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DIRECTIONS FOR IMPROVING THE EFFICIENCY OF E-COMMERCE ENTITIES

This article addresses the critical need to enhance the operational and strategic efficiency of e-commerce entities in a rapidly evolving digital economy. It aims to systematize mechanisms and strategies to optimize business processes, reduce costs, and improve customer experiences.

It is highlighted several challenges such as high operational costs, logistics inefficiencies, limited adoption of advanced technologies, and adaptability issues in e-commerce. These are linked to broader scientific and practical tasks, including digital transformation, sustainable business models, and global economic integration, emphasizing the role of technologies like AI, big data analytics, and automation.

It is proposed a structured approach to align tools with specific operational and strategic goals.

The study outlines 14 interconnected factors for improving efficiency, including personalization, logistics optimization, AI, omnichannel strategies, cybersecurity, AR/VR, social commerce, and sustainability. These are synthesized in a comprehensive table, illustrating their impact with examples. The framework emphasizes consumer trust, cost reduction, and market adaptability.

It is provided a robust framework for e-commerce entities to achieve operational excellence through technology integration, consumer-centric strategies, and sustainability. Future research should focus on scalable solutions for SMEs, cross-border regulatory strategies, generative AI, blockchain, real-time analytics, and workforce upskilling to sustain long-term efficiency gains.

This work offers practical and scientific value by addressing unresolved challenges and providing a cohesive methodology for e-commerce entities to thrive in a competitive, digital landscape.

Keywords: e-commerce, operational efficiency, e-commerce entities, enhancing operational efficiency, artificial intelligence.

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НАПРЯМИ ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ ДІЯЛЬНОСТІ СУБ'ЄКТІВ ЕЛЕКТРОННОЇ КОМЕРЦІЇ

Статтю присвячено актуальній потребі підвищення операційної та стратегічної ефективності суб'єктів електронної комерції в умовах швидкозмінної цифрової економіки. Метою дослідження є систематизація механізмів та стратегій для оптимізації бізнес-процесів, зниження витрат і покращення клієнтського досвіду.

У дослідженні висвітлюються такі виклики для суб'єктів електронної комерції, як високі операційні витрати, неефективність логістики, обмежене впровадження передових технологій та проблеми адаптації на електронних ринках. Дані питання пов'язані з ширшими науковими та практичними завданнями, зокрема цифровою трансформацією, створенням стійких бізнес-моделей і глобальною економічною інтеграцією, з акцентом на ролі таких технологій як штучний інтелект, аналіз великих даних і автоматизація бізнес-процесів.

Пропонується структурований підхід для узгодження інструментів підвищення ефективності діяльності суб'єктів електронної комерції із конкретними операційними та стратегічними цілями.

Дослідження окреслює 14 взаємопов'язаних факторів для підвищення ефективності діяльності суб'єктів електронної комерції, включаючи персоналізацію, оптимізацію логістики, штучний інтелект, омніканальні стратегії, кібербезпеку, доповнену та віртуальну реальність, соціальну комерцію та сталий розвиток. Ці фактори узагальнені в комплексній таблиці, що ілюструє їхній вплив на прикладах. Запропонована модель наголошує на довірі споживачів, зниженні витрат і адаптивності до ринку.

Стаття пропонує надійну модель для суб'єктів електронної комерції для досягнення ефективності діяльності через інтеграцію технологій, стратегії, орієнтовані на клієнта, та сталі практики. Майбутні дослідження мають зосередитися на масштабованих рішеннях для малих і середніх підприємств, стратегіях регулювання транскордонної торгівлі, генеративному штучному інтелекті, блокчейні, аналітиці в реальному часі та підвищенні кваліфікації працівників для забезпечення довгострокового зростання ефективності.

Ключові слова: електронна комерція, ефективність діяльності, суб'єкти електронної комерції, підвищення ефективності діяльності, штучний інтелект.

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STATEMENT OF THE PROBLEM IN GENERAL FORM AND ITS CONNECTION WITH IMPORTANT SCIENTIFIC OR PRACTICAL TASKS

The rapid development of e-commerce has significantly transformed modern economic systems, creating new opportunities for businesses and consumers. However, the dynamic growth of this sector is accompanied by

challenges related to the operational efficiency of e-commerce entities. These challenges include high operational costs, inefficiencies in logistics and supply chain management, limited application of advanced technologies, and insufficient adaptability to changing market demands.

The problem of enhancing the efficiency of e-commerce entities lies in the need to develop and implement effective mechanisms that optimize business processes, reduce costs, and improve customer experience while maintaining competitiveness in a rapidly evolving digital environment.

