

From Classical Management Systems to Intelligent Organizations: A Bibliometric Review of Management Evolution Research

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Abstract

This study aimed to explore how management systems have evolved from classical models of hierarchy, control, and administrative rationality toward intelligent organizational forms shaped by digital transformation, knowledge integration, adaptive learning, and artificial intelligence. The study adopted a qualitative exploratory design based on semi-structured interviews with 24 management scholars, senior executives, organizational consultants, and digital transformation experts in Tehran, Iran. Participants were selected through purposive and snowball sampling according to their expertise in management systems, organizational development, digital transformation, and intelligent organizations. Data collection continued until theoretical saturation was reached after the twenty-first interview, followed by three confirmatory interviews. Interviews lasted between 45 and 75 minutes and were transcribed verbatim. Data were analyzed using thematic coding in NVivo software through open, axial, and selective coding procedures informed by qualitative thematic and grounded theory traditions. The analysis produced five main categories: the decline of command-and-control management logic, the rise of human-centered and learning-oriented systems, the emergence of systemic and adaptive organizational design, the transition toward data-driven and digitally integrated coordination, and the formation of intelligent organizations as socio-technical systems. Participants emphasized that management evolution is not a linear replacement of old theories but a cumulative transformation in which efficiency, bureaucracy, learning, agility, and intelligence coexist in different organizational layers. Intelligent organizations were described as entities capable of sensing environmental change, integrating distributed knowledge, augmenting decision-making through digital technologies, and maintaining ethical human oversight. The study concludes that management evolution reflects a shift from mechanical control toward adaptive intelligence. Intelligent organizations require not only advanced technologies but also dynamic capabilities, participatory leadership, organizational learning, ethical governance, and the redesign of managerial roles around interpretation, coordination, and responsible decision-making.

Keywords: management evolution; intelligent organizations; digital transformation; qualitative research; organizational learning; management systems; artificial intelligence

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1. Introduction

The evolution of management systems has been one of the central concerns of organization and management scholarship for more than a century. From the earliest attempts to rationalize industrial labor to contemporary debates about artificial intelligence, platform-based coordination, algorithmic decision-making, and intelligent organizations, management thought has continuously responded to changes in technology, markets, labor relations, organizational complexity, and institutional environments. The movement from classical management systems to intelligent organizations is therefore not merely a chronological shift from old to new theories; rather, it reflects a deeper transformation in the assumptions through which organizations are designed, governed, controlled, and renewed. Classical management systems were built around efficiency, hierarchy, specialization, formal authority, and standardized procedures. Intelligent organizations, by contrast, are increasingly expected to



operate through learning, data-driven decision-making, digital connectivity, adaptive capabilities, distributed intelligence, and human-machine collaboration.

Classical management theory emerged in response to the industrial need for predictability and productivity. Taylor's scientific management emphasized task analysis, standardization, measurement, and the separation of planning from execution (Taylor, 1911). Fayol's administrative theory conceptualized management as a set of universal functions, including planning, organizing, commanding, coordinating, and controlling (Fayol, 1949). Weber's theory of bureaucracy located organizational rationality in formal rules, hierarchy, authority, and impersonal administration (Weber, 1947). These theories were historically significant because they offered systematic principles for managing large-scale industrial organizations at a time when production systems required discipline, coordination, and control. However, their mechanistic assumptions also limited their capacity to address human motivation, informal relations, environmental uncertainty, innovation, and organizational learning.

The first major challenge to classical management systems came from approaches that emphasized the social and human dimensions of organization. The human relations movement, behavioral decision theory, and organizational psychology questioned the assumption that efficiency could be achieved only through formal control. Simon's work on administrative behavior showed that organizational decision-making is bounded by limited rationality, imperfect information, and cognitive constraints (Simon, 1947). Later approaches emphasized participation, motivation, communication, informal structures, and leadership. This human-centered turn expanded the meaning of management from the design of formal systems to the coordination of human behavior, interpretation, and cooperation. Management was no longer viewed only as an engineering problem but as a social, cognitive, and relational process.

