Maneggio
E-ISSN : 3032-7652
https://ejournal-nawalaedu.com/index.php/mj
Vol.3.No.2 April 2026
DOI : https://doi.org/10.62872/80a1qw75

Managing Organizational Complexity: An Analysis of Decision Dynamics in Unstable Work Systems

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Entered : February 04, 2026
Revised : March 26, 2026
Accepted: April 12, 2026
Published : April 27, 2026

ABSTRACT

This study examines the dynamics of decision-making in complex and unstable organizational systems, where traditional rational-linear approaches are increasingly inadequate in addressing uncertainty, rapid change, and multidimensional interactions. The research aims to develop an integrative decision-making model by incorporating perspectives from complexity theory, system dynamics, management psychology, and digital technologies. A qualitative approach was employed using a systematic literature review and conceptual synthesis of recent scholarly works (2021–2025). Data were collected through document analysis and analyzed using thematic content analysis and systems thinking to identify key dimensions influencing decision-making processes. The findings reveal that decision-making in complex systems is nonlinear, adaptive, and emergent, shaped by the interaction of structural, technological, and human factors. Key dimensions include complex adaptive systems, chaos and nonlinear dynamics, feedback mechanisms, psychological factors, conflict management, and the integration of AI and data-driven systems. The discussion highlights the importance of a hybrid approach that balances technological capabilities with human-centered leadership and organizational learning to enhance decision quality and resilience. In conclusion, this study proposes an integrative framework that provides both theoretical and practical contributions, enabling organizations to navigate uncertainty and improve decision-making effectiveness in unstable environments.

Keywords: *Adaptive Systems, Complexity Theory, Decision Making, Digital Technology, Organizational Resilience*

INTRODUCTION

The increasing complexity of organizational environments in the digital era has significantly transformed how decisions are made, particularly within unstable and dynamic work systems. Organizations are no longer operating in predictable and linear contexts; instead, they face continuous disruptions, rapid technological changes, and interdependent relationships among multiple actors. In such environments, decision-making processes emerge not from a single rational framework but from the interaction of diverse stakeholders, incomplete information, and evolving situational pressures. This condition is evident in various sectors, including education, logistics, and SMEs, where adaptability becomes a key determinant of organizational survival. Consequently, decision-making must be understood as a complex, adaptive, and emergent phenomenon rather than a fixed procedural activity (Tsai, 2025; Sánchez-García et al., 2022)

A critical research problem arises from the inadequacy of traditional decision-making models in explaining real-world organizational behavior under conditions of

instability. Classical models, which emphasize rationality, linearity, and predictability, often fail to capture the fluid and nonlinear nature of decision-making processes in complex systems. In practice, organizations facing crises frequently experience the breakdown of established routines, leading to the emergence of ad hoc decisions and decentralized coordination. These conditions demonstrate that decision-making is not merely a structured process but a dynamic interaction shaped by uncertainty and contextual variability. As a result, there is an urgent need to develop more flexible and context-sensitive frameworks that can better reflect the realities of organizational decision-making (Göksoy, 2024; Wijiati et al., 2025)

Theoretical advancements in complexity science, chaos theory, and complex adaptive systems (CAS) offer a more comprehensive understanding of decision-making in unstable environments. Organizations are increasingly viewed as systems that continuously adapt through local interactions, feedback mechanisms, and learning processes. Within this framework, decision-making is not a linear sequence but an emergent outcome influenced by dynamic relationships and environmental changes. Chaos theory further emphasizes the sensitivity of systems to initial conditions and the unpredictable nature of outcomes, while the Garbage Can Model illustrates how decisions arise from the intersection of problems, solutions, and actors in ambiguous situations. These perspectives provide a more realistic foundation for analyzing decision-making in complex organizational systems (Tsai, 2025; Göksoy, 2024)

Empirical evidence supports these theoretical perspectives by demonstrating how organizations respond to instability and crises through adaptive and self-organizing behaviors. For instance, in logistics companies experiencing operational disruptions, decision-making processes shift from hierarchical control to collaborative and decentralized approaches, enabling faster and more flexible responses. Similarly, in educational institutions, fluctuating participation, internal conflicts, and environmental uncertainty necessitate a move away from rigid decision-making structures toward more iterative and adaptive processes. These findings highlight the importance of understanding decision-making as a context-dependent and evolving process shaped by both internal and external factors (Tsai, 2025; Wijiati et al., 2025)

