

A Critical Review of Digital Leadership Research

Hongmei Gong^{1*} and Guowei Hua²

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Abstract

As an emerging field of research, the concept of digital leadership remains relatively ambiguous. A review of the relevant literature reveals that both domestic and international scholars primarily draw on theories from management and social psychology—particularly leadership theory, organizational change theory, and complex adaptive systems theory—as the theoretical foundation for exploring digital leadership. Current research has mainly focused on defining the conceptual connotation of digital leadership and constructing theoretical models, while systematic investigations into its structural dimensions and the development of reliable measurement instruments remain limited.

Against the backdrop of the digital economy, enterprise performance evaluation is becoming increasingly multidimensional. With the deepening of digital transformation, organizations are placing greater reliance on high-performing employees to maintain a competitive advantage. Given that different leadership styles exert varying effects on employee innovation and performance, digital leadership—characterized by vision articulation, technological proficiency, and transformation facilitation—has emerged as a pivotal leadership style for navigating change and enhancing performance in the digital era.

Therefore, it is of both theoretical and practical significance to examine the mechanisms through which digital leadership influences employee work performance. This paper provides a comprehensive review of existing research on digital leadership and outlines potential directions for future inquiry.

Keywords: The Era of Digital Intelligence, Digital Leadership, Digital-era Leader Resonant

^{1,2}International Chinese College, Panyapiwat Institute of Management, Thailand

*E-mail: 755941663@qq.com

Introduction

As Charles Dickens famously wrote in a tale of two cities, “It was the best of times, it was the worst of times.” This line vividly captures the contrasting mindsets individuals may adopt when confronted with a highly uncertain external environment—either embracing change with optimism or hesitating in fear and confusion. For those with the courage to face uncertainty, such times are rich with opportunity; for those who resist transformation, they represent anxiety and loss.

Today, the wheel of history is rapidly turning toward the digital era, characterized by the sweeping emergence of artificial intelligence, big data, cloud computing, and the Internet of Things. For Chinese organizational leaders, the pressing question is how to navigate the profound transformations brought about by digital technologies and coexist with the uncertainty. As with an egg, if it is broken from the outside, it becomes food; if it breaks from within, it gives birth to new life and boundless hope. This metaphor aptly illustrates the internal awakening and proactive transformation that leaders require in the age of digital disruption.

Research Objectives

1. To define the conceptual connotation of digital leadership and clarify its theoretical boundaries, distinguishing it from traditional leadership models.
2. To review the theoretical foundations and current state of research on digital leadership.
3. To systematically analyze the existing literature on digital leadership, with particular focus on how digital leaders, in the context of digital transformation, influence employee performance through vision articulation, technological empowerment, and transformational drive.

Research Problem

1. What are the core conceptual dimensions of digital leadership, and how has the concept evolved and been constructed in the literature?
2. In what ways does digital leadership differ from traditional leadership paradigms?
3. What are the identified antecedents and outcomes of digital leadership in existing research? What is the current status of empirical investigations in this area?
4. How is digital leadership measured, and what are the prevailing empirical approaches and measurement tools used in contemporary research?

Literature Review

Formation of the Concept of Digital Leadership

The advancement of technology has never ceased. Since the steam era, leaders have undergone a comprehensive “evolution” to adapt to technological changes. With the increasing complexity of production factors and diversity of internal interconnections, traditional “simple management” can no longer meet societal development needs, and “complex management” has become increasingly crucial. Managers are no longer able to address managerial issues with traditional methods; instead, they must adjust their management approaches and adopt new leadership styles to keep pace with societal progress. The success or failure of enterprises largely depends on whether leaders can accurately recognize the importance and urgency of digitalization and possess the capability to lead digital and business transformation. Against

this backdrop, digital leadership has increasingly attracted attention from both academia and practice.

In English, the term leadership refers both to leadership as a capability (leadership talent) and to the leadership process (leadership behavior). Since Avolio first introduced the concept of E-Leadership, scholars have yet to reach a consensus on its precise definition. Currently, although a unified definition is still lacking in academic circles, researchers have explored digital leadership from various perspectives, primarily focusing on behaviors, processes, and capabilities.