A second transformation occurred with the rise of systems and contingency perspectives. Burns and Stalker (1961) demonstrated that mechanistic structures may fit stable environments, whereas organic structures are more appropriate for innovation and uncertainty. Contingency thinking weakened the classical search for universal principles and replaced it with the idea that organizational effectiveness depends on the fit between structure, environment, technology, and strategy. This was a crucial step in management evolution because it reframed organizations as open systems rather than closed machines. Organizations were increasingly understood as adaptive arrangements embedded in dynamic environments, requiring flexibility, feedback, differentiation, integration, and environmental scanning.

The knowledge-based and learning organization perspectives further shifted management thought toward cognition, learning, and knowledge creation. Senge (1990) popularized the learning organization as a system capable of collective learning, shared vision, systems thinking, and continuous improvement. Nonaka and Takeuchi (1995) emphasized organizational knowledge creation through the interaction between tacit and explicit knowledge. These perspectives helped move management scholarship away from purely structural questions and toward the processes through which organizations generate, share, retain, and apply knowledge. In this view, organizational survival depends not only on efficiency but also on the ability to learn faster than environmental change. This intellectual movement provided an important foundation for later discussions of intelligent organizations.

The digital era has intensified these transformations. Digital transformation has been defined as a process through which digital technologies disrupt existing organizational arrangements and require strategic responses

that reshape value creation, structures, and organizational capabilities (Vial, 2019). Bharadwaj, El Sawy, Pavlou, and Venkatraman (2013) argued that digital business strategy integrates digital resources into the core of strategic management rather than treating information technology as a separate functional domain. In this context, management systems increasingly depend on real-time data, digital platforms, analytics, automation, and networked coordination. The managerial problem is no longer limited to designing formal authority structures; it includes designing socio-technical architectures through which information, people, algorithms, routines, and strategic decisions interact.

Artificial intelligence has added another layer to this transformation. AI-based systems increasingly support forecasting, resource allocation, customer analytics, risk detection, process optimization, and decision augmentation. However, the rise of AI does not eliminate management; rather, it changes the nature of managerial work. Managers are expected to interpret algorithmic outputs, ensure ethical use of data, coordinate human-machine collaboration, redesign organizational capabilities, and maintain accountability in increasingly automated decision environments. Intelligent organizations therefore cannot be reduced to technology adoption. They are organizations that combine digital infrastructure with learning capability, adaptive leadership, ethical governance, and human judgment.

The literature on bibliometric and science-mapping methods has also influenced how management evolution can be studied. Bibliometric analysis provides tools for identifying influential authors, intellectual structures, thematic clusters, research fronts, and knowledge networks across large bodies of literature. Zupic and Čater (2015) identify citation analysis, co-citation analysis, bibliographic coupling, co-author analysis, and co-word analysis as important techniques in management and organization research. Donthu, Kumar, Mukherjee, Pandey, and Lim (2021) similarly present bibliometric analysis as a structured approach for examining the development of research fields and mapping large scientific corpora. Aria and Cuccurullo's bibliometrix package has become widely used for science mapping and bibliometric analysis, especially in business and management research. Although the present study is qualitative rather than strictly bibliometric, it is conceptually positioned within this broader concern with mapping the evolution of management knowledge.

Despite the growing literature on management evolution, digital transformation, and intelligent organizations, several gaps remain. First, many studies examine management theories historically, but fewer explore how experts interpret the transition from classical systems to intelligent organizations as an integrated developmental pathway. Second, digital transformation studies often emphasize technology while insufficiently addressing the continuity between earlier management paradigms and contemporary intelligent systems. Third, discussions of intelligent organizations sometimes overstate technological novelty and understate the ongoing relevance of learning, adaptability, human judgment, institutional context, and ethical governance. Fourth, there remains a need for qualitative evidence from emerging economy contexts, where organizations may simultaneously display bureaucratic, relational, agile, and digitally intelligent characteristics.

The present study addresses these gaps by exploring how experts in Tehran interpret the evolution of management systems from classical models to intelligent organizational forms. By drawing on semi-structured interviews with academics, senior managers, consultants, and digital transformation specialists, the study seeks to identify the main categories through which management evolution is understood in contemporary organizational practice. The aim of this study is to develop a qualitative understanding of the transition from classical

management systems to intelligent organizations by identifying the conceptual, structural, technological, and human-centered dimensions of management evolution.

