

Ethical AI Practices in E-Commerce Companies: Evidence from Henan Toward, China Toward a Policy Guide

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Abstract

This study examined the ethical artificial intelligence practices of selected e-commerce companies operating in Henan Province, China and developed a basis for a region-specific policy guide for responsible AI governance. It was anchored on the Fairness, Accountability, and Transparency Framework and the Privacy by Design Framework, which guided the assessment of fairness, accountability, transparency, and privacy in AI-driven e-commerce systems. The study used a mixed-methods descriptive design that combined a structured 4-point Likert-scale survey questionnaire and semi-structured interviews. The respondents were employees engaged in AI-related or data-driven operations and selected management-level personnel from Alibaba, JD.com, Meituan, and Pinduoduo with operational presence in Henan Province. Quantitative data were analyzed using percentage, weighted mean, standard deviation, and ANOVA, while qualitative data were treated through thematic analysis. The findings showed that respondents generally perceived ethical AI practices at an agreeable level across fairness (2.72), accountability (2.84), transparency (2.85), and privacy (2.82). No significant differences were found when respondents were grouped according to company and years in service. However, fairness significantly differed by educational attainment, while privacy significantly differed by frequency of AI interaction. The challenges in implementing AI technologies were rated serious overall (2.93), with the most critical issue involving the misuse of AI by fraudsters through fake images, fake reviews, and fraudulent refund claims. Other major concerns included regulatory compliance, customer misunderstanding of AI decisions, cybersecurity risks, technical integration difficulties, and continuous investment demands. The study concluded that ethical AI practices were present but still required stronger and more consistent governance. It recommended the development and application of a region-specific policy guide aligned with the PIPL and DSL to improve fairness, accountability, transparency, privacy, and organizational compliance. The study is relevant to SDG 8, SDG 9, and SDG 16 because it addresses responsible innovation, sustainable digital commerce, and stronger institutional governance. Its sustainability impact lies in supporting technological, socio-economic, policy, community, and institutional sustainability through more ethical and human-centered AI implementation in e-commerce.

Keywords: Accountability, E-commerce, Ethical AI Practices, Fairness, Henan Province, Privacy, Transparency

1. Introduction

Artificial intelligence (AI) has become a major force in e-commerce by improving personalization, predictive analytics, automation, logistics, and customer experience (Kaplan & Haenlein, 2020; Zhang & Liu, 2023). At the same time, its rapid integration has raised ethical concerns involving privacy breaches, algorithmic bias, opacity, discriminatory pricing, and weak accountability (Jobin et al., 2020; Liu, 2022). In China, these concerns are especially significant because large e-commerce platforms such as Alibaba, JD.com, Meituan, and Pinduoduo operate within a fast-growing digital economy shaped by strong technological expansion and evolving legal regulation through the Personal Information Protection Law (PIPL) and the Data Security Law (DSL) (Wang & Li, 2022). Within this broader environment, Henan Province offers a relevant regional setting for examining how ethical AI principles are interpreted and implemented beyond China's first-tier cities, where regulatory capacity, business maturity, and consumer awareness may differ (Sun, 2021; Chen & Wang, 2023). The study therefore focuses on fairness, accountability, transparency, and privacy as the core dimensions of ethical AI practice and seeks to generate evidence for a region-specific policy guide for responsible AI governance in Henan's e-commerce sector (Binns, 2020; Mehrabi et al., 2020; Cavoukian, 2020).

The integration of AI into e-commerce has transformed digital business models by enabling automated decision-making, personalized shopping experiences, and operational efficiency (Kaplan & Haenlein, 2020). However, these benefits are accompanied by ethical risks such as consumer data misuse, algorithmic manipulation, discriminatory pricing, and weak transparency in automated systems (Jobin et al., 2020). In China, where e-commerce significantly contributes to economic activity, major platforms have faced increasing scrutiny regarding algorithmic opacity, market dominance, and consumer protection, prompting the enactment of the PIPL and DSL to strengthen accountability and data governance (Liu, 2022; Wang & Li, 2022). Henan Province represents a distinct context for this inquiry because its e-commerce landscape includes mid-sized enterprises, small retailers, and rural digital entrepreneurs that depend heavily on platform-driven algorithms for

competitiveness but may have weaker institutional and regulatory capacity than firms in highly advanced regions (Sun, 2021). Prior studies have focused more on Beijing, Shanghai, Hangzhou, and other highly regulated innovation hubs, leaving limited understanding of how second-tier provinces adapt national AI governance mandates in actual business settings (Chen & Wang, 2023). This study addresses that gap by examining how e-commerce companies in Henan apply ethical AI principles and how these practices may inform a policy guide that is regionally adaptive, transparent, accountable, and privacy-centered.

