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Research Paper

Intelligent Transformation of Social Organizations in the Artificial Intelligence Era: Mechanisms and Pathways Based on the TOE Framework

Zhang Kexin, Wang Weipeng
Department of Political Science, School of Law, Politics and Public Administration, Hebei Normal University, Shijiazhuang 050024, Hebei, P. R. China

Abstract: *Artificial intelligence (AI) is increasingly reshaping governance structures and service delivery models, positioning social organizations as key actors in the transformation toward intelligent social governance. However, existing studies remain fragmented and lack an integrated analytical framework to explain how AI empowers the serviceg functions of social organizations. Drawing on the Technology–Organization–Environment (TOE) framework, this study develops a systematic analytical model to examine the multi-dimensional mechanisms of AI empowerment. Through qualitative analysis, the study demonstrates that AI enhances service functions through data-driven decision-making and process automation at the technological level; organizational factors—such as managerial cognition, resource endowment, and learning capacity—mediate the depth of technological integration; while environmental conditions, including policy support, institutional trust, and inter-organizational networks, shape the external enabling ecosystem. The findings further reveal that AI empowerment is not merely a process of technological adoption but a systemic transformation involving the co-evolution of technology, organization, and institutional environment. Meanwhile, challenges such as data quality constraints, technological opacity, organizational inertia, and regulatory ambiguity may hinder effective implementation. By extending the TOE framework to the context of AI-enabled social governance, this study contributes to the literature by integrating data governance, organizational cognition, and institutional trust into a unified analytical perspective. The study also provides policy and managerial implications for advancing data-centric governance, organizational transformation, and adaptive institutional design. These insights contribute to a deeper understanding of intelligent governance and support the development of inclusive and sustainable AI-enabled social systems.*

Keywords*: Artificial Intelligence; Social Organizations; TOE Framework; Digital Governance; AI Empowerment; Service Functions*

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I. Introduction

Artificial Intelligence (AI) has emerged as an innovative driving force for social development. The concept of "empowerment" refers to granting greater space for development and is often used after a noun to indicate the possibilities that a specific subject confers upon a particular object (Huang et al., 2025). "AI empowerment" can thus be understood as the capacity of AI technologies to provide specific entities with expanded possibilities for development and to broaden their scope of advancement.

Research on AI empowerment has expanded rapidly across multiple domains, reflecting its growing significance in contemporary scholarship and its broad applicability across different sectors. In education, for example, Holmes (2023) demonstrated that AI enhances personalized learning and teaching efficiency, while also raising critical concerns regarding ethics, governance, and human–AI collaboration. In the economic domain, Brynjolfsson et al. (2019) identified AI as a general-purpose technology that significantly improves productivity, but may simultaneously exacerbate labor market polarization and inequality. In the field of cultural communication, Flew (2021) found that AI-driven digital platforms are reshaping content production and dissemination, while introducing new governance challenges related to platform power and cultural diversity. However, existing studies have predominantly focused on sector-specific applications of AI, while insufficient attention has been paid to its role in empowering the service functions of social organizations from an integrated

analytical perspective, particularly within a systematic framework such as TOE.

Global policy frameworks have increasingly emphasized the transformative role of artificial intelligence in enhancing governance capacity and public service delivery. For instance, the United Nations, in its report E-Government Survey 2022, highlights that digital technologies, including AI, are critical for advancing inclusive, effective, and accountable governance. Similarly, international policy frameworks have articulated a set of normative principles for the responsible development and governance of AI (United Nations, 2022). The OECD (2019) emphasizes that AI should be leveraged to enhance innovation and societal well-being while ensuring transparency and accountability. In parallel, the European Commission (2020) highlights the importance of trustworthy AI, stressing requirements such as human oversight, technical robustness, and data governance. At the global level, UNESCO (2021) further advances a human-centered approach to AI, advocating ethical principles including fairness, inclusiveness, and sustainability. These global policy discourses suggest that AI is becoming a key driver in reshaping governance systems worldwide. National policy documents stress the importance of artificial intelligence in enhancing governance capacity and effectiveness, while recognizing that reliance solely on governmental power may create structural constraints. In this regard, social organizations are playing an increasingly important role in public service provision and collaborative governance. Encouraging multi-stakeholder participation has thus become a widely recognized pathway toward building a governance model characterized by co-construction, co-governance, and shared benefits.

