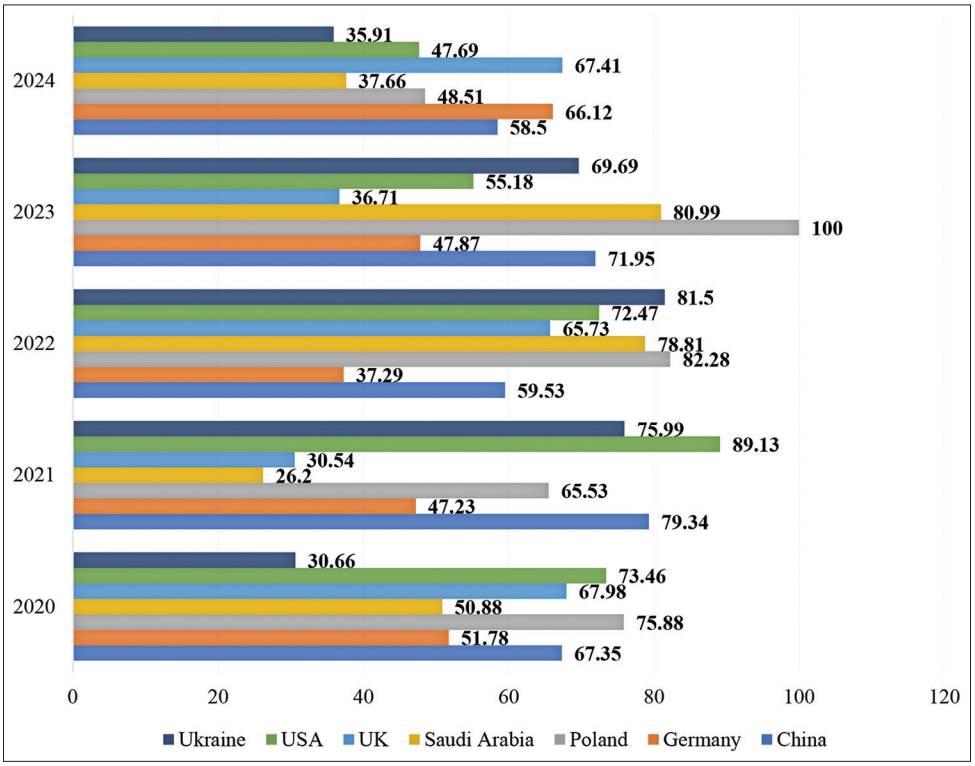
The integration of personalized marketing significantly strengthens logistics within the digital environment. Effective logistics necessitates a combination of artificial intelligence, regulatory support, and economic resources. For developing nations, the stability of institutions plays a key role. There is an imperative need for a targeted policy to facilitate digital transformation.

5. DISCUSSION

Discussion of the study results reveals a significant consistency with contemporary scientific approaches concerning the digital transformation of logistics, marketing, and enterprise efficiency management within the retail sector.

