Literature Review: Characteristics of Digital Leadership in Digital Transformation

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Abstract

Digital transformation has recently created significant research interest due to its acceleration across industry sectors. However, the existing literature on digital transformation that addresses digital leadership characteristics is insufficient to provide a comprehensive understanding. This research explores the characteristics, traits, and skills of digital leadership. The research methodology used a systematic literature review summarizing 30 articles from Scopus-indexed journals. Characteristics are obtained from citations from previous research that discusses digital transformation leadership. The results of this study explain that digital leadership characteristics consist of twenty different traits, seven of which are characteristics of digital leaders that are important for the effective implementation of digital transformation. As such, these characteristics can reflect the significance of digital leaders in achieving digital transformation goals at the human and organizational levels.

Keywords: leadership, digital leadership, digital transformation, digital leader characteristics, literature review

1   Introduction

Digital transformation has become a must in today's business world. Conceptually, digital transformation is described as a process aimed at improving the performance of an entity by inducing significant changes in its aspects through the integration of information technology, computing, communication, and connectivity. By implementing digital transformation, companies become more competitive as they can increase productivity, create added value, and improve social well-being. This situation encourages organizations to transition to the digital realm to survive and gain a competitive advantage [1]. The ability to transform digitally includes strategically applying technology and innovative digital tools [2]. Organizations need leaders who can identify digital opportunities and turn them into innovative business models [3]. Leaders are key in shaping organizations' strong and sustainable digital culture [4]. The emergence of digital transformation brings new challenges to those in leadership positions. Leadership significantly impacts the company by setting standards, expectations, and desired outcomes for large-scale and complex transformation projects [5]. Leadership style shows a leader's characteristics, skills, and behavior as they perform their duties [6]. Therefore, facing the challenges of today's digital age, it is appropriate to adopt digital leadership to achieve organizational goals [7]. Digital leaders act as individuals who add value to the organization by integrating leadership skills with digital technology. A digital leader consistently manages the digital transformation process and adapts various leadership approaches, such as transformational, transactional, and other, to provide a competitive advantage from a strategic perspective [8]. Leadership focus in the digital age emphasizes policy innovation, dynamic and adaptive leaders, optimizing positions to stimulate change, technological innovation, and enhancing the quality and competence of team members to achieve goals [8].

Digital leadership refers to the expertise and skills of a leader in setting appropriate goals and designing strategies to achieve digital transformation [9]. Previous studies have shown that digital leadership is essential in driving the digital transition in various sectors, such as enterprises, organizations, education, and government [10], [11]. According to Niu, the quality of digital leadership in organizations is directly linked to the ability to make accurate decisions and nurture

innovations that enhance the long-term survival of organizations [12]. According to Cortellazzo, digital leadership refers to the expertise and skills of a leader in setting appropriate goals and designing strategies to achieve digital transformation [4]. So, the company's success today depends on the progress of its leadership practices and the automation of business processes. Organizations should take the initiative to define criteria for judging digital leaders based on their characteristics, actions, and responsibilities [1]. Previous research by [13], [14], [15], [16] has discussed the skills of digital leaders but has not presented a systematic explanation of the operational definitions and critical attributes of digital leaders that effectively support the digital transformation process. Based on this background, this study aims to fill the gap in the literature by documenting the diverse traits of digital leaders who can drive progress in digital transformation. The method applied in this research involved reviewing literature, referring to journal articles recorded in Scopus. Therefore, the research question formulated for this research involves two fundamental aspects: 1) What characteristics are involved in digital leadership? 2) What essential characteristics of digital leadership impact the digital transformation process? The main objective of this study is to gain a better understanding of the characteristics of digital leaders who have the potential to create or break down the process of digital transformation.

