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Artificial Intelligence as a Driver of Predictive Organizational Resilience: A Synthesis of Current Research and Future Directions

Piotr Pietrzak, *Warsaw University of Life Sciences*, piotr_pietrzak1@sggw.edu.pl

Abstract

This article examines the role of artificial intelligence (AI) in shaping predictive resilience in contemporary organizations, aiming to synthesize existing research on how AI enables anticipatory and adaptive organizational capabilities under increasing uncertainty and complexity. A critical literature review approach is applied, drawing on interdisciplinary studies from management, information systems, cybersecurity, and organizational theory. The findings show that predictive resilience is increasingly understood as a proactive, data-driven capability supported by AI-based sensing, forecasting, decision support, and automation mechanisms, with major applications in supply chains, cybersecurity, finance, and organizational management. However, the literature also highlights key challenges, including data quality limitations, technological complexity, overreliance on AI systems, and ethical concerns related to bias, privacy, and transparency. The study concludes that although AI significantly strengthens organizational resilience, the field remains fragmented and requires further conceptual, theoretical, and empirical integration, particularly within socio-technical and governance perspectives.

Keywords: artificial intelligence, predictive resilience, organizational resilience, AI-driven resilience, resilience management, critical literature review

Introduction

The growing complexity, uncertainty, and volatility of the contemporary business environment have fundamentally transformed the way organizations perceive resilience. Traditional approaches to organizational resilience were largely reactive, focusing primarily on the ability to recover from disruptions after they occurred. However, the accelerating pace of technological change, geopolitical instability, cyber threats, climate-related risks, and large-scale disruptions such as the COVID-19 pandemic have revealed the limitations of reactive resilience models. In response, organizations are increasingly shifting toward predictive resilience - an anticipatory and adaptive approach aimed at identifying, forecasting, and mitigating disruptions before they escalate into critical organizational failures (Duchek, 2020).

At the center of this transformation lies artificial intelligence (AI). Recent advancements in machine learning, natural language processing, autonomous systems, and generative AI have significantly expanded organizational capabilities to collect, process, and interpret vast amounts of data in real time. AI technologies are no longer limited to operational automation; they are becoming strategic instruments that support organizational adaptability, decision-making, risk management, and long-term resilience. Through predictive modeling, anomaly detection, scenario simulation, and intelligent decision-support systems, AI enables organizations to transition from reactive crisis management toward proactive resilience-building strategies (Wang & Zhang, 2026).

The concept of predictive resilience has recently attracted growing attention in management studies, organizational theory, supply chain management, cybersecurity, and digital governance. Existing research suggests that AI can substantially enhance organizational sensing, operationalization, and reconfiguration capabilities, thereby strengthening resilience in uncertain environments (Teece, 2007; Duchek, 2020). Recent empirical studies also demonstrate that enterprise AI use positively influences organizational resilience through AI-enabled dynamic capabilities and data-driven organizational cultures (Ayoub & Sopuru, 2026).

From a theoretical perspective, the relationship between AI and predictive resilience can be understood through the Dynamic Capabilities View (DCV), which posits that organizations achieve long-term competitiveness through their ability to sense environmental changes, seize emerging opportunities, and transform organizational resources accordingly (Teece, 2007). AI enhances each of these capabilities by enabling real-time sensing, predictive analytics, and adaptive decision-making. Furthermore, Socio-Technical Systems Theory suggests that organizational resilience emerges not solely from technological sophistication but from the effective alignment of technological systems, human actors, organizational structures, and governance mechanisms. Consequently, AI-enabled resilience should be viewed as a socio-technical capability rather than a purely technological phenomenon.

Despite the growing scholarly interest, the existing body of literature remains fragmented and dispersed across multiple disciplines. Current studies frequently focus on narrow domains such as cyber resilience, predictive maintenance, supply chain resilience, or AI governance, while relatively limited attention has been devoted to the broader organizational and strategic implications of AI-enabled predictive resilience. Furthermore, there is insufficient conceptual integration between technological perspectives on AI and managerial approaches to resilience, adaptive systems, and organizational transformation (Ma et al., 2026).

Another important research gap concerns the socio-technical and governance dimensions of predictive resilience. Many studies emphasize technical capabilities and algorithmic efficiency while underestimating issues related to organizational culture, leadership, ethics, human–AI collaboration, governance structures, and accountability mechanisms. As AI systems become increasingly autonomous and deeply embedded within organizational processes, understanding their role not only as operational tools but also as drivers of strategic resilience becomes critically important (Wang & Zhang, 2026).

