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# Three Decades of Management System Evolution Research: A Bibliometric and Science Mapping Analysis

**Shahrouz Mahdavi[1]*, Elaheh Fallah[1]**

1. Department of Systems Management, Sharif University of Technology, Tehran, Iran

## Abstract

This study aimed to map the intellectual, thematic, and conceptual evolution of management system evolution research over three decades and to develop an interpretive framework explaining how management systems have shifted from control-oriented structures toward adaptive, digital, and knowledge-based organizational configurations. The study used a bibliometric and qualitative interpretive design. In the bibliometric phase, documents published between 1994 and 2024 were retrieved from Scopus and Web of Science using keywords related to management systems, organizational evolution, adaptive systems, digital transformation, dynamic capabilities, and management innovation. After screening and duplicate removal, a final sample of 1,312 records was analyzed through performance analysis, co-citation analysis, bibliographic coupling, keyword co-occurrence, thematic evolution, and science mapping using Bibliometrix and VOSviewer. In the qualitative phase, semi-structured interviews were conducted with 24 senior managers, organizational consultants, and academic experts in Tehran. Interviews continued until theoretical saturation and were analyzed using thematic analysis in NVivo. The bibliometric results showed three major evolutionary periods: the efficiency and control period, the strategic renewal and capability-building period, and the digital-adaptive systems period. Science mapping identified five dominant clusters: strategic management systems, learning and knowledge-based systems, dynamic capabilities, digital transformation, and adaptive governance. The qualitative findings produced four main categories: movement from hierarchical control to adaptive coordination, integration of digital intelligence into management systems, capability-based renewal, and tension between standardization and contextual flexibility. Management system evolution research has moved from structural and efficiency-centered assumptions toward systemic, dynamic, and digitally mediated perspectives. The proposed framework suggests that future management systems must combine strategic coherence, adaptive capability, data-driven intelligence, and human-centered governance.

**Keywords:** management system evolution; bibliometric analysis; science mapping; adaptive management; digital transformation; dynamic capabilities; organizational systems

**✉ *CORRESPONDING AUTHOR'S EMAIL**

shahrouz.mahdavi.sys@gmail.com

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## 1. Introduction

Management systems have undergone a substantial conceptual transformation over the past three decades. Earlier views of management systems were largely rooted in principles of planning, formalization, coordination, measurement, and managerial control. In this tradition, organizations were often conceptualized as relatively stable arrangements in which managerial systems translated strategic objectives into operational routines, performance indicators, reporting mechanisms, and accountability structures. Such assumptions were consistent with industrial-era organizational designs, where efficiency, role clarity, process standardization, and hierarchical coordination were regarded as central conditions for organizational performance. However, the increasing volatility of markets, acceleration of technological change, globalization of value chains, and emergence of knowledge-intensive forms of work have gradually challenged these assumptions. Management systems are no longer viewed merely as instruments of control; they are increasingly understood as adaptive socio-technical

architectures through which organizations sense environmental change, integrate knowledge, allocate attention, renew capabilities, and coordinate action under uncertainty.

The evolution of management system research reflects broader shifts in management and organization theory. During the 1990s, influential theories of organizational learning, strategic capabilities, and knowledge-based competition redirected scholarly attention from static structures to dynamic processes. March's distinction between exploration and exploitation provided a foundational language for understanding the tension between refinement of existing routines and experimentation with new possibilities (March, 1991). Similarly, the dynamic capabilities perspective argued that competitive advantage in changing environments depends not only on existing resources but also on the ability to integrate, build, and reconfigure internal and external competences (Teece et al., 1997). These contributions expanded the meaning of management systems by positioning them as mechanisms through which organizations continuously adjust their resource base, learning routines, and strategic responses. The intellectual movement from stability to adaptation is therefore one of the defining trajectories of management system evolution research.

A second trajectory concerns the rise of performance management, quality management, and strategic control systems. Throughout the 1990s and early 2000s, management systems were frequently examined through the lenses of total quality management, balanced scorecards, business process reengineering, enterprise resource planning, and integrated performance measurement. These approaches emphasized alignment between strategy and operations, the codification of processes, continuous improvement, and the use of metrics to guide managerial decision-making. Although these systems improved organizational visibility and accountability, later research increasingly questioned whether excessive formalization could reduce experimentation, local problem-solving, and organizational agility. As organizations moved into more uncertain and digitally mediated environments, scholars began to examine the paradoxical role of management systems: they must stabilize organizational action while also enabling adaptation, innovation, and renewal.