2 Literature Review

Technological developments have influenced many different leadership styles, as stated by [9]. Digital leadership is a fast-paced style involving cross-hierarchy, focused on teamwork and cooperation, emphasizing organizational innovation [9]. Günzel-Jensen said digital leadership is closely linked to three leadership styles: transactional, transformative, and empowerment. It shows that digital leadership involves technology, strategy, digital skills, and other characteristics [1]. According to [17], a leader's ability to develop, oversee, direct, and use information and communication technology (ICT) to improve business efficiency is essential to digital leadership theory. Digital leadership skills are precious in various organizations adopting the digital element. Along with increasing attention to digital technologies and solutions rapidly transforming organizations and industries, digital leadership is being introduced in response to the skills leaders need in today's digital age [18]. However, no apparent trait distinguishes good digital leaders from those who drive digital transformation. While previous research [13], [14], [15], [16] generally addressed the competencies required by digital transformation leaders, they did not systematically explain the operational definition of each of the proposed dimensions of digital leadership. As a result, it isn't easy to measure and compare objectively these aspects of digital leadership. Furthermore, previous research by [1], [10], [5] has not provided a thorough understanding of the essential characteristics required by digital leadership to support digital transformation. Therefore, this research needs to systematically investigate the characteristics of digital leaders and important characteristics that reflect effective traits, behaviors, and skills to support success in digital transformation.

3 Research Method

This research method involves a systematic series of stages to answer the research objectives when conducting a literature review. The steps in the research are as follows.

3.1 Search Terms

In this study, search terms were used in two stages. In the first stage, research questions are formulated into population categories, interventions, comparisons, results, and strategic contexts. (PICOC). Using the RQ 1 PICOC Research Question formula, the results are shown as follows: population: digital leadership; interventions: characteristics, competencies, skills, and context; for this research question, there is no description, comparison, or outcome. The second stage is keyword selection from keyword synonyms combined with OR and each PICOC component combined with AND. Terms were searched with the following keywords: ("digital leadership") AND (characteristics* OR competencies* OR skills*).

3.2 Apply Criteria

The article search on a trusted global repository database lasted two weeks, from October 16 to 28, 2023. A systematic analysis process was used when selecting relevant publication databases to ensure that articles met the inclusion and exclusion requirements. Inclusion criteria included the selection of keywords related to digital leadership, answering the research question, and Scopus-indexed papers. The exclusion criteria included repetitive or duplicate articles, non-English articles, conference articles, and articles that did not present complete results.

3.3 Selection Process

Relevant research articles were selected through a 4-stage process, namely:
1. First stage: Researchers searched appropriate and predetermined keywords; articles were in English, and article filters were not used.
2. Second stage: Researchers then found articles that might be relevant to the research. The article selection criteria used is the title of the article. The article title keywords used were "leadership" and "digital leadership."
3. Stage three: After getting the article results from the second step, duplicate articles were filtered to be deleted. Then, the appropriate articles are selected; only articles from journals with Scopus indexes from Q1 to Q2 are accepted.
4. Fourth Step: The articles selected from the previous step were evaluated by reading the abstracts and conclusions. A total of 30 pieces that met the criteria were considered the results.

Based on the four stages of the screening process that have been carried out, 30 relevant articles for research have been produced, which can be seen in Table 1 below.

Table 1. Results of The Selection Process

Database	No Filter	1st Filter	2nd Filter	3rd Filter
Google Scholar	61900	1740	57	17
Science Direct	33105	142	20	7
Emerald Insight	24000	128	16	3
Springer	91844	137	13	2
Taylor & Francis	69110	55	10	1
Total	279959	2202	116	30

Based on the previous article selection results, 30 articles related to this literature review have been indexed in the Q1 and Q2 categories on Scopus. Table 2 presents the results of examining the articles listed by Scimago journal rank.

Table 2. List of Journal

Publisher	Journal	Quartile
Elsevier Ltd.	Business Horizons	Q1
Italy Publication	Emerging Science Journal	Q1
MDPI AG	Sustainability	Q1
Elsevier	Information & Management	Q1
Emerald Group Publishing Ltd.	Engineering, Construction, and Architectural Management	Q1
MDPI AG	Sustainability	Q1
SAGE Publications Inc.	Journal of Leadership & Organizational Studies	Q1
Emerald Group Publishing Ltd.	Management Research Review	Q1
BioMed Central Ltd.	Journal of Occupational Medicine and Toxicology	Q1