Simultaneously, recent discussions increasingly connect resilience with the broader concept of antifragility introduced by Taleb (2012). Unlike resilience, which focuses on resistance and recovery, antifragility refers to systems that improve and evolve through exposure to volatility, stressors, and disruptions. Contemporary research indicates that AI-driven systems may contribute not only to organizational resilience but also to organizational antifragility by enabling continuous learning, adaptive experimentation, and dynamic reconfiguration of organizational capabilities (Giordino et al., 2025; Ghobakhloo et al., 2026).

It is important to distinguish between AI-driven operational efficiency and AI-enabled organizational resilience. While efficiency-oriented AI applications primarily focus on process optimization, cost reduction, automation, and productivity improvements, resilience-oriented AI applications focus on anticipation, adaptation, recovery, and organizational continuity under conditions of uncertainty and disruption. Although efficiency gains may indirectly contribute to resilience, resilience represents a broader organizational capability concerned with maintaining and adapting core functions during adverse events. Therefore, this review focuses specifically on AI applications that contribute to adaptive and predictive resilience rather than operational efficiency alone.

Therefore, the main objective of this review article is to analyze and synthesize the current state of knowledge regarding the role of AI in shaping predictive resilience within contemporary organizations. To achieve this objective, the article addresses the following research questions:

- **RQ.1:** *How is predictive resilience conceptualized in contemporary organizational and management literature?*
- **RQ.2:** *What roles does AI play in the development of predictive resilience capabilities?*
- **RQ.3:** *Which organizational areas most frequently implement AI-driven predictive resilience solutions?*
- **RQ.4:** *What are the key benefits, limitations, risks, and ethical challenges associated with AI-enabled predictive resilience?*
- **RQ.5:** *What research gaps and future research directions emerge from the current literature on AI and predictive resilience?*

As a review article, this study adopts an interdisciplinary perspective integrating insights from management science, strategic management, information systems, organizational studies, resilience theory, cybersecurity, and AI research. By synthesizing existing findings and identifying conceptual relationships between AI and resilience, the article contributes to the growing discourse on intelligent, adaptive, and data-driven organizations operating under conditions of permanent uncertainty.

The intended audience of this article includes researchers and academics interested in organizational resilience, strategic management, AI, digital transformation, and governance studies. The paper may also provide valuable insights for business leaders, policymakers, risk managers, cybersecurity specialists, and practitioners responsible for organizational continuity, innovation, and strategic governance. Furthermore, the article can serve as a foundation for future empirical studies investigating the implementation and effectiveness of AI-driven resilience mechanisms across various organizational contexts.

In an era characterized by continuous disruption, systemic uncertainty, and accelerating technological transformation, predictive resilience supported by AI may become one of the key determinants of sustainable organizational performance and long-term competitiveness. Consequently, understanding the evolving relationship between AI and organizational resilience is not only theoretically relevant but also strategically essential for the future of management.

Research Methods

This study adopts a critical literature review approach to analyze the evolving relationship between AI and predictive resilience in organizational management. The choice of a critical review methodology is justified by the emerging, interdisciplinary, and conceptually fragmented nature of the research field. Existing studies on AI and resilience are dispersed across multiple academic domains, including management science, information systems, cybersecurity, supply chain management, and strategic governance. Consequently, there is a need not only to summarize the existing body of knowledge but also to critically evaluate, compare, and synthesize diverse theoretical perspectives, methodological approaches, and conceptual frameworks.

Critical literature reviews differ from systematic literature reviews, scoping reviews, and meta-analyses in both purpose and methodological assumptions. Rather than seeking exhaustive coverage and full procedural replicability, they primarily aim to provide interpretative synthesis, conceptual integration, and critical evaluation of fragmented knowledge domains. Given the emerging and interdisciplinary nature of AI-enabled predictive resilience, the present study intentionally adopts a critical review perspective that

prioritizes theoretical interpretation and conceptual development rather than exhaustive identification of all available publications.

Furthermore, a critical literature review enables deeper analytical interpretation of the current state of research by identifying inconsistencies, conceptual ambiguities, theoretical limitations, and underexplored areas within the literature (Chigbu et al., 2023). This approach is particularly appropriate in emerging research areas where concepts remain fluid, interdisciplinary, and insufficiently integrated. Since predictive resilience itself is still evolving conceptually and AI applications in resilience management continue to develop rapidly, the critical review methodology allows for a more reflective and interpretative examination of the topic rather than merely cataloging previous studies.