A third major shift is associated with management innovation and organizational ambidexterity. Management innovation refers to the invention and implementation of new management practices, processes, structures, or techniques intended to advance organizational goals (Birkinshaw et al., 2008). This concept is important because it treats management systems themselves as objects of innovation rather than neutral administrative tools. In parallel, the literature on organizational ambidexterity emphasized the need to balance alignment and adaptability, exploitation and exploration, efficiency and flexibility (Raisch & Birkinshaw, 2008). From this perspective, management system evolution is not a linear movement from bureaucracy to flexibility; rather, it is a continuing effort to design organizational arrangements that can support discipline and experimentation simultaneously. This ambidextrous interpretation is particularly relevant for contemporary organizations that must maintain operational reliability while responding to technological disruption, new stakeholder expectations, and ecosystem-level interdependence.

More recently, digital transformation has become a central force reshaping management systems. Digital technologies such as artificial intelligence, cloud computing, platform architectures, blockchain, big data analytics, and automation have changed how organizations collect information, coordinate workflows, make decisions, and interact with stakeholders. Digital transformation research conceptualizes technological change not simply as technology adoption but as a strategic process that alters value creation paths, organizational structures, routines, and capabilities (Vial, 2019). In this context, management systems increasingly operate as data-intensive

and algorithmically supported systems. Dashboards, predictive analytics, real-time monitoring, digital platforms, and AI-assisted decision tools are transforming the temporal rhythm of management, shifting organizations from periodic review cycles toward continuous sensing and rapid response. Warner and Wäger's work on digital transformation also connects digital change to dynamic capabilities, suggesting that digital renewal depends on an organization's ability to build sensing, seizing, and reconfiguring capabilities over time (Warner & Wäger, 2019).

The ecosystem perspective has further broadened the study of management systems. Contemporary organizations increasingly operate within interdependent networks of suppliers, customers, regulators, technology providers, platforms, and institutional actors. Adner conceptualized ecosystems as structures of interdependent actors whose alignment is necessary for value creation (Adner, 2017). This view has direct implications for management system research because the boundaries of management are no longer confined to the formal organization. Management systems must now coordinate across organizational borders, manage complementarities, govern partnerships, and respond to ecosystem-level uncertainty. As a result, the unit of analysis in management system evolution has expanded from the internal administrative system to broader configurations of interorganizational governance, digital infrastructure, and stakeholder coordination.

Despite the growth of this literature, the field remains conceptually fragmented. Research on management system evolution is distributed across strategy, organization studies, information systems, operations management, innovation management, knowledge management, quality management, and digital transformation. Each stream uses different concepts and methods, creating a dispersed intellectual structure. Bibliometric and science mapping methods are especially useful in such contexts because they allow researchers to identify publication trends, influential authors, core journals, intellectual foundations, thematic clusters, and emerging research fronts. Donthu et al. describe bibliometric analysis as a useful method for mapping large volumes of scientific literature, while Zupic and Čater argue that bibliometric methods can complement traditional reviews in management and organization research by making field structures more transparent and reproducible (Donthu et al., 2021; Zupic & Čater, 2015).

Science mapping adds a further analytical layer by visualizing the relationships among documents, authors, keywords, journals, and conceptual themes. Tools such as Bibliometrix and VOSviewer have become widely used for this purpose. Bibliometrix provides an R-based workflow for comprehensive science mapping, while VOSviewer supports the construction and visualization of bibliometric networks such as co-authorship, co-citation, bibliographic coupling, and keyword co-occurrence maps (Aria & Cuccurullo, 2017; van Eck & Waltman, 2010). These tools make it possible to move beyond narrative description and examine the cognitive architecture of a research domain. In the case of management system evolution research, science mapping can show how early themes of control, quality, and performance have interacted with later themes of agility, learning, digital transformation, resilience, ambidexterity, and adaptive governance.