Behavioral Perspective:

One view considers digital leadership as the key actions undertaken within enterprises and their business ecosystems to implement digital strategies. El Sawy et al. (2016) highlighted this viewpoint. Originating from American scholar Avolio et al. (2000), the concept of “E-Leadership” was first proposed to define the new form of leadership arising from adapting to advanced information technologies. They analyzed the relationship between leadership and advanced information technologies, defining

Electronic leadership as a social influence process mediated by Advanced Information Technology (AIT) that affects individuals, teams, and/or organizations attitudes, emotions, cognition, behaviors, and/or performance. Avolio and Kahai (2003) further deepened the study of E-Leadership, emphasizing its existence within IT-mediated work environments, where leaders assign tasks and organize workflows via information technology and utilize information as a resource to support organizational decision-making. In 2014, Avolio and colleagues updated the concept, defining E-Leadership as social influence behaviors embedded in both proximal and distal contexts, mediated by AIT, capable of generating changes in attitudes, emotions, cognition, behaviors, and performance.

Capability Perspective:

Another perspective regards digital leadership as a critical leadership competency possessed by corporate leaders. Arham et al. (2024) defined digital leadership as a leadership approach combining digital capabilities, business acumen, and soft skills to achieve digital transformation objectives. Sandel (2013) described digital leadership as a set of capabilities aimed at transforming environments through the optimization of technological and digital skills, with digital characteristics including creativity, motivation, credibility, broad knowledge, collaboration, interaction, and trust in subordinates. Oberer et al. (2018) argued that a leader’s personal competencies, mindset, and ability to apply new methods and tools constitute key elements of digital leadership. They described digital leadership as a rapid, cross-hierarchical, team-oriented, and collaborative organizational leadership style focused on innovation. Larjovuori et al. (2016) defined digital leadership as the leader’s ability to create a clear and meaningful vision for the digitalization process and to execute strategies to realize that vision. He stressed that leaders must not only guide organizational progress but also shoulder managerial responsibilities, balancing people management with the control of tangible and intangible resources, flexibly switching between leadership and management functions. Guangming (2019) explained digital leadership from a strategic level, considering it a new leadership style where managers, after setting strategic goals, adopt inclusive decision-making and strategy formulation approaches, ensuring full stakeholder involvement in co-creation, while delegating authority to guarantee smooth strategy implementation. Damayanti et al. (2021). Defined digital leadership as the leader’s capability

to establish direction, influence others, and drive sustainable change through information acquisition, while building relationships to anticipate and guide the transformations necessary for future organizational success. Suryana (2023) viewed digital leadership as the innovative capacity developed by leaders during digitalization, enabling enterprises to gain competitive advantages. Although not explicitly using the term “digital leadership,” Duan and Zhu (2020) contributed relevant insights by defining “leadership in the digital era” as the ability of leaders to strategically leverage digital assets and lead digital transformation efforts to enhance and sustain competitive advantage in digital environments. However, existing research still lacks sufficient exploration of how digital leadership empowers enterprises and employees and the mechanisms through which it drives deep organizational transformation.

Process Perspective:

Wen and Wenlong (2024) contend that digital leadership is a change-oriented process in complex digital contexts, where by leaders exercise control over digital environments, utilize digital tools for communication and management to generate adaptability, and engage in reciprocal influence with followers and their teams. Roman et al. (2018) defined “E-Leadership” as “a set of technology-mediated social influence processes aimed at changing attitudes, emotions, cognition, behaviors, and performance within organizations.” Roman et al. (2019). Further argued that digital leadership represents a social influence process requiring leaders to master and apply skills in motivation, communication, and management, while being able to adopt and integrate advanced information technologies in response to environmental changes. Yanping and Li (2020) noted that digital technology propels society into a new stage and, through grounded theory analysis, explored the capability and behavioral elements of digital leadership, elucidating its deeper connotations. Xie et al. (2023), investigating how digital leadership drives organizational innovation under the digital economy context, emphasized that digital leadership should be regarded as a management process. This process demands that organizational leaders not only possess the ability to create clear and meaningful visions but also encourage proactive thinking and active participation among organizational members, thereby ensuring effective implementation of digital transformation strategies. Men (2020) suggested that within the digital context, the term “E-Leadership” can continue to be used as the English equivalent for digital leadership. He argued that digital leadership should not be viewed in isolation as merely leadership or leadership processes, but rather as an organic integration of leadership and its process of influence. He defined digital leadership as “the capability and process by which individuals, groups, and organizations, through digital technologies, undergo changes in attitudes, emotions, cognition, behaviors, and performance” Men (2020), and called for more systematic integration of emerging leadership research with the context of digital transformation.

In recent years, as the background of digital transformation has become clearer, more scholars have transitioned from studying “E-Leadership” to “Digital Leadership,” emphasizing the digital technology context. Although terms such as “digitalized leadership,” “digital leadership,” and “digital leadership capability” appear in Chinese literature, the English terminology converges on “Digital Leadership.” Variations in translation have led to differences in the Chinese terminology.