The reviewed literature consistently identifies fairness, accountability, transparency, and privacy as the foundational pillars of ethical AI in e-commerce. Globally, ethical AI is framed as both a strategic and moral requirement, with Jobin, Ienca, and Andorno (2020) emphasizing fairness, accountability, and transparency as safeguards against algorithmic discrimination and misuse, while Cavoukian (2020) advances Privacy by Design (PbD) as a model for embedding privacy protections at the earliest stages of system development. Related studies further show that organizations integrating ethical AI practices improve trust, governance, and long-term market credibility (Binns, 2020; Floridi and Cowls, 2021; Mehrabi et al., 2020; Zhang et al., 2020; Liu and Zhang, 2021). The literature on e-commerce likewise presents digital commerce as both a technological and socioeconomic system. Laudon and Traver (2020), Turban et al. (2021), Laudon and Laudon (2020), and Chaffey (2021) describe how AI, analytics, digital payments, and automated customer service have increased efficiency and consumer engagement, but they also underscore the need for governance mechanisms that protect fairness, accountability, and consumer rights. In China, Zhang and Liu (2023), Liu (2022), and Wang and Li (2022) show that while leading platforms have advanced digital ecosystems, ethical implementation remains uneven, especially in provincial contexts where smaller enterprises face limited expertise and resources. Across the specific dimensions of fairness, transparency, accountability, and privacy, the literature indicates that fairness reduces bias and discriminatory outcomes (Binns, 2020; Floridi and Cowls, 2021; Mehrabi et al., 2020); transparency strengthens explainability, traceability, and consumer trust (Jobin, Ienca, and Andorno, 2020; Longoni and Cian, 2022; CAC, 2021); accountability requires auditability, ethical oversight, and clearly assigned responsibility (Floridi and Cowls, 2021; Martin et al., 2021); and privacy remains central to user trust, legal compliance, and responsible data governance (Cavoukian, 2020; Zhao & Chen, 2021; Wang et al., 2020). Collectively, the literature shows that ethical AI is not optional but necessary for organizational legitimacy, consumer confidence, and sustainable digital commerce.

At the global level, AI-enabled e-commerce is associated with improved efficiency, market scalability, and consumer targeting, yet it also raises ethical issues concerning bias, data privacy, and explainability (Laudon and Traver, 2020; Turban et al., 2021; Chaffey, 2021; Binns, 2020). At the national level, China has become one of the most dynamic e-commerce environments, with platforms such as Alibaba, JD.com, Meituan, and Pinduoduo transforming retail, logistics, and payment ecosystems through AI-driven innovation (Zhang and Liu, 2023; Liu, 2022). In response to ethical and regulatory concerns, the Chinese policy environment has advanced through the PIPL and DSL, which provide a legal basis for data protection, consent, and accountability (Wang & Li, 2022; Zhao & Chen, 2021). At the local level, Henan Province has emerged as a growing digital trade and logistics hub, supported by expanding AI-assisted retail and cross-border commerce (Henan Provincial Department of Commerce, 2022; Zhengzhou Cross-Border E-Commerce Pilot Zone Report, 2023). However, the provincial context also reveals persistent gaps in governance capacity, employee training, transparency standards, and privacy compliance, especially among small and medium-sized enterprises (Chen and Huang, 2023; Li et al., 2021; Zhao and Xu, 2022). These regional conditions make Henan an important site for examining how national AI governance is interpreted in practice and how ethical implementation differs outside first-tier cities.

