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BEYOND SURVIVAL: LEVERAGING HUMAN–AI INTERACTION FOR TRANSFORMATIVE RESILIENCE AND SUSTAINABILITY IN THE MALAYSIAN PUBLIC SECTOR

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ABSTRACT

Public sector organizations increasingly operate in environments characterized by uncertainty, technological disruption, and complex societal challenges that demand greater adaptability, innovation, and resilience. In response, governments worldwide are accelerating digital transformation initiatives, particularly through the adoption of Artificial Intelligence (AI), to enhance governance effectiveness, operational efficiency, and public service delivery. However, existing evidence suggests that technological investments alone do not guarantee sustainable organizational transformation, as many AI-enabled initiatives fail to generate expected outcomes due to socio-technical misalignment, organizational resistance, and governance challenges. Consequently, scholarly attention has shifted toward understanding how Human–AI Interaction (HAI) contributes to organizational adaptability and long-term resilience. Drawing upon Socio-Technical Systems (STS) Theory, this conceptual paper examines the relationship between Human–AI Interaction and Transformative Resilience within the Malaysian public sector. The study proposes that effective collaboration between humans and AI systems strengthens organizational adaptability by integrating technological capabilities with human judgment, learning, and decision-making processes. The paper further conceptualizes Organizational Agility as a mediating mechanism through which Human–AI Interaction contributes to Transformative Resilience, while Digital Trust is proposed as a moderating condition influencing the effectiveness of Human–AI collaboration. The study develops a moderated-mediation conceptual framework linking Human–AI Interaction, Organizational Agility, Digital Trust, and Transformative Resilience within

public sector organizations. The paper contributes to Human–AI Interaction, resilience, and digital governance literature by extending existing research beyond technology adoption toward higher-order organizational outcomes associated with adaptive transformation and sustainable governance. Practically, the study provides insights for policymakers and public sector leaders seeking to design human-centered AI governance systems capable of strengthening organizational resilience, institutional sustainability, and future-ready public sector transformation in emerging digital economies such as Malaysia.

Keywords: Human–AI interaction; transformative resilience; organizational agility; digital trust; public sector; Malaysia.

INTRODUCTION

Public sector organizations (PSOs) across the world are increasingly operating in environments characterized by persistent uncertainty, technological disruption, and complex societal challenges. Governments no longer face isolated crises, but rather overlapping disruptions such as climate change, economic volatility, cybersecurity threats, demographic transitions, pandemics, and rapid technological change that collectively create conditions of continuous or systemic crisis (Chen et al., 2021). These developments have intensified institutional pressures and challenged the adaptive capacity of public institutions, rendering traditional bureaucratic approaches based on stability, predictability, and incremental change increasingly inadequate (Horák et al., 2026). In this environment, sustainable public service delivery can no longer rely solely on rigid procedures and operational continuity. Public organizations are increasingly expected to demonstrate adaptability, innovation, and strategic responsiveness while maintaining accountability, service effectiveness, and citizen trust (Alibašić, 2025). Consequently, resilience within public administration has evolved beyond the traditional focus on recovery toward broader capabilities associated with organizational learning, institutional renewal, and adaptive transformation. In response to these pressures, governments worldwide have accelerated investments in digital transformation initiatives, particularly those involving Artificial Intelligence (AI). AI is increasingly viewed as a strategic enabler of evidence-based policymaking, predictive governance, intelligent automation, and citizen-centered service delivery (Androutsopoulou et al., 2025; Yannis & Gerasimos, 2026). AI-enabled technologies are now being integrated into public administration to support data analytics, operational coordination, administrative automation, and decision-making processes aimed at improving governance efficiency and responsiveness.

Malaysia reflects this broader global trajectory through ongoing digital transformation and AI modernization initiatives designed to strengthen governance capability and public sector performance. AI applications in areas such as predictive analytics, automated administrative processes, and digital public services are increasingly recognized as important tools for enhancing operational efficiency, policy responsiveness, and institutional sustainability. Consequently, AI-driven digital transformation has become a strategic priority for strengthening governance effectiveness and resilience within the Malaysian public sector. Despite growing investments in AI-enabled transformation, however, the anticipated organizational benefits have not consistently materialized. Existing studies reveal persistent gaps between technological investments and actual organizational outcomes, with many digital transformation initiatives underperforming due to governance weaknesses, organizational resistance, fragmented coordination, infrastructure limitations, and inadequate alignment between technological systems and human capabilities (Daud et al., 2024; Mahusin et al., 2024). In many cases, organizations prioritize technological sophistication without adequately addressing the organizational, cultural, and

human dimensions necessary for sustainable transformation. This suggests that technological adoption alone is insufficient to generate meaningful organizational change and resilience.

Consequently, scholarly attention has increasingly shifted from whether organizations adopt AI toward how humans and AI interact within organizational environments. This emerging perspective emphasizes that organizational outcomes depend not merely on technological capability, but on the quality of collaboration between human actors and intelligent systems (Alon-Barkat & Busuioc, 2023; Rulandari & Silalahi, 2025). Within this context, Human–AI Interaction (HAII) has emerged as an important socio-technical construct. Human–AI Interaction refers to collaborative processes in which AI systems augment human judgment, learning, problem-solving, and decision-making rather than replacing human expertise. AI contributes predictive analytics, computational efficiency, and data-driven insights, while humans provide contextual interpretation, ethical reasoning, creativity, and strategic judgment (Rulandari & Silalahi, 2025). Contemporary perspectives therefore emphasize complementarity between humans and AI systems as a pathway toward enhanced organizational learning, innovation, and adaptive capability. The growing relevance of HAII aligns closely with Socio-Technical Systems (STS) perspectives, which argue that organizational outcomes emerge through interactions between social and technical systems rather than through technology alone (Herrmann & Pfeiffer, 2023). Although previous research has extensively examined AI adoption, digital readiness, and technology acceptance, relatively limited attention has been devoted to understanding how Human–AI collaboration contributes to higher-order organizational outcomes such as adaptability, institutional transformation, and resilience, particularly within public sector contexts characterized by governance complexity and accountability requirements (Herrmann & Pfeiffer, 2023; Thomas, 2024). Emerging evidence suggests that effective Human–AI collaboration can enhance organizational learning, innovation, decision quality, and strategic responsiveness by combining AI-enabled analytical capabilities with human oversight and contextual judgment (Jannatul Ferdousi et al., 2026; Li & Tian, 2026). AI-supported systems can improve environmental sensing, predictive coordination, and adaptive governance processes, thereby strengthening organizational capacity to respond to uncertainty and disruption. Nevertheless, much of the existing literature remains concentrated on operational efficiency and adoption behavior, leaving limited understanding of whether and how Human–AI Interaction contributes to deeper forms of organizational adaptation and sustainable governance transformation.