MDPI AG	Sustainability	Q1
Elsevier BV	International Journal of Educational Research	Q1
SAGE Publications Inc.	German Journal of Human Resource Management	Q1
Elsevier Ltd.	Business Horizons	Q1
Elsevier Inc.	Journal of Business Research	Q1
MDPI AG	Sustainability	Q1
Springer London	Cognition, Technology & Work	Q1
MDPI AG	Sustainability	Q1
Elsevier Inc.	Journal of Business Research	Q1
Springer International Publishing AG	Business Research	Q1
MDPI AG	Sustainability	Q1
Elsevier Ltd.	Technology in Society	Q1
Palgrave Macmillan Ltd.	Journal of International Business Studies	Q1
Emerald Group Publishing Ltd.	International Journal of Entrepreneurial Behaviour and Research	Q1
MDPI AG	Sustainability	Q1
UQ Business School	Australasian Journal of Information Systems	Q2
Frontiers Media S.A	Frontiers in Psychology	Q2
MDPI	International Journal of Environmental Research and Public Health	Q2
Taylor and Francis Ltd.	Research-Technology Management	Q2
Routledge	Church, Communication, and Culture	Q2
Frontiers Media S.A	Frontiers in Psychology	Q2

3.4 Research Mapping

Keyword mapping of research topics is carried out to support the research foundation; the keywords used for this research are digital leadership topics. Publish or perish, and VOS viewer is used for this research mapping. The results of article searches using two world databases, namely the Google Scholar database, obtained 1452 articles, and the Scopus database received 200 reports. Furthermore, the article results were visualized using a VOS viewer to produce the diagram in Figure 1.
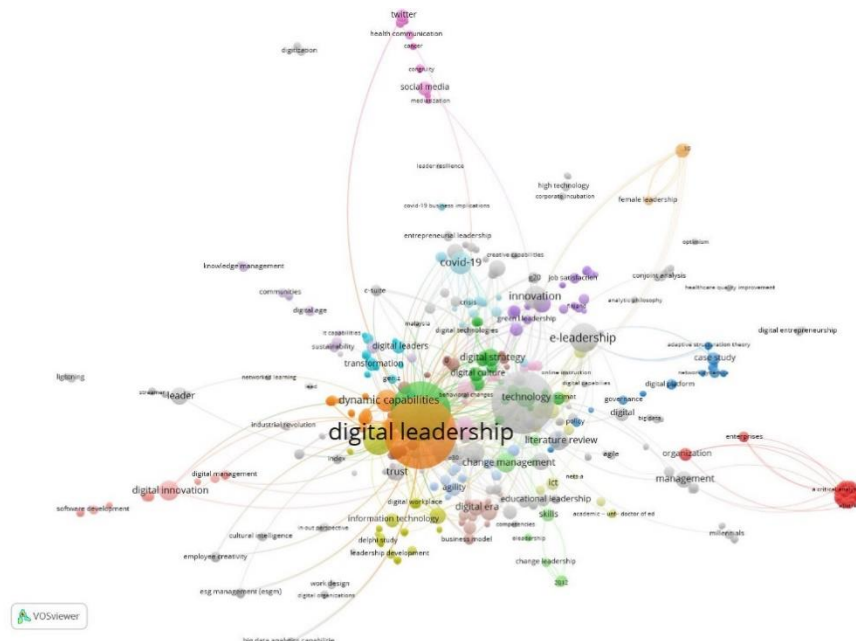

Fig 1. Research Mapping

Figure 1 shows that the VOS viewer mapping resulted in 54 clusters, each represented by a different color. The clusters in the VOS viewer group the items seen on the map, and each collection reflects one term with a specific color to indicate where the item has been placed. The item "digital leadership" was identified as the most frequent item, appearing 119 times. Digital leadership is also directly linked to the article "Digital Transformation," which appears 80 times. And the item "characteristics" that refer to digital leadership only appears four times. This number is relatively small compared to the most common item, "digital leadership." This shows that research on digital leadership characteristics is still lacking in the scientific literature, making this topic worthy of further study.

4 Results and Analysis

The researcher then extracted data from the 30 selected articles based on the study selection. At this stage, the researcher details the findings and presents the analysis to achieve the research objectives in the literature review.

4.1 Keyword Extraction

The deriving of the characteristics of digital leadership involved extracting keywords from critical quotes in the 33 selected texts. By doing this, we can recognize and evaluate the key elements that form the basis of digital leadership from the perspective of the relevant literature. As a result of this literature review, 26 literature citations were identified with 73 keywords that reflect the various characteristics, roles, and skills of digital leadership. Table 3 summarizes keywords from the literature review citations significantly related to digital leadership characteristics.