The service functions of social organizations are fundamentally oriented toward addressing diverse social needs. By mobilizing and integrating social resources, these organizations deliver differentiated services to both specific groups and the broader public, thereby constituting a crucial component of contemporary governance systems. In recent years, digital transformation has been widely recognized as a key pathway for enhancing the effectiveness and sustainability of social service provision. Emerging evidence suggests that digital technologies can significantly improve organizational responsiveness, service precision, and resource allocation efficiency, thus reshaping traditional service delivery models (Mergel et al., 2019; Tangi et al., 2021).

Within this context, the digital empowerment of social organizations has become an increasingly prominent trend in both policy and practice. The integration of artificial intelligence, in particular, offers new opportunities to overcome structural constraints inherent in conventional service models, facilitating a transition toward more intelligent, personalized, and data-driven service provision (Yang, 2024). As recent studies indicate, AI-enabled systems can enhance decision-making processes, optimize service matching, and improve overall governance performance, thereby reinforcing the role of social organizations in collaborative governance frameworks. Consequently, the convergence of AI technologies and social organizational service functions can be understood not merely as a technological upgrade, but as a structurally driven transformation shaped by broader digital governance dynamics. Despite these advancements, existing literature on AI empowerment of social organizations remains fragmented. Current studies have predominantly examined implementation pathways at the micro- and meso-levels, focusing on specific application scenarios such as community elderly care and grassroots governance. However, insufficient attention has been paid to a systematic analysis of AI empowerment from a macro and integrative perspective. In particular, there is a lack of analytical frameworks capable of capturing the interaction between technological, organizational, and environmental factors in shaping AI adoption and its outcomes. To address this gap, this paper adopts a TOE (Technology–Organization–Environment) framework to systematically explore the challenges and practical pathways of AI empowerment in social organizations, thereby contributing to a more comprehensive understanding of its governance implications.

II. Theoretical Framework Selection and Its Applicability

Amid the transformative wave driven by artificial intelligence, the realization of social organizations' service functions unfolds within a complex and dynamic context shaped by the interaction of technological, organizational, and institutional factors. On the one hand, technological elements—such as artificial intelligence and data analytics—are fundamentally reshaping service delivery models, decision-making processes, and resource allocation mechanisms. On the other hand, these transformations are embedded within broader institutional environments characterized by regulatory frameworks, policy incentives, and evolving public expectations. Simultaneously, internal organizational conditions, including governance structures, resource endowments, and capacity foundations, critically mediate how such technologies are adopted and utilized. Together, these dimensions constitute a multi-layered analytical field in which technological logic, organizational logic, and institutional logic are deeply intertwined.

Against this backdrop, the Technology–Organization–Environment (TOE) framework, originally developed by Louis G. Tornatzky and Mitchell Fleischer, provides a robust and widely adopted analytical lens for examining the determinants of technological adoption at the organizational level. The core premise of the TOE framework is that the adoption and diffusion of new technologies are jointly shaped by three contextual dimensions: the characteristics of the technology, the internal attributes of the organization, and the external

environment in which the organization operates (DePietro et al., 1990; Tornatzky & Fleischer, 2020). As a multi-level analytical framework, TOE has been extensively applied in studies of digital transformation, e-government, and innovation diffusion, demonstrating strong explanatory power across diverse empirical settings.

Specifically, the technological dimension emphasizes the inherent attributes of the technology and the conditions of its application. This includes not only functional characteristics such as relative advantage, compatibility, and complexity, but also critical enabling factors such as data availability, infrastructure readiness, and system integration capacity. In the context of AI, these factors are particularly salient due to the data-intensive and algorithm-driven nature of intelligent systems, which often introduce higher levels of uncertainty and implementation risk.

The organizational dimension focuses on the internal conditions that shape an organization's capacity and willingness to adopt new technologies. Key elements include organizational size, structural flexibility, resource availability, leadership cognition, and human capital composition. For social organizations, managerial awareness of digital transformation and the availability of interdisciplinary talent are especially crucial, as they directly influence strategic decision-making and the depth of technological integration. In addition, organizational culture and governance mechanisms play a pivotal role in determining whether AI applications can be effectively embedded into existing service processes.

The environmental dimension captures the external pressures and enabling conditions that influence technological adoption. This encompasses institutional arrangements such as policies, regulations, and industry standards, as well as broader socio-economic factors including market competition, resource accessibility, and stakeholder expectations. In the era of digital governance, policy support for AI development, the maturity of digital infrastructure, and public concerns regarding ethics and trust have become key environmental variables shaping organizational behavior.