However, bibliometric maps alone cannot fully explain the practical meaning of the field's evolution. Quantitative science mapping can identify clusters and trends, but it does not capture how managers and organizational experts interpret the lived transformation of management systems. For this reason, the present study combines bibliometric analysis with a qualitative interview phase. The bibliometric component maps the field's scientific structure, whereas the interview component provides contextual interpretation from senior managers, consultants, and academic experts. This combination is appropriate because management system evolution is both

a scientific field and a practical organizational phenomenon. Its development is reflected in publications, citation networks, and keywords, but also in managerial experiences of shifting from formal control to adaptive coordination, from manual reporting to digital intelligence, and from stable planning systems to dynamic capability-based renewal.

Accordingly, this study seeks to answer the following questions: What are the major publication trends and intellectual foundations of management system evolution research over the past three decades? What thematic clusters and research fronts have shaped the field? How do experts interpret the practical transformation of management systems in contemporary organizations? By integrating bibliometric mapping and qualitative thematic analysis, the study contributes to the literature in three ways. First, it provides a systematic overview of the evolution of management system research from 1994 to 2024. Second, it identifies the intellectual and thematic architecture of the field through science mapping. Third, it develops a conceptual framework explaining management system evolution as a transition from control-centered systems to adaptive, digital, capability-based, and context-sensitive management architectures. Therefore, the aim of this study was to conduct a bibliometric and science mapping analysis of three decades of management system evolution research and to develop a qualitative interpretive framework explaining the field's major conceptual and practical transformations

## 2. Methods and Materials

This study used a bibliometric and qualitative interpretive design. The bibliometric phase was conducted to identify the scientific structure, publication trends, influential sources, intellectual foundations, and thematic evolution of management system evolution research from 1994 to 2024. The qualitative phase was conducted to deepen the interpretation of the bibliometric patterns through semi-structured interviews with experts familiar with organizational change, management systems, digital transformation, and strategic renewal. The use of a combined design was appropriate because bibliometric analysis provides a macro-level map of scientific production, whereas qualitative inquiry explains how the mapped themes are understood in managerial practice. Bibliometric analysis was guided by established recommendations for performance analysis and science mapping in business and management research (Donthu et al., 2021; Zupic & Čater, 2015).

In the bibliometric phase, data were retrieved from Scopus and Web of Science Core Collection because both databases are widely used multidisciplinary citation databases for scientific mapping. Scopus was selected because it is a curated abstract and citation database, and Web of Science was selected because of its long-standing citation indexing structure and editorial selection process. The search covered publications from January 1994 to December 2024. The search string combined terms related to management systems and organizational evolution, including "management system," "management systems," "organizational evolution," "management evolution," "adaptive management," "dynamic capabilities," "management innovation," "digital transformation," "organizational agility," "strategic renewal," "knowledge management system," and "performance management system." Searches were limited to peer-reviewed articles, reviews, and conference papers in business, management, decision sciences, information systems, and organization studies. Records were exported with full bibliographic information, abstracts, author keywords, cited references, source titles, affiliations, and citation counts.

The initial search produced 1,846 records. After removing duplicates, non-English records, editorials, book reviews, non-scholarly materials, and publications outside the thematic scope of management system evolution, 1,312 records were retained for final analysis. Screening followed a transparent review logic inspired by systematic review recommendations in management research and PRISMA-style reporting principles (Tranfield et al., 2003; Page et al., 2021). Inclusion criteria were: direct relevance to management systems, organizational adaptation, capability renewal, strategic control, digital management, or systemic transformation; publication between 1994 and 2024; and availability of complete bibliographic metadata. Exclusion criteria included purely technical information systems papers without managerial implications, sector-specific operational studies without conceptual relevance to management systems, and documents lacking sufficient bibliographic data.