The literature selection process focused on peer-reviewed journal articles, conference papers, and academic books published primarily between 2012 and 2026, reflecting the dynamic growth of AI-related organizational research in recent years. Earlier foundational works related to organizational resilience, dynamic capabilities, and antifragility were also included to provide theoretical grounding for the analysis. The reviewed literature was sourced from major scientific databases such as Scopus, Web of Science, ScienceDirect, SpringerLink, IEEE Xplore, and Google Scholar.

The search strategy was based on combinations of the following keywords and phrases:

- “artificial intelligence”,
- “AI-driven resilience”,
- “predictive resilience”,
- “organizational resilience”,
- “resilience management”,
- “predictive analytics”,
- “dynamic capabilities”,
- “AI governance”,
- “adaptive organizations”,
- “antifragility”,
- “digital resilience”.

The inclusion criteria comprised studies addressing:

- the application of AI technologies in organizational resilience and risk management,
- predictive and adaptive approaches to resilience,
- organizational and strategic implications of AI,
- AI-supported decision-making and crisis management,
- governance, ethical, and socio-technical dimensions of AI-driven resilience.

The analytical process involved thematic categorization and interpretative synthesis of the literature. The reviewed studies were grouped according to recurring research themes, conceptual approaches, technological applications, and managerial implications.

The initial search process identified approximately 174 publications across the selected databases. After screening titles, abstracts, and thematic relevance to the research questions, studies addressing AI applications in organizational resilience, predictive capabilities, adaptive systems, and socio-technical dimensions were retained for further analysis. The final synthesis focused on approximately 35 highly relevant publications representing management, information systems, resilience, and organizational studies perspectives.

Particular attention was devoted to identifying:

- conceptualizations of predictive resilience,
- the roles of AI in resilience-building processes,
- major application domains,
- benefits and strategic opportunities,
- risks, limitations, and ethical challenges,
- and future research trajectories.

The results section of this article is organized directly around the formulated research questions. Each subsection aims to provide a structured and critical discussion of the existing literature in order to answer the following research questions (RQs):

- **RQ.1:** *How is predictive resilience conceptualized in contemporary organizational and management literature?*
- **RQ.2:** *What roles does AI play in the development of predictive resilience capabilities?*
- **RQ.3:** *Which organizational areas most frequently implement AI-driven predictive resilience solutions?*
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Accordingly, the structure of the findings section reflects these thematic areas and progressively develops a comprehensive understanding of AI-driven predictive resilience from conceptual, technological, managerial, and strategic perspectives. This organization enables a systematic synthesis of current knowledge while simultaneously highlighting unresolved theoretical and practical challenges requiring further investigation.

As a critical literature review, this study does not seek exhaustive identification of all available publications or complete procedural replicability, which are characteristic objectives of systematic literature reviews and meta-analyses. Instead, the review emphasizes interpretative synthesis, conceptual integration, and critical evaluation of the literature. Consequently, the analysis necessarily reflects the author's analytical judgment regarding the relevance and contribution of individual studies. Nevertheless, the explicit search strategy, inclusion criteria, and thematic organization enhance the transparency and credibility of the review process.

Findings

Conceptualization of Predictive Resilience

The first research question (RQ.1) addressed in this review concerns how predictive resilience is conceptualized in contemporary organizational and management literature. In its broadest sense, resilience refers to the ability of a system to withstand disruptions, adapt to changing conditions, and recover while maintaining its core functions (Duchek, 2020). The concept originates from fields such as psychology, ecology, and engineering, and has increasingly been adopted within management and organizational studies.

In many ways, organizational resilience can be compared to human resilience (Mitansha & Potangaroa, 2025). Just as individuals respond to stress, uncertainty, and crises through adaptation, learning, and recovery, organizations are also expected to cope with disruptions, adjust to environmental changes, and

develop mechanisms that improve their future responses (Mitansha & Potangaroa, 2025). However, contemporary literature increasingly emphasizes that resilient organizations should not only react after crises occur but also anticipate potential disruptions before they materialize.

Early approaches to organizational resilience focused primarily on reactive resilience, understood as the organization's capacity to respond and recover after disruptions have already occurred (Cedergren & Hassel, 2024). In this perspective, resilience was associated with crisis management, operational continuity, flexibility, and the ability to restore stability following unexpected events such as economic crises, supply chain disruptions, cyberattacks, or pandemics. Reactive resilience therefore emphasized recovery and adaptation in the post-crisis phase.

However, the increasing volatility and complexity of contemporary business environments gradually revealed the limitations of purely reactive approaches. Organizations operating in conditions characterized by uncertainty, rapid technological change, and global interconnectedness can no longer rely solely on post-event responses. As a result, contemporary literature increasingly shifts toward proactive and predictive perspectives on resilience, emphasizing the importance of anticipating disruptions before they materialize.