One such higher-order capability is Transformative Resilience. Traditionally, resilience has been understood as an organization's ability to absorb shocks, maintain operations, and recover from disruption. However, contemporary resilience scholarship increasingly argues that recovery alone is insufficient in environments characterized by continuous and systemic disruption (Abdullahi, Dhahi, Mohamed, & Senasi, 2025b; Miceli et al., 2021). Instead, organizations must develop the capacity to adapt, learn, innovate, and reconfigure structures and processes in response to changing conditions. This broader capability, often referred to as Transformative Resilience, reflects the ability of organizations to “bounce forward” through institutional renewal and adaptive transformation rather than merely “bounce back” to pre-crisis conditions (Miceli et al., 2021). Transformative resilience is particularly important within public sector environments where institutions must maintain operational continuity, governance legitimacy, and citizen trust while simultaneously responding to evolving societal demands. Although previous studies have identified leadership, organizational learning, innovation capability, and dynamic capabilities as important antecedents of resilience (Alberti et al., 2018; Chen et al., 2021; Lee et al., 2013), limited research has examined how Human–AI collaboration contributes to transformative resilience within public administration contexts.

Drawing upon Socio-Technical Systems (STS) Theory (Appelbaum, 1997), this study argues that transformative resilience emerges from the effective integration of technological capabilities and human expertise within organizational systems. STS theory posits that organizational effectiveness depends on the alignment and joint optimization of social and technical subsystems. Within this perspective, AI technologies represent technical resources, while human competencies, organizational culture, governance arrangements, and institutional processes constitute social resources. Sustainable organizational transformation therefore occurs when these elements interact synergistically to strengthen adaptability, learning, and organizational responsiveness. However, the relationship between Human–AI Interaction and Transformative Resilience is unlikely to be entirely direct. Existing research suggests that technological resources often generate strategic outcomes through intermediate organizational capabilities that facilitate adaptation and responsiveness. In this regard, Organizational Agility represents a particularly important mechanism. Organizational Agility refers to an organization’s ability to sense environmental changes, process information rapidly, and respond through flexible decision-making and resource reconfiguration (Appelbaum, 1997; Stanley & Aggarwal, 2023). Human–AI collaboration may strengthen agility by improving information processing, predictive intelligence, and adaptive decision-making capabilities, while agility subsequently enables organizations to translate these insights into adaptive organizational action and institutional transformation. Furthermore, the effectiveness of Human–AI collaboration may depend on the extent to which individuals trust AI-enabled systems and digital governance processes. Digital Trust therefore represents an important contextual condition shaping AI-enabled organizational transformation. Digital trust encompasses perceptions regarding the reliability, transparency, fairness, security, accountability, and ethical governance of digital systems. High levels of trust may strengthen employees’ willingness to engage with AI-supported technologies, while low trust may generate skepticism, resistance, and underutilization of AI capabilities.

Against this background, this study seeks to address several important gaps in the literature. First, the study extends Human–AI Interaction literature beyond technology adoption by examining its influence on transformative organizational outcomes within public sector environments. Second, it contributes to resilience scholarship by positioning Human–AI Interaction as a socio-technical antecedent of Transformative Resilience. Third, the study advances understanding of the mechanisms and contextual conditions underlying this relationship through the inclusion of Organizational Agility and Digital Trust. Finally, by focusing on the Malaysian public sector, the study provides contextually relevant insights into AI-enabled governance transformation within emerging digital economies. Accordingly, this paper proposes a moderated-mediation conceptual framework in which Human–AI Interaction influences Transformative Resilience through Organizational Agility, while Digital Trust strengthens the relationship between Human–AI Interaction and Organizational Agility. In doing so, the study contributes to emerging discussions concerning socio-technical resilience, sustainable digital governance, and AI-enabled public sector transformation in increasingly uncertain environments.

LITERATURE REVIEW

Human–AI Interaction (HAI)

The rapid advancement of Artificial Intelligence (AI) has transformed organizational decision-making, knowledge management, and governance processes across both public and private sectors. Contemporary scholarship increasingly conceptualizes AI not merely as an automation tool, but as an augmentative socio-technical capability that collaborates with human actors in complex organizational

environments (Ali et al., 2025). This perspective has led to the emergence of Human–AI Interaction (HAII), which emphasizes complementarity rather than substitution between human intelligence and machine intelligence. AI contributes analytical capacity, predictive insights, and data-driven support, while humans provide contextual understanding, ethical reasoning, experiential judgment, and value-sensitive decision-making under uncertainty (Tangi et al., 2025). Within organizational settings, effective Human–AI collaboration can improve information processing, reduce cognitive overload, minimize heuristic biases, and enhance decision quality (Ali et al., 2025; Li & Tian, 2026). AI systems are particularly valuable in processing complex datasets and generating predictive insights that support evidence-based decision-making. However, these benefits depend largely on the quality of interaction between humans and intelligent systems. Poorly designed AI integration may result in over-reliance on algorithms, diminished human judgment, algorithmic bias, and reduced accountability.