Despite these developments, a significant research gap remains in the lack of integration among various theoretical and empirical approaches to organizational complexity. Existing studies often focus on specific dimensions, such as system dynamics, psychological factors, or technological tools, without fully addressing how these elements interact within a unified framework. For example, system dynamics approaches effectively map causal relationships and feedback loops but often overlook the role of human emotions and leadership styles. Conversely, research in management psychology emphasizes the importance of emotional intelligence and adaptive leadership but lacks integration with quantitative modeling techniques. This fragmentation limits the practical applicability of current theories in addressing complex organizational challenges (Sánchez-García et al., 2022; Fadli et al., 2025)

Another important gap lies in the limited exploration of the role of digital technologies, particularly artificial intelligence (AI) and data-driven systems, in supporting decision-making within complex environments. While recent studies have highlighted the potential of machine learning models and digital information systems to enhance decision quality and speed, challenges such as data quality, digital literacy, and resistance to technological change remain significant barriers. Moreover, the interaction between human decision-makers and technological systems is still not fully understood, particularly in contexts that require both analytical precision and contextual sensitivity.

This gap underscores the need for a more integrated approach that combines technological capabilities with human-centered considerations (Firman, 2024; Lu, 2025)

In addition to technological aspects, the role of social and psychological dynamics in decision-making processes also requires further attention. Organizational conflict, when managed constructively, can serve as a source of innovation and learning rather than merely a barrier to effectiveness. Open communication, collaboration, and training play crucial roles in transforming conflict into productive outcomes. Furthermore, communication network structures within organizations significantly influence information flow and decision efficiency, particularly during crises. However, existing research has not sufficiently integrated these social dimensions into broader models of organizational complexity, resulting in an incomplete understanding of decision-making processes (Hananto et al., 2024; Wen et al., 2025)

Based on these identified gaps, this study offers a novel contribution by proposing an integrative framework that combines complexity theory, system dynamics, management psychology, and digital technologies. The novelty of this research lies in its holistic perspective, which emphasizes the interaction between structural, technological, and human factors in shaping decision-making processes. Unlike previous studies that examine these aspects in isolation, this research seeks to bridge theoretical and empirical approaches to provide a more comprehensive understanding of organizational complexity. This integrative approach is expected to enhance both theoretical development and practical application in the field of organizational management (Lahoti et al., 2025; Fadli et al., 2025)

Furthermore, this study underscores the importance of balancing data-driven decision-making with human-centered approaches. While digital technologies and AI offer significant advantages in terms of speed and predictive accuracy, they cannot fully replace human judgment, particularly in complex and uncertain situations. Therefore, organizations must adopt hybrid decision-making models that integrate technological tools with psychological awareness, adaptive leadership, and organizational culture. This balanced approach is essential for ensuring that technological advancements contribute positively to decision quality without undermining human agency and organizational cohesion (Firman, 2024; Wijiati et al., 2025)

Finally, the objective of this study is to analyze and develop an integrative model of decision-making in complex and unstable organizational systems by incorporating perspectives from complexity science, system dynamics, management psychology, and digital technologies. This objective aims to provide a comprehensive framework that can guide organizations in navigating uncertainty, enhancing resilience, and improving decision-making effectiveness. By addressing the limitations of existing models and integrating multiple dimensions of complexity, this research contributes to advancing the understanding of organizational decision-making in the contemporary era (Tsai, 2025; Sánchez-García et al., 2022)

METHOD

This study employs a qualitative research design with a conceptual and exploratory approach aimed at developing an integrative model of decision-making in complex and unstable organizational systems. The research is grounded in a literature-based methodology, specifically utilizing a systematic literature review combined with a conceptual synthesis approach. Data are collected through document analysis of relevant scholarly sources, including peer-reviewed journal articles, conference proceedings, and recent empirical studies related to complexity theory, system dynamics, management psychology, and digital technologies in organizational contexts. The selection of data

sources follows purposive sampling criteria, prioritizing publications from 2021 to 2025 to ensure the inclusion of up-to-date and relevant insights. The data collection process involves identifying key themes, theoretical frameworks, and empirical findings that reflect the dynamics of decision-making in complex environments, particularly those addressing instability, uncertainty, and adaptive organizational behavior.

The data analysis technique used in this study is qualitative content analysis combined with thematic synthesis and integrative model development. Initially, all collected data are coded to identify recurring concepts, patterns, and relationships across the literature. These codes are then categorized into broader themes, such as complexity dynamics, adaptive decision-making, technological integration, and psychological factors. Furthermore, the study employs a systems thinking approach to map causal relationships and interactions among these themes, enabling the construction of a holistic and multidimensional framework. To enhance analytical rigor, the study also applies triangulation of sources by comparing findings from different studies and theoretical perspectives. The final stage involves synthesizing the results into an integrative model that reflects the interplay between structural, technological, and human dimensions of decision-making in unstable work systems, thereby ensuring both theoretical coherence and practical relevance.