Data analysis in the bibliometric phase included descriptive performance analysis, citation analysis, co-citation analysis, bibliographic coupling, keyword co-occurrence analysis, thematic evolution, and science mapping. Bibliometrix in R was used for descriptive statistics, thematic evolution, and conceptual structure analysis, while VOSviewer was used to visualize co-citation, bibliographic coupling, and keyword co-occurrence networks. Bibliometrix was selected because it offers an integrated R-based workflow for science mapping, and VOSviewer was selected because of its capacity to construct and visualize large bibliometric maps (Aria & Cuccurullo, 2017; van Eck & Waltman, 2010). Keywords were standardized by merging singular and plural forms, harmonizing spelling variants, and combining synonymous terms such as “digital transformation” and “digitalization” when conceptually appropriate. Network maps were interpreted based on cluster membership, node size, link strength, and thematic proximity.

The qualitative phase involved 24 participants from Tehran. Participants included 8 senior managers, 6 organizational development consultants, 5 university faculty members in management and organization studies, and 5 digital transformation or strategy experts. Purposeful sampling was used to select participants with direct expertise in management systems, organizational transformation, strategic planning, knowledge management, or digital change. Snowball sampling was also used to identify additional information-rich participants. Interviews continued until theoretical saturation, which was reached at the 21st interview; three additional interviews were conducted to confirm the stability and completeness of the categories. Participants had between 7 and 28 years of professional experience, and all had direct involvement in the design, evaluation, or transformation of management systems.

Data were collected through semi-structured interviews lasting between 45 and 75 minutes. The interview guide included questions on the historical transformation of management systems, the role of digital technologies, tensions between control and flexibility, the importance of dynamic capabilities, barriers to management system renewal, and the future direction of adaptive management systems. Sample questions included: “How have management systems changed in your organization or professional field over the past two decades?” “What role has digital transformation played in reshaping managerial coordination and decision-making?” and “What tensions do organizations face when they attempt to become more adaptive while maintaining control?” Interviews were recorded with participant consent, transcribed verbatim, anonymized, and imported into NVivo for coding.

The qualitative analysis followed thematic analysis. Braun and Clarke’s approach was used because it provides a flexible and systematic procedure for identifying, reviewing, defining, and reporting patterns within qualitative data (Braun & Clarke, 2006). The analysis proceeded through familiarization with transcripts, initial coding, searching for candidate themes, reviewing themes against the data, defining and naming final categories, and

writing the analytical narrative. Open coding was first used to identify meaningful units, followed by axial coding to connect related codes into subcategories. Finally, selective coding was used to construct the main interpretive categories. Credibility was strengthened through member checking with six participants, peer review by two management scholars, and comparison between the qualitative categories and bibliometric clusters. Dependability was supported through an audit trail documenting coding decisions, theme revisions, and category definitions.

Ethical considerations were observed throughout the qualitative phase. Participants were informed about the aim of the study, voluntary participation, confidentiality, and the right to withdraw at any stage. All names and organizational identifiers were removed from transcripts. Participants were coded as P1 to P24. Because the bibliometric phase used publicly available scholarly metadata and the qualitative phase involved professional interviews, the study presented minimal risk to participants.

## 3. Findings and Results

The bibliometric analysis showed that research on management system evolution increased gradually from 1994 to 2005, accelerated between 2006 and 2015, and expanded rapidly after 2016. The early period was dominated by themes such as quality management, performance measurement, strategic control, business process reengineering, and knowledge management systems. The middle period showed stronger attention to organizational learning, dynamic capabilities, innovation systems, ambidexterity, and strategic renewal. The most recent period was characterized by rapid growth in studies on digital transformation, agile management, platform-based coordination, data-driven decision-making, resilience, adaptive governance, and smart organizations. Citation analysis indicated that the intellectual foundation of the field was shaped by strategic management, organizational learning, dynamic capabilities, innovation management, and information systems research.

The science mapping results identified five dominant clusters. The first cluster, strategic control and performance systems, included studies on performance management, balanced scorecards, process control, quality systems, and strategic alignment. The second cluster, knowledge and learning systems, included research on organizational learning, knowledge management, absorptive capacity, and learning routines. The third cluster, dynamic capabilities and renewal, included studies on capability reconfiguration, strategic agility, ambidexterity, and organizational transformation. The fourth cluster, digital transformation and intelligent systems, included research on digital platforms, analytics, AI-supported decision-making, enterprise systems, and data-driven management. The fifth cluster, adaptive governance and ecosystem coordination, included studies on interorganizational networks, ecosystems, resilience, stakeholder governance, and adaptive organizational design. Together, these clusters suggest that management system evolution research has shifted from internal control mechanisms toward broader systems of adaptive coordination and digital intelligence.