This issue is closely linked to important scientific and practical tasks, such as the development of innovative digital technologies (e.g., artificial intelligence, big data analytics, and automation) and their integration into e-commerce systems to enhance decision-making and operational performance. Practically, addressing this problem supports the creation of sustainable business models, cost reduction, and improved resource utilization, which are critical for the competitiveness of e-commerce entities in both domestic and global markets. The resolution of these challenges also aligns with broader economic goals, such as fostering digital transformation and sustainable development in the context of global economic integration.

ANALYSIS OF THE LATEST RESEARCH AND PUBLICATIONS

The issues of theory and practice in developing mechanisms for improving the efficiency of e-commerce entities are addressed in the scientific works of the following researchers: Shan, H., Yang, K., & Shi, J. [1], Ferreira, T., Pedrosa, I., & Bernardino, J. [2], Volynets, V., Sysoiev, D., Kotsur, A., Murenets, I., & Kyrylenko, S. [3], Jiang, W. [4], Wang, C.-N., Dang, T.-T., Nguyen, N.-A.-T., & Le, T.-T.-H. [5], Jawad, S. G., & Mohammed, A. H. [6], Liu, P. [7], Sharma, K. [8], Kumar, M., Kumar, N., Sha, S. N., Kennedy, E., & Ilankadhir, M. [9], Chukwunweike, J. N., Abiodun, D., Bright, O., & Taiwo, R. [10], Nathalie, J., Jacqueline, G., Yusuf, N. A., & Ming, L. W. [11], Wen, H. J., Lim, B. B. L., & Huang, H. L. [12], Rahman, M. A., & Kirby, E. D. [13], Lande, O. B. S., Johnson, E., Adeleke, G. S., Amajuoyi, C. P., & Simpson, B. [14], Zhang, Y., & Li, H. [15].

To enhance the efficiency of e-commerce entities, a multifaceted approach is essential, focusing on operational processes, customer insights, and technological integration. By leveraging strategic frameworks and advanced technologies, e-commerce businesses can optimize their performance and better meet consumer demands.

Utilizing Balanced Scorecard and Super-SBM Model helps identify inefficiencies in financial, customer, internal processes, and learning aspects, leading to targeted improvements[1].

Integrating business intelligence with e-commerce enables companies to analyze purchasing patterns, enhance customer relationship management, and tailor marketing strategies[2].

Improved insights lead to better inventory control, reducing costs and increasing responsiveness to market demands[2].

The adoption of digital tools is crucial for streamlining operations and enhancing profitability, especially in challenging environments[3].

AI can optimize information management, leading to more efficient decision-making processes and operational workflows[4].

Implementing hybrid models like Grey model and Data Envelopment Analysis allows businesses to predict performance and assess efficiency based on key financial metrics[5].

While these strategies present a robust framework for improving e-commerce efficiency, challenges such as regulatory compliance and market volatility must also be addressed to ensure sustainable growth and consumer protection.

ISOLATION OF PREVIOUSLY UNRESOLVED PARTS OF THE GENERAL PROBLEM, TO WHICH THE ARTICLE IS DEDICATED

Although technologies like artificial intelligence (AI), big data analytics, and machine learning are recognized as tools for improving e-commerce efficiency, there is a gap in systematic approaches that integrate these technologies holistically to address both operational and strategic challenges specific to diverse e-commerce entities.

Despite a significant number of scientific studies on various mechanisms for improving the efficiency of e-commerce entities, the question arises of systematizing such relevant tools.

The lack of a unified framework to categorize, prioritize, and integrate these diverse instruments hinders their effective application across different types of e-commerce entities, particularly for small and medium enterprises (SMEs) and cross-border operations. This unresolved issue involves the need to develop a structured approach that consolidates existing tools, aligns them with specific operational and strategic goals. By addressing this gap, the article seeks to contribute to a more cohesive and practical methodology for enhancing the efficiency of e-commerce entities.

FORMULATION OF THE PURPOSES OF THE ARTICLE

The purpose of this article is to identify and systematize effective mechanisms and strategies for enhancing the operational and strategic efficiency of e-commerce entities in a dynamic digital environment.

PRESENTATION OF THE MAIN MATERIAL

In the context of globalization and digitalization of the economy, e-commerce has become a key driver of economic development. The growing competition in the e-commerce market requires businesses to adopt innovative approaches to enhance their operational efficiency.