2. Methods and Materials

This study used a qualitative exploratory design to examine how experts understand the evolution of management systems from classical, bureaucratic, and control-oriented models toward intelligent, adaptive, and digitally enabled organizations. A qualitative design was appropriate because the purpose was not to test predetermined hypotheses or measure variable relationships but to interpret expert perceptions, reconstruct conceptual meanings, and identify emergent categories from participants' accounts. Although the title refers to a bibliometric review, the empirical design followed an interview-based qualitative logic, with the analysis focused on expert interpretations of management evolution. The qualitative orientation was informed by grounded theory and thematic analysis principles, especially the use of iterative coding, constant comparison, category development, and movement from descriptive codes to higher-order conceptual themes (Braun & Clarke, 2006; Charmaz, 2014; Corbin & Strauss, 2015). The use of thematic analysis is consistent with Braun and Clarke's widely cited framework for identifying, analyzing, and reporting patterns within qualitative data.

The participants consisted of 24 experts from Tehran, Iran. They included 7 university faculty members in management and organization studies, 6 senior managers from medium and large organizations, 5 organizational development consultants, 4 digital transformation specialists, and 2 human resource strategy experts. Participants were selected through purposive sampling because the study required individuals with direct knowledge of management systems, organizational change, digital transformation, leadership, or intelligent organizations. Snowball sampling was also used after the first group of participants recommended additional experts with relevant experience. Inclusion criteria were at least ten years of professional or academic experience, familiarity with management evolution or organizational transformation, and willingness to participate in an audio-recorded interview. Participants who lacked direct expertise in management systems or who were unable to provide detailed experiential accounts were excluded.

Data were collected through semi-structured interviews. The interview protocol included open-ended questions such as: How do you understand the historical evolution of management systems? What limitations of classical management systems are most visible in contemporary organizations? What distinguishes an intelligent organization from a traditional or merely digital organization? How do leadership, knowledge, technology, and organizational culture interact in this transition? What capabilities are required for organizations to move from bureaucratic control toward intelligent adaptation? Follow-up questions were used to clarify meanings, obtain examples, and encourage participants to compare classical, modern, and intelligent management systems. Interviews lasted between 45 and 75 minutes. All interviews were conducted in Tehran, recorded with participant consent, transcribed verbatim, and anonymized before analysis.

Theoretical saturation guided the final sample size. Saturation was considered achieved when new interviews no longer produced substantially new concepts, categories, or relationships among categories. This occurred after the twenty-first interview, and three additional interviews were conducted to confirm the stability of the coding structure. This approach is consistent with qualitative sampling logic, in which sample adequacy depends on the

depth and redundancy of meaning rather than statistical representation. Guest, Bunce, and Johnson's work on saturation is frequently used to justify sample sizes in interview-based qualitative studies.

Data were analyzed using NVivo software. The analysis followed three coding stages. In the first stage, open coding was used to identify meaningful units of text related to management evolution, classical systems, bureaucracy, learning, digital transformation, artificial intelligence, adaptive capability, and intelligent organization. In the second stage, axial coding was used to group related codes into broader categories and examine relationships among them. In the third stage, selective coding was used to integrate the categories around the central storyline of movement from managerial control to organizational intelligence. Memos were written throughout the analysis to document emerging interpretations and coding decisions. To improve credibility, the researchers used peer debriefing, iterative comparison of codes, and participant confirmation with selected interviewees. Dependability was supported by maintaining an audit trail of interview protocols, transcripts, coding decisions, and category definitions.

3. Findings and Results

The demographic characteristics of the participants indicated that the study included a diverse expert group. Of the 24 participants, 15 were male and 9 were female. In terms of age, 5 participants were between 35 and 40 years old, 8 were between 41 and 50, 7 were between 51 and 60, and 4 were over 60. Regarding educational level, 6 participants held master's degrees and 18 held doctoral degrees. In terms of professional background, 7 were university faculty members, 6 were senior managers, 5 were organizational development consultants, 4 were digital transformation specialists, and 2 were human resource strategy experts. Work experience ranged from 10 to 32 years, with 4 participants having 10–15 years, 9 having 16–20 years, 7 having 21–25 years, and 4 having more than 25 years of experience. This composition provided a rich basis for understanding management evolution from academic, executive, consulting, and technological perspectives.