In summary, found that the digital leadership field grows at an annual rate of 15.09%, with an average citation count of 21.48 per article. Hot topics include “performance management,” “transformation,” and “innovation.” Digital leadership is a leadership approach that leverages technological mediation, resource integration, empowerment, and collaboration to drive

organizational digital transformation. As a novel leadership paradigm, digital leadership has garnered broad academic attention in recent years. Existing research mainly explores its connotations and mechanisms from three perspectives: Behavior, capability, and process. The behavioral perspective focuses on leaders' specific management practices in digital contexts; the capability perspective emphasizes leaders' technological literacy and strategic thinking in digital transformation; and the process perspective highlights how digital leadership dynamically influences organizational and employee behaviors through interactive mechanisms.

To better articulate the concept of digital leadership, this study systematically reviews key representative viewpoints, as summarized in Table 1

Table 1 A Systematic Review Table of Digital Leadership Research

Perspective	Author(S) & Year	Concept Definition
Behavioral Perspective	Roman et al. (2019)	Digital leadership is a process of social influence that is manifested not only in a leader's communication, motivation, and managerial characteristics but also in their capacity for insight into, understanding of, and integration with the information technology environment.
	Avolio (2000)	Defined as a social influence process mediated by Advanced Information Technology (AIT), affecting attitudes, emotions, cognition, behaviors, and performance at individual, team, and organizational levels.
	Avoli & Kahai (2003)	E-Leadership exists in IT-mediated work environments, assigning tasks and organizing workflows via technology, using information as a resource to support organizational decision-making.
Capability- Based Perspective	Arham & Muenjohn (2024)	Leadership that integrates professional skills, abilities, and digital competencies to realize digital transformation goals.
	Suryana (2023)	Digital leadership is the capacity to foster innovation throughout the digitalization process to secure a competitive advantage.
	Bell & Reed (2022)	Leaders set strategic goals through inclusive decision-making and stakeholder co-creation, enabling smooth strategy implementation via empowerment.
	Larjovuor et al. (2016)	The ability to create a clear and meaningful vision for digitalization and execute strategies to achieve it, balancing leadership and management roles.
	Damayant & Mirfani (2021)	Leaders establish direction, influence others, and drive sustainable change through information acquisition, fostering relationships to guide future success.

Table 1 A Systematic Review Table of Digital Leadership Research (Con.)

Perspective	Author(S) & Year	Concept Definition
Capability- Based Perspective	Duan & Zhu (2020)	Digital era leadership involves strategically utilizing digital assets and leading digital transformation to maintain a sustainable competitive advantage.
	Wen & Wenlong (2024)	The ability to use data science technologies to lead organizations towards digital transformation and sustained growth.
	Roman et al. (2018)	It signifies a social-influence process that demands leaders master and apply skills in motivation, communication, and management, while also integrating cutting-edge information technologies in response to evolving environmental needs.
Process Perspective	Men (2020)	The capacity and process through which digital technologies are leveraged to induce changes in the attitudes, emotions, cognitions, behaviors, and performance of individuals, groups, and organizations.
	Wang et al. (2024)	It is a process, unfolding within complex digitalized contexts, in which leaders—oriented toward transformation—exert communicative and managerial influence through the strategic command of the digital environment and the deployment of digital tools, thereby fostering adaptability and engaging in reciprocal influence with followers and their teams.

Source: Compiled by the author based on the literature review.

Comparative Analysis of Digital Leadership and Traditional Leadership

Digital leadership emphasizes establishing an egalitarian and collaborative relationship between leaders and employees, focusing on stimulating employees' autonomy and innovation capabilities, and promoting employee-driven innovation rather than merely relying on top-down directive leadership. Unlike transformational leadership's top-down approach, digital leadership places greater emphasis on supporting employees in meeting the agility, openness, and collaboration demands characteristic of the digital era. Compared to charismatic leadership, digital leadership highlights inclusiveness and empowerment, fostering employees' self-management and creativity. Similar to empowering leadership, it seeks to stimulate employees' intrinsic motivation, but with a stronger focus on innovation, cross-boundary collaboration, and managing uncertainty within digital environments.

Amid the current wave of digital transformation, enterprises' management models and leadership approaches are undergoing profound changes. While traditional leadership theories—such as transformational, transactional, and empowering leadership—remain instructive, enterprises operating in digital contexts require leadership that better adapts to technology-driven change. The primary reasons for selecting digital leadership as the research focus are as follows:

The Specificity of the Digital Environment: Traditional leadership theories mainly focus on structured internal organizational management, whereas digital leadership emphasizes capabilities such as technology-driven decision-making, data-enabled management, remote collaboration, and agile innovation. Leaders need to possess digital mindsets, data analytical skills, and agile responsiveness to navigate rapidly evolving market conditions.