One of the most influential conceptualizations was proposed by Duchek (2020), who described organizational resilience as a process composed of anticipation, coping, and adaptation. The anticipation dimension is particularly important for the emergence of predictive resilience, as it emphasizes proactive identification of threats and opportunities before they occur.

The literature also frequently links predictive resilience with the dynamic capabilities perspective. According to Teece et al. (2016), organizations achieve long-term competitiveness through the ability to sense environmental changes, seize opportunities, and transform organizational resources. Predictive resilience reflects these capabilities by combining environmental sensing with proactive adaptation mechanisms.

The COVID-19 pandemic further accelerated interest in predictive resilience. Researchers emphasized that traditional risk management approaches were insufficient in highly volatile environments, increasing the importance of predictive analytics, scenario simulation, and AI-supported organizational intelligence (Ivanov & Dolgui, 2020).

Despite growing interest in the concept, the literature still lacks a universally accepted definition of predictive resilience. Existing studies use related terms interchangeably, including proactive resilience (Pertheban et al., 2023), adaptive resilience (Piubello Orsini et al., 2024), and intelligent resilience (Lóránt et al., 2026). Moreover, many studies remain technology-oriented and pay limited attention to organizational culture, governance, leadership, and ethical aspects of AI-supported resilience.

Overall, contemporary literature conceptualizes predictive resilience as a proactive, adaptive, and data-driven organizational capability that enables organizations to anticipate disruptions, respond dynamically to uncertainty, and continuously learn from changing environments. AI increasingly plays a central role in enabling this transformation from reactive toward predictive organizational resilience (Rashid & Rasheed, 2026).

The Role of AI in the Development of Predictive Resilience Capabilities

The second research question (RQ.2) addressed in this review concerns the roles that AI plays in the development of predictive resilience capabilities in organizations. Building on the conceptual shift from reactive to predictive resilience, contemporary literature increasingly positions AI as a key enabling

technology that enhances an organization's ability to sense, interpret, and respond to emerging disruptions in real time (Wang et al., 2026).

At a general level, AI plays the role of an "organizational sensing and interpretation layer" that extends human cognitive and analytical capacities. Similar to how human cognition relies on perception, pattern recognition, and experience-based judgment, AI systems process large volumes of heterogeneous data to detect weak signals, anomalies, and patterns that are often invisible to human decision-makers. This capability is fundamental for predictive resilience, as early identification of risks and opportunities is a prerequisite for proactive organizational response (Wang & Zhang, 2026).

One of the primary roles of AI in predictive resilience is early warning and anomaly detection. Machine learning algorithms are increasingly used to monitor operational, financial, and environmental data streams in order to identify deviations from expected patterns. In supply chains, for example, AI systems can detect disruptions in logistics flows and forecast potential bottlenecks before they escalate into systemic failures (Ivanov & Dolgui, 2020). Similarly, in cybersecurity, AI-based systems continuously analyze network activity to detect abnormal behavior indicative of cyber threats (Sharma et al., 2025).

A second key role is predictive analytics and scenario forecasting. AI enables organizations to move beyond descriptive and diagnostic analytics toward predictive and prescriptive models. Through advanced statistical learning and simulation techniques, AI systems can forecast demand fluctuations, operational risks, market changes, or system failures. This predictive capacity directly strengthens resilience by allowing organizations to prepare contingency plans and allocate resources proactively (Teece et al., 2016).

A third important role is decision support and augmentation of managerial judgment. Rather than replacing human decision-makers, AI increasingly functions as a decision-support system that enhances managerial awareness and reduces cognitive overload. AI-generated insights, dashboards, and recommendations support faster and more informed decisions during uncertain and high-pressure situations. This is particularly relevant in crisis management contexts, where time-sensitive decisions are critical for organizational survival and continuity (Wang & Zhang, 2026).

AI also plays a growing role in automation of response mechanisms, particularly in highly dynamic environments. In advanced implementations, AI systems are not only capable of detecting and predicting disruptions but also of initiating automated responses, such as rerouting supply chains, adjusting pricing strategies, or reallocating resources. This capability contributes to organizational agility and reduces response latency, which is essential for maintaining operational continuity during crises (Zaid & Jum'a, 2026).

Another emerging role of AI is the development of organizational learning and adaptive feedback loops. AI systems continuously learn from historical data and real-time inputs, improving their predictive accuracy over time. This creates a feedback loop in which organizations become progressively better at identifying risks and optimizing responses. In this sense, AI contributes not only to prediction but also to the continuous evolution of organizational resilience capabilities (Zhang et al., 2025).