The demographic characteristics of the qualitative participants showed a diverse expert sample. Among the 24 participants, 15 were male and 9 were female. In terms of age, 5 participants were between 30 and 39 years old, 11 were between 40 and 49 years old, and 8 were 50 years old or older. Regarding education, 6 participants held a master's degree and 18 held a doctoral degree. In terms of professional role, 8 participants were senior managers, 6 were organizational development consultants, 5 were university faculty members, and 5 were digital transformation or strategy experts. Professional experience ranged from 7 to 28 years; 7 participants had less than

10 years of experience, 10 had between 10 and 20 years, and 7 had more than 20 years. This composition provided a balanced view of academic, consulting, managerial, and digital transformation perspectives.

The first main category was **movement from hierarchical control to adaptive coordination**. Participants emphasized that traditional management systems were designed around hierarchy, formal authority, documentation, periodic reporting, and centralized decision-making. However, contemporary organizations increasingly require faster feedback loops, cross-functional coordination, and distributed decision authority. Participants did not reject control entirely; rather, they argued that control must be redesigned as enabling coordination instead of merely monitoring compliance. One senior manager stated, "In the past, our management system worked like a reporting machine. Every unit sent numbers upward, and decisions came downward. Today, this rhythm is too slow. The system must help people coordinate before problems become formal reports" (P4). Another participant explained, "The issue is not whether we need structure. We need structure, but it must be flexible enough to absorb uncertainty" (P11). This category corresponds with the bibliometric movement from performance control and quality systems toward agility, adaptation, and dynamic governance.

The second main category was **integration of digital intelligence into management systems**. Participants consistently described digital transformation as a central driver of management system evolution. Digital dashboards, enterprise systems, business intelligence platforms, AI-based analytics, and real-time data infrastructures were viewed as changing both the speed and quality of managerial decision-making. However, participants also warned that digitalization can reproduce old bureaucratic logics if organizations merely automate existing routines. One consultant noted, "Some organizations think digital transformation means turning every form into software. That is not evolution; it is bureaucracy with a screen" (P7). A digital strategy expert added, "The real change happens when data changes the decision cycle. Managers no longer wait for quarterly reports; they can see weak signals early and act faster" (P18). This category supports the bibliometric finding that digital transformation and intelligent systems have become a major research front in management system evolution.

The third main category was **capability-based renewal of management systems**. Participants argued that evolved management systems are not defined only by tools, procedures, or software, but by the organizational capabilities they enable. These include sensing environmental changes, learning from feedback, reallocating resources, redesigning processes, and mobilizing people around strategic priorities. Several participants referred to the importance of dynamic capabilities, even when they did not use the academic term explicitly. One academic participant stated, "A management system is valuable only when it increases the organization's capacity to learn and reconfigure itself. Otherwise, it becomes a ceremonial structure" (P15). Another participant observed, "The organizations that survived repeated crises were not necessarily the ones with the most detailed plans; they were the ones that could revise their plans without losing coherence" (P21). This theme aligns with the bibliometric cluster centered on dynamic capabilities, ambidexterity, and strategic renewal.

The fourth main category was **tension between standardization and contextual flexibility**. Participants described management system evolution as a continuous balancing act between the need for standard procedures and the need for local adaptation. Standardization was viewed as necessary for accountability, scalability, quality assurance, and organizational memory. At the same time, excessive standardization was seen as a barrier to creativity, responsiveness, and contextual problem-solving. One participant explained, "The same management template cannot work equally in a startup unit, a public organization, and a mature industrial company. The system must have a stable core but flexible edges" (P2). Another senior consultant stated, "Many failures happen because

organizations import fashionable systems without translating them into their own culture and capability level" (P9). This category indicates that management system evolution is not a simple replacement of traditional systems with agile or digital systems; it is a process of designing context-sensitive configurations.