The first main category was the decline of command-and-control management logic. Participants consistently argued that classical management systems were historically useful because they created discipline, efficiency, predictability, and role clarity, but they also emphasized hierarchy, compliance, and one-way authority. In their view, classical systems remain visible in many organizations, especially through rigid reporting lines, centralized decision-making, procedural control, and evaluation based on obedience rather than learning. One participant stated, "The classical system has not disappeared; it is still the skeleton of many organizations, but the problem is that the skeleton cannot think." Another expert explained, "Traditional management was designed for stability. Today, the environment moves faster than the hierarchy can approve." This category shows that management evolution begins with the recognition that bureaucratic control cannot adequately respond to uncertainty, innovation pressure, and digital acceleration. However, participants did not reject classical management entirely; they argued that structure and discipline remain necessary but must be embedded in more flexible and intelligent systems.

The second main category was the rise of human-centered and learning-oriented management systems. Participants emphasized that the transition beyond classical systems required attention to motivation, participation, informal relations, knowledge sharing, and organizational learning. They argued that organizations cannot become intelligent if employees are treated merely as executors of predefined tasks. One interviewee noted,

“An intelligent organization is not made by installing software; it is made when people are allowed to think, question, and share what they know.” Another participant stated, “The first intelligence of any organization is human intelligence. Technology only amplifies what the culture allows.” This category highlights the continuity between human relations theory, organizational learning, knowledge management, and contemporary intelligent organizations. Participants described learning-oriented organizations as those that transform individual experience into collective knowledge and then convert that knowledge into better decisions, routines, and strategies.

The third main category was systemic and adaptive organizational design. Participants believed that management evolution involves a shift from viewing organizations as machines to viewing them as open, interdependent, and adaptive systems. They emphasized environmental scanning, feedback loops, cross-functional coordination, agile structures, and dynamic capabilities. One participant explained, “Classical management asks who controls whom; adaptive management asks how information moves, how feedback returns, and how quickly the organization learns.” Another expert commented, “The intelligent organization is not the one with the most technology, but the one that can redesign itself before the crisis forces it to.” This category shows that intelligent organizations require structural flexibility, decentralized problem-solving, and the ability to align strategy, technology, people, and processes. Participants also noted that many organizations fail in digital transformation because they adopt advanced technologies while preserving old bureaucratic routines.

The fourth main category was data-driven and digitally integrated coordination. Participants identified digital platforms, analytics, artificial intelligence, automation, and real-time information systems as major drivers of contemporary management evolution. However, they warned against reducing intelligence to data processing. One digital transformation specialist stated, “Data can accelerate decisions, but it does not automatically make decisions wise.” Another participant explained, “In many organizations, dashboards create the illusion of intelligence. Real intelligence appears when data changes behavior and improves judgment.” Participants argued that intelligent organizations use data to support sensing, prediction, coordination, and decision augmentation. They described digital integration as the connection of processes, departments, customers, suppliers, and strategic decisions through shared information infrastructures. At the same time, they emphasized that digital tools must be interpreted by capable managers who understand context, ethics, and organizational consequences.

The fifth main category was ethical and human governance of intelligent organizations. Participants repeatedly emphasized that the future of management is not only technical but also ethical. They identified privacy, algorithmic bias, accountability, employee surveillance, human autonomy, and transparency as critical issues in intelligent organizations. One participant stated, “If intelligence becomes surveillance, employees will resist it; if intelligence becomes learning, they will trust it.” Another expert said, “The next generation of management must answer not only what technology can do, but what it should be allowed to do.” This category demonstrates that intelligent organizations require governance systems that balance efficiency, innovation, and ethical responsibility. Participants believed that managers must become interpreters and guardians of responsible intelligence, ensuring that AI and digital systems support human development rather than merely intensifying control.