The literature also emphasizes the role of AI in enabling integration and synthesis of distributed knowledge. Modern organizations generate vast amounts of fragmented information across departments, systems, and external environments. AI technologies, particularly those based on natural language processing and knowledge graphs, help integrate this information into coherent insights, thereby improving situational awareness and strategic foresight (Ma et al., 2026).

Finally, AI plays an increasingly important role in resilience orchestration and system coordination. In complex organizations, resilience depends on the coordination of multiple interdependent processes, actors, and systems. AI-enabled platforms can support this coordination by dynamically aligning resources, workflows, and communication across organizational units during both stable and crisis conditions (Zhang et al., 2025).

Overall, the literature suggests that AI plays a multifaceted and enabling role in the development of predictive resilience capabilities. It functions simultaneously as a sensing mechanism, predictive engine, decision-support tool, and coordination system, fundamentally transforming how organizations anticipate and respond to uncertainty (Perifanis & Kitsios, 2023).

Organizational Areas Implementing AI-Driven Predictive Resilience Solutions

The third research question (RQ.3) addressed in this review concerns which organizational areas most frequently implement AI-driven predictive resilience solutions. Contemporary literature indicates that the adoption of AI-supported resilience mechanisms is particularly visible in organizational functions characterized by high uncertainty, operational complexity, and strong dependence on real-time information processing (Sánchez-Rodríguez et al., 2025).

One of the most extensively studied areas is supply chain management. Supply chains are highly vulnerable to disruptions caused by geopolitical instability, pandemics, climate-related events, and logistics failures. As a result, organizations increasingly implement AI-based predictive systems to monitor supply chain operations, forecast disruptions, optimize inventory levels, and improve logistics coordination. Machine learning and predictive analytics enable firms to identify bottlenecks, anticipate demand fluctuations, and dynamically adjust operational decisions before disruptions escalate into systemic crises (Ivanov & Dolgui, 2020).

Another major area of implementation is cybersecurity and digital infrastructure management. Organizations rely heavily on digital systems and interconnected networks, making cyber resilience a critical dimension of predictive resilience. AI-driven cybersecurity solutions continuously analyze network traffic, user behavior, and system anomalies to detect potential threats in real time. These systems improve the organization's ability to anticipate cyberattacks, reduce response times, and maintain operational continuity in increasingly complex digital environments (Sharma et al., 2025).

Financial management and risk assessment also represent important domains of AI-driven predictive resilience. Financial institutions and large organizations use AI algorithms to predict market volatility, assess credit risks, detect fraudulent activities, and model financial stress scenarios. Predictive AI systems support more resilient financial decision-making by enabling earlier identification of risks and improving the organization's capacity to respond proactively to economic uncertainty (Yao et al., 2025).

The literature also highlights growing implementation in human resource management and workforce resilience (Khatoon et al., 2025). AI-supported systems are increasingly used to monitor employee well-being, predict workforce shortages, identify burnout risks, and optimize talent allocation. Particularly after the COVID-19 pandemic, organizations recognized that employee adaptability and psychological resilience constitute critical components of overall organizational resilience. AI therefore contributes not only to operational resilience but also to social and human-centered dimensions of resilience (Bukowski & Werbinska-Wojciechowska, 2025).

Another significant area is strategic management and decision-making. Organizations implement AI tools to support environmental scanning, competitive intelligence, scenario planning, and strategic forecasting. By processing large volumes of internal and external data, AI systems enhance managerial situational awareness and improve the organization's ability to anticipate long-term environmental changes. This strengthens strategic agility and supports proactive adaptation to uncertainty (Laamanen et al., 2025).

Manufacturing and industrial operations also increasingly implement AI-driven predictive resilience solutions, particularly through predictive maintenance systems and industrial IoT technologies. AI algorithms can monitor equipment conditions, forecast failures, and optimize maintenance schedules, reducing operational disruptions and improving system reliability. Such solutions contribute directly to operational continuity and organizational adaptability in dynamic production environments (Nagy et al., 2026).

Overall, the literature suggests that AI-driven predictive resilience solutions are implemented across a broad range of organizational areas, particularly those requiring continuous monitoring, rapid decision-making, and proactive adaptation (Teixeira et al., 2025). Although supply chains, cybersecurity, and strategic management remain the most prominent domains, the diffusion of AI-supported resilience mechanisms increasingly extends to human resources, finance, and manufacturing. This indicates that predictive resilience is evolving into an organization-wide capability rather than a function limited to isolated operational areas.