Limitations of Existing Research: Traditional leadership studies have primarily explored the effects of leaders on organizational performance and employee behaviors, with relatively limited systematic investigation into leadership characteristics in digital contexts. Recent research has begun to focus on digital leadership, with ongoing refinement of measurement scales and conceptual frameworks, thereby providing fertile ground for innovation.

Practical Demand for Digital Leadership: During digital transformation, enterprises require leaders capable of driving organizational change through competencies such as digital strategic thinking, technology-driven decision-making, and cross-departmental collaboration. These capabilities differ significantly from those emphasized in traditional leadership. Many digital transformation failures have been attributed to leaders' lack of digital leadership capacity, underscoring the concept's strong practical relevance.

Dimensions and Measurement of Digital Leadership

In the context of the surging wave of digital transformation, a key challenge for the new generation of leaders is how to cultivate leadership that aligns with the evolving demands of the digital era. Existing research generally categorizes the measurement of digital leadership into two approaches.

The first is direct measurement. This method typically draws upon the analysis of the characteristics of digital leadership, describing it across multiple dimensions. Zhu (2015) proposed five key traits of digital leaders: Thought leadership, innovation leadership, global vision, exploration-oriented leadership, and deep leadership, each of which she elaborated in detail.

The second is indirect measurement. For example, Wang et al. (2024) employed text mining techniques in their study. One stream of this approach investigates whether corporate leaders possess digital or IT-related backgrounds and experiences, as well as the extent of their decision-making authority. This includes reviewing annual reports and executive résumés of listed companies to identify leaders likely responsible for digital initiatives—such as the presence of Chief Information Officers (CIOs), Chief Digital Officers (CDOs), heads of information centers, or IT department directors. Another stream measures digital leadership by the proportion of leaders with digital or IT backgrounds. Similarly, Sebastian et al. (2022), in examining the relationship between executives' digital attributes and corporate digital innovation, evaluated the proportion of Top Management Team (TMT) members whose professional backgrounds reflected relevant digital technology experience, thereby assessing the TMT's digital knowledge.

At present, research on digital leadership remains in an exploratory phase, particularly in terms of developing structured dimensional frameworks and validated measurement scales. For instance, Wen and Wenlong (2024) examined the essence, components, and emergence mechanism of digital leadership based on Complex Adaptive System (CAS) theory, but did not propose a corresponding scale. Xie (2023) adopted a six-item scale developed by Oktaysoy and Kaygin (2022) to investigate the relationship between digital leadership and organizational innovation, reporting a Cronbach's alpha of 0.811. However, the items were inductively derived from literature rather than developed through rigorous psychometric procedures.

Other existing scales also exhibit limitations. Claassen and Broding (2021) developed a measurement tool restricted to the public administration sector, limiting its generalizability. Westerman et al. (2012) proposed a digital leadership model encompassing leaders' required attitudes, competencies, behaviors, and their ability to drive digital transformation, emphasizing digital self-transformation, though no concrete scale was developed. Yanping and Li (2020) constructed five dimensions of corporate digital leadership based on grounded theory, but did not formulate a measurement scale suitable for empirical studies. Men (2020), from the perspective of Digital China initiatives, proposed six dimensions of digital leadership focusing on government officials, whose applicability to corporate settings is limited, and likewise did not produce a scale.

A Systematic Review of Digital Leadership Research: A Dual-Level Perspective

Following a comprehensive analysis of the literature on digital leadership, it has been observed that existing academic studies primarily explore this concept from two major perspectives: The individual level (including leaders and followers) and the organizational level (such as teams and the organization as a whole).

1. Studies on Organizational-Level Impacts

These studies mainly focus on the macro-level impacts of digital leadership, such as its effects on organizational innovation, performance, dynamic alliances, virtual teams, and organizational resilience. For example, an empirical study on equipment manufacturing firms, found that digital leadership positively affects both performance and innovation. Wasono and Furinto (2018) revealed that enterprises can enhance their sustainable competitive advantage by strengthening digital leadership and innovation management, with digital leadership playing a critical role in driving innovation. examined how digital leadership influences digital transformation. Based on resource orchestration theory and dynamic capabilities theory, they proposed a path model linking “digital leadership–digital-oriented strategic renewal–digital transformation,” and investigated the boundary role of organizational resilience.