This study is anchored in the Fairness, Accountability, and Transparency (FAT) Framework and the Privacy by Design (PbD) Framework. The FAT Framework, as articulated by Binns (2020) and Mehrabi et al. (2020), provides a basis for evaluating whether AI systems are socially responsible, equitable, transparent, and technically reliable. In e-commerce, fairness addresses discriminatory pricing and biased recommendations; accountability emphasizes monitoring, audit, and correction of AI outcomes; and transparency requires disclosure of algorithmic logic so that stakeholders can understand how automated decisions are made. The PbD Framework, introduced by Cavoukian (2020), complements FAT by embedding privacy protections directly into system design. In AI-driven e-commerce, this includes data minimization, secure storage, controlled retention, and transparent handling of personal information (Wang et al., 2020). PbD also aligns with China's evolving legal framework under the PIPL and DSL, which require organizations to safeguard user privacy and adopt transparent consent practices (Zhao & Chen, 2021). Conceptually, the study links employees' demographic profiles, perceived ethical AI practices, and implementation challenges to the development of a proposed AI and Policy Guide. Ethical AI practice—covering fairness, transparency, accountability, and privacy—functions as the core construct, while demographic characteristics and organizational barriers provide context for understanding how ethical principles are perceived and operationalized in Henan's e-commerce firms. This integrative model supports the study's goal of producing a prescriptive, region-specific framework for responsible AI governance in emerging digital economies.

The reviewed literature reveals a clear gap between national ethical AI standards and their implementation in provincial e-commerce settings. Existing studies in China have focused largely on major corporations and highly developed

metropolitan regions, while there is limited understanding of how employees in second-tier provinces such as Henan perceive and apply fairness, accountability, transparency, and privacy in daily operations (Chen & Wang, 2023). Research also shows that smaller firms in provincial settings often face limited technical expertise, insufficient training, inconsistent enforcement, and weak governance structures, making ethical AI compliance uneven across regions (Chen and Huang, 2023; Wang and Li, 2022; Zhao and Xu, 2022). In addition, existing policies are often generic and insufficiently customized to regional business realities. The literature points to the need for localized guidance that addresses the actual governance, literacy, and compliance constraints of firms operating within Henan's e-commerce ecosystem (Henan Provincial Department of Commerce, 2022; Zhengzhou Cross-Border E-Commerce Pilot Zone Report, 2023). This study is therefore justified in examining employee perceptions, identifying ethical challenges, and generating an evidence-based policy guide tailored to Henan Province. By doing so, it bridges theory and practice and contributes context-specific insights into ethical AI governance in China's expanding digital economy.

Based on the study's focus, the most relevant SDGs are SDG 8 – Decent Work and Economic Growth, SDG 9 – Industry, Innovation and Infrastructure, and SDG 16 – Peace, Justice, and Strong Institutions. The study aligns with SDG 8 because ethical AI practices in e-commerce influence business competitiveness, consumer trust, and the sustainable growth of digital trade in Henan Province. It aligns with SDG 9 because it addresses responsible technological innovation, AI governance, and the strengthening of digital systems that support modern commerce. It also aligns with SDG 16 because the study emphasizes accountability, transparency, privacy protection, and policy guidance, all of which support stronger institutional practices and more ethical digital governance.

This study contributes primarily to technological sustainability, socio-economic sustainability, policy and governance sustainability, community sustainability, and institutional sustainability. It supports technological sustainability by promoting the ethical and human-centered deployment of AI in e-commerce systems. It advances socio-economic sustainability by encouraging fairer, more trustworthy digital markets that can strengthen customer confidence, business legitimacy, and long-term competitiveness. It contributes to policy and governance sustainability by providing evidence for a region-specific policy guide aligned with the PIPL and DSL, thereby supporting more consistent ethical oversight in provincial e-commerce operations. The study is also important to community sustainability because it addresses the implications of AI ethics for consumers, small business owners, and vulnerable groups who may be affected by biased, opaque, or privacy-invasive systems. Finally, it strengthens institutional sustainability by helping organizations improve governance mechanisms, employee awareness, and compliance capacity in a rapidly evolving digital environment. Overall, the study supports a sustainable, human-centered AI ecosystem in Henan Province that balances innovation with accountability, growth with fairness, and efficiency with ethical integrity.

2. Material and methods

2.1 Research Design

The study adopted a mixed-methods descriptive design integrating quantitative and qualitative approaches. The quantitative component used a structured survey questionnaire to measure employees' perceptions of fairness, accountability, transparency, and privacy based on the Fairness, Accountability, and Transparency (FAT) and Privacy by Design (PbD) frameworks. The qualitative component used semi-structured interviews with selected management-level employees to generate deeper insights into organizational challenges and ethical governance in AI implementation. This combined design was intended to provide both breadth through statistical analysis and depth through thematic exploration.