The fifth integrative category was **human-centered governance in technologically mediated systems**. Although this category was less dominant than the previous four, it emerged as an important future-oriented theme. Participants argued that as management systems become more data-intensive and algorithmically supported, ethical judgment, participation, trust, and human interpretation become more important rather than less important. One participant stated, "Data can show patterns, but people still decide what matters. A management system without human judgment can become very efficient at doing the wrong thing" (P23). Another participant added, "Employees accept new systems when they feel the system helps them perform, not when they feel it only watches them" (P6). This category extends the bibliometric findings by suggesting that future research should connect management system evolution with responsible digital governance, employee agency, and ethical decision-making.

Overall, the findings indicate that management system evolution research has developed through three interrelated movements. First, the field has moved from control-centered systems to adaptive coordination systems. Second, it has moved from isolated managerial tools to integrated capability architectures. Third, it has moved from internal organizational design to digitally mediated and ecosystem-oriented governance. The qualitative findings reinforce the bibliometric maps by showing that practitioners experience these shifts as practical tensions: stability versus flexibility, standardization versus contextualization, data-driven decision-making versus human judgment, and short-term efficiency versus long-term renewal

## 4. Discussion and Conclusion

The purpose of this study was to map three decades of management system evolution research and to develop an interpretive framework explaining the transformation of management systems from control-oriented administrative structures toward adaptive, digital, and capability-based organizational systems. The findings showed that the field has evolved across three broad periods. The first period emphasized efficiency, quality, performance control, and formalized managerial procedures. The second period focused on learning, innovation, strategic renewal, and dynamic capabilities. The third period increasingly centers on digital transformation, adaptive governance, intelligent decision systems, agility, and ecosystem coordination. This pattern suggests that management system evolution is not merely a technical change in managerial tools but a deeper transformation in the logic of organizing.

The first major finding was the movement from hierarchical control to adaptive coordination. This result is consistent with the broader shift in organization theory from mechanistic assumptions toward adaptive and learning-based views of organization. Traditional management systems emphasized stability, formalization, and vertical accountability, which were appropriate for relatively predictable environments. However, as environmental complexity increased, organizations required systems capable of supporting faster learning, distributed decision-making, and cross-functional integration. This finding aligns with March's argument that organizations must balance exploitation and exploration, because excessive reliance on existing routines may reduce long-term adaptability (March, 1991). It also supports the dynamic capabilities view, which emphasizes

that organizations must reconfigure competences in response to changing environments (Teece et al., 1997). In this sense, management systems evolve when they become mechanisms for continuous adjustment rather than instruments of administrative control alone.

The second major finding concerned the integration of digital intelligence into management systems. Bibliometric clusters showed that digital transformation, analytics, enterprise systems, platform coordination, and AI-supported decision-making have become central themes in recent research. Interview participants similarly emphasized that digital technologies alter the rhythm of management by enabling real-time monitoring, predictive insight, and faster feedback. This finding is strongly aligned with Vial's conceptualization of digital transformation as a process in which digital technologies create disruptions that trigger strategic responses and reshape value creation paths (Vial, 2019). It also corresponds with Warner and Wäger's argument that digital transformation is an ongoing process of strategic renewal requiring dynamic capabilities (Warner & Wäger, 2019). However, the qualitative findings add an important caution: digitalization does not automatically produce management system evolution. If digital tools merely automate rigid routines, they may intensify bureaucracy rather than enable adaptation. Therefore, digital intelligence must be embedded in redesigned decision processes, participatory governance, and learning-oriented routines.

The third major finding was that evolved management systems are capability-based rather than tool-based. Participants repeatedly argued that management systems matter because of the capabilities they create: sensing, learning, coordinating, prioritizing, resource reallocation, and reconfiguration. This finding supports the dynamic capabilities literature, which views organizational advantage as dependent on the ability to integrate, build, and reconfigure resources under conditions of change (Teece et al., 1997). It also aligns with management innovation research, which treats management practices and systems as potential sources of organizational renewal (Birkinshaw et al., 2008). The implication is that the effectiveness of a management system cannot be evaluated only by its formal completeness, documentation, or technological sophistication. Instead, it should be assessed by whether it improves the organization's capacity to interpret change, mobilize knowledge, redesign routines, and act coherently in uncertain conditions.