In a multiple-case study of ten firms combined with empirical data from 117 firms, Benitez and Mi (2024) demonstrated that digital leadership enhances innovation performance through digital platforms. Similarly, the impact of digital leadership on organizational innovation has also garnered attention. Xie et al. (2023) investigated the roles of digital platform capability and environmental competitiveness. Studies discussed the connotation, significance, and enhancement strategies of digital leadership in public libraries. Drawing on the resource-based view and dynamic capabilities theory, Previous research has also explored how Party-building practices foster digital leadership in the case study of Haier Smart Home's “Party branches embedded in micro-units.” Additionally, the application of digital leadership in virtual team management—a rising management model—has gained growing attention among scholars both domestically and internationally.

2. Studies at the Individual Level

At the individual level, research focuses on how leaders influence employees' attitudes, values, and behaviors through their actions and leadership styles: Leader influence on employee attitudes and values. In their study on millennial workplace engagement, they found that a learning culture significantly and positively affects digital leadership. Showed that managers' technological capabilities, innovativeness, and motivational guidance positively influenced banking operations. Oktaysoy et al. (2022) found that digital leadership skills significantly affect leaders' mental health—those with low digital leadership capabilities are more likely to

experience lower levels of psychological well-being. Digital resources and the challenge of digital survival: With the growing importance of data and digital tools in management—often controlled by IT professionals rather than leaders (Bresnahan et al., 2002)—information asymmetry and potential internal/external interference can impair communication efficiency. The increasing dependence on digital systems has led to the phenomenon of “digital survival,” challenging traditional leadership competencies and weakening authority structures. Communication in the digital age: Zaccaro emphasizes that effective communication is crucial for leveraging the benefits of digital technologies while mitigating their potential drawbacks. Clear communication systems not only help leaders better understand employee behavior but also enhance task efficiency. Establishing a robust internal communication framework is essential for clarifying leader–follower roles and improving overall organizational effectiveness.

The above summarizes a portion of the empirical research literature relevant to digital leadership.

Review of Research on Digital Leadership

In their influential work *Leadership*, American leadership scholars Richard Hughes, Robert Ginnett and Gordon Curphy proposed a leadership research model (see Figure 1), which conceptualizes leadership as the intersection of three key elements: The leader, the followers, and the context in which they interact (Hughes 2006). This model highlights the essence of leadership research as a dynamic and relational process shaped by these three dimensions.

In reviewing the literature on digital leadership, this study adopts the framework of this leadership model and analyzes the topic from three perspectives: 1) the interaction between digital context and digital leaders; 2) the influence of digital leadership on followers; and 3) the dynamics of digital leadership groups.

First, the model emphasizes that leadership is not an isolated act, but the result of an interplay between leaders, followers, and contextual factors. The effectiveness of digital leadership depends not only on the traits and behaviors of the leaders themselves, but also on employees’ capabilities, attitudes, and the technological environment within the organization. In the context of digital transformation, how leaders enhance digital adaptability and adjust leadership strategies according to varied digital settings has become a key issue in leadership studies.

Second, whereas traditional leadership research has primarily focused on individual leader characteristics (e.g., charismatic or transformational leadership), this model stresses the situational contingency of leadership. During digital transformation processes, differences in technological infrastructure, organizational culture, and market dynamics can significantly influence the form and effectiveness of digital leadership. Thus, the model provides a robust theoretical foundation for examining digital leadership across diverse organizational environments.

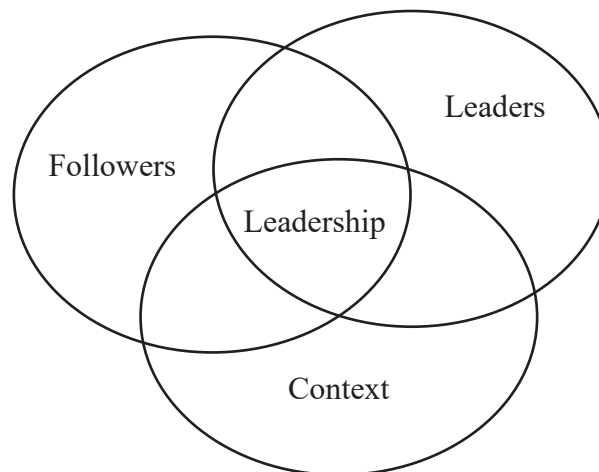


Figure1: Digital Leadership Model Framework

Source: The Impact of Digital Leadership on Employee Innovative Performance.