Consequently, contemporary scholarship emphasizes the importance of transparency, explainability, accountability, and human oversight in AI-enabled organizational systems (Jannatul Ferdousi et al., 2026). Effective HAII requires strategic collaboration in which computational efficiency is balanced with human interpretation and ethical judgment. The effectiveness of Human–AI collaboration is also shaped by organizational culture, user expertise, institutional support, trust in AI systems, and governance arrangements. In public sector environments, HAII extends beyond operational efficiency toward broader concerns relating to governance legitimacy, institutional accountability, and public trust. Public organizations operate within highly regulated contexts where decisions frequently involve ethical considerations, citizen welfare, and democratic accountability. Consequently, AI implementation within public administration requires strong human oversight, institutional coordination, transparency, and explainability to ensure fairness, legitimacy, and accountability in AI-supported governance processes (Ali et al., 2025; Herrmann & Pfeiffer, 2023). Human–AI Interaction therefore represents not only a technological collaboration process but also an important governance mechanism through which intelligent systems and human judgment are integrated within public institutional environments.

Transformative Resilience

The concept of organizational resilience has evolved significantly in response to increasing environmental uncertainty, technological disruption, and institutional complexity. Traditionally, resilience referred to an organization's ability to absorb shocks, recover from crises, and restore operational stability. However, contemporary scholarship increasingly emphasizes adaptability, innovation, and institutional transformation as essential dimensions of resilience (Abdullahi et al., 2024). This broader perspective has led to the emergence of Transformative Resilience, which reflects an organization's capacity not only to recover from disruption but also to reconfigure structures, processes, and capabilities to enhance long-term sustainability and adaptability (DesJardine et al., 2019; Duchek, 2019). Transformative resilience therefore represents a proactive capability through which organizations leverage disruption as an opportunity for organizational learning, innovation, and strategic renewal. This perspective is particularly relevant in contemporary public governance environments characterized by overlapping crises, policy uncertainty, and rapidly changing societal expectations. In such settings, resilience depends not only on operational continuity but also on organizational flexibility, adaptive governance, and collaborative problem-solving.

Digital transformation has emerged as a critical enabler of transformative resilience. Existing studies suggest that digital technologies strengthen resilience by facilitating real-time information sharing, virtual collaboration, adaptive coordination, and data-driven decision-making during crises (Thomas,

2024). Digital maturity and transformation management intensity have also been associated with stronger organizational adaptability and resilience in turbulent environments (Abdullahi, Dhahi, Mohamed, & Senasi, 2025b). In public sector contexts, transformative resilience is increasingly linked to governance effectiveness, institutional adaptability, policy continuity, and citizen trust. Research highlights the importance of leadership, digital infrastructure, cross-sector collaboration, institutional learning, and civic engagement in strengthening public sector resilience (Alon-Barkat & Busuioc, 2023; Yannis & Gerasimos, 2026). Contemporary scholarship further suggests that transformative or “antifragile” capabilities enable organizations to benefit from disruption through innovation, experimentation, and strategic renewal. Consequently, transformative resilience represents a critical capability that enables public institutions not only to withstand crises but also to emerge more adaptive, innovative, and sustainable.

Organizational Agility

Organizational Agility is widely recognized as a critical dynamic capability enabling organizations to sense environmental changes, respond rapidly to uncertainty, and reconfigure resources effectively in response to emerging opportunities and threats (Abdullahi, Dhahi, Mohamed, & Senasi, 2025b). In increasingly volatile and complex environments, agility supports organizational responsiveness, flexibility, and continuous adaptation. Traditional bureaucratic structures often limit the capacity of organizations to respond effectively to rapid technological and environmental change. Organizational agility addresses these limitations by enabling flexible decision-making, rapid coordination, and adaptive resource mobilization (Jarrahi, 2018). Contemporary scholarship increasingly positions agility as an essential capability supporting digital transformation, innovation, and resilience within modern organizations. Digital transformation and AI-enabled technologies significantly enhance organizational agility by improving information access, enabling real-time analytics, and supporting faster decision-making processes (Cosa & Torelli, 2024). AI-supported systems strengthen organizational sensing capabilities through predictive analytics, trend identification, and environmental monitoring, while digital collaboration tools improve coordination and distributed problem-solving (Saltalamacchia et al., 2025). Within public sector digital transformation contexts, agility has been identified as a key mechanism linking technological capabilities with organizational performance and adaptive outcomes. Existing research suggests that digital transformation contributes to resilience and organizational effectiveness largely through agility rather than through technology alone (Gong & Ribiere, 2025). Agile organizations are generally better positioned to anticipate disruptions, respond strategically to uncertainty, and sustain operational continuity during crises (He et al., 2022). Consequently, agility and resilience are increasingly viewed as mutually reinforcing capabilities supporting sustainable organizational transformation.

Digital Trust

The increasing integration of AI-enabled technologies into governance and organizational systems has elevated the importance of Digital Trust within contemporary digital transformation research (Cojocar, 2025). Digital trust refers to confidence in the reliability, transparency, fairness, accountability, security, and legitimacy of digital technologies and the institutions governing them. In public sector environments, digital trust extends beyond technical functionality to include broader perceptions regarding ethical governance, procedural fairness, institutional accountability, and alignment with societal values. Trust is particularly important in AI-enabled public administration because intelligent systems increasingly influence decisions affecting public welfare, citizen rights, and service delivery. Consequently, public employees and citizens must trust not only the technical performance of AI

systems but also the governance structures, ethical safeguards, and accountability mechanisms surrounding their implementation (El Khatib et al., 2025; Kluiters et al., 2023). Where trust is weak, resistance to AI-supported systems and skepticism toward digital governance initiatives are likely to increase. Contemporary scholarship identifies several key dimensions necessary for building digital trust, including algorithmic transparency, explainable AI, participatory governance, digital literacy, ethical standards, and institutional oversight mechanisms (Bhatnagar, 2025; Kluiters et al., 2023). Explainability is especially important because individuals are more likely to trust AI-generated recommendations when decision-making processes are understandable and subject to human review. Similarly, governance arrangements emphasizing accountability, human-in-the-loop decision-making, auditability, and redress mechanisms are essential for sustaining public confidence in AI-enabled systems (Bhatnagar, 2025; Cojocar, 2025; El Khatib et al., 2025). Conversely, poorly governed AI systems characterized by opacity, algorithmic bias, weak accountability, or perceived unfairness may undermine institutional legitimacy and public trust. Consequently, digital trust increasingly represents a foundational condition for successful AI adoption, organizational transformation, and sustainable digital governance. Within public sector contexts, digital trust therefore functions as a critical enabling condition for leveraging Human–AI Interaction to strengthen Organizational Agility, Transformative Resilience, and sustainable public sector transformation.