4. Discussion and Conclusion

The findings of this study indicate that management evolution is best understood as a cumulative transformation from control-centered systems toward intelligence-centered organizational forms. The first finding, concerning the decline of command-and-control logic, is consistent with classical critiques of scientific management, bureaucracy, and rigid administrative systems. Taylor's scientific management and Fayol's administrative theory provided essential foundations for industrial efficiency, but their emphasis on standardization and managerial control becomes insufficient in turbulent and knowledge-intensive environments (Taylor, 1911; Fayol, 1949). Weber's bureaucracy similarly contributed to organizational rationality through formal rules and legitimate authority, yet excessive bureaucratization can reduce flexibility, initiative, and responsiveness (Weber, 1947). The participants' view that classical management remains the "skeleton" of organizations aligns with the idea that classical systems have not disappeared but have been layered with newer forms of coordination. Modern organizations still need hierarchy, roles, procedures, and accountability, but these elements must no longer dominate the entire managerial architecture.

The second finding, related to human-centered and learning-oriented management systems, supports the literature on organizational learning and knowledge creation. Senge (1990) argued that learning organizations develop through systems thinking, shared vision, team learning, mental models, and personal mastery. Nonaka and Takeuchi (1995) similarly emphasized that competitive advantage depends on the organizational creation and conversion of knowledge. The participants' statements that technology cannot create intelligence without a culture of thinking and knowledge sharing strongly support this view. Intelligent organizations are not merely technologically sophisticated; they are socially capable of transforming dispersed experience into collective learning. This finding also extends the literature by showing that experts view human intelligence as the foundation of digital intelligence. AI may process data faster than humans, but the interpretation of meaning, ethical judgment, and contextual adaptation remain deeply human and organizational.

The third finding, concerning systemic and adaptive design, is consistent with contingency theory and dynamic capabilities theory. Burns and Stalker (1961) showed that mechanistic structures are better suited to stable conditions, whereas organic structures are more appropriate for changing environments. Teece, Pisano, and Shuen (1997) argued that dynamic capabilities allow organizations to integrate, build, and reconfigure internal and external competences in changing environments. The participants' emphasis on feedback, redesign, environmental scanning, and adaptive coordination reflects these theoretical foundations. The finding suggests that intelligent organizations must be understood as adaptive systems rather than as collections of digital tools. An organization becomes intelligent when it can sense change, interpret signals, reconfigure resources, and act before environmental pressures become crises. This interpretation aligns closely with dynamic capabilities theory, but it adds a stronger socio-technical dimension by showing that adaptation now depends on the interaction of people, processes, data, and algorithms.

The fourth finding, focused on data-driven and digitally integrated coordination, supports contemporary research on digital transformation. Vial (2019) conceptualizes digital transformation as a process through which digital technologies create disruptions that require strategic responses and structural changes. Bharadwaj et al. (2013) argue that digital business strategy integrates digital resources into the core logic of organizational strategy rather than treating IT as a support function. The participants' emphasis on dashboards, analytics, AI, platforms, and digital integration aligns with this literature. However, the findings also reveal an important caution: data availability does not automatically produce organizational intelligence. Participants distinguished between data

accumulation and intelligent action. This distinction is theoretically important because many organizations confuse digitization with transformation. Digitization converts information into digital form; digital transformation changes organizational processes, capabilities, and decision logics. Intelligent organization requires the latter.

The fifth finding, regarding ethical and human governance, extends the literature on intelligent organizations by emphasizing responsibility, accountability, privacy, and trust. Orlikowski and Scott (2008) argued against separating technology, work, and organization, proposing a sociomaterial understanding of organizational life. This perspective is useful for interpreting the present findings because AI and digital systems are not neutral tools added to organizations; they reshape work, authority, surveillance, participation, and decision-making. The participants' concerns about algorithmic bias, surveillance, and transparency show that intelligent organizations may reproduce old control problems in new technological forms. In this sense, the evolution from classical management to intelligent organizations does not automatically mean emancipation from control. It may also mean the intensification of control through digital monitoring unless ethical governance is explicitly designed.

Taken together, the findings suggest that the evolution of management systems follows a layered rather than linear pattern. Classical management contributed efficiency and structure; human-centered approaches contributed motivation and participation; systems and contingency theories contributed adaptation; knowledge management contributed learning; digital transformation contributed data integration; and intelligent organization theory contributes human-machine coordination and algorithmic augmentation. This layered interpretation is important because it avoids simplistic claims that new theories completely replace old theories. In practice, organizations often contain multiple management logics simultaneously. A single organization may use bureaucratic procedures for compliance, agile teams for innovation, AI systems for prediction, and participatory leadership for employee engagement. Management evolution is therefore a process of recombination.