Methodology

In the field of digital leadership research, both qualitative and quantitative empirical approaches have been employed. However, there is still no consensus within academia regarding a unified definition of digital leadership. Scholars have interpreted the concept from different perspectives. From a qualitative standpoint, literature reviews show that most existing studies on digital leadership are primarily theoretical or qualitative in nature. Among the reviewed articles, only two developed measurement tools for digital leadership, while the majority of studies focused on correlations are limited to case-based research. This indicates a clear need for the development of robust measurement instruments. Only by progressively refining such tools can future studies systematically test the relationship between digital leadership and other organizational behaviors through quantitative methods.

In terms of empirical research methods, measurement of digital leadership has primarily relied on questionnaires, with scholars constructing instruments based on different dimensional frameworks. Broadly, the research pathways can be categorized into the following types:

(1) Exploratory research based on dimensional classification. Early scholars mainly employed literature synthesis and theoretical deduction to identify the core elements of digital leadership. For instance, Wang et al. (2024) proposed seven components, including technological capability, analytical capability, and adaptability, though no concrete measurement tool was developed. These studies emphasized conceptual construction but lacked quantitative validation.

(2) Preliminary scale development with simplified items. Oktaysoy et al. (2022) conceptualized digital leadership into two dimensions—attitudes and skills—and designed a six-item short scale. Similarly et al., (2020) developed a five-item scale in the Chinese context, covering areas such as digital environment mastery and digital talent development. Although these efforts initiated quantification, the instruments were largely based on researchers' judgment, with limited items and insufficient reliability and validity testing.

(3) Expanded dimensions and capability frameworks. Scholars such as Zhang and Zheng (2023) proposed multidimensional frameworks, including digital communication, digital trust, digital ethical empathy, and digital mindset transformation, from the perspectives of input-output

and capability building. However, these remained at the theoretical level and did not yield operational scales.

(4) Localized scale development attempts. Drawing on the logic of “Mingdao, Qushi, Youshu, Shuren,” constructed a four-dimensional scale—digital mindset, digital detection, digital socialization, and digital reserve—measured with a seven-point Likert scale. This represents one of the few more systematic attempts at indigenous scale development.

Overall, the current measurement of digital leadership mainly relies on questionnaire-based scales, with the following methodological characteristics: Item generation is often based on literature review and expert interviews, with limited application of rigorous qualitative approaches such as grounded theory interviews; the number of items per scale is generally small, and dimensional classifications lack consistency; reliability and validity testing is often limited to Exploratory Factor Analysis (EFA), with insufficient Confirmatory Factor Analysis (CFA) and systematic assessment of convergent and discriminant validity; and the cross-cultural applicability of foreign-developed scales remains questionable, with few large-sample validations conducted in the local context.

The present study focuses on perceived digital leadership and its underlying psychological processes. The questionnaire sample was obtained by inviting working relatives and friends, as well as acquaintances who had founded or managed enterprises, who, in turn, assisted in recruiting employees from their companies to participate. The measurement instrument adopted in this study is the scale developed by Zhang and Zheng (2023), which combined qualitative and quantitative methods within the Chinese context and followed a rigorous, standardized procedure. Their digital leadership scale consists of four dimensions: Digital mindset transformation, digital resource building, digital ethical empathy, and digital practice cognition. The instrument includes 18 items, with a Cronbach’s α coefficient of 0.952, indicating very high internal consistency and strong measurement stability.

Results

Through a systematic review of relevant domestic and international literature, it can be found that digital leadership, as an emerging leadership style, has gradually become an important topic in organizational management and leadership research. Existing research has achieved certain results in terms of concept definition, theoretical basis, structural dimensions, antecedent mechanisms, and outcome variables, laying a theoretical and empirical foundation for the development of this field.

This study’s review of the literature on digital leadership yields the following results:

1. Definition: Digital leadership is the ability of leaders to use a series of digital resources to influence the attitudes, emotions, and behaviors of organizational members, aiming to promote organizational digital transformation and respond to the digital environment.
2. The difference between digital leadership and traditional leadership: It is top-down, acknowledges employees as “strong individuals”, is inclusive and empowering, and centered on “employees”, with leadership empowerment behavior being a specific representative behavior of digital leadership.
3. Review of the current research status of antecedent and consequent variables of digital leadership in existing studies.

4. The measurement of digital leadership by Zhang and Zheng 2023 has been found to have good reliability and validity, and presents the current status of existing empirical research.

Conclusions

Overall, the following three aspects can be summarized:

First, theoretical contributions. Existing research is mostly based on perspectives such as leadership theory, organizational change theory, self-determination theory, and complex adaptive systems theory, initially revealing that digital leadership effectively enhances the adaptability and innovation of individuals, teams, and organizations through paths such as vision shaping, technology empowerment, and agile collaboration. Studies show that digital leadership not only boosts employees' creativity, work engagement, and organizational commitment but also plays a positive role in promoting organizational digital transformation and overall performance improvement.