Theoretical Foundation: Socio-Technical Systems (STS) Theory

This study is grounded in Socio-Technical Systems (STS) Theory, which explains that organizational effectiveness emerges through the alignment and joint optimization of social and technical subsystems rather than through technological advancement alone (Makarius et al., 2020). The technical subsystem includes technologies, digital infrastructures, workflows, and operational processes, while the social subsystem comprises employees, organizational culture, leadership, governance structures, and institutional practices. STS theory argues that sustainable organizational transformation occurs when these subsystems are effectively integrated and continuously adapted to changing environments.

The relevance of STS theory has become increasingly important in the era of Artificial Intelligence (AI) and digital transformation. Contemporary organizations increasingly rely on AI-enabled systems for decision-making, predictive analytics, governance, and service delivery. However, organizational outcomes are determined not merely by AI adoption, but by the quality of interaction between human actors and intelligent technologies. Recent extensions of STS theory therefore emphasize intelligent socio-technical systems characterized by human-centered AI integration, collaborative intelligence, and adaptive organizational design (Ali et al., 2025; Thomas, 2024). Within this study, Human–AI Interaction (HAI) represents the central socio-technical mechanism through which human expertise and AI capabilities are integrated within public sector organizations. HAI refers to collaborative processes in which AI enhances information processing, predictive analysis, and decision support, while humans contribute contextual understanding, ethical reasoning, and strategic judgment (Jarrahi, 2018; Makarius et al., 2020). From an STS perspective, sustainable organizational outcomes emerge not from AI technologies independently, but from the effective collaboration between intelligent systems and human actors.

STS theory further suggests that successful AI integration requires supportive organizational structures, adaptive workflows, governance mechanisms, and employee readiness (Yu et al., 2023). In this regard, Organizational Agility is conceptualized as a dynamic capability through which Human–AI Interaction contributes to organizational transformation. Organizational Agility refers to the ability to sense environmental changes and respond rapidly through adaptive decision-making and resource

reconfiguration. Human–AI collaboration strengthens analytical and predictive capabilities, while agility enables organizations to translate these insights into adaptive organizational action and institutional renewal. Existing studies increasingly show that digital transformation and AI-enabled capabilities enhance organizational performance and resilience primarily through increased agility rather than through technology alone (Atobishi et al., 2024; Gong & Ribiere, 2025). Agile organizations are therefore better positioned to respond strategically to uncertainty, disruption, and evolving governance demands. The framework also incorporates Digital Trust as an important social condition shaping the effectiveness of Human–AI collaboration. Digital Trust refers to confidence in the reliability, transparency, fairness, security, and ethical governance of AI-enabled systems. Research suggests that trust significantly influences employees’ willingness to engage with AI technologies and integrate digital insights into organizational decision-making (Gkinko & Elbanna, 2023; Kovacs & Horvath, 2025). From an STS perspective, Digital Trust strengthens the interaction between social and technical systems by facilitating greater acceptance and utilization of AI-supported processes.

The ultimate outcome examined in this study is Transformative Resilience, which refers to an organization’s capacity not only to withstand disruption but also to adapt, reconfigure, and transform its structures and capabilities to enhance long-term sustainability. Contemporary resilience scholarship increasingly emphasizes proactive adaptation, organizational learning, and institutional renewal in response to complex and uncertain environments (Abdullahi, Dhahi, Mohamed, & Senasi, 2025a; Abdullahi et al., 2026). STS theory explains that such resilience emerges when technological innovation is effectively integrated with human adaptability, organizational learning, and governance coordination. Thus, STS theory provides an integrative lens for explaining how Human–AI Interaction, Organizational Agility, and Digital Trust collectively contribute to Transformative Resilience within the Malaysian public sector. The theory highlights that sustainable digital transformation depends not solely on technological adoption, but on the effective integration of intelligent technologies, human capabilities, and supportive organizational conditions.

Hypothesis Development

Human–AI Interaction and Transformative Resilience

The growing integration of Artificial Intelligence (AI) into organizational systems has transformed the nature of decision-making, knowledge management, and adaptive governance. Contemporary scholarship increasingly conceptualizes AI as an augmentative capability that enhances rather than replaces human cognition and judgment (Jarrahi, 2018). Within this perspective, Human–AI Interaction (HAI) represents a collaborative socio-technical process in which AI provides analytical, predictive, and data-driven capabilities, while humans contribute contextual understanding, ethical reasoning, and strategic judgment (Cojocaru, 2025; Saltalamacchia et al., 2025). In increasingly volatile and uncertain environments, such collaboration can strengthen organizational adaptability by improving environmental sensing, decision quality, and strategic responsiveness. Existing studies suggest that AI-enabled capabilities contribute to organizational resilience when effectively embedded within organizational processes and dynamic capabilities rather than functioning as isolated technological tools (Cojocaru, 2025; Saltalamacchia et al., 2025; Tangi et al., 2025). Consistent with Socio-Technical Systems (STS) Theory, resilience emerges through the effective alignment of technological systems, human expertise, and organizational structures. Within public sector contexts, resilience extends beyond operational recovery toward transformative adaptation, institutional renewal, and long-term sustainability (Abdullahi et al., 2024; Miceli et al., 2021). Effective Human–AI collaboration may therefore enable public organizations to respond more strategically to disruption while strengthening

their capacity for continuous learning and adaptive transformation. Accordingly, the following hypothesis is proposed:

H1: Human–AI Interaction positively influences Transformative Resilience in the Malaysian public sector.