Amid global digital transformation, e-commerce has emerged as one of the most dynamic sectors of the economy, fostering trade growth, innovation, and international collaboration. According to Statista, the global e-commerce market surpassed $6 trillion USD in 2024 and is projected to reach $8 trillion USD by 2028 [16]. However, increasing competition, shifting consumer preferences, and rapid technological advancements compel e-commerce entities to continuously improve their business processes. Enhancing the efficiency of these entities is a critical factor for their competitiveness and sustainable development, making this topic highly relevant for both scientific and practical research.

Analysis reveals that the efficiency of e-commerce entities depends on several interconnected factors:

1. Personalization and Data Analytics: Leveraging Big Data and machine learning algorithms enables the creation of personalized offers, boosting conversion rates and customer loyalty. For instance, Amazon's recommendation systems generate up to 35% of the company's total revenue by analyzing user behavior.
2. Logistics Optimization: Integrating automated supply chain management (SCM) systems and robotic warehouses reduces costs and accelerates delivery. For example, JD.com has reduced delivery times to 24 hours in China through logistics automation.
3. Artificial Intelligence Technologies: AI is utilized for automating marketing campaigns, customer support chatbots, and demand forecasting. According to McKinsey, implementing AI in e-commerce can enhance operational efficiency by 20–30% through automation of routine processes [17].
4. Omnichannel Strategies: Modern consumers expect seamless interactions across multiple channels (websites, mobile apps, social media). Companies successfully implementing omnichannel approaches achieve 15–20% higher customer satisfaction compared to competitors using single-channel strategies.
5. Cybersecurity and Customer Trust: Protecting user data is critical amid rising cyber threats. Implementing encryption standards (e.g., SSL/TLS) and blockchain technologies for transaction transparency enhances consumer trust.
6. Adoption of Augmented and Virtual Reality (AR/VR): AR and VR technologies create interactive customer experiences, increasing engagement and purchase likelihood while reducing return rates by enabling better product evaluation before purchase.
7. Development of Social Commerce: Integrating commerce features into social media platforms (Instagram, TikTok, Facebook) allows e-commerce entities to reach broader audiences and streamline purchasing processes. Utilizing influencers and targeted advertising on social media enhances marketing campaign effectiveness.
8. Inventory Management Automation: AI-based inventory management systems, such as demand forecasting and automated restocking, help reduce overstock or shortages.
9. Environmental Sustainability and Green Practices: Consumers increasingly prefer brands adhering to sustainability principles. Implementing eco-friendly initiatives, such as biodegradable packaging or logistics optimization to reduce carbon footprints, boosts customer loyalty.
10. Gamification of Customer Experience: Incorporating gamified elements, such as bonuses, task-based discounts, or loyalty programs, enhances customer engagement.
11. Optimization of Customer Support via Chatbots and Voice Assistants: Advanced use of AI chatbots and voice assistants (e.g., Amazon Alexa for shopping) enables 24/7 query handling, reducing support costs. According to Gartner, companies using chatbots cut customer support costs by 30% [18].
12. Real-Time Analytics: Real-time analytics enables e-commerce entities to quickly respond to changes in consumer behavior, market conditions, or competitive strategies.
13. Integration with Marketplaces and Ecosystems: Collaborating with major marketplaces (Amazon, eBay, Etsy) or building proprietary ecosystems (e.g., Alibaba) helps e-commerce entities expand market presence and optimize marketing costs.
14. Employee Training and Development: Investing in training employees on new technologies and data analytics improves internal process efficiency. Companies conducting regular digital skills training demonstrate significant productivity gains.

These factors complement traditional approaches to improving e-commerce efficiency, emphasizing innovative technologies, consumer trends, and sustainability (Table 1).

The table synthesizes essential drivers of efficiency for e-commerce entities, integrating technological innovation, consumer-focused strategies, and sustainable practices to address the challenges of a rapidly evolving market projected to reach $8 trillion USD by 2028. Advanced technologies such as AI, Big Data, and real-time analytics streamline operations, enhance personalization, and reduce costs, while omnichannel strategies and social commerce elevate customer engagement and market reach. Sustainable practices and robust cybersecurity foster consumer trust and align with global demands, particularly in cross-border contexts. The framework also highlights the need for accessible solutions to empower smaller enterprises and the importance of workforce training to complement technological advancements. Collectively, these elements provide a comprehensive approach to

overcoming unresolved challenges, ensuring e-commerce entities achieve operational excellence and sustainable competitiveness.

