

AI-ENABLED TECHNOLOGY INNOVATION IN E-COMMERCE

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ABSTRACT

Recently, advanced digital/internet-based technology has become more prevalent and advanced to play a dominant role in e-commerce. Among them, AI-driven technology innovation in e-commerce plays an important role for its development. There is research potential to discuss how AI-driven technology innovation can benefit the digital economy, as typified by e-commerce, and how it can contribute to the digital transformation of companies in traditional industries. This special issue expands our understanding of organizational and customer intentions and behavior toward AI, such as privacy issues, the perceived benefits and risks of AI-driven technology innovations in e-commerce and building long-term trust relationships between users and AI.

Keywords: AI-enabled technology; E-commerce; Digital economy

1. Introduction

Artificial intelligence (AI) refers to a broad set of software systems designed to perform tasks that traditionally have required human intelligence. AI is typically instantiated through machine learning and prediction, reinforcement learning, and deep learning. There is great excitement about the development of AI and its myriad potential applications that should benefit society and spur economic growth. Yet, there are also concerns about what AI technologies mean for the future of work, job displacement, individual privacy, and the potential for harm due to algorithmic bias.

Researchers thus recognize there is both a light side and a dark side to AI. On the one hand, it has been regarded as a next-generation powerful technology that can bring great business value and facilitate enterprises to achieve their business goals (Davenport and Ronanki, 2018; Mikalef and Gupta, 2021). AI has been behind many of the major developments that have taken place in e-commerce in recent years providing solutions to improve the performance of e-commerce and facilitate digital transformation for enterprises in traditional industries. AI has been a catalyst also for the platform economy and development of financial technology, among others. Some example applications of AI in e-commerce include recommender systems (Zhang et al., 2021), risk management systems, virtual customer service assistants (Cheng et al., 2021), visual and audio searches, and customer relationship management (Libai et al., 2020). AI is providing for greater personalization in e-commerce (Huang and Rust, 2021), improved matching of users in multi-sided digital platforms, and real-time price optimization, among others. AI chatbots are used to replace human agents by helping users with natural language queries (Cheng et al., 2022). AI chatbots can solve 40-60% of problems for users of e-commerce companies and improve service efficiency (Cheng et al., 2021). In backend operations, AI is automating warehousing tasks and fraud detection in payment systems. For example, a previous study analyzed the successful application of AI in Alibaba's e-commerce fulfillment centers, identifying three key AI resources-data, AI

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algorithms and robots, and three primary functions—predicting, planning, and learning to successfully create value (Zhang et al., 2021). Moreover, AI can assist in organizing product data and building models for dynamic pricing and clearance pricing (Lukinskiy et al., 2023). AI can also allow systems to automatically forecast, replenish, order, stock, and shelve, automating warehousing and logistics, improving the efficiency of the heaviest aspects of e-commerce and optimizing costs, thereby creating greater profit margins (Chan and Gao, 2021). AI-enabled technology innovations also bring changes and offer potential advantages in other areas of the digital economy. The first focus point is the use of AI-based intelligent technology to create a number of intelligent products, including intelligent application software, intelligent basic software, and intelligent basic hardware. The second focus point is the use of intelligent technology to create new application systems. These application systems include intelligent design, intelligent manufacturing, intelligent logistics, and intelligent finance. The third focus, let intelligent technology improve social governance (Zuiderwijk et al., 2021), such as intelligent courts, intelligent security systems, intelligent cities, intelligent transportation, intelligent medical care, and intelligent education (Cheng et al., 2020). For example, previous studies have found relatively positive public attitudes toward healthcare AI (Gao et al., 2020). Future research needs to provide deeper insights into the evaluation of the importance of AI and its potential use in the context of e-commerce.