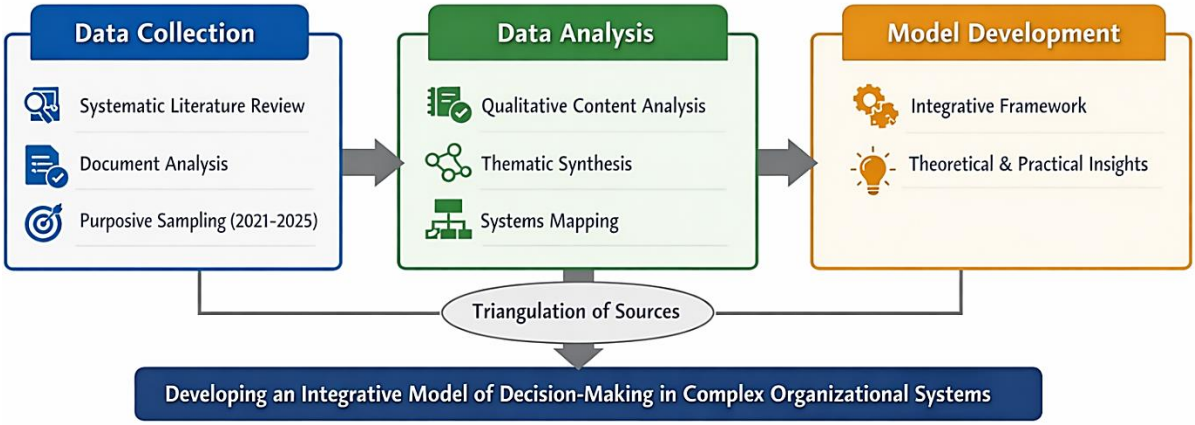

Figure 1. Diagram Conceptual Research

RESULT AND DISCUSSION

Based on the results of the qualitative content analysis and thematic synthesis of the selected literature, several key dimensions were identified that shape decision-making dynamics in complex and unstable organizational systems. These dimensions reflect the integration of theoretical perspectives, empirical findings, and technological developments, which collectively contribute to the formulation of an integrative decision-making model.

Table 1. Key Dimensions of Decision-Making Dynamics in Complex and Unstable Organizational Systems

No	Key Dimension	Core Findings	Context/Source Focus	Implication for Decision-Making
1	Complexity & Adaptive Systems	Organizations operate as adaptive systems through	CAS perspective (Tsai, 2025; Sánchez-García et al., 2022)	Decisions emerge dynamically, not linearly

		learning and self-organization		
2	Chaos & Nonlinear Dynamics	Decision processes are unpredictable and sensitive to initial conditions	Chaos theory, Garbage Can (Göksoy, 2024)	Flexible and short-term decision strategies are required
3	Crisis & Self-Organization	Breakdown of routines leads to decentralized and collaborative decisions	Crisis case (Tsai, 2025)	Encourages adaptive restructuring and rapid response
4	System Dynamics & Feedback	Use of causal loops and feedback systems enhances resilience	SMEs & safety systems (Sánchez-García et al., 2022; Bugalia et al., 2021)	Supports long-term and evidence-based decisions
5	Psychological Factors	Leadership adaptability and emotional intelligence improve decision quality	Management psychology (Fadli et al., 2025)	Human-centered decision-making becomes essential
6	Conflict & Collaboration	Conflict can foster innovation when managed collaboratively	Organizational conflict (Hananto et al., 2024)	Promotes learning and creative problem-solving
7	Digital Systems & AI	AI and data systems enhance speed and accuracy but face adoption challenges	AI & MIS (Firman, 2024; Lu, 2025; Lahoti et al., 2025)	Requires integration of human and technological aspects
8	Communication Networks	Information flow structure affects decision efficiency	Network analysis (Wen et al., 2025)	Improves coordination during uncertainty

The table above demonstrates that decision-making in complex organizational systems is inherently multidimensional, involving the interaction of structural, technological, and human factors. The findings indicate that no single approach is sufficient to address the challenges of instability; instead, organizations must adopt integrative strategies that combine adaptive system thinking, technological support, and human-centered leadership. Furthermore, the presence of feedback mechanisms, collaborative conflict management, and advanced data systems enhances organizational resilience and decision quality. Overall, these results reinforce the importance of developing a holistic framework that accommodates the dynamic and nonlinear nature of decision-making in contemporary organizational contexts.