Second, empirical achievements. Currently, scholars have accumulated several empirical research results, generally agreeing that digital leadership helps to stimulate employees' work enthusiasm, promote knowledge sharing, and drive organizational innovation and performance improvement. Some studies have also made attempts in measurement tools, for instance, using the scale developed by Zhang and Zheng (2023), and others, verifying the structural dimensions of digital leadership and its good reliability and validity. However, there is insufficient attention paid to the potential negative effects of digital leadership, such as the possible employee stress, cognitive burden, and digital divide, which still need in-depth exploration.

Third, research deficiencies and prospects. Overall, research on digital leadership is still in its development stage, with issues such as an incomplete conceptual system, the need for localization and optimization of measurement tools, insufficient in-depth research on antecedent and outcome mechanisms, insufficient cross-level and cross-industry comparisons, and a single research method.

Future Research Directions

1. In empirical research on digital leadership, data should be collected from multiple channels. Different data sources can provide different perspectives and information, which helps to reduce the bias brought by a single data source. Develop localized scales and build systematic, scientific, and China-specific measurement tools. Besides traditional questionnaires, methods such as interviews, observations, and case studies can also be combined. For instance, through interviews with leaders and employees, gain a deeper understanding of their perceptions and experiences of digital leadership; through observing the actual behaviors of leaders and the digital practices of organizations, obtain more intuitive data; through case studies, research the leadership performance and lessons learned in the digital transformation process of specific organizations or industries. The combination of multiple data sources can mutually verify each other, enhancing the credibility of research conclusions.

2. Focus on exploring the antecedent variables of digital leadership. Deeply investigate the formation mechanism of digital leadership influenced by organizational environment, leadership traits, cultural atmosphere, etc. Through experimental methods, under controlled variable conditions, test the causal impact of digital leadership on employee behavior, organizational performance, and other variables. For example, by designing experimental

scenarios, compare the team collaboration effects, innovation capabilities, and job satisfaction of teams with different levels of digital leadership, thereby more accurately assessing the role of digital leadership. Explore the influence of organizational culture, structure, and other factors on digital leadership. Comparative studies can help reveal the internal mechanisms of digital leadership and provide differentiated development paths for organizations.

3. Digital leadership ultimately occurs in the practice and experience of individual leaders. Case studies can deeply explore the thinking transformation, behavioral changes, opportunities, and challenges faced by individual leaders during the digital transformation process. Through case studies of different leaders, common patterns and individual differences in the formation of digital leadership can be summarized, providing targeted suggestions for cultivating and enhancing digital leadership.

4. Comparative research methods can effectively explore the different factors influencing the level of digital leadership. There are significant differences in digital leadership among different leaders, organizations, or industries. Through comparative analysis, the key factors causing these differences can be identified. Optimize research methods, break through the limitations of cross-sectional and single data sources, and adopt longitudinal tracking, paired data, and multi-method integration to reveal causal relationships and dynamic evolution processes. Explore the connotation, formation mechanism, effect, and influencing factors of digital leadership from different angles and levels.

In conclusion, the research on digital leadership is at a critical stage where theoretical exploration and practical application are advancing simultaneously. Future research not only needs to achieve further systematization and localization in theory but also needs continuous innovation in methodology and practice to comprehensively reveal the multi-dimensional mechanism of digital leadership and provide more targeted theoretical support and practical guidance for the digital transformation and high-quality development of enterprises.

References

- Ahmad, A. F., Norizan, N. S., Ahmad, A. F., & Muen John, A. (2024). Construct development for resilient leadership model (rel model): A view from Malaysian SMEs. *International Journal of Organizational Leadership*, 13(2), 251-274.
- Avolio, B. J., & Kahai, S. S. (2003). E-leadership: Implications for theory, research, and practice. *Leadership Quarterly*, 11(4), 615-668.
- Avolio, B. J., Jung, D. I., & Zhu, J. (2000). Opening the black box: An experimental investigation of the mediating effects of trust and value. *Journal of Organizational Behavior*, 21(8), 949-964.
- Bell, K., & Reed, M. (2022). The tree of participation: A new model for inclusive decision-making. *Community Development Journal*, 57(4), 595-614. <https://doi.org/10.1093/cdj/bsab018>
- Benitez, J., Liu, R. Z., Zhang, L., Shao, Z., & Mi, J. N. (2024). Exploring the influence of gamification-enabled customer experience on continuance intention towards digital platforms for e-government: An empirical investigation. *Information & Management*, 61(5), 103986.
- Bresnahan, T. F., Brynjolfsson, E., & Hitt, L. M. (2002). Information technology, workplace organization, and the demand for skilled labor: Firm-level evidence. *The Quarterly Journal of Economics*, 117(1), 339-376.