2.2 Locale of the Study

The study was conducted in Henan Province, China, focusing on e-commerce companies with operational presence in the province. Henan served as the setting because it is identified in the manuscript as a growing regional hub for e-commerce and digital trade in Central China. The selected companies maintain substantial operations in Henan through logistics centers, merchant networks, and local employment, making the province an appropriate context for examining regional AI ethics and governance.

2.3 Respondents of the Study

The respondents consisted of employees engaged in AI-related or data-driven operations within the selected e-commerce companies. For the quantitative component, the study involved non-management staff who regularly interacted with AI systems. For the qualitative component, it involved management-level officers responsible for strategic oversight. The respondent characteristics examined in the study were educational attainment, department or functional area, years of experience, and frequency of AI interaction, since these variables were used to determine whether perceptions of ethical AI practices differed according to employee profile.

2.4 Sample and Sampling Procedure

The population comprised employees from four leading e-commerce companies with operational presence in Henan Province: Alibaba, JD.com, Meituan, and Pinduoduo. These firms were purposively selected because of their established AI-driven systems and regional influence. For the quantitative survey, a total of 120 employees participated, with 30 respondents drawn from each company. These respondents represented departments directly engaged with AI tools, including technology, logistics, customer service, and marketing. For the qualitative component, 12 management respondents were selected for semi-structured interviews.

2.5 Research Instrument

The study used two complementary research instruments. The first was a structured 4-point Likert-scale survey questionnaire designed to measure perceptions across the four dimensions of fairness, accountability, transparency, and privacy. The questionnaire was pre-tested with 30 employees to improve wording and clarity, and its reliability was evaluated using Cronbach's Alpha, with a coefficient of 0.8 and above considered acceptable for internal consistency. The second instrument was a semi-structured interview guide used with 12 management respondents to explore contextual challenges, governance mechanisms, and policy alignment with the PIPL and DSL.

2.6 Data Gathering Procedure

Data gathering followed a sequence of approval, administration, interview, validation, and ethical compliance. Formal permission was first secured from each participating company and from the Graduate School. The researcher then distributed online questionnaires through secure digital forms to the 120 employee respondents, while emphasizing confidentiality and voluntary participation. Semi-structured interviews with the 12 management respondents were conducted virtually or by phone and were recorded and transcribed with participant consent. Quantitative data were analyzed first, after which qualitative themes were integrated to support and contextualize the results. All data were handled in accordance with the Personal Information Protection Law (PIPL) and the Data Security Law (DSL) of the People's Republic of China to ensure respondent anonymity and secure storage.

2.7 Data Analysis Techniques

Quantitative data were processed using SPSS and Excel. Percentage analysis was used to describe respondent profiles, while weighted mean determined the extent of perceived ethical AI practice across the four dimensions. Standard deviation measured response variability, and ANOVA tested the null hypothesis on whether significant differences existed in perceived ethical AI practices when respondents were grouped according to demographic variables, using $p < 0.05$ as the criterion. Qualitative interview data were analyzed through thematic analysis, in which recurring themes related to fairness, accountability, transparency, privacy, and organizational challenges were coded and synthesized to reinforce the quantitative findings and inform the proposed AI Ethics and Policy Guide.

3. Results and Discussion

3.1 Main Findings

3.1.1 Respondent Profile

The respondents were evenly distributed across the four company sectors, with AI Development and Engineering, Data Governance and Compliance, Product and Operations, and Customer Service each representing 25% of the sample. Most respondents held an Associate degree (47%), followed by a Bachelor's degree (44.5%), while only 8.5% had a Master's degree or above. In terms of years in service, the largest group had 1–3 years of experience (29.5%), followed by less than 1 year (26.5%), 3–5 years (24.5%), and more than 5 years (19.5%). Regarding AI use, most respondents interacted with AI weekly (32.5%) or daily (31%), while fewer reported monthly (21%) or rare use (15.5%). These results indicate balanced representation across organizational functions and show that the respondents were largely early-career employees with regular exposure to AI-related work. This profile suggests that the findings reflect perceptions from a workforce that is actively engaged with AI in day-to-day operations rather than from occasional or peripheral users.