Human–AI Interaction and Organizational Agility

Human–AI collaboration enhances organizational information processing, predictive capabilities, and decision support by combining AI-driven analytical capacity with human contextual judgment and strategic interpretation. AI technologies enable organizations to process large volumes of data, identify emerging patterns, anticipate disruptions, and support faster decision-making processes. At the same time, human actors contribute experiential knowledge, ethical reasoning, and adaptive judgment necessary for translating technological insights into meaningful organizational actions (Atobishi et al., 2024; Gong & Ribiere, 2025; Jarrahi, 2018). These combined capabilities improve organizational responsiveness, flexibility, and adaptive coordination, all of which are central dimensions of Organizational Agility. In increasingly volatile and uncertain environments, effective Human–AI Interaction enables organizations to sense environmental changes more rapidly and respond strategically through timely decision-making and resource reconfiguration. Existing research similarly suggests that AI-enabled capabilities strengthen agility by enhancing real-time analytics, operational flexibility, and adaptive organizational processes (Alon-Barkat & Busuioc, 2023; Gong & Ribiere, 2025). Accordingly, the following hypothesis is proposed:

H2: Human–AI Interaction positively influences Organizational Agility.

Organizational Agility and Transformative Resilience

Organizational Agility is increasingly recognized as a critical capability that enables organizations to respond effectively to environmental turbulence, uncertainty, and disruption. Agile organizations possess the ability to adapt rapidly, reconfigure resources efficiently, and implement flexible responses to emerging challenges. Such responsiveness strengthens organizational learning, adaptive capacity, and continuous transformation, which are essential dimensions of Transformative (Abdelaziz Elgamal, 2018; Abdullahi, Dhahi, Mohamed, & Senasi, 2025b; Miceli et al., 2021). Within public sector contexts, agility enables organizations to maintain operational continuity while simultaneously adapting structures, processes, and governance approaches to evolving societal demands and crises. Organizations characterized by high agility are therefore better positioned not only to withstand disruption but also to leverage uncertainty as an opportunity for institutional renewal and long-term sustainability. Accordingly, the following hypothesis is proposed:

H3: Organizational Agility positively influences Transformative Resilience.

Mediating Role of Organizational Agility

Although Human–AI Interaction may strengthen organizational adaptability and decision-making capabilities, these technological benefits may not directly translate into resilience outcomes unless organizations possess the capability to convert AI-enabled insights into adaptive organizational action. Organizational Agility provides this critical mechanism by enabling institutions to respond rapidly to environmental changes through flexible coordination, timely decision-making, and strategic resource

reconfiguration. From a Socio-Technical Systems (STS) perspective, technological capabilities generate organizational outcomes through adaptive organizational processes rather than through technology alone. Human–AI collaboration strengthens information availability, predictive intelligence, and strategic responsiveness, while Organizational Agility enables organizations to operationalize these capabilities into transformative adaptation and resilience development. Existing studies similarly suggest that agility functions as a mediating capability linking digital transformation and resilience outcomes (Atobishi et al., 2024; Gong & Ribiere, 2025). Accordingly, the following hypothesis is proposed:

H4: Organizational Agility mediates the relationship between Human–AI Interaction and Transformative Resilience.

Moderating Role of Digital Trust

Trust in AI technologies has emerged as a critical determinant of successful Human–AI collaboration and digital transformation. Existing research shows that individuals’ willingness to rely on AI-generated recommendations depends heavily on perceptions of reliability, transparency, fairness, and accountability (Bhatnagar, 2025; Kluiters et al., 2023). In public sector contexts, where institutional legitimacy and ethical governance are especially important, Digital Trust becomes central to effective AI integration. Digital Trust refers to confidence in the reliability, security, transparency, and ethical governance of digital systems and AI-enabled technologies. High levels of trust encourage employees to engage with AI systems, integrate algorithmic insights into decision-making, and support AI-enabled organizational processes. Conversely, low trust may generate skepticism, resistance, and underutilization of AI capabilities (El Khatib et al., 2025). From an STS perspective, Digital Trust represents a critical social condition shaping the effectiveness of interaction between human actors and intelligent technologies. When trust in AI systems is high, Human–AI collaboration is likely to produce stronger adaptive and agile organizational responses. In contrast, low trust weakens the extent to which AI capabilities contribute to organizational flexibility and responsiveness. Accordingly, the following hypothesis is proposed:

H5: Digital Trust positively moderates the relationship between Human–AI Interaction and Organizational Agility, such that the relationship is stronger when Digital Trust is high than when it is low.

Moderated Mediation Effect

Emerging research suggests that the organizational outcomes associated with AI-enabled transformation occur through complex mediated and conditional processes (Shatila, 2025; Yu et al., 2026). In particular, technological capabilities often influence resilience indirectly through organizational capabilities such as agility, innovation, and adaptive leadership (El Khatib et al., 2025; Gkinko & Elbanna, 2023). At the same time, contextual conditions such as trust and organizational support shape the strength of these indirect relationships. In the present study, Human–AI Interaction is expected to influence Transformative Resilience indirectly through Organizational Agility. However, the effectiveness of this indirect relationship is likely to depend on the level of Digital Trust within the organization. When trust in AI systems is high, employees are more willing to utilize AI-generated insights and participate in AI-enabled organizational processes, thereby strengthening the impact of HAI on agility and resilience. Conversely, low trust may weaken the extent to which Human–AI

collaboration contributes to adaptive organizational outcomes. Accordingly, the following hypothesis is proposed:

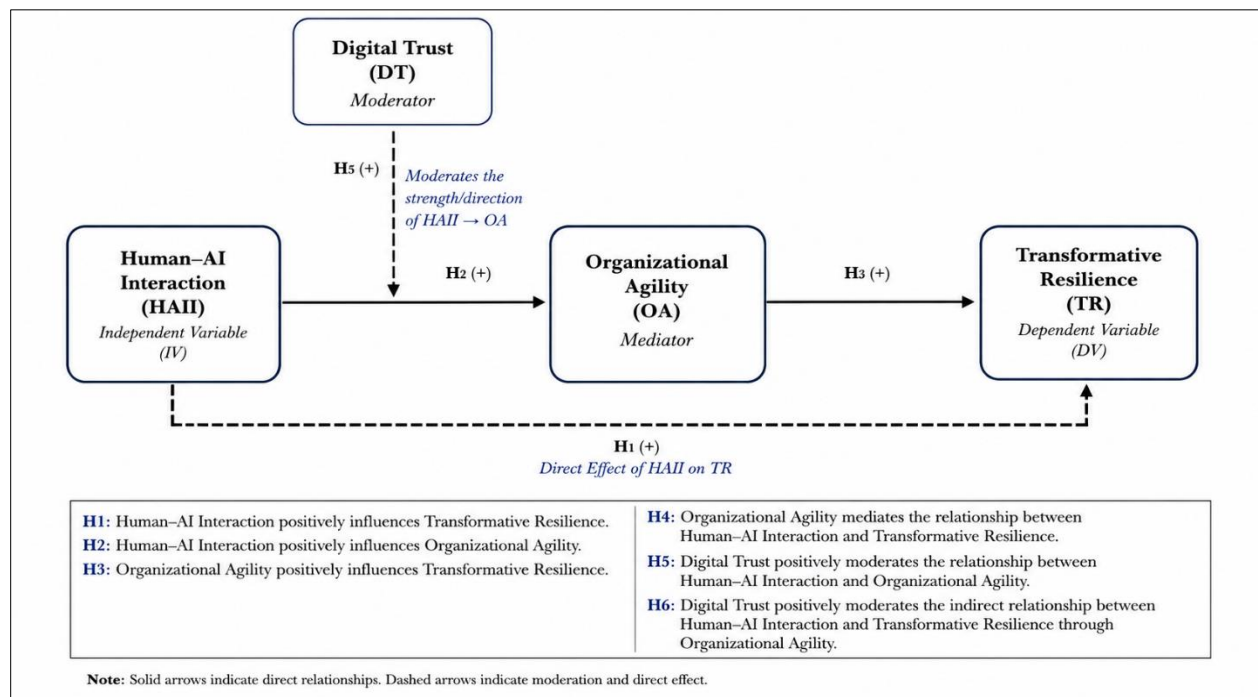
H6: Digital Trust positively moderates the indirect relationship between Human–AI Interaction and Transformative Resilience through Organizational Agility, such that the mediated relationship is stronger at higher levels of Digital Trust.

Proposed Conceptual Framework

Based on the preceding discussion, this study proposes a moderated mediation framework in which Human–AI Interaction influences Transformative Resilience directly and indirectly through Organizational Agility, while Digital Trust strengthens the relationship between Human–AI Interaction and Organizational Agility as shown in figure 1.

Figure 1

Conceptual Framework



METHODOLOGY

Research Context

This conceptual paper proposes a future empirical investigation focusing on Malaysian public sector organizations (PSOs), including federal ministries, statutory bodies, government agencies, and public institutions involved in digital governance, administrative modernization, and AI-enabled public service delivery. Malaysia provides a particularly suitable context for examining the relationship between Human–AI Interaction (HAI), Organizational Agility, Digital Trust, and Transformative Resilience due to the government’s ongoing commitment toward digital transformation and AI integration through

initiatives such as MyDIGITAL, the Malaysia Digital Economy Blueprint, the National Artificial Intelligence Roadmap, and the Public Sector Digitalization Strategic Plan (MAMPU, 2024; Ministry of Digital, 2025).

In recent years, Malaysian public institutions have increasingly adopted intelligent technologies including predictive analytics, digital platforms, AI-assisted decision-support systems, smart governance applications, and automated administrative processes. These developments reflect broader governmental efforts to strengthen governance efficiency, service delivery, institutional responsiveness, and sustainable public sector transformation. However, public organizations continue to face important challenges relating to technological integration, bureaucratic rigidity, workforce readiness, cybersecurity concerns, and institutional trust deficits that may influence the effectiveness of AI-enabled transformation initiatives (KPMG, 2025). These institutional realities make the Malaysian public sector an appropriate setting for examining how Human–AI Interaction contributes to Transformative Resilience through Organizational Agility and under varying levels of Digital Trust.

To ensure broader contextual representation, future empirical investigations may focus on ministries and agencies actively engaged in digital transformation initiatives, including the Ministry of Digital, Ministry of Economy, Ministry of Health, Ministry of Education, Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), Malaysia Digital Economy Corporation (MDEC), and selected federal statutory bodies. Data collection may be concentrated in major administrative and digital governance hubs such as Putrajaya, Kuala Lumpur, Cyberjaya, and Shah Alam, where digital government initiatives and AI-enabled governance programs are most actively implemented.

Research Design and Data Collection Procedure

To empirically validate the proposed conceptual framework, this study proposes a quantitative research design using a structured survey methodology. Quantitative approaches are widely employed in public administration, organizational behavior, and information systems research because they enable the systematic examination of relationships among latent constructs and facilitate theory testing through statistical analysis (Hair & Alamer, 2022). A future empirical study may adopt a time-lagged, multi-wave survey design to minimize common method variance (CMV) and strengthen causal interpretation among study variables. Methodological scholars increasingly recommend temporal separation between predictor and criterion variables when examining perceptual and behavioral constructs measured from the same respondents (Podsakoff et al., 2012). Accordingly, data relating to Human–AI Interaction and Digital Trust may be collected during the first survey phase, while Organizational Agility and Transformative Resilience may be measured in a subsequent phase separated by an appropriate temporal interval. The target respondents would include professional and management-level public officers, ICT personnel, policy analysts, administrative officers, and digital transformation specialists directly involved in AI-supported organizational processes and digital governance initiatives. A purposive sampling strategy is proposed because the study requires respondents possessing relevant knowledge and practical experience concerning AI-enabled systems and Human–AI collaboration. Although purposive sampling may limit generalizability, it remains appropriate and widely accepted in organizational and digital governance research where specialized expertise is necessary to generate meaningful responses. Future studies may distribute questionnaires electronically and physically across participating public agencies. Ethical procedures including informed consent, anonymity, confidentiality assurances, and voluntary participation should be implemented in accordance with recognized research ethics standards governing human-subject research.