Yet, like all new technologies, the successful diffusion and incorporation of AI among organizations is often uneven, and more widespread diffusion of these technologies into the core operating models of firms (Iansiti and Lakhani, 2020) to generate system-wide changes has been advocated (Agrawal et al., 2022). Diffusion of AI is also complicated at the individual level, with past studies highlighting considerations in AI technology acceptance (Gursoy et al., 2019), satisfaction, and trust (Hasija and Esper, 2022). Lack of trust in AI and the absence of humanistic factors are the underlying reasons why some people still have negative attitudes toward healthcare AI, suggesting that practitioners may need to focus more on improving the credibility of technology companies and meeting the emotional needs of patients, rather than focusing solely on technical issues (Gao et al., 2020). The ethical issues of AI have been discussed, such as data security and privacy issues (Rana et al., 2022; Song et al., 2022). AI applied in e-commerce has received increased attention, and several studies are drawing on the topic discussing the potential risks of AI-based chatbots (Cheng et al., 2021) and AI-based recommendation systems (Chinchanachokchai et al., 2021). Specifically, training algorithms through massive amounts of data allows AI to have more significant problem-solving capabilities, which also puts personal privacy at risk. With the support of Big Data technologies and devices, much important information about individuals, such as health information, location information, and network traces, can be captured and saved in real-time. By applying data mining techniques, data controllers can easily extract some useful personal information based on incomplete and vague fragmented data (Zhu et al., 2020). In this way, individuals lose control of their privacy, and some are even in a state of ready-prying eyes. For example, Benlian et al. (2020) explore the adverse effects of smart home assistants and how to mitigate them by designing information technology artifact-based features. In addition, Cichy et al. (2021) used mixed research methods to explore how information privacy and data security affect the willingness of car drivers to share information in the unique environment provided by connected cars. Furthermore, the study by Rana et al. (2022) provides a comprehensive analysis of how factors such as opacity, suboptimal business decisions, and perceived risk of AI systems can lead to operational inefficiencies and competitive disadvantages for firms. Thus, while AI is a powerful enabler in accelerating technological innovation as well as fostering economic development, the potential problems that impede AI progress must be accurately identified and addressed if AI is to reach a broader audience and gain widespread adoption. Cao et al. (2021) developed and validated a new AI acceptance-avoidance model that facilitates a more balanced debate on the benefits and dark sides of using AI for organizational decision-making, thus helping to explain and predict individual attitudes and intentions toward the use of AI, and informing management decisions using AI-based systems. In summary, solving the ethical and social issues of AI requires establishing effective mechanisms and necessary regulatory measures, better grasping emerging issues such as data and privacy, weakening the adverse effects of AI, and striving to achieve a harmonious coexistence between AI and humans.

Overall, in-depth research on AI-driven technology innovation in e-commerce and other digital economies is still in its early stages and lacks systematic understanding, especially in the context of changing realities. There is research potential to examine how AI-driven technology innovation can benefit the digital economy, as typified by e-commerce, and how it can contribute to the digital transformation of companies in traditional industries. There is also a need to expand our understanding of customer intention and behavior, such as privacy issues, the perceived benefits and risks of AI-driven technology innovations in e-commerce, and building long-term trust relationships between users and AI.

2. Development of the Special Issue

This special issue called for a wide range of original high-quality submissions focusing on e-commerce affected by AI-enabled technology innovation. We encouraged authors to submit papers addressing interesting research questions about the opportunities and challenges of AI-enabled technology innovation in e-commerce in the setting of the Covid-19 pandemic. The Covid-19 pandemic provided an important impetus to the development of the special issue and our call for submissions. The pandemic dramatically changed social and economic life in almost all countries due to strict physical restrictions, such as social distancing and local or national lockdowns, required to promote public health management and save lives. The policies implemented by most countries during each wave of the pandemic placed great pressure on global supply chains, bringing unprecedented challenges to international business (Mena et al., 2022), including cross-border e-commerce (Wang et al., 2021). Even with domestic markets, customers have changed consumption behaviors due to uncertainties of the pandemic and policies of quarantine. They are reducing their frequency of outdoor activities and preferring online activities (Kawasaki et al., 2021). The pandemic has thus fueled the significant growth of e-commerce (Beckers et al., 2021), and forced traditional enterprises to rapidly convert from offline to online channels and respond with digital transformation of their business models to meet customer preferences (Amankwah-Amoah et al., 2021). Changing customer preferences and behaviors caused by the pandemic has been a catalyst for innovation in the platform economy (Chan and Gao, 2021) and financial technology (FinTech) (Chen et al., 2021). As consumers craved greater social presence during the pandemic, live streaming on social networking sites, online games, and e-commerce platforms became more popular. However, the pandemic has also negatively affected sharing economy (e.g., the usage of Airbnb during the pandemic) and traditional industries such as the restaurant industry, tourism, and retail, which forces a deeper look at the assumptions underlying theoretical frameworks that guide managerial decisions and organizational practices (George et al., 2020). In general, the development of the digital economy, typified by e-commerce, faces unprecedented opportunities and challenges based on the new realities, presenting an additional important context for the study of AI innovations in e-commerce.