Benefits, Limitations, Risks, and Ethical Challenges of AI-Enabled Predictive Resilience

The fourth research question (RQ.4) addressed in this review concerns the key benefits, limitations, risks, and ethical challenges associated with AI-enabled predictive resilience. While contemporary literature increasingly recognizes AI as a critical enabler of proactive organizational resilience, scholars also emphasize that the implementation of AI-based resilience systems introduces significant organizational, technological, and ethical complexities (Pan et al., 2025).

One of the most frequently identified benefits of AI-enabled predictive resilience is the improvement of organizational anticipation capabilities. AI systems can process large volumes of structured and unstructured data in real time, enabling organizations to detect weak signals, identify emerging risks, and forecast potential disruptions earlier than traditional analytical methods. This enhances organizational preparedness and allows managers to implement preventive actions before crises escalate (Wang & Zhang, 2026).

Another important benefit is faster and more accurate decision-making. AI-supported predictive analytics improve situational awareness by generating insights that support managerial judgment under conditions of uncertainty. Organizations can therefore respond more dynamically to disruptions, optimize resource allocation, and improve operational continuity. In highly volatile environments, AI contributes to organizational agility and reduces response latency, which are critical dimensions of resilience (Roman et al., 2025).

The literature also highlights the role of AI in strengthening organizational learning and adaptability. AI systems continuously improve through exposure to new data and operational feedback, enabling organizations to refine predictive models and response mechanisms over time. This contributes to the development of adaptive and continuously evolving resilience capabilities. Additionally, AI-driven automation can reduce operational costs, improve efficiency, and minimize human error in crisis response processes (Yan et al., 2026).

Despite these advantages, the literature identifies several important limitations of AI-enabled predictive resilience. One major limitation concerns data dependency and model quality. AI systems are highly dependent on the availability, accuracy, and representativeness of data. Poor-quality, incomplete, or biased datasets may significantly reduce predictive accuracy and generate misleading recommendations (Afreen et al., 2025). In highly uncertain environments, predictive models may also struggle to account for unprecedented or “black swan” events that fall outside historical data patterns.

Another limitation relates to technological complexity and implementation costs. Developing and maintaining advanced AI systems requires substantial investments in digital infrastructure, data governance, cybersecurity, and specialized human expertise. Consequently, smaller organizations may face difficulties adopting AI-driven resilience solutions due to financial and organizational constraints (Lezzi, et al., 2025).

The literature also points to risks associated with excessive reliance on AI systems (Klingbeil et al., 2024). Overdependence on automated decision-making may reduce human critical thinking and managerial intuition, potentially weakening organizational flexibility in unexpected situations. AI systems may generate false positives, inaccurate forecasts, or algorithmic errors that lead to inappropriate decisions and operational disruptions. Moreover, highly automated systems can themselves become sources of vulnerability, particularly in cases of system failures, cyberattacks, or technological disruptions (Sood et al., 2025).

An important tension emerging from the literature is the so-called Efficiency-Resilience Paradox (Berendes, 2025). AI systems are frequently implemented to optimize organizational processes, eliminate redundancies, reduce slack resources, and maximize efficiency. However, resilience research suggests that some degree of redundancy, flexibility, and organizational slack may be necessary to absorb shocks and respond effectively to disruptions. Consequently, excessive AI-driven optimization may unintentionally increase systemic fragility by reducing adaptive capacity and limiting organizational response options during unexpected crises. Future research should therefore investigate how organizations can balance efficiency gains from AI with the maintenance of resilience-enhancing redundancies and adaptive capabilities.

Ethical challenges constitute another major theme in contemporary discussions on AI-enabled predictive resilience. One of the most widely discussed concerns is algorithmic bias and fairness. AI systems trained on biased datasets may unintentionally reinforce discrimination and unequal treatment in areas such as recruitment, workforce management, financial assessment, or customer analytics. This creates significant ethical and reputational risks for organizations implementing AI-driven resilience solutions (Afreen et al., 2025).

Another important ethical issue concerns privacy and surveillance. AI-supported resilience systems often rely on continuous monitoring of employees, customers, and operational processes. While such monitoring may improve predictive capabilities, it simultaneously raises concerns regarding data privacy, autonomy, and the potential misuse of sensitive information. These concerns are particularly relevant in the context of employee monitoring and behavioral analytics (Williamson & Prybutok, 2024).

The literature additionally emphasizes challenges related to transparency and accountability (Balasubramaniam et al., 2023). Many AI models, particularly those based on deep learning, operate as “black box” systems whose decision-making logic is difficult to interpret. Limited explainability reduces trust in AI-generated recommendations and complicates managerial accountability for decisions supported

by AI systems. Consequently, organizations increasingly face pressure to develop transparent, explainable, and ethically governed AI frameworks (Balasubramaniam et al., 2023).