3.1.2 Fairness

Respondents generally agreed that ethical AI practices in terms of fairness were present in their companies, with an overall mean of 2.72. The highest-rated indicator was the belief that AI-driven pricing strategies were not discriminatory, with a mean of 2.86, followed by the view that AI hiring tools ensured equal opportunities, with a mean of 2.82. The lowest-rated indicator was the belief that the company takes measures to eliminate biases in AI decision-making, with a mean of 2.52. This pattern suggests that respondents perceived fairness in visible AI outcomes, particularly pricing and hiring, but were less confident about deeper bias-mitigation mechanisms. In other words, fairness was acknowledged at a general level, yet internal efforts to address algorithmic bias appeared less strongly established.

3.1.3 Accountability

The accountability dimension also received an overall verbal interpretation of Agree, with an overall mean of 2.84. The highest-rated indicator was the presence of an AI ethics board or similar oversight mechanism, with a mean of 2.90. This was followed by the perception that the company takes responsibility for AI-based decisions affecting customers and that employees are held accountable for AI-related decisions, both with a mean of 2.85. The lowest-rated indicator was the belief that the company takes proactive steps when AI recommendations lead to customer dissatisfaction, with a mean of 2.79. The findings show that respondents generally perceived accountability structures to be in place, especially in terms of formal oversight and responsibility. However, the relatively lower rating for proactive response to customer dissatisfaction suggests that accountability may be stronger at the structural level than in practical remediation when AI-related problems affect users.

3.1.4 Transparency

Transparency was likewise rated Agree, with an overall mean of 2.85. The highest-rated indicator was the belief that the company clearly communicates how AI systems affect customers and employees, with a mean of 2.89. This was followed by the view that users are provided with sufficient information about AI-driven recommendations, with a mean of 2.88, and that employees are allowed to challenge AI decisions and request explanations, with a mean of 2.86. The lowest-rated indicator was the understanding that the company has clear AI ethical policies and guidelines, with a mean of 2.79. These results indicate that respondents generally perceived openness in AI communication, especially in how systems affect stakeholders. At the same time, the lower score for clear ethical policies suggests that practical communication may be more evident than formal policy clarity, leaving room for stronger codification and internal dissemination of AI ethics guidelines.

3.1.5 Privacy

Privacy also obtained an overall verbal interpretation of Agree, with an overall mean of 2.82. The highest-rated indicator was the belief that the company has strict policies to prevent unauthorized access to AI-generated data, with a mean of 2.89. This was followed by understanding how the company collects, stores, and uses AI-related data, with a mean of 2.82. The lowest-rated indicator was the belief that personal data used in AI training is anonymized, with a mean of 2.77. The privacy results suggest that respondents generally recognized data protection efforts in their organizations, particularly in access control and data governance. However, the lower score on anonymization indicates that privacy safeguards related to AI training data may be less visible or less fully understood, pointing to a need for stronger privacy implementation and communication in this area.

3.2 Differences in Perceived Ethical AI Practices

3.2.1 Grouping by Company

No significant differences were found in perceived ethical AI practices when respondents were grouped according to company. The results showed p-values greater than 0.05 across all dimensions: fairness ($F = 0.730$, $p = 0.535$), accountability ($F = 1.044$, $p = 0.374$), transparency ($F = 0.647$, $p = 0.586$), and privacy ($F = 0.740$, $p = 0.529$). This means that respondents from different companies generally shared similar perceptions of ethical AI practices. The findings suggest that comparable ethical standards, policies, or regulatory expectations may be operating across the participating firms, resulting in relatively consistent views regardless of company affiliation.

3.2.2 Grouping by Educational Attainment

When grouped by educational attainment, only fairness showed a significant difference. Fairness obtained $F = 3.328$ and $p = 0.038$, while accountability ($F = 1.069$, $p = 0.346$), transparency ($F = 1.472$, $p = 0.232$), and privacy ($F = 2.650$, $p = 0.073$) were all not significant. These results indicate that educational attainment influenced how respondents evaluated fairness in AI systems, but not the other three dimensions. This suggests that fairness may require more critical ethical and technical judgment, while accountability, transparency, and privacy may be more uniformly perceived because they are shaped by broader organizational policies and regulatory expectations.