Measurement of Constructs

The proposed study intends to employ established multi-item scales adapted from prior empirical literature to ensure content validity, construct validity, and comparability with existing studies. All items may be measured using a five-point Likert scale ranging from “strongly disagree” to “strongly agree,” which is commonly used in public administration, organizational behavior, and information systems research. Human–AI Interaction may be operationalized using measurement items adapted from recent Human–AI collaboration literature emphasizing decision support, cognitive augmentation, knowledge integration, and collaborative intelligence (La Sala et al., 2024; Rulandari & Silalahi, 2025). Organizational Agility may be measured using established scales focusing on organizational responsiveness, adaptability, and resource reconfiguration capabilities (Abdullahi, Dhahi, Mohamed, & Senasi, 2025b). Digital Trust may be assessed using items examining reliability, transparency, fairness, security, and ethical governance of AI-enabled systems (Bhatnagar, 2025; Cojocar, 2025; El Khatib et al., 2025; Kluiters et al., 2023). Transformative Resilience may be measured using scales adapted from resilience and organizational adaptation literature, focusing on institutional learning, innovation, adaptive transformation, and long-term organizational renewal (Kantur & Iseri-Say, 2015; Lee et al., 2013). To enhance contextual suitability, future studies may subject the measurement instruments to expert review involving scholars and practitioners in public administration, digital governance, and organizational resilience. A pilot study may also be conducted to assess item clarity, reliability, and contextual relevance prior to full-scale data collection.

Data Analysis Technique

To test the proposed conceptual framework and hypothesized relationships, future empirical analysis may employ Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is considered particularly suitable for complex predictive models involving mediation, moderation, and higher-order relationships, especially within emerging research areas and theory development contexts (Wang et al., 2023). The proposed analytical procedure would involve two stages. First, the measurement model would be assessed to evaluate construct reliability, convergent validity, and discriminant validity using indicators such as Cronbach’s alpha, composite reliability, average variance extracted (AVE), and heterotrait-monotrait ratio (HTMT). Second, the structural model would be evaluated to test the hypothesized direct, mediating, moderating, and moderated mediation relationships among Human–AI Interaction, Organizational Agility, Digital Trust, and Transformative Resilience. Bootstrapping procedures may further be employed to assess the statistical significance of path coefficients, indirect effects, and conditional effects. Such analytical approaches are widely recommended in contemporary organizational and information systems research because they provide robust estimation for complex theoretical models involving latent constructs and conditional relationships (Becker et al., 2023; Sarstedt et al., 2021).

Addressing Potential Methodological Biases

Future empirical investigations should incorporate both procedural and statistical remedies to minimize potential methodological biases including common method variance, nonresponse bias, and social desirability bias. Procedurally, temporal separation of measurements, anonymity assurances, psychological separation of constructs, and clear questionnaire wording may help reduce response bias and evaluation apprehension (Podsakoff et al., 2012). Statistically, future studies may assess nonresponse bias by comparing early and late respondents across key variables. Common method variance may be examined using marker-variable techniques and full collinearity variance inflation

factor (VIF) assessments (Abdullahi, Dhahi, Mohamed, Khalid, et al., 2025; Kock & Lynn, 2012). Social desirability bias may further be minimized through indirect questioning procedures and assurances that there are no right or wrong answers. Collectively, these methodological procedures would strengthen the validity, reliability, and robustness of future empirical findings while ensuring alignment with established standards in public administration and digital governance research.

Expected Contributions

This conceptual paper offers several important theoretical and practical contributions. Theoretically, the study extends Human–AI Interaction (HAI) literature beyond technology adoption and acceptance by examining its relationship with higher-order organizational outcomes, particularly Transformative Resilience within public sector contexts. The paper further contributes to resilience scholarship by positioning HAI as a socio-technical capability that supports adaptive organizational transformation in increasingly uncertain governance environments. Additionally, the study advances Socio-Technical Systems (STS) Theory by integrating Organizational Agility and Digital Trust into a moderated mediation framework explaining how AI-enabled collaboration contributes to resilient and sustainable public sector transformation. In doing so, the framework provides a more nuanced understanding of the mechanisms and contextual conditions through which Human–AI collaboration generates organizational value. From a practical perspective, the proposed framework offers insights for policymakers and public sector leaders seeking to design human-centered AI governance systems that strengthen organizational adaptability, institutional resilience, and sustainable digital transformation within the Malaysian public sector and other emerging digital economies.

EXPECTED OUTCOMES AND FUTURE RESEARCH DIRECTIONS

Firstly, the study anticipates that Human–AI Interaction (HAI) will positively influence Transformative Resilience in the Malaysian public sector (H1). Effective collaboration between human actors and AI-enabled systems is expected to strengthen organizational learning, adaptive decision-making, environmental sensing, and strategic responsiveness. Through AI-supported analytics, predictive insights, and intelligent decision support, public organizations may become better positioned to respond proactively to uncertainty and disruption. This outcome suggests that AI technologies can contribute to sustainable public sector transformation when integrated as collaborative socio-technical capabilities rather than merely as operational tools. Consequently, public organizations that effectively combine human expertise with intelligent technologies are expected to demonstrate stronger capacities for institutional adaptation, renewal, and long-term resilience.

Secondly, Human–AI Interaction is expected to positively influence Organizational Agility (H2). Human–AI collaboration enhances information processing, real-time analytics, and decision-support capabilities, enabling organizations to sense environmental changes and respond more rapidly to emerging challenges. AI technologies can improve operational flexibility and responsiveness by supporting faster analysis, resource coordination, and adaptive planning, while human actors provide contextual interpretation and strategic judgment. This outcome implies that organizations leveraging effective Human–AI collaboration are likely to develop greater agility in managing increasingly volatile and complex governance environments. Thirdly, Organizational Agility is anticipated to positively influence Transformative Resilience (H3). Agile organizations possess the ability to adapt rapidly, reconfigure resources efficiently, and implement flexible responses during periods of disruption and uncertainty. In the context of the Malaysian public sector, agility is expected to strengthen institutional

adaptability, policy responsiveness, and organizational continuity, thereby enabling public institutions not only to withstand crises but also to transform and improve in response to evolving societal demands. This finding would reinforce the growing argument that resilience in contemporary organizations depends on adaptive transformation rather than mere operational recovery.

Furthermore, Organizational Agility is expected to mediate the relationship between Human–AI Interaction and Transformative Resilience (H4). While Human–AI collaboration may strengthen organizational information-processing and analytical capabilities, these technological advantages may not directly translate into resilience outcomes unless organizations possess the agility necessary to convert digital insights into adaptive organizational actions. Organizational Agility therefore represents the operational mechanism through which Human–AI Interaction contributes to institutional transformation and resilience development. This outcome would further support Socio-Technical Systems (STS) Theory by demonstrating that technological capabilities generate strategic outcomes through adaptive organizational processes rather than through technology alone.