Importantly, the TOE framework underscores that these three dimensions do not operate independently; rather, they interact dynamically to influence both the process and outcomes of technological adoption. For instance, advanced technological capabilities may not translate into effective application in the absence of organizational readiness or supportive policy environments. Conversely, favorable institutional conditions and strong organizational capacity can facilitate the successful implementation of even complex technologies. This interactive perspective is particularly relevant for social organizations, whose intermediary role positions them at the intersection of state, market, and society.

Therefore, the TOE framework demonstrates strong applicability to the present study, as it captures the multi-dimensional determinants of AI adoption while providing an integrated analytical lens through which technological attributes, organizational conditions, and environmental factors can be jointly examined.

III. Mechanism Analysis of AI Empowering the Service Functions of Social Organizations

3.1 Technological Dimension: Mechanisms of AI-Driven Empowerment

The advanced data-processing capabilities of artificial intelligence enable social organizations to make more informed and evidence-based decisions. In practice, social organizations are required to process large volumes of heterogeneous information, including demographic data of service recipients, preference data, and service feedback. Traditional data-processing approaches often struggle to extract meaningful insights in a timely and accurate manner, limiting organizations' ability to respond effectively to complex service demands. In contrast, AI-enabled systems can perform data cleaning, rapid filtering, and precise analysis of large-scale datasets within a short period. By facilitating the circulation of information flows, value flows, and service flows, AI contributes to the formation of data-driven decision-making mechanisms, thereby enhancing both the precision and responsiveness of service delivery (Chen et al., 2025).

In addition, the automation capabilities of AI significantly improve operational efficiency. Social organizations frequently undertake routine tasks characterized by high levels of repetition and standardization, such as document processing, data entry, and report generation. With the expansion of service functions, organizational activities have become increasingly diversified, placing higher demands on management efficiency and response speed. Reliance on manual labor not only reduces efficiency but also constrains accuracy and increases operational costs. Given that many of these tasks follow structured procedures, organizations can deploy AI-enabled solutions to establish standardized processing frameworks and foster human–machine collaboration, thereby optimizing operational performance.

For instance, in volunteer recruitment and management, intelligent systems can automatically screen applicants based on predefined criteria and dynamically match volunteers with appropriate tasks according to their skills and availability. Such applications improve the efficiency and effectiveness of resource allocation, ultimately enhancing service outcomes.

Beyond these functional improvements, the effectiveness of AI-driven empowerment also depends on the degree of alignment between technological design and service scenarios. In practice, AI systems are not

universally applicable; their performance varies significantly across different service contexts characterized by diverse user needs, data availability, and operational complexity (Madan & Ashok, 2023). For example, highly standardized service processes are more conducive to automation, whereas personalized and context-sensitive services require more flexible and adaptive algorithmic support.

Moreover, the "black-box" nature of certain AI models raises important considerations regarding interpretability, particularly in contexts where transparency and accountability are required (Burrell, 2016). For social organizations, where accountability and trust are essential, the lack of explainability may limit the extent to which AI-generated insights are adopted in practice. Therefore, technological empowerment should not be understood solely in terms of efficiency gains, but also in relation to transparency, adaptability, and contextual compatibility.

Therefore, at the technological level, AI empowers social organizations through data-driven decision-making and process automation.
Its effectiveness further depends on adaptability, transparency, and contextual compatibility.

3.2 Organizational Dimension: Internal Drivers of AI Empowerment

Internal organizational factors constitute the fundamental driving forces that shape the effectiveness of AI empowerment. At the strategic level, managers play a pivotal role in guiding technology adoption. As key decision-makers, their cognitive perceptions and attitudes toward AI significantly influence organizational willingness to embrace technological innovation. When managers move beyond traditional cognitive frameworks and actively integrate AI into organizational development strategies, they can reshape internal innovation ecosystems, thereby enhancing both the acceptance and depth of technological integration.

Organizational size also exerts heterogeneous effects on the process of AI adoption (Kong, 2022). Large-scale social organizations typically possess more abundant resources, including financial capital, technical expertise, and infrastructure, which enable them to construct relatively comprehensive technological ecosystems. These advantages provide strong support for the upgrading of service functions. In contrast, smaller organizations are often constrained by limited resources and tend to adopt AI technologies incrementally. By selecting cost-effective and user-friendly tools—such as basic data analytics platforms or intelligent customer service systems—they can gradually embed AI into their operational processes through modular applications. Empirical evidence further suggests that the effectiveness of such AI applications is closely linked to users' perceived value, particularly private value such as efficiency and convenience (Wang et al., 2021).