3.2.3 Grouping by Years in Service

No significant differences were found when respondents were grouped according to years in service. The p-values for fairness ($F = 0.690$, $p = 0.559$), accountability ($F = 0.435$, $p = 0.728$), transparency ($F = 1.177$, $p = 0.320$), and privacy ($F = 0.208$, $p = 0.891$) were all greater than 0.05. This shows that length of service did not materially affect perceptions of ethical AI practices. The findings imply that awareness of fairness, accountability, transparency, and privacy may be shaped more by organizational culture, internal guidelines, and institutional regulation than by employee tenure.

3.2.4 Grouping by Frequency of Interaction with AI Systems

When grouped by frequency of interaction with AI systems, fairness, accountability, and transparency did not show significant differences, with fairness at $F = 0.923$ and $p = 0.431$, accountability at $F = 1.197$ and $p = 0.312$, and transparency

at $F = 0.142$ and $p = 0.935$. Privacy, however, showed a significant difference, with $F = 4.226$ and $p = 0.006$. This indicates that the frequency of AI interaction significantly affected perceptions of privacy, but not the other ethical dimensions. The result suggests that more frequent engagement with AI systems may heighten awareness of how personal data is collected, processed, and stored, making privacy concerns more sensitive among those with greater direct exposure to AI tools.

3.3 Challenges in Implementing AI Technologies in Henan

The challenges encountered by e-commerce companies in implementing AI technologies within the Henan regional context were rated overall as Serious, with a mean of 2.93. The most serious issue was the use of AI by fraudsters to generate fake images, fake reviews, and fraudulent refund claims, with a mean of 3.29. Other highly rated concerns included strict regulatory rules on data usage, algorithm transparency, and fair competition (3.18); customer misunderstanding of AI decision-making and the resulting trust issues (3.13); heavy competition requiring continuous AI investment despite uncertain profitability (3.12); export restrictions and security concerns affecting access to advanced AI chips (3.04); inaccurate recommendations and poor predictions (3.04); and vulnerability to hacking, cyberattacks, and data breaches (3.03). Lower-ranked but still serious concerns included high-volume transaction processing (3.00), price wars and costly AI-driven marketing campaigns (2.95), competition for skilled AI engineers and researchers (2.93), biased outcomes from historical data (2.89), costly AI infrastructure development (2.89), technical complexity in integrating AI into existing systems (2.88), consumer skepticism toward AI shopping tools (2.87), and the large amount of customer data required by AI systems (2.79). These findings show that AI implementation challenges in Henan are not limited to one domain but span fraud risk, regulation, transparency, profitability, technical infrastructure, cybersecurity, talent, and trust. The results therefore point to the need for a comprehensive and region-specific policy guide that can strengthen ethical governance, improve operational reliability, and support more sustainable AI adoption in the provincial e-commerce sector.

4. Conclusion & Recommendations

The study concludes that respondents from selected e-commerce companies in Henan Province generally perceived their organizations' ethical AI practices in terms of fairness, accountability, transparency, and privacy as present at an agreeable level. The respondents were broadly similar across company affiliation and years in service, while differences appeared in perceptions of fairness when grouped by educational attainment and in perceptions of privacy when grouped by frequency of AI interaction. The findings also show that companies face serious ethical and operational challenges in AI implementation, particularly fraud-related misuse, regulatory compliance pressures, customer misunderstanding of AI decisions, cybersecurity risks, technical integration difficulties, and the need for sustained investment. Overall, the results support the need for a region-specific, evidence-based policy guide that strengthens responsible AI governance and aligns corporate practice with China's Personal Information Protection Law (PIPL) and Data Security Law (DSL).

Based on the findings, selected e-commerce companies in Henan Province should strengthen the implementation of fairness, accountability, transparency, and privacy in their AI systems through more consistent internal governance, clearer oversight mechanisms, stronger data protection practices, and improved responsiveness to ethical and operational risks. Regional enterprises, regulators, and digital economy planners should use the study's evidence in developing and applying a policy guide that is responsive to local conditions, improves employee awareness and compliance capacity, and supports responsible, transparent, and privacy-centered AI applications in the e-commerce sector in line with the PIPL and DSL.