We did not limit the research types and welcomed studies with a wide range of methods, including quantitative, qualitative, design science research, and mixed methods under the following topics:

- The bright sides and dark sides of AI technology application in e-commerce.
- Issues related to trust, privacy, and security of AI-enabled innovation in e-commerce.
- Users' perceived risk and coping behaviors in AI-enabled e-commerce and communication during the COVID-19 pandemic.
- Case studies brought by the Covid-19 pandemic illustrating applications of AI-enabled technology innovation in e-commerce.
- Big data analytics, fintech, blockchain, and other emerging technologies for e-commerce applications during the COVID-19 pandemic.
- AI-enabled digital transformation and digital economy during the COVID-19 pandemic.
- AI-enabled communication and collaboration for local and distributed contexts.
- Cultural, social, and policy impact of AI-enabled technology innovation in e-commerce.
- Governance and regulation issues for AI technology in e-commerce.
- Global and Cross-border e-commerce and AI technology innovation.
- Design and behavioral issues for human-AI interaction in e-commerce.

3. Content of the Special Issue

We received over 20 submissions and selected five articles for this special issue of JECR that provide insight into some of these fundamental research questions on AI in e-commerce. A summary of each is presented below.

The first paper is co-authored by Isaac Owusu Asante, Yushi Jiang, Atlab Md Hossin, and Xiao Luo and is entitled "Optimization of consumer engagement with artificial intelligence elements on electronic commerce platforms." Drawing on the stimuli-organism-response (S-O-R) model, this paper investigates the mechanisms by which the application of AI in e-commerce attracts positive engagement attitudes from consumers. After analyzing 464 questionnaires collected from consumers of different e-commerce platforms, the authors conclude that AI capability elements have a direct and indirect positive impact on behavioral engagement. This study provides helpful insights for e-commerce platforms to understand the bright side of AI to improve the consumer experience.

The second paper is co-authored by Taewoo Roh, Byung Il Park, and Shufeng (Simon) Xiao and is entitled "Adoption of AI-enabled robo-advisors in Fintech: Simultaneous employment of UTAUT and the theory of reasoned action." By integrating the unified theory of acceptance and use of technology (UTAUT) and the theory of reasoned action (TRA), the authors develop and validate a conceptual model to explore the key factors influencing user adoption of robo-advisors in Fintech. After analyzing 638 questionnaires collected from Chinese users having experience with

robo-advisor service, this paper identifies the direct and indirect effects of various predictors, such as perceived security and perceived privacy, on users' attitudes toward robo-advisors and their intention to adopt such fintech services, as well as the significant mediating roles of attitude, trust, and facilitating conditions. This study provides helpful implications for understanding users' adoption of robo-advisors in Fintech.

AI is wildly used in customer relationship management. Although there are some service failures during the usage of AI in the service area, the performance of AI service quality is improving day by day. Currently, ChatGPT is gaining a lot of attention, which can help provide more accurate services. The third paper in this issue investigates the impact of AI usage on CRM. The authors collected 193 e-commerce enterprise data in China. The empirical results indicate that AI usage positively impacts CRM performance and that CRM capabilities positively mediate their relationship. This paper contributes to IS research with an eloquent theoretical explanation and strong empirical evidence on why e-commerce enterprises deploy AI initiatives to improve their CRM capabilities and performance.