The fourth major finding was the persistent tension between standardization and contextual flexibility. This finding is particularly important because it challenges simplistic narratives that present management system evolution as a complete movement away from structure toward flexibility. The participants emphasized that organizations still need standards, routines, metrics, and formal responsibilities. However, these elements must be designed in ways that allow local adaptation and contextual interpretation. This result aligns with organizational ambidexterity research, which argues that organizations must simultaneously pursue alignment and adaptation (Raisch & Birkinshaw, 2008). It also reflects the central paradox of contemporary management systems: they must create enough stability to coordinate collective action while remaining flexible enough to support innovation and responsiveness. A mature management system is therefore not one that eliminates control, but one that transforms control into enabling discipline.

The fifth major finding was the emergence of human-centered governance in technologically mediated management systems. Although the bibliometric analysis identified digital transformation and intelligent systems as a dominant cluster, the qualitative interviews showed that technological sophistication increases the importance of trust, interpretation, ethical judgment, and employee participation. This finding extends existing digital transformation research by emphasizing that management system evolution cannot be reduced to datafication or

automation. Algorithmic decision support may improve speed and pattern recognition, but it also raises issues of transparency, accountability, surveillance, and managerial responsibility. Therefore, future management systems must integrate digital intelligence with human-centered governance. This is consistent with broader discussions of digital transformation as an organizational and strategic phenomenon rather than a purely technical process (Vial, 2019).

The science mapping results also revealed that management system evolution research has become increasingly interdisciplinary. The field draws from strategic management, organization theory, information systems, operations management, knowledge management, innovation studies, and public administration. This interdisciplinarity is both a strength and a challenge. It allows the field to capture the complexity of modern management systems, but it also produces conceptual fragmentation. Similar concepts may appear under different labels, such as agility, resilience, adaptive capability, dynamic capability, transformation capacity, and organizational renewal. Bibliometric methods are useful in this context because they help identify hidden connections between dispersed literatures. As Donthu et al. and Zupic and Čater argue, bibliometric methods can clarify the structure of large and fragmented research domains by identifying influential works, thematic clusters, and research fronts (Donthu et al., 2021; Zupic & Čater, 2015).

The findings contribute to the literature by proposing an integrated interpretation of management system evolution. The proposed framework includes four interconnected dimensions: adaptive coordination, digital intelligence, capability-based renewal, and contextual governance. Adaptive coordination refers to the shift from vertical command systems to cross-functional, feedback-driven, and distributed forms of coordination. Digital intelligence refers to the incorporation of data, analytics, platforms, and AI-supported tools into managerial decision processes. Capability-based renewal refers to the ability of management systems to support sensing, learning, reconfiguration, and strategic renewal. Contextual governance refers to the balance between standardization and flexibility, ensuring that management systems remain aligned with organizational culture, sectoral conditions, and stakeholder expectations. Together, these dimensions explain why contemporary management systems cannot be designed as static administrative templates; they must function as evolving architectures that connect strategy, technology, people, and learning.

The study also has practical implications. Managers should evaluate their management systems not only in terms of compliance and reporting accuracy but also in terms of adaptability, learning capacity, decision speed, and strategic coherence. Digital transformation initiatives should not begin with software selection alone; they should begin with a diagnosis of decision processes, information flows, managerial routines, and organizational capabilities. Consultants and policymakers should avoid universal templates and instead design management systems that combine a stable core with flexible adaptation mechanisms. Organizations that operate in turbulent environments should pay particular attention to feedback loops, scenario thinking, cross-functional integration, and participatory governance. These elements can prevent management systems from becoming rigid bureaucratic structures.

In conclusion, the discussion shows that management system evolution is best understood as a transition from administrative control to adaptive capability. The field's intellectual development reflects the changing nature of organizations themselves: from relatively stable hierarchies to dynamic, digital, and ecosystem-embedded systems. The challenge for future research is to develop more precise theories and empirical measures that explain

how management systems enable or constrain adaptation. The challenge for practice is to design systems that preserve strategic discipline while enabling experimentation, learning, and responsible digital transformation.

## Ethical Considerations

All procedures performed in this study were under the ethical standards.

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## Conflict of Interest

The authors report no conflict of interest.

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