Discussion

The findings presented in Table 1 provide a comprehensive foundation for understanding decision-making dynamics in complex and unstable organizational systems, aligning directly with the research objective of developing an integrative model

that incorporates complexity theory, system dynamics, management psychology, and digital technologies. The analysis reveals that decision-making is no longer a linear and rational process but rather a multidimensional phenomenon shaped by interactions among structural, technological, and human factors. This confirms the fundamental premise of complexity science, which views organizations as complex adaptive systems (CAS) that continuously evolve through learning, interaction, and self-organization. In such systems, decision outcomes are not predetermined but emerge from ongoing adaptive processes, making flexibility and responsiveness essential organizational capabilities (Tsai, 2025; Sánchez-García et al., 2022)

The dimension of complexity and adaptive systems highlights that organizations operate through decentralized interactions and iterative learning processes, which significantly influence how decisions are formed. This perspective challenges traditional hierarchical models by emphasizing the importance of local decision-making and distributed intelligence within organizations. The findings suggest that decision-making effectiveness depends on the organization's ability to facilitate continuous learning and adaptation, particularly in environments characterized by uncertainty and rapid change. This is consistent with prior research indicating that adaptive capacity and organizational learning are critical determinants of resilience in complex systems, especially in SMEs and dynamic industries (Sánchez-García et al., 2022; Tsai, 2025)

Furthermore, the role of chaos and nonlinear dynamics provides deeper insight into the unpredictable nature of decision-making processes. The findings demonstrate that decisions often arise from nonlinear interactions and are highly sensitive to initial conditions, as emphasized in chaos theory. The relevance of the Garbage Can Model further illustrates that in highly uncertain environments, decision-making is not a structured process but rather a convergence of problems, solutions, and participants occurring simultaneously. This perspective explains why organizations in unstable contexts often rely on short-term planning, experimentation, and flexible structures instead of rigid strategies. Such an approach allows organizations to remain responsive to unexpected changes and emerging opportunities (Göksoy, 2024; Grewatsch et al., 2021)

The findings related to crisis and self-organization further reinforce the importance of adaptability in decision-making. Empirical evidence from crisis situations, such as warehouse fires in logistics organizations, shows that the breakdown of formal routines can trigger the emergence of new organizational structures through decentralized coordination and cross-unit collaboration. This phenomenon reflects the concept of dissipative structures, where order emerges from chaos through self-organization. In this context, decision-making becomes a collective and emergent process rather than a top-down directive, highlighting the importance of collaboration and real-time problem-solving in managing crises (Tsai, 2025; Wijiati et al., 2025)

Another critical dimension identified in the findings is the role of system dynamics and feedback mechanisms in enhancing decision-making quality. The use of systems thinking and system dynamics enables organizations to map causal relationships, identify feedback loops, and anticipate long-term consequences of decisions. This approach is particularly valuable in complex environments where decisions have multiple interdependencies and delayed effects. For example, in SMEs and safety-critical systems, the integration of feedforward, buffering, and feedback mechanisms has been shown to improve organizational resilience and decision accuracy. These findings underscore the importance of adopting a holistic and systemic perspective in decision-making processes (Sánchez-García et al., 2022; Bugalia et al., 2021)

In addition to structural and systemic factors, the findings highlight the significant influence of psychological dimensions on decision-making. Management psychology plays a crucial role in shaping how individuals and groups respond to complexity and uncertainty. Adaptive leadership, emotional intelligence, and the ability to manage stress and conflict are essential competencies for effective decision-making in unstable environments. The results indicate that organizations that prioritize human-centered approaches, including leadership development and emotional awareness, are better equipped to navigate complexity and enhance decision quality. This aligns with previous studies emphasizing the importance of integrating psychological insights into organizational decision-making frameworks (Fadli et al., 2025; Hananto et al., 2024)

The role of conflict and collaboration further enriches the understanding of decision-making dynamics in complex systems. Contrary to traditional views that perceive conflict as a barrier, the findings suggest that conflict can serve as a catalyst for innovation and organizational learning when managed constructively. Open communication, collaborative problem-solving, and continuous training are critical in transforming conflict into productive outcomes. Moreover, the structure of communication networks within organizations significantly influences the flow of information and the efficiency of decision-making processes. Effective communication networks enable faster information exchange and better coordination, particularly in crisis situations (Hananto et al., 2024; Wen et al., 2025)