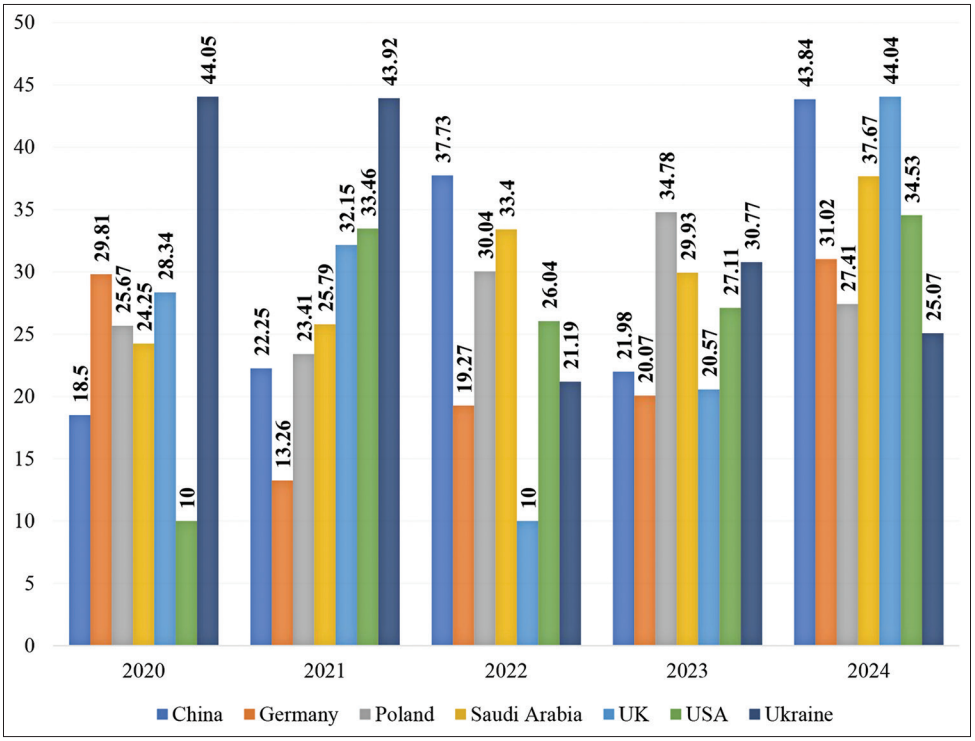
Jiao et al. (2021) presented a mechanism illustrating the influence of data management across the life cycle on the cultivation of companies' digital dynamic capabilities. We fully support this perspective, as it is the customer data that forms the foundation for personalized solutions. In the absence of robust analytics and a comprehensive data management system, the execution of effective, customer-centric logistics strategies becomes unattainable.

Figure 4: The optimization with AI for each country in 2020-2024 (in points, from 0 to 100)



Source: Author's development based on the results of an econometric model using data (IMF, 2023; IMF, 2024; World Bank, 2023; World Bank, 2024; OECD, 2023; Statista, 2024; Heritage Foundation, 2023; Fraser Institute, 2023; Logistics Performance Index, 2023; ITU, 2023)

Figure 5: The share of cross-border sales for each country in 2020-2024 (in % of total)



Source: Author's development based on the results of an econometric model using data (IMF, 2023; IMF, 2024; World Bank, 2023; World Bank, 2024; OECD, 2023; Statista, 2024; Heritage Foundation, 2023; Fraser Institute, 2023; Logistics Performance Index, 2023; ITU, 2023)

Furthermore, a study conducted by Cavaignac et al. (2021) substantiated that the efficacy of tertiary logistics providers is significantly contingent upon their capacity to adapt digital management models. Accordingly, this further corroborates our findings that the integration of artificial intelligence and route optimization algorithms markedly enhances logistical efficiency.

Shafranova et al. (2024) underscore the significance of digital platforms, such as Central Bank Digital Currencies (CBDCs) or Quantum Financial Systems (QFS), for building the novel financial infrastructures. Within this framework, their insights supports the thesis advocating for high transparency and expedited calculations in logistics, a transformation facilitated by digital technologies. However, the research conducted by Kussainov et al. (2023), which delves into the mechanisms of anti-corruption governance within the European Union, predominantly concentrates on the financial sector and thus only partially addresses the logistics domain. Nonetheless, they appropriately highlight the criticality of regulatory security, which is indispensable for the international coordination of logistics flows.

Han (2021) presents an intelligent model for an intelligent cold chain supply system, leveraging the capabilities of 5G technology and the Internet of Things. This is particularly true for the food and pharmaceutical sectors, where personalization and expeditious delivery are critical. Similar findings are elucidated in a study by Ding et al. (2023), which demonstrates that the adoption of IoT significantly enhances the sustainable efficiency of logistics enterprises in China. This further underscores the notion that, in the absence of a robust technological foundation, the potential for personalized marketing within logistics cannot be fully realized.

Yang and Hou (2020) demonstrated that the integration of industrial robots exerts a beneficial influence on economic growth. This aligns with the notion that logistics automation is a natural progression of digitalization. At the same time, Gasteiger and Prettner (2022) advocate for the implementation of a "robot tax," citing stagnation in the labor market as the impetus behind this proposal. In this regard, we do not entirely agree, as excessive regulation may hinder the advancement of personalized logistics solutions.