A significant issue facing AI-based platforms is how to encourage users to provide personal information. The fourth paper, by Luo, Li, and Ye, draws on privacy calculus and trust theory to explore users' information participation as a key issue in AI-based platforms. Data from 470 users of a medical consultation AI platform confirm the importance of trust in information participation behavior. Trust is the key path in shaping user information participation and fully mediates the effects of privacy-related antecedents on user information participation. Individual differences were also found to moderate some of these effects. The paper provides useful implications for platform operators needing to overcome low levels of trust and encourage information participation behavior.

The final paper by Chow et al. is entitled "Artificial intelligence adoption: an extended compensatory level of acceptance." The authors examine the effects of cybersecurity, perceived anthropomorphism, and the mediating constructs of perceived level of AI intelligence, performance expectancy, and effort expectancy on the adoption of AI virtual banking services. They find that users are willing to make an extra effort to learn to use AI technologies if they can gain long-term benefits.

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REFERENCES

- Agrawal, A., Gans, J., & Goldfarb, A. (2022). *Power and prediction: The disruptive economics of artificial intelligence*. Harvard Business Review Press.
- Akter, S., & Wamba, S. F. (2016). Big data analytics in E-commerce: A systematic review and agenda for future research. *Electronic Markets*, 26(2), 173-194.
- Akter, S., Wamba, S. F., Gunasekaran, A., Dubey, R., & Childe, S. J. (2016). How to improve firm performance using big data analytics capability and business strategy alignment? *International Journal of Production Economics*, 182, 113-131.
- Amankwah-Amoah, J., Khan, Z., & Wood, G. (2021). COVID-19 and business failures: The paradoxes of experience, scale, and scope for theory and practice. *European Management Journal*, 39(2), 179-184.
- Beckers, J., Weekx, S., Beutels, P., & Verhetsel, A. (2021). COVID-19 and retail: The catalyst for e-commerce in Belgium? *Journal of Retailing and Consumer Services*, 62, 102645.
- Benlian, A., Klumpe, J., & Hinz, O. (2020). Mitigating the intrusive effects of smart home assistants by using anthropomorphic design features: A multimethod investigation. *Information Systems Journal*, 30(6), 1010-1042.
- Cao, G., Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2021). Understanding managers' attitudes and behavioral intentions towards using artificial intelligence for organizational decision-making. *Technovation*, 106, 102312.
- Chan, J., Gao, Y. L., & McGinley, S. (2021). Updates in service standards in hotels: How COVID-19 changed operations. *International Journal of Contemporary Hospitality Management*, 33(5), 1668-1687.
- Chen, X., You, X., & Chang, V. (2021). FinTech and commercial banks' performance in China: A leap forward or survival of the fittest? *Technological Forecasting and Social Change*, 166, 120645.
- Cheng, X., Bao, Y., Zarifis, A., Gong, W., & Mou, J. (2021). Exploring consumers' response to text-based chatbots in e-commerce: The moderating role of task complexity and chatbot disclosure. *Internet Research*, 32(2), 496-517.