- Claassen, K., Dos Anjos, D. R., Kettschau, J., & Broding, H. C. (2021). How to evaluate digital leadership: A cross-sectional study. *Journal of Occupational Medicine and Toxicology (London, England)*, 16(1), 44.
- Damayanti, F. P., & Mirfani, A. M. (2021). An analysis of digital leadership in the COVID-19 era. In *the 4th International Conference on Research of Educational Administration and Management (ICREAM 2020)* (pp. 156-159). Atlantis Press.
- Duan, K. (2020). Theoretical and empirical analysis of leaders' authorization choices. *Governance Studies*, 36(5), 28.
- Duan, L., & Zhu, G. (2020). Psychological interventions for people affected by the COVID-19 epidemic. *The Lancet Psychiatry*, 7(4), 300-302.
- El Sawy, O. A., Amsinck, H., Kræmmmergaard, P., & Lerbech Vinther, A. (2016). How LEGO built the foundations and enterprise capabilities for digital leadership. *MIS Quarterly Executive*, 15(2), 141-166.
- Hughes, R. L. (2006). *Leadership: Enhancing the lessons of experience* (5th ed.). Tsinghua University Press.
- Larjovuori, R. L., Bordi, L., Mäkinen, J. P., Heikkilä-Tammi, K. (2016). The role of leadership and employee well-being in organizational digitalization. In *the 26th Annual RESER Conference 2016* (pp. 1141-1154). University of Naples Federico II.
- Men, L. X. (2020). Public sector digital leadership: A literature review and research prospects. *E-Government*, 2, 100-110.
- Oberer, B., & Erkollar, A. (2018). Leadership 4.0: Digital leaders in the age of industry 4.0. *International Journal of Organizational Leadership*, 7(4), 404-412.
- Oktaysoy, O., Topcuoglu, E., & Kaygin, E. (2022). A study on digital leadership scale adaptation. *International Journal of Organizational Leadership*, 11(4), 407-425.
- Roman, A. V., Van Wart, M., Wang, X. H., et al. (2019). Defining e-leadership as competence in ICT-mediated communications: An exploratory assessment. *Public Administration Review*, 79(6), 853-866.
- Roman, R., Lopez, J., & Mambo, M. (2018). Mobile edge computing, fog et al.: A survey and analysis of security threats and challenges. *Future Generation Computer Systems*, 78, 680-698.
- Sandel, M. J. (2013). Market reasoning as moral reasoning: Why economists should re-engage with political philosophy. *Journal of Economic Perspectives*, 27(4), 121-140.
- Suryana, A. (2023). Understanding of digital leadership by scholars' student in era 4.0. *Journal of Namibian Studies: History Politics Culture*, 36, 334-355.
- Suryana, R. E. (2023). A bibliometric analysis of human resource development research: Trends and research focus from 2010 to 2023. *Journal Administrasi Pendidikan*, 21(2), 121-128.
- Wang, W., Xi, Y., & Liu, P. (2024). The connotation, composition, and emergence mechanism of digital leadership from the perspective of complex adaptive systems theory. *Journal of Management*, 21(4), 475-478.
- Wasono, L. W., & Furinto, A. (2018). The effect of digital leadership and innovation management for incumbent telecommunication company in the digital disruptive era. *International Journal of Engineering and Technology*, 7(29), 125-130.
- Wen, Z., & Wenlong, H. (2024). Digital wealth creation, distribution and common prosperity. *Social Sciences in China*, 45(3), 38-56.

- Westerman, G., Bonnet, D., & McAfee, A. (2012). *The advantages of digital maturity*. MIT Sloan Management Review.
- Xie, P., Ma, L., Wei, Y. Y., & Qiao, X. T. (2023). Digital leadership and organizational innovation: The role of digital platform capability and environmental competitiveness. *Research on Economics and Management*, 44(1), 129-144.
- Yanping, L., & Li, M. (2020). The structural dimensions of corporate digital leadership and its effects: A grounded theory study based on the Chinese context. *Wuhan University Journal (Philosophy & Social Sciences)*, 73(6), 125-136.
- Zhang, Z., & Zheng, X. (2023). Digital leadership: Structural dimensions and scale development. *Business Management Journal*, 45, 152-168.
- Zhu, P. (2015). *Leadership master: Five digital trends to leap leadership maturity*. Lulu Press.