Table 1

Key Factors Influencing the Efficiency of E-Commerce Entities

Factor	Description	Impact/Example
Personalization and Data Analytics	Leveraging Big Data and machine learning algorithms to create personalized offers.	Boosts conversion rates and customer loyalty; Amazon's recommendation systems generate up to 35% of total revenue.
Logistics Optimization	Integrating automated supply chain management (SCM) systems and robotic warehouses.	Reduces costs and accelerates delivery; JD.com reduced delivery times to 24 hours in China.
Artificial Intelligence Technologies	AI used for automating marketing campaigns, customer support chatbots, and demand forecasting.	Enhances operational efficiency by 20–30% through automation [17].
Omnichannel Strategies	Seamless interactions across multiple channels (websites, mobile apps, social media).	Achieves 15–20% higher customer satisfaction compared to single-channel strategies.
Cybersecurity and Customer Trust	Implementing encryption standards (e.g., SSL/TLS) and blockchain for transaction transparency.	Enhances consumer trust amid rising cyber threats.
Adoption of AR/VR	Using augmented and virtual reality to create interactive customer experiences.	Increases engagement, purchase likelihood, and reduces return rates.
Development of Social Commerce	Integrating commerce features into social media platforms (Instagram, TikTok, Facebook).	Expands audience reach and enhances marketing campaign effectiveness via influencers and targeted ads.
Inventory Management Automation	AI-based systems for demand forecasting and automated restocking.	Reduces overstock or shortages.
Environmental Sustainability	Implementing eco-friendly initiatives like biodegradable packaging and logistics optimization.	Boosts customer loyalty by aligning with sustainability principles.
Gamification of Customer Experience	Incorporating gamified elements like bonuses, task-based discounts, or loyalty programs.	Enhances customer engagement.
Customer Support Optimization	Using AI chatbots and voice assistants (e.g., Amazon Alexa) for 24/7 query handling.	Cuts customer support costs by 30% [18].
Real-Time Analytics	Enabling quick responses to changes in consumer behavior, market conditions, or competitive strategies.	Improves adaptability and decision-making.
Integration with Marketplaces	Collaborating with platforms like Amazon, eBay, Etsy, or building proprietary ecosystems (e.g., Alibaba).	Expands market presence and optimizes marketing costs.
Employee Training and Development	Investing in training on new technologies and data analytics.	Improves internal process efficiency and productivity.

Given the projected growth of the global e-commerce market to $8 trillion USD by 2028 [16], e-commerce entities must adapt to new challenges, including stricter regulatory requirements, rising cyber threats, and evolving consumer expectations. Artificial intelligence technologies, particularly generative AI, offer opportunities for creating dynamic content and automating marketing, significantly enhancing the efficiency of e-commerce entities.

The comprehensive implementation of modern tools for improving efficiency enables e-commerce entities not only to optimize business processes but also to create unique customer experiences, which are critical for competitiveness in today's environment.

CONCLUSIONS FROM THIS STUDY AND PROSPECTS FOR FURTHER EXPLORATION IN THIS DIRECTION

The study provides a comprehensive analysis of the challenges and opportunities in enhancing the operational and strategic efficiency of e-commerce entities within a rapidly growing market. The research identifies key barriers, including high operational costs, logistics inefficiencies, limited adoption of advanced technologies, and inadequate adaptability to market dynamics. Through a systematic review of recent literature, it establishes that efficiency hinges on integrating innovative technologies like AI, Big Data, real-time analytics, and AR/VR, alongside consumer-centric strategies such as personalization, omnichannel approaches, and social commerce. The study addresses previously unresolved issues, particularly the lack of unified frameworks for technology integration, especially for SMEs and cross-border operations, by proposing a structured approach to align diverse tools with operational and strategic goals. Additional factors, including cybersecurity, sustainability, gamification, and employee training, are critical for fostering consumer trust and operational excellence. Collectively, these findings offer a robust framework that enables

e-commerce entities to optimize processes, reduce costs, and enhance customer experiences, ensuring competitiveness and alignment with global digital transformation and sustainability objectives.

Future research should focus on developing scalable, cost-effective frameworks to make advanced technologies accessible to SMEs, addressing their resource constraints. Exploring tailored strategies for cross-border e-commerce, particularly regarding regulatory compliance and energy efficiency, will further enhance global market competitiveness. The integration of emerging technologies, such as generative AI for dynamic content creation and blockchain for supply chain transparency, warrants deeper investigation to maximize their impact on efficiency. Additionally, studying the long-term effects of sustainability practices and their economic viability in diverse e-commerce contexts could strengthen the adoption of green initiatives. Research into real-time analytics and its application in dynamic pricing and inventory management could address gaps in responsiveness to market fluctuations. Finally, investigating the role of workforce upskilling in sustaining technological advancements will ensure that human capital keeps pace with digital transformation, providing a holistic approach to improving e-commerce efficiency.

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