- Cheng, X., Zhang, X., Cohen, J., & Mou, J. (2022). Human vs. AI: Understanding the impact of anthropomorphism on consumer response to chatbots from the perspective of trust and relationship norms. *Information Processing & Management*, 59(3), 102940.
- Cheng, X., Sun, J., & Zarifis, A. (2020). Artificial intelligence and deep learning in educational technology research and practice. *British Journal of Educational Technology*, 51(5), 1653-1656.
- Chinchanachokchai, S., Thontirawong, P., & Chinchanachokchai, P. (2021). A tale of two recommender systems: The moderating role of consumer expertise on artificial intelligence based product recommendations. *Journal of Retailing and Consumer Services*, 61, 102528.
- Cichy, P., Salge, T. O., & Kohli, R. (2021). Privacy concerns and data sharing in the internet of things: Mixed methods evidence from connected cars. *MIS Quarterly*, 45(4), 1863-1891.
- Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review*, 96(1), 108-116.
- Gao, S., He, L., Chen, Y., Li, D., & Lai, K. (2020). Public perception of artificial intelligence in medical care: Content analysis of social media. *Journal of Medical Internet Research*, 22(7), e16649.
- George, G., Lakhani, K., & Puranam, P. (2020). What has changed? The impact of Covid pandemic on the technology and innovation management research agenda. *Journal of Management Studies*, 57(8), 1754-1758.
- Gursoy, D., Chi, O. H., Lu, L., & Nunkoo, R. (2019). Consumers acceptance of artificially intelligent (AI) device use in service delivery. *International Journal of Information Management*, 49, 157-169.
- Hasija, A., & Esper, T. L. (2022). In artificial intelligence (AI) we trust: A qualitative investigation of AI technology acceptance. *Journal of Business Logistics*, 43, 388-412.
- Huang, M. H., & Rust, R. T. (2021). A strategic framework for artificial intelligence in marketing. *Journal of the Academy of Marketing Science*, 49(1), 30-50.
- Iansiti, M., & Lakhani, K. R. (2020). *Competing in the age of AI: Strategy and leadership when algorithms and networks run the world*. Harvard Business Review Press.
- Kawasaki, T., Wakashima, H., & Shibasaki, R. (2022). The use of e-commerce and the COVID-19 outbreak: A panel data analysis in Japan. *Transport Policy*, 115, 88-100.
- Libai, B., Bart, Y., Gensler, S., Hofacker, C. F., Kaplan, A., Kötterheinrich, K., & Kroll, E. B. (2020). Brave new world? On AI and the management of customer relationships. *Journal of Interactive Marketing*, 51, 44-56.
- Lukinskiy, V., Lukinskiy, V., Ivanov, D., Sokolov, B., & Bazhina, D. (2023). A probabilistic approach to information management of order fulfilment reliability with the help of perfect-order analytics. *International Journal of Information Management*, 68, 102567.
- Luo, J. M., Vu, H. Q., Li, G., & Law, R. (2021). Understanding service attributes of robot hotels: A sentiment analysis of customer online reviews. *International Journal of Hospitality Management*, 98, 103032.
- Mena, C., Karatzas, A., & Hansen, C. (2022). International trade resilience and the Covid-19 pandemic. *Journal of Business Research*, 138, 77-91.
- Mikalef, P., & Gupta, M. (2021). Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. *Information & Management*, 58(3), 103434.
- Rana, N. P., Chatterjee, S., Dwivedi, Y. K., & Akter, S. (2022). Understanding dark side of artificial intelligence (AI) integrated business analytics: Assessing firm's operational inefficiency and competitiveness. *European Journal of Information Systems*, 31(3), 364-387.
- Ren, G., & Hong, T.H. (2019). Examining the relationship between specific negative emotions and the perceived helpfulness of online reviews. *Information Processing & Management*, 56(4), 1425-1438
- Song, M., Xing, X., Duan, Y., Cohen, J., & Mou, J. (2022). Will artificial intelligence replace human customer service? The impact of communication quality and privacy risks on adoption intention. *Journal of Retailing and Consumer Services*, 66, 102900.
- Wang, X., Xie, J., & Fan, Z. P. (2021). B2C cross-border e-commerce logistics mode selection considering product returns. *International Journal of Production Research*, 59(13), 3841-3860.
- Wongkitrungrueng, A., & Assarut, N. (2020). The role of live streaming in building consumer trust and engagement with social commerce sellers. *Journal of Business Research*, 117, 543-556.
- Zhang, Q., Lu, J., & Jin, Y. (2021). Artificial intelligence in recommender systems. *Complex & Intelligent Systems*, 7(1), 439-457.
- Zhang, D., Pee, L. G., & Cui, L. (2021). Artificial intelligence in e-commerce fulfillment: A case study of resource orchestration at Alibaba's Smart Warehouse. *International Journal of Information Management*, 57, 102304.
- Zhu, T., Ye, D., Wang, W., Zhou, W., & Yu, P. (2020). More than privacy: Applying differential privacy in key areas of artificial intelligence. *IEEE Transactions on Knowledge and Data Engineering*, 34(6), 2824-2843.

Zuiderwijk, A., Chen, Y. C., & Salem, F. (2021). Implications of the use of artificial intelligence in public governance: A systematic literature review and a research agenda. *Government Information Quarterly*, 38(3), 101577.