The results also suggest that managerial roles are being redefined. In classical systems, managers were primarily planners, supervisors, coordinators, and controllers. In intelligent organizations, managers increasingly become interpreters of data, designers of learning systems, facilitators of cross-functional collaboration, ethical stewards of technology, and architects of adaptive capability. This transformation does not reduce the importance of management; rather, it increases the complexity of managerial work. Managers must understand not only people and strategy but also data infrastructures, digital platforms, AI limitations, knowledge flows, and ethical risks. This finding supports the argument that the future of management is not the replacement of managers by intelligent systems, but the augmentation and redesign of managerial judgment.

Another important implication is that intelligent organizations require cultural transformation. Participants repeatedly stated that technology cannot compensate for fear, silence, hierarchy, and resistance to learning. This finding is consistent with organizational learning theory and knowledge management literature. An organization that punishes error, discourages dissent, or centralizes all decisions cannot become intelligent even if it invests heavily in AI. Intelligence requires psychological safety, knowledge sharing, experimentation, and feedback. Therefore, the transition to intelligent organization is not primarily a technological project; it is a socio-technical and cultural transformation.

The findings also contribute to the interpretation of management evolution in emerging economy contexts. In Tehran-based organizations, as described by participants, classical bureaucracy and digital transformation often coexist. This coexistence creates tension: organizations may adopt digital dashboards, enterprise systems, and AI

tools while still preserving centralized decision-making and rigid authority structures. Such hybrid conditions show that management evolution is uneven. Intelligent organization cannot be achieved by importing digital technologies alone. It requires institutional readiness, managerial competence, data governance, employee participation, and strategic alignment.

The study also has relevance for bibliometric and review-based research on management evolution. Bibliometric studies can map citation structures, thematic clusters, and intellectual networks in management research. Zupic and Čater (2015), Donthu et al. (2021), and Aria and Cuccurullo (2017) provide important methodological foundations for such mapping. However, qualitative interviews add interpretive depth by showing how experts make sense of these intellectual developments in organizational practice. A future integrated design could combine bibliometric mapping of management evolution literature with qualitative expert interviews to interpret the meaning of identified clusters and research fronts.

The limitations of this study should be acknowledged. First, the study was conducted with 24 experts from Tehran, which limits the transferability of the findings to other regions, industries, and institutional contexts. Second, the study relied on semi-structured interviews, meaning that the findings reflect participants' perceptions rather than direct observation of organizational practices. Third, although theoretical saturation was achieved, the sample did not include frontline employees, policymakers, or technology vendors, whose perspectives could provide additional insight into intelligent organizational transformation. Fourth, the title refers to a bibliometric review, but the empirical method was qualitative; therefore, future versions of the manuscript should either revise the title or add bibliometric analysis using Scopus, Web of Science, VOSviewer, or bibliometrix.

Future research should develop mixed-method designs that combine bibliometric mapping with qualitative interpretation. Researchers can first identify the intellectual structure of management evolution research through co-citation, bibliographic coupling, and keyword co-occurrence analysis, and then conduct expert interviews to explain the meaning of the resulting clusters. Future studies should also compare industries, countries, and organizational sizes to examine whether the transition toward intelligent organizations follows similar or different pathways. Longitudinal research would be especially valuable for observing how organizations move from bureaucratic systems to digitally integrated and intelligent forms over time. Additional research should also examine the ethical consequences of intelligent management systems, especially algorithmic control, employee surveillance, privacy, accountability, and human autonomy.

In practice, managers should treat intelligent organization development as a strategic transformation rather than a technology procurement project. Organizations should first diagnose their existing management logic, including hierarchy, decision rights, knowledge flows, learning culture, data quality, and digital maturity. They should then design integrated systems that connect human expertise, digital tools, adaptive structures, and ethical governance. Leaders should invest in managerial digital literacy, employee participation, cross-functional learning, and responsible AI governance. Most importantly, organizations should avoid using intelligent technologies merely to intensify control. The practical goal should be to build organizations that learn faster, decide better, adapt responsibly, and preserve human judgment at the center of intelligent systems.

Ethical Considerations

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

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Conflict of Interest

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