Table 3. Summary of Keywords Extraction

Quotation	Keywords	ID Study
Digital leadership is characterized by proactive action, forward-thinking, and support.	Proactive Forward Thinking Support	A5
Digital leaders must enhance vision and firm commitment and communicate effectively with team members and stakeholders of the organization as a whole.	Vision Commitment Communication	A15
To develop digital companies in the Asia Pacific, digital leaders are identified as digital visionaries, smart risk takers, foster innovators, agility, tolerance of ambiguity, and collaborators.	Digital Visionary Smart Risk Taker Foster Innovation Agility Tolerance of Ambiguity Collaborator	A19
A digital leader must have digital skills and work effectively in a digital environment.	Digital Skills Collaboration	A19
Digital leadership involves inspirational, visionary, absorbing uncertainty, innovation, and adaptation skills.	Inspirational Visionary Risk Taking Innovation Adaptation	A1
Digital leaders can provide the vision and digital agendas that lead the company toward a bright future.	Vision Digital Knowledge	A9
Digital leadership involves creativity, deep knowledge, vision, and collaboration.	Creativity Deep Knowledge Vision Collaboration	A20

Digital leaders possess digital skills, communicate effectively, make strategic decisions, and adapt to capitalize on opportunities from technology trends.	Digital Skills Communication Strategic Decision-making Adaptation	A21
Successful digital leaders are known as strong leaders with digital skills.	Strong Leadership Digital Skills	A22
Important digital leadership characteristics include communication, transparency, agility, collaboration, innovation, empowerment, and adaptability.	Communication Transparency Agility Collaboration Innovation Empowerment Adaptation	A23
Digital leader traits include vision and skilled digital skills to support employees.	Vision Digital Skills Support	A8
Digital leadership characteristics include knowledge, digital literacy, a clear vision of goals, agility, risk-taking, and collaboration.	Knowledge Digital Literacy Clear Vision of Purpose Agility Risk Taking Collaboration	A30
Digital leaders must be able to lead business transformation by using digital skills and strategic leadership.	Digital Skills Strategic Leader	A11
Effective leadership is characterized by the ability to implement a digital vision in the digital transformation process.	Digital Vision	A13
Leadership capabilities include cognitive, interpersonal, and strategic skills.	Cognitive Interpersonal Strategic Skills	A3
Successful leaders consider the skills and knowledge digitally built into the organization.	Digital Skills Digital Knowledge	A24
Digital enterprises' success depends heavily on leaders' ability to keep up with technological developments, design directions, and develop digital strategies.	Digital Strategy	A25
Transparency is essential for digital leadership innovation.	Transparency	A26
Digital literacy, a positive attitude, digital skills, digital knowledge sharing, and a participatory style are capabilities that build trust and influence the performance of digital leaders.	Digital Literacy Digital Skills Digital Knowledge	A16
Digitally skilled leaders can influence employees and improve performance by maintaining a consistent digital culture.	Digital Skills	A27
Leaders must have the digital skills to make fast, accurate, and participatory decisions to ensure sustainable company performance.	Digital Skills Decision Making	A28
The stronger the digital leader, the higher the potential for the company to make accurate decisions and drive innovation across the organization.	Strong Leadership	A12
The decision-making process can be accelerated by visionary leadership.	Visionary Leader	A10

Inspirational leaders are essential in making the right decisions, and leaders must develop digital skills.	Inspirational Decision Making Digital Skills	A4
Digital leaders have the competencies of digital vision, digital knowledge, failing fast, managing diverse teams, and empowerment.	Digital Vision Digital Knowledge Collaboration Empowerment	A14
Digital leadership can manage product descriptions, responses to customer inquiries, marketing strategies, problem-solving, and decision-making processes.	Decision Making	A29

4.2 Characteristics of Digital Leadership

Once the keyword extraction results are obtained, the next step is to categorize the keywords as critical attributes in the context of digital leadership characteristics. Through the literature analysis, we found as many as 20 characteristics of digital leadership that are most frequently highlighted in the literature that we speak of. Visionary leaders can design a clear and meaningful vision to support the organization's digitization process and improve efficiency in decision-making. Therefore, it is essential for digital leaders to continuously enrich their vision to face the various challenges that may arise in the digital era [8], [15], [19], [20]. Digital skills involve the expertise and capabilities required by digital leaders to inspire and guide information technology-related creativity across organizational structures [16], [4], [21], [22], [23]. Being able to demonstrate a strong understanding of digital tools and how technology impacts businesses is an indication of digital competence [9]. To encourage creativity and new ideas through the use of digital technology, leaders must be able to communicate with their followers. This may be accomplished by enabling, encouraging, and connecting with the respective followers [10], [19], [24]. Agility encompasses a leader's ability to move and respond quickly to changes and challenges in dynamic work processes [19], [24]. Adaptability reflects leadership skills in keeping focused and achieving goals in an ever-changing environment that demands resilience and strong adaptability [1], [24]. A leader who can recognize, evaluate, and strategically take risks in the face of digital transformation and rapid corporate advances is a risk-taker who is very astute [1], [19]. Inspirational digital leadership involves motivating others by evoking emotions, beliefs, values, and behaviors and encouraging them to work hard [16], [1]. Transparency in digital leadership helps to communicate progress and obstacles when setting goals clearly and builds team trust to understand the work and influence overall performance [4], [1], [25].