The study is limited to selected e-commerce companies operating in Henan Province, China, and focuses only on the four ethical AI dimensions of fairness, accountability, transparency, and privacy. Its findings are based primarily on survey-based perception data and are therefore interpretive rather than predictive, and they are not intended to be generalized to all provinces in China. The study also excludes other AI ethics dimensions such as sustainability, explainability, and environmental impact in order to maintain conceptual focus.

Compliance with ethical standards

The study was conducted in accordance with institutional ethical standards and applicable research protocols. Participation was voluntary, and informed consent was secured from all respondents prior to data collection. The confidentiality and anonymity of participants were protected throughout the study, and all information obtained was used solely for academic purposes and handled with due care. Ethical approval and necessary permissions were obtained from the concerned authorities before the conduct of the research. The authors declare no conflict of interest, acknowledge all individuals and institutions that contributed to the completion of the study, and affirm that the manuscript is original, that all sources were properly cited, and that copyright ownership and authorship responsibility are duly recognized.

REFERENCES

- Binns, R. (2020). Fairness in machine learning: Lessons from political philosophy. *Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency*. <https://doi.org/10.1145/3351095.3372858>
- Cavoukian, A. (2020). *Privacy by design: The 7 foundational principles*. Information and Privacy Commissioner of Ontario. <https://www.ipc.on.ca/wp-content/uploads/Resources/pbd-7foundationalprinciples.pdf>
- Chen, X., & Wang, L. (2023). AI governance in China: Regional disparities and enforcement challenges. *Journal of Technology and Society*, 45(2), 87–105.
- Floridi, L., & Cows, J. (2021). A unified framework of five principles for AI in society. *Harvard Data Science Review*, 1(1). <https://doi.org/10.1162/99608f92.8cd550d1>
- Jobin, A., Ienca, M., & Andorno, R. (2020). Artificial intelligence: The global landscape of ethics guidelines. *Nature Machine Intelligence*, 1(9), 389–399. <https://doi.org/10.1038/s42256-019-0088-2>
- Kaplan, A., & Haenlein, M. (2020). Rethinking AI: Ethical implications and future perspectives. *Business Horizons*, 63(1), 25–36.
- Li, H., Zhang, J., & Wang, Y. (2021). AI-driven personalization and its impact on consumer trust in China. *Computers in Human Behavior*, 125, 106–114.
- Liu, H. (2022). Algorithmic regulation in China: Balancing innovation and ethical concerns. *Journal of Asian Business Studies*, 16(2), 243–259.
- Mehrabi, N., Morstatter, F., Saxena, N., Lerman, K., & Galstyan, A. (2021). A survey on bias and fairness in machine learning. *ACM Computing Surveys*, 54(6), 1–35. <https://doi.org/10.1145/3457607>
- Sun, Y. (2021). Consumer perceptions of AI-driven personalization: A regional analysis in China. *Computers in Human Behavior*, 120, 106–135.
- Wang, L., Zhou, Y., & Li, X. (2022). Ethical AI practices in Chinese tech enterprises: A grounded theory approach. *Technology in Society*, 71, 102139. <https://doi.org/10.1016/j.techsoc.2022.102139>
- Wang, R., Liu, Y., & Chen, H. (2020). Data privacy in AI: Challenges and solutions. *Journal of Business Ethics*, 167(2), 333–342. <https://doi.org/10.1007/s10551-019-04120-5>
- Wang, X., & Li, J. (2022). China's data protection laws and their impact on AI-driven commerce. *Computers, Privacy & Data Protection*, 4(1), 78–94.
- Zhang, K., & Li, J. (2020). Enhancing consumer trust in AI-driven e-commerce through transparency. *Journal of Retailing*, 95(3), 97–109. <https://doi.org/10.1016/j.jretai.2019.06.002>
- Zhang, Y., & Liu, Q. (2023). AI ethics and consumer trust in China's digital economy. *Journal of Business Ethics*, 180(3), 521–539.
- Zhang, Y., Liu, X., & Wang, Z. (2020). Ethical AI practices in e-commerce: A framework for implementation. *Electronic Commerce Research and Applications*, 39, 100898. <https://doi.org/10.1016/j.elerap.2020.100898>
- Zhao, Y., & Chen, L. (2021). The implications of the Personal Information Protection Law on e-commerce in China. *International Journal of Law and Information Technology*, 29(3), 210–225. <https://doi.org/10.1093/ijlit/eaab014>