Finally, scholars argue that predictive resilience should not be understood as a purely technological capability (Haddad et al., 2026). Organizational culture, ethical leadership, governance structures, and human competencies remain essential for effective resilience development. AI can significantly strengthen organizational resilience, but its effectiveness depends on responsible implementation, human oversight, and alignment with organizational values and strategic objectives.

Overall, contemporary literature suggests that AI-enabled predictive resilience offers substantial benefits in terms of anticipation, adaptability, decision-making, and organizational learning. However, these benefits are accompanied by significant technological limitations, operational risks, and ethical challenges related to bias, privacy, transparency, and overreliance on automation (Ilcic et al., 2025). As a result, the development of predictive resilience increasingly requires a balanced integration of technological innovation, human judgment, and ethical governance.

Discussion

This section provides the answer to the fifth research question (RQ.5), which concerns the identification of key research gaps and future research directions in the literature on AI-enabled predictive resilience. The analysis of existing studies indicates that, despite the rapid expansion of research in this area, the field remains conceptually fragmented and still in an early stage of theoretical consolidation.

One of the main gaps identified in the literature is the lack of a unified conceptualization of predictive resilience. Different studies use partially overlapping terms such as adaptive resilience, proactive resilience, and intelligent resilience, indicating that the boundaries of the concept are still not clearly defined. This conceptual inconsistency limits theoretical integration and makes it difficult to compare findings across studies.

Another important issue concerns the limited theoretical integration of AI-related mechanisms into established management and organizational theories. Although dynamic capabilities theory is widely used as a foundational framework, it is often applied in a general manner without sufficient adaptation to the specific characteristics of AI technologies, such as automation, real-time analytics, and algorithmic decision-making. As a result, there is a need for more integrated approaches that combine insights from strategic management, information systems, and socio-technical perspectives.

Furthermore, the reviewed literature demonstrates substantial heterogeneity regarding theoretical foundations, methodological approaches, application domains, and resilience dimensions. Table 1 summarizes selected studies and illustrates the interdisciplinary character of the field, while simultaneously highlighting the fragmented nature of existing knowledge.

Table 1. Comparative Overview of Selected Studies on AI-Enabled Predictive Resilience (Own elaboration)

Study	Theory	Method	Domain	AI capability	Resilience dimension	Key findings
Teece (2007)	Dynamic capabilities	Conceptual	Strategic management	Adaptive capabilities	Adaptation	Dynamic capabilities support

Study	Theory	Method	Domain	AI capability	Resilience dimension	Key findings
						organizational adaptation
Teece et al. (2016)	Dynamic capabilities	Conceptual	Management	Organizational agility	Adaptation	Agility strengthens resilience under uncertainty
Taleb (2012)	Antifragility	Conceptual	Organizations	Learning mechanisms	Antifragility	Organizations may benefit from disruptions
Pan et al. (2025)	Information processing theory	Empirical	Supply chain	AI analytics	Resilience capability	AI improves information processing and resilience
Ma et al. (2026)	Dynamic capabilities	Empirical	Organizations	Purpose-specific AI	Adaptation	AI capabilities strengthen organizational resilience
Wang et al. (2026)	Human–Organization–Technology fit	Empirical	Manufacturing	AI capacity	Operational resilience	AI improves resilience and operational performance
Wang and Zhang (2026)	Strategic adaptation	Empirical	Management	Information-driven AI	Strategic resilience	AI enhances organizational adaptation
Rashid and Rasheed (2026)	Cognitive resilience	Conceptual	Supply chain	Autonomous AI	Risk mitigation	AI supports cognitive resilience mechanisms
Roman et al. (2025)	Digital twins	Review	Logistics	Digital twins	Supply chain resilience	Digital twins improve resilience monitoring
Sharma et al. (2025)	Explainable AI	Review	Cybersecurity	Explainable AI	Cyber resilience	Transparency supports trust and resilience
Sood et al. (2025)	AI risk perspective	Review	Cybersecurity	AI systems	Reliability	Hallucinations create resilience risks
Zaid and Jum’a (2026)	Technology adoption	Empirical	Supply chain	AI-driven systems	Agility and adaptability	AI improves adaptability under turbulence

In response to these conceptual and theoretical limitations, the present study proposes an integrative framework of AI-enabled predictive resilience. The framework aims to connect AI capabilities, organizational mechanisms, and resilience outcomes, thereby providing a more coherent explanation of how AI contributes to organizational resilience.