Furthermore, employee competencies represent a critical factor in determining the success of AI implementation. From the perspective of human resource management, workforce capabilities constitute a core element of organizational competitiveness. Employees' digital literacy and technological proficiency play a mediating role in translating technological potential into practical outcomes. Insufficient skills may hinder the effective integration of intelligent systems with existing workflows, thereby weakening the expected benefits of AI adoption.

In addition, organizational learning mechanisms play a crucial role in sustaining AI-driven transformation. The adoption of AI is not a one-time event but an iterative process that requires continuous experimentation, feedback, and adjustment. Organizations that establish internal learning routines—such as pilot projects, cross-functional teams, and knowledge-sharing platforms—are better positioned to accumulate experience and gradually refine their technological applications.

This dynamic learning process reduces uncertainty associated with AI adoption and enables organizations to move from passive technology use to proactive innovation. In contrast, organizations lacking such mechanisms may struggle to scale initial applications, resulting in fragmented or superficial implementation.

In sum, organizational factors function as critical internal enablers that shape the depth and sustainability of AI integration, where managerial cognition, resource endowment, human capital, and organizational learning jointly determine whether technological adoption evolves from fragmented application to systematic innovation.

3.3 Environmental Dimension: External Institutional Drivers

The external environment provides essential institutional and social conditions for AI empowerment. Policies and regulations play a guiding role in shaping the direction and scope of technological application. In recent years, the Chinese government has identified artificial intelligence as a key driver of high-quality development and has introduced a series of policy initiatives to promote its application in public service provision. In the Chinese context, these policies emphasize the importance of leveraging AI to deliver personalized, diversified, and high-quality services, which aligns closely with the transformation goals of social organizations. In addition, policy frameworks encourage collaborative innovation among enterprises, research institutions, and industry organizations, thereby expanding access to technological resources and fostering a

supportive innovation ecosystem.

The socio-cultural environment also constitutes an important foundation for the adoption of AI technologies. With the increasing penetration of intelligent applications—such as recommendation systems and AI assistants—public perceptions of AI have become more positive in terms of both usefulness and ease of use. This growing acceptance creates a favorable cultural atmosphere, providing both social legitimacy and psychological readiness for the implementation of AI-enabled services by social organizations. Consequently, resistance to technological adoption is reduced, facilitating the broader diffusion of intelligent service models.

Beyond policy and socio-cultural factors, the inter-organizational environment also plays a crucial role in shaping the effectiveness of AI empowerment. Social organizations are often embedded in complex collaborative networks involving government agencies, enterprises, and research institutions. The development and application of AI technologies typically require cross-sectoral cooperation, particularly in areas such as data sharing, technological support, and resource integration. In this context, the degree of network connectivity and the availability of collaborative platforms significantly influence the accessibility of AI technologies for social organizations. A well-developed ecosystem can facilitate knowledge diffusion, reduce technological barriers, and enhance innovation capacity. Conversely, fragmented collaboration mechanisms and limited external linkages may constrain the adoption and effective utilization of AI technologies.

Overall, the external environment constitutes a dynamic institutional framework within which AI empowerment unfolds, as regulatory arrangements, socio-cultural acceptance, and inter-organizational networks interact to define both the opportunities and constraints of technological adoption, ultimately influencing whether AI-driven transformation can be institutionalized as a sustainable governance innovation.

IV. Challenges and Strategic Responses

4.1 Technological Challenges and Responses

At the technological level, data quality constitutes a fundamental constraint on the effective application of artificial intelligence in social organizations. As the primary input for algorithmic systems, data determines the reliability and accuracy of analytical outcomes. In practice, data collected by social organizations often suffers from multiple deficiencies, including noise, missing values, and structural bias. Noisy data may arise from errors in data collection devices or manual input processes, while missing data is frequently caused by incomplete information from service recipients. In addition, insufficient sample representativeness can lead to systematic bias, preventing datasets from accurately reflecting the characteristics of target populations. These issues not only weaken the analytical capacity of intelligent systems but may also lead to biased decision-making outcomes.

Addressing these challenges requires the establishment of comprehensive data governance mechanisms. First, advanced data cleaning and preprocessing tools should be developed to automatically identify anomalies, correct errors, and fill missing values. Second, more scientific and systematic data collection methods should be adopted to improve sample coverage and reduce bias. Third, institutionalized data quality auditing systems should be introduced to regularly evaluate data accuracy, completeness, and consistency, thereby ensuring the long-term reliability of data resources.

In addition to data-related issues, the stability and security of AI systems represent another critical challenge. System instability—such as unexpected failures, operational disruptions, or algorithmic errors—may directly affect service continuity and reduce organizational credibility. Meanwhile, security risks primarily involve the protection of sensitive and personal data. Given that social organizations often handle large volumes of confidential information, inadequate technical safeguards or management loopholes may lead to privacy breaches and ethical controversies.

To mitigate these risks, continuous technological monitoring and security enhancement are essential. Establishing real-time AI security monitoring platforms can facilitate the early detection of system vulnerabilities and operational risks (Wen & Chen, 2025). At the same time, encryption technologies and access control mechanisms should be widely applied to ensure the secure storage, transmission, and processing of sensitive data. In addition, regular system maintenance and iterative upgrades should be implemented to improve system robustness and adaptability in dynamic technological environments.

More fundamentally, these technological challenges highlight the need to shift from a tool-oriented perspective to a governance-oriented approach to AI. Rather than treating AI systems as isolated technical solutions, social organizations should embed them within broader governance frameworks that integrate ethical standards, risk management, and accountability mechanisms. This shift is essential for ensuring that technological innovation aligns with social values and public interests, thereby enhancing the legitimacy and sustainability of AI applications.

4.2 Organizational Challenges and Responses

At the organizational level, internal constraints significantly influence the effectiveness of AI adoption. One prominent challenge lies in the persistence of traditional cognitive frameworks among organizational members. Technological change is not merely a technical process but is deeply embedded in social and organizational contexts (Barley, 1986). Cognitive biases and behavioral inertia may lead to resistance to new technologies. Some employees, concerned about potential job displacement, may develop technological anxiety, while others may perceive AI as increasing complexity and uncertainty, thereby reducing their willingness to engage with it. Such attitudes hinder the integration of intelligent systems into organizational practices.

To address this issue, it is necessary to promote a gradual transformation of organizational culture. Social organizations should strengthen internal awareness and education through systematic training programs, workshops, and seminars on AI applications. By improving employees' understanding of the functionality and value of AI, misconceptions and resistance can be effectively reduced. Moreover, encouraging staff participation in AI-related projects allows them to directly experience the efficiency gains brought by intelligent systems, thereby enhancing their acceptance and engagement.

A further constraint lies in the incompatibility between traditional management models and the requirements of AI technologies. Existing workflows in many social organizations are characterized by complex approval procedures and hierarchical decision-making structures, which limit flexibility and responsiveness. At the same time, fragmented information management systems often result in "information silos," hindering data sharing and increasing the cost of AI implementation (Wu & Chen, 2023). Such structural rigidities constrain both the deployment and optimization of intelligent technologies.

In response, organizational processes should be systematically reconfigured. This includes simplifying administrative procedures, enhancing decision-making efficiency, and promoting the integration of digital management tools. Building unified data management platforms and establishing standardized data protocols can break down departmental barriers and enable efficient data circulation. These measures provide a solid organizational foundation for the effective operation of AI systems (Luo, 2024).

Furthermore, the shortage of interdisciplinary talent constitutes a critical bottleneck. The effective application of AI requires professionals who possess both domain knowledge in social services and technical expertise in artificial intelligence. However, due to resource constraints and limited competitiveness in the labor market, social organizations often face difficulties in attracting and retaining such talent.

To alleviate this constraint, it is essential to expand talent development pathways. Social organizations can strengthen cooperation with universities and professional training institutions to cultivate interdisciplinary professionals through joint programs and practical training initiatives. At the same time, improving talent incentive mechanisms—such as offering competitive compensation, career development opportunities, and professional recognition—can enhance the attractiveness of social organizations to high-quality talent.

Ultimately, organizational transformation in the context of AI adoption is not limited to structural adjustment, but involves a deeper reconfiguration of institutional logic. This includes redefining roles and responsibilities, fostering a culture of innovation, and establishing flexible governance mechanisms that can accommodate technological uncertainty. Such transformation enables social organizations to move beyond reactive adaptation toward proactive engagement with digital change.

In essence, organizational challenges reflect deeper tensions between traditional institutional logics and emerging technological demands, requiring social organizations to reconstruct cognitive frameworks, optimize structural arrangements, and cultivate interdisciplinary capabilities in order to transform AI adoption from passive adaptation into proactive organizational innovation.

4.3 Environmental Challenges and Responses

At the environmental level, institutional and societal factors create both constraints and uncertainties for the application of AI technologies in social organizations. One major challenge lies in the incompleteness of policy and regulatory frameworks. Although general laws concerning data security and personal information protection have been established, detailed and context-specific guidelines for AI applications in social organizations remain insufficient. As a result, organizations often face ambiguity regarding compliance requirements, which increases the potential for legal risks and limits their willingness to adopt innovative technologies.

To address this issue, it is necessary to strengthen institutional supply and regulatory clarity. Policymakers should develop specialized frameworks that define the boundaries of data usage, clarify responsibilities for data governance, and establish standards for algorithmic accountability (Cui & Jiang, 2026). By providing clear and systematic legal guidance, these measures can reduce uncertainty and create a more stable environment for technological innovation.

Another significant constraint arises from insufficient public trust in AI technologies. Due to the inherent complexity and opacity of algorithmic systems, the public may have concerns regarding the fairness,

transparency, and reliability of AI-driven decisions. Since social organizations rely heavily on trust to deliver services and maintain legitimacy, a lack of public confidence may hinder the implementation and diffusion of AI-enabled service models.

Building institutional and societal trust thus becomes a critical prerequisite for AI adoption. Social organizations should actively engage in public communication and science popularization efforts, disseminating knowledge about AI principles and practical applications through diverse channels. In addition, increasing transparency in AI decision-making processes—such as providing accessible explanations of data sources, algorithmic logic, and decision outcomes—can help reduce public uncertainty and strengthen trust relationships.

Furthermore, the broader inter-organizational environment may also constrain AI adoption. Limited collaboration among government agencies, enterprises, and research institutions can restrict access to technological resources and reduce opportunities for knowledge exchange. Fragmented cooperation mechanisms may therefore hinder the diffusion and effective utilization of AI technologies.

To overcome these limitations, it is important to foster a collaborative innovation ecosystem. Strengthening cross-sector partnerships, promoting data-sharing mechanisms, and building integrated innovation platforms can enhance resource accessibility and facilitate knowledge diffusion. Such efforts contribute to the formation of a supportive external environment that enables the sustainable development of AI applications in social organizations.

From a broader perspective, addressing environmental challenges requires the co-evolution of institutions and technologies. As AI systems continue to evolve, regulatory frameworks and governance models must adapt accordingly to balance innovation and risk. This dynamic adjustment process underscores the importance of adaptive governance, in which policymakers, organizations, and society collaboratively shape the trajectory of technological development.

V. Discussion

5.1 Theoretical Contributions: Extending the TOE Framework in AI Empowerment Contexts

This study contributes to the existing literature by extending the explanatory scope of the Technology–Organization–Environment Framework in the context of AI-enabled social governance. While prior studies have widely applied the TOE framework to examine technological adoption in business organizations and e-government settings, its application to social organizations—particularly in the domain of AI empowerment—remains limited.

First, this study enriches the technological dimension by moving beyond conventional attributes such as relative advantage and complexity, and instead emphasizing data governance and system resilience as core enabling mechanisms. Unlike traditional information technologies, AI systems are fundamentally data-driven and algorithmically dynamic. As such, the effectiveness of technological adoption is not only determined by system functionality but also by the quality, availability, and governance of data resources. This finding aligns with recent studies highlighting the central role of data infrastructure in AI-driven transformation.

Second, at the organizational level, this study advances the TOE framework by integrating cognitive and structural perspectives. Existing TOE-based research often focuses on structural variables such as organizational size and resource availability. However, the findings of this study demonstrate that managerial cognition, organizational culture, and employee capabilities jointly shape the depth of AI integration. This suggests that technological adoption should be understood as both a structural process and a socio-cognitive transformation echoing the duality of technology perspective proposed by Orlikowski (1992) that technology is enacted through organizational practices rather than deterministically imposed.

Third, this study deepens the environmental dimension by incorporating trust and inter-organizational networks as critical external variables. While traditional TOE studies emphasize regulatory pressure and market competition, this research shows that, in the context of social organizations, public trust and collaborative ecosystems function as essential enabling conditions for AI adoption. This finding resonates with emerging literature on digital governance, which underscores the importance of trust and networked collaboration in public sector innovation (Janssen et al., 2020).

Taken together, this study extends the TOE framework by highlighting the interactive roles of data governance, organizational cognition, and institutional trust, thereby offering a more nuanced analytical model for understanding AI empowerment in social organizations.

5.2 Practical Implications for AI-Enabled Social Governance

Beyond theoretical contributions, this study also provides important practical insights for policymakers and social organizations seeking to leverage AI technologies.

First, at the technological level, the findings suggest that a shift from technology-centric adoption toward data-centric governance models should be prioritized rather than a technical afterthought. Investments in data quality management, infrastructure development, and security mechanisms are essential for ensuring the

reliability and sustainability of AI applications. This implies that policymakers should shift from a technology-centric approach to a data-centric governance model, emphasizing standards, interoperability, and accountability (Wylde, 2024).

Second, at the organizational level, successful AI adoption requires simultaneous transformation of organizational cognition and structure. Capacity-building paradigms that integrate both technical skill development and cognitive transformation should not only focus on technical skills but also promote cognitive transformation regarding AI. Moreover, organizational reforms—such as process reengineering and platform integration—are necessary to align institutional arrangements with the operational logic of AI technologies.

Third, at the environmental level, the study highlights the importance of building trust and fostering collaborative ecosystems. Policymakers should enhance regulatory clarity and transparency to reduce uncertainty, while social organizations should actively engage in public communication to improve societal understanding of AI. At the same time, the construction of collaborative governance ecosystems is essential for enabling resource integration and innovation diffusion, thereby creating a supportive environment for AI-enabled transformation.

These implications indicate that AI empowerment is not a purely technological process but a systemic transformation that requires coordinated efforts across multiple dimensions.

5.3 Limitations and Directions for Future Research

Despite its contributions, this study has several limitations that provide avenues for future research.

First, this study adopts a primarily conceptual and analytical approach based on the TOE framework, without extensive empirical validation. Future research could employ quantitative methods or case studies to test the proposed analytical model and examine the relative influence of different factors.

Second, the analysis focuses on social organizations within a specific institutional context. Given that governance systems, policy environments, and technological infrastructures vary across countries, future studies could conduct comparative research across different national contexts to enhance the generalizability of findings.

Third, while this study incorporates multiple dimensions within the TOE framework, further theoretical integration is possible. Future research could combine TOE with other perspectives—such as institutional theory or resource dependence theory—to develop a more comprehensive analytical framework.

Finally, as AI technologies continue to evolve, emerging issues such as algorithmic bias, ethical governance, and human–AI collaboration warrant deeper investigation. Exploring these topics will be essential for understanding the long-term implications of AI empowerment in social governance.

VI. Conclusion and Future Research

This study demonstrates that AI empowerment in social organizations represents a systemic transformation shaped by the interaction of technological, organizational, and environmental factors. By extending the TOE framework to the context of social governance, it highlights the critical roles of data governance, organizational cognition, and institutional trust in shaping AI adoption outcomes. Overall, the findings suggest that AI-enabled transformation reflects a shift toward more data-driven, adaptive, and collaborative governance models.

Despite these contributions, several avenues for future research remain. First, empirical studies are needed to validate the analytical framework proposed in this study and to examine the relative influence of different factors across diverse organizational contexts. Second, comparative research across countries and governance systems would help to assess the generalizability of the findings and identify context-specific dynamics. Third, future studies could integrate the TOE framework with complementary theoretical perspectives, such as institutional theory and resource dependence theory, to develop a more comprehensive analytical model. Finally, as AI technologies continue to evolve, further research is required to explore emerging issues such as algorithmic governance, ethical accountability, and human–AI collaboration in social service provision (Dwivedi et al., 2023).

Moreover, this study suggests that the transformative potential of AI in social organizations should be understood not merely in terms of technological substitution, but as a process of institutional reconfiguration. As AI systems become increasingly embedded in service delivery, they reshape organizational boundaries, redistribute decision-making authority, and redefine accountability structures. This implies that future governance models will need to accommodate hybrid forms of human–AI collaboration, in which algorithmic systems and human actors jointly participate in value creation and public service provision (Chang, 2024). In this sense, AI empowerment represents not only a tool for enhancing efficiency, but also a catalyst for the evolution of governance paradigms toward more adaptive, intelligent, and participatory forms.

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