Communication is a foundational element in digital leadership skills that provides creative effectiveness in social interactions and openness to new ideas from teams and stakeholders [24]. In the face of the digital revolution, leaders must be innovative to maintain their competitive advantage. Digital leaders should encourage their team members to try new things, make mistakes, change, and evaluate the outcomes. Innovative thinking is vital for digital leaders, and they should promote creative thinking [26], [24]. Supportive leadership relates to various behaviors, including meeting subordinates' needs and preferences, promoting positive attitudes, building confidence, respecting employees, and fostering quality relationships [1]. Strong leadership designs and drives transformation. In this situation, strong leadership capability refers to how a manager drives change [5]. A digital leader with strong digital literacy skills can guide an organization through digital transformation with deep insight and awareness of possible changes. Digital literacy skills include a comprehensive understanding of the various potential changes associated with digitization [16]. Forward-thinking leaders are considered leaders who utilize technology wisely, showing initiative in adopting digital technologies. Digital leaders drive digital innovation and have a well-thought-out strategy to transform the company by applying digital technology [5]. Digital leaders act as strategic executors with a deep understanding and the ability to ensure successful alignment between business aspects and digital technology. A solid strategy is essential in digital transformation to advance digital business development [11], [27]. Leaders must make decisions more quickly, often without full access to the information needed and without adequate time to conduct in-depth consideration and analysis of the decisions taken [28], [29]. Those who are in positions of authority and who

demonstrate the path to a social and political environment that is more equal and satisfying by promoting the self-determination of individuals, communities, and countries [24]. Clear commitment is essential in any initiative, and it is a significant obstacle to the level of commitment from leaders [15]. And finally, proactive leaders will take the initiative to drive digital transformation within their organizational structure [5]. Table 4 presents the characteristics of digital leaders; thus, the first research question can be answered.

Table 4. Digital Leadership Characteristics

Characteristics	ID Study
Visionary	A1; A8; A9; A13; A14; A15; A17; A19; A20; A30
Digital skill	A4; A8; A10; A11; A16; A21; A22; A23; A26; A29
Digital knowledge	A9; A14; A16; A20; A22; A30
Collaboration	A10; A14; A19; A20; A24; A30
Agility	A19; A24; A30
Adaptive	A1; A24; A26
Smart risk-taker	A1; A1; A30
Inspirational	A1; A4; A16
Transparency	A1; A4; A16
Communication	A16; A24; A25
Innovation	A15; A24; A26
Supportive leader	A1; A19; A24
Decision making	A4; A28; A29
Strong leadership	A5; A8
Digital literacy	A16; A30
Forward-thinking	A5; A16
Strategic leader	A3; A11
Empowerment	A14; A24
Commitment	A15
Proactive	A5

4.3 Key Characteristics of Digital Leadership

Some key characteristics often associated with digital leadership have been found by analyzing previous literature. In this context, we outlined digital leaders' essential factors related to digital transformation. Thus, the second research question has been answered. We identified seven crucial characteristics of digital leadership that can influence the success of digital transformation.

1. Digital leaders must have a long-term vision for the future. Previous research found that the critical job of digital leaders is to choose digital consultants with a clear vision to ensure that organizational transformation objectives are met [19]. Therefore, a digital leader must demonstrate an innovative and visionary nature and a readiness to use their intuition to face and respond to constant disturbances. One of the most critical aspects of digital leadership is the incorporation of information technology and digital transformation into the management of an organization or group.
2. Regarding digital leadership, having strong digital talents is necessary to formulate digital transformation concepts successfully. In the digital era, leadership requires the capacity to inspire