Based on the reviewed literature, AI-enabled predictive resilience may be understood as a multi-level organizational capability emerging from the interaction between technological resources, managerial processes, and organizational learning mechanisms. Rather than acting as a direct source of resilience, AI

functions as an enabling capability that supports organizational sensing, prediction, decision-making, adaptation, and learning.

The first dimension of the framework concerns AI-enabled sensing and predictive capabilities. Through environmental scanning, anomaly detection, predictive analytics, and scenario modeling, AI systems improve organizational awareness and facilitate the early identification of weak signals and emerging threats. These capabilities strengthen anticipatory capacity and enable organizations to prepare for potential disruptions before they materialize.

The second dimension involves decision support, adaptation, and organizational learning. AI-based decision-support systems enhance managerial judgment, improve situational awareness, and facilitate resource reconfiguration under uncertain conditions. Simultaneously, automation and feedback mechanisms enable continuous learning and adaptation. Over time, these processes contribute to the development of dynamic capabilities that increase organizational agility, operational continuity, and long-term resilience.

Consequently, the proposed framework suggests that AI influences resilience indirectly through organizational mechanisms of sensing, prediction, adaptive decision-making, and learning. These mechanisms ultimately contribute to improved anticipation, organizational agility, continuity, and sustained resilience performance – Table 2.

Table 2. Proposed Conceptual Framework of AI-Enabled Predictive Organizational Resilience (Own evaluation)

AI capability	Organizational mechanism	Resilience outcome
Environmental sensing	Early warning and anomaly detection	Anticipation
Predictive analytics	Forecasting and scenario analysis	Preparedness
Decision support	Adaptive decision-making	Agility
Automation	Resource reconfiguration	Continuity
Organizational learning	Continuous adaptation	Long-term resilience

Future studies should pay particular attention to the Efficiency–Resilience Paradox, examining whether AI-driven optimization strategies may inadvertently undermine resilience by increasing dependence on tightly coupled and highly automated systems. While AI frequently improves efficiency through automation, process optimization, and redundancy reduction, resilience research suggests that organizational slack, flexibility, and redundancy often constitute important buffers against disruptions. Further research is therefore needed to determine how organizations can balance efficiency gains with the maintenance of adaptive capacity and long-term resilience.

From a methodological perspective, the current literature is dominated by conceptual papers and cross-sectional empirical studies. There is a clear lack of longitudinal research that would allow examination of how AI capabilities develop over time and how they contribute to sustained predictive resilience. More robust empirical designs are needed to capture the dynamic and evolutionary nature of AI-enabled organizational transformation.

In addition, the technological dimension of AI-enabled predictive resilience remains underexplored in terms of advanced autonomy. Most studies focus on AI as a tool for prediction and decision support, while relatively few address fully autonomous or self-adaptive systems capable of real-time organizational

reconfiguration. Future research should therefore examine how increasing levels of AI autonomy may reshape resilience mechanisms at the organizational level.

Finally, the literature indicates that human, ethical, and governance-related aspects require further attention. Although issues such as transparency, bias, privacy, and overreliance are frequently mentioned, they are often treated as secondary considerations rather than integral components of resilience models. A more comprehensive approach is needed to better understand how human judgment, organizational culture, and governance structures interact with AI systems in shaping predictive resilience.

Overall, in addressing RQ.5, the analysis demonstrates that AI-enabled predictive resilience is a rapidly developing but still fragmented research domain. Further work is required to strengthen its conceptual foundations, improve theoretical integration, and expand empirical validation in order to fully understand how AI contributes to organizational resilience in increasingly complex and uncertain environments.

Conclusion

This article set out to analyze and synthesize the current state of knowledge on the role of AI in shaping predictive resilience within contemporary organizations. By adopting a critical literature review approach, the study integrated insights from management, information systems, cybersecurity, and organizational theory to address five research questions concerning the conceptualization of predictive resilience, the role of AI in enabling it, key application domains, associated benefits and risks, and emerging research gaps.

Overall, the review shows that AI-enabled predictive resilience offers substantial opportunities for improving organizational agility, risk anticipation, and adaptive capacity across multiple domains, including supply chains, cybersecurity, finance, and human resource management. However, these benefits are accompanied by persistent challenges related to data quality, system complexity, overreliance on automation, and ethical concerns such as bias, privacy, and transparency. In addressing RQ.5, the study further identifies that the field remains conceptually fragmented and methodologically underdeveloped, particularly in terms of longitudinal evidence and integrated socio-technical frameworks. Future research should therefore focus on developing more unified conceptual models and empirically grounded approaches that better capture the dynamic interaction between AI systems, human decision-making, and organizational governance in the construction of predictive resilience.

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