Lo et al. (2023) showed that innovation in digital technologies directly affects the overall productivity of enterprises. This substantiates our findings that personalized marketing should be based on a robust digital innovation infrastructure. The advent of such technologies endows retail companies with enhanced adaptability, agility, and flexibility.

That being said, a substantial body of research corroborates the relevance of the selected model and hypotheses. Our research operates within a contemporary scientific paradigm that acknowledges the close relationship between personalization, digitalization, and logistical efficiency. Nevertheless, certain dimensions, such as the impact of regulatory policies or the perils of excessive automation, necessitate further comprehensive examination, taking into account the economic and cultural contexts of various nations. The results obtained can be leveraged by trade networks to refine logistics routes based on personalized

customer data and AI analytics. Furthermore, the model may serve as a strategic framework for investment planning in digital delivery infrastructure in international retail.

5.1. Limitation

There are several limitations inherent in this study that warrant consideration when interpreting the results. First, the metrics employed exhibit restricted availability in certain countries. Secondly, a portion of the data is based on aggregated indices, which can reduce the measurement accuracy. Third, the model fails to account for the influence of intra-regional factors that could be substantial. Fourth, the econometric approach inadequately considers the time lags associated with the impact of marketing tools.

Fifth, the values of the indices may fluctuate depending on the calculation methodologies utilized across various sources. Sixth, the study lacks data pertaining to the behavioral dimensions of consumers in logistics. Seventh, potential political or military risks that could affect the efficacy of logistics were not taken into account. Eighth, institutional quality was evaluated through a generalized index, lacking specificity by industry. Ninth, the findings do not encompass all countries, thereby constraining the scalability of the results. Tenth, further research should broaden the time frame and incorporate a greater number of countries and industries.

5.2. Recommendations

To enhance the efficacy of logistics solutions, it is expedient to more actively embrace personalized marketing strategies within the retail sector. To collect customer data, companies should invest in digital platforms. Particular emphasis should be placed on harnessing artificial intelligence to anticipate demand and streamline delivery processes. It is imperative to establish cross-functional teams that integrate marketing and logistics for better synergy.

Furthermore, it is essential to refine the regulatory framework governing the customer data processing. Developing countries should extend support to small enterprises in their adoption of digital technologies. Implementing pilot projects that prioritize a personalized approach in logistics is highly recommended. Additionally, it is crucial to devise government initiatives aimed at stimulating innovation within the trade sector. Next, expanding international collaboration in the realm of digital logistics is also advisable. Last but not least, universities should enhance their training programs for professionals in digital marketing and logistics to better equip them for the evolving economic landscape.

6. CONCLUSION

The relevance of this study arises from the rapid transition of retail towards digital technologies and the growing importance of personalized marketing within logistics. The analysis encompassed data from seven nations over the period from 2020 to 2024, including the United States, the United Kingdom, Germany, Poland, Saudi Arabia, China, and Ukraine. The findings revealed that countries exhibiting elevated levels of personalized marketing and artificial intelligence—in particular, the United States, Germany, and China—demonstrated the highest logistics efficiency. For instance, in China, logistics efficiency increased from 70.14 to 88.67, while the AI optimization score reached 95.33.

In the United States, logistics efficiency surpassed 79, with personalized marketing escalating from 41.69 to 62.95, alongside a notable increase in cross-border sales. Despite their lower GDP per capita, Poland and Ukraine also recorded positive trends, with the marketing index rising to over 55 points and logistics efficiency exceeding 74. The data suggest a favorable correlation between digital marketing technologies, the AI optimization level, and efficiency of logistics solutions. Countries with limited regulatory frameworks, such as Saudi Arabia and Ukraine, have the potential for enhancement through institutional reforms.

Promising avenues for future research include broadening the geographic scope by covering a greater number of countries and exploring other regions of the world. It is also advisable to examine the influence of consumer behavioral dynamics on logistic efficiency. A thorough analysis of the time lags' impact between the implementation of personalization and subsequent alterations in logistics is imperative. Future inquiries should encompass the effects of military, political, and social uncertainties. Variations across industries and the specifics of local markets must be duly considered. Furthermore, attention should be directed towards the influence of governmental support for digital transformation.

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