Technological factors, particularly digital systems and artificial intelligence (AI), also play a pivotal role in shaping decision-making processes. The findings indicate that digital information systems and management accounting systems (MAS) enhance data quality, reporting speed, and decision accuracy. Additionally, AI and machine learning technologies, such as LSTM and DQN, provide advanced decision support by simulating various scenarios and predicting potential outcomes. However, the effectiveness of these technologies is influenced by factors such as digital literacy, data quality, and organizational readiness. This highlights the need for a balanced approach that integrates technological capabilities with human judgment and organizational culture (Firman, 2024; Lahoti et al., 2025)

Importantly, the findings emphasize that data-driven decision-making should not be viewed as a replacement for human-centered approaches but rather as a complementary mechanism. While digital technologies offer significant advantages in terms of efficiency and predictive accuracy, they cannot fully capture the contextual and emotional dimensions of decision-making. Therefore, organizations must adopt hybrid decision-making models that combine technological tools with human insight and adaptive leadership. This integrative approach ensures that decisions are not only data-informed but also contextually relevant and socially acceptable (Wijiati et al., 2025; Firman, 2024)

The integration of communication network analysis further strengthens the proposed model by highlighting the importance of information flow in decision-making processes. The findings demonstrate that hierarchical and functional communication structures significantly influence how information is distributed and utilized within organizations. In complex environments, efficient communication networks enable organizations to respond quickly to changes and coordinate actions effectively. This is particularly important in crisis situations, where timely and accurate information is critical for decision-making. Consequently, organizations must invest in developing robust communication infrastructures and fostering a culture of transparency and collaboration (Wen et al., 2025; Tsai, 2025)

Overall, the discussion of findings supports the development of an integrative model of decision-making that captures the multidimensional nature of organizational complexity. The model emphasizes the interplay between adaptive systems, nonlinear dynamics, systemic feedback, psychological factors, social interactions, and technological capabilities. By integrating these dimensions, the model provides a comprehensive framework for understanding and managing decision-making in unstable work systems. This approach addresses the limitations of existing models, which often focus on isolated aspects of decision-making, and offers a more holistic and practical perspective (Sánchez-García et al., 2022; Lahoti et al., 2025)

In relation to the research objective, the findings clearly demonstrate that an integrative approach is essential for improving decision-making effectiveness in complex organizational systems. The proposed model not only enhances theoretical understanding but also provides practical guidance for organizations in managing uncertainty and instability. By adopting flexible structures, leveraging technological tools, and prioritizing human-centered leadership, organizations can enhance their resilience and adaptability. Ultimately, this study contributes to the advancement of organizational management by offering a comprehensive and context-sensitive framework for decision-making in the era of complexity (Tsai, 2025; Sánchez-García et al., 2022)

CONCLUSION

In conclusion, this study successfully achieves its objective of developing an integrative model of decision-making in complex and unstable organizational systems by synthesizing perspectives from complexity theory, system dynamics, management psychology, and digital technologies. The findings demonstrate that decision-making is inherently nonlinear, adaptive, and multidimensional, emerging from the interaction of structural, human, and technological factors rather than following a purely rational-linear process. The proposed integrative model highlights the importance of combining adaptive organizational structures, feedback-based system thinking, psychologically informed leadership, and data-driven technologies to enhance decision quality and organizational resilience. Furthermore, the study confirms that effective decision-making in unstable environments requires a hybrid approach that balances technological capabilities with human judgment and social dynamics. Thus, this research contributes both theoretically and practically by offering a comprehensive framework that enables organizations to navigate uncertainty, improve adaptability, and sustain performance in increasingly complex environments.

IMPLICATIONS

The implications of this study highlight the necessity for organizations to redesign their decision-making frameworks by adopting a holistic and integrative approach that combines adaptive structures, system-based thinking, human-centered leadership, and digital technologies. Practically, organizations are encouraged to move beyond rigid hierarchical models toward more flexible and decentralized systems that enable rapid response and continuous learning in unstable environments. The integration of system dynamics tools, such as feedback mechanisms and causal mapping, can support more informed and anticipatory decisions, while the adoption of AI and data-driven systems can enhance accuracy and efficiency when aligned with human judgment. Additionally, leaders must develop emotional intelligence and adaptive capabilities to manage uncertainty, conflict, and collaboration effectively. From a policy and managerial perspective, this study implies that sustainable organizational performance in complex

environments depends on the ability to balance technological innovation with social and psychological dimensions, thereby fostering resilience, innovation, and long-term adaptability.

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