The study also proposes that Digital Trust will positively moderate the relationship between Human–AI Interaction and Organizational Agility (H5). Public employees who perceive AI systems as reliable, transparent, secure, and ethically governed are expected to engage more confidently with AI-supported technologies and integrate AI-generated insights into organizational decision-making processes. High levels of digital trust are therefore likely to strengthen the effectiveness of Human–AI collaboration in fostering organizational responsiveness and adaptability. Conversely, low trust in digital systems may reduce employee willingness to rely on AI technologies, thereby weakening the contribution of Human–AI Interaction to organizational agility. This outcome highlights the importance of trustworthy AI governance frameworks, transparency mechanisms, and ethical safeguards within public sector digital transformation initiatives.

Finally, the study anticipates a significant moderated mediation effect whereby Digital Trust strengthens the indirect relationship between Human–AI Interaction and Transformative Resilience through Organizational Agility (H6). Specifically, the indirect effect of Human–AI Interaction on resilience through agility is expected to become stronger under conditions of high digital trust. This suggests that trust functions as an important socio-organizational condition enabling public institutions to fully leverage AI-enabled collaboration for adaptive transformation and resilience development. The expected finding reinforces the broader argument that successful AI-enabled governance depends not only on technological sophistication but also on supportive organizational and institutional conditions that facilitate meaningful Human–AI collaboration. Hence, these expected outcomes contribute to a deeper understanding of how AI-enabled socio-technical systems may strengthen sustainable governance, adaptive capacity, and institutional resilience within the Malaysian public sector. The study therefore extends existing Human–AI Interaction literature beyond technology adoption and acceptance by examining its influence on higher-order organizational outcomes associated with resilience and transformation.

Future empirical research should validate the proposed conceptual framework across diverse public sector institutions and governance environments. Additional contextual variables such as leadership support, organizational culture, digital capability, ethical AI governance, and employee digital literacy may also be incorporated to enrich understanding of AI-enabled organizational transformation. Longitudinal research designs may further provide insight into how Human–AI collaboration, agility, and resilience evolve over time in response to ongoing digital transformation initiatives. Comparative cross-country studies may additionally enhance understanding of socio-technical resilience across different institutional and governance contexts.

LIMITATIONS AND RECOMMENDATIONS

This conceptual paper has several limitations that provide important directions for future research. First, the study remains conceptual in nature and therefore does not provide empirical evidence validating the proposed relationships among Human–AI Interaction, Organizational Agility, Digital Trust, and Transformative Resilience. Future empirical studies are therefore necessary to statistically test the proposed framework and examine the generalizability of the hypothesized relationships within different public sector contexts. Second, the proposed framework focuses specifically on the Malaysian public sector, which may limit broader contextual generalizability. Institutional structures, governance arrangements, levels of digital maturity, and public trust dynamics differ significantly across countries and administrative systems. Future comparative studies involving multiple countries, sectors, or governance environments would therefore provide richer insights into the contextual conditions shaping AI-enabled organizational resilience. Third, the study adopts a relatively focused socio-technical perspective emphasizing Organizational Agility and Digital Trust as the primary mediating and moderating mechanisms. However, other organizational and environmental factors may also influence the effectiveness of Human–AI collaboration. Future studies may therefore incorporate additional variables such as leadership capability, organizational learning, innovation culture, employee digital competence, cybersecurity readiness, and ethical AI governance to develop more comprehensive explanatory models. Fourth, the study conceptualizes Human–AI Interaction primarily from an organizational capability perspective. Future research may benefit from exploring micro-level behavioral dimensions of Human–AI collaboration, including employee perceptions, cognitive adaptation, trust formation processes, resistance to AI adoption, and human-centered AI governance practices within public institutions.

Despite these limitations, the study provides several important recommendations for policymakers and public sector leaders. Governments should prioritize the development of human-centered AI governance strategies that emphasize collaboration between intelligent technologies and public employees rather than technological replacement. Public institutions should also invest in organizational agility through adaptive leadership, digital capability development, workforce upskilling, and flexible governance structures capable of responding effectively to rapidly changing environments. Additionally, policymakers should strengthen digital trust by promoting transparency, explainability, accountability, cybersecurity protection, and ethical AI governance frameworks. Building trust in public sector AI systems will be essential for ensuring employee acceptance, institutional legitimacy, and sustainable digital transformation. Collectively, these recommendations may support the development of a more adaptive, resilient, and future-ready Malaysian public sector.

CONCLUSION

This paper proposes a conceptual framework explaining how Human–AI Interaction may contribute to Transformative Resilience within the Malaysian public sector. Drawing upon Socio-Technical Systems (STS) Theory, the study argues that sustainable organizational transformation emerges not from technological capabilities alone, but from the effective integration of intelligent technologies, human expertise, organizational processes, and supportive institutional conditions. The framework positions Organizational Agility as a critical mediating capability through which Human–AI collaboration enhances adaptive organizational transformation, while Digital Trust functions as an important contextual condition shaping the effectiveness of AI-enabled collaboration. By integrating perspectives from Human–AI Interaction, organizational resilience, agility, and digital governance literature, the

study contributes to emerging scholarly discussions concerning AI-enabled public sector transformation and sustainable governance in increasingly uncertain environments. The paper further contributes to public administration and digital governance research by extending Human–AI Interaction literature beyond technology adoption toward higher-order organizational outcomes associated with resilience, adaptability, and institutional sustainability. In doing so, the study provides a contextually relevant framework for understanding how public organizations in emerging digital economies such as Malaysia may leverage AI technologies to strengthen long-term governance effectiveness and organizational resilience. Ultimately, the study emphasizes that the future of resilient governance depends not merely on the adoption of advanced technologies, but on the quality of collaboration between humans and intelligent systems in addressing increasingly complex societal challenges. As governments continue to accelerate digital transformation initiatives, fostering effective Human–AI collaboration, organizational agility, and digital trust will become increasingly essential for building adaptive, sustainable, and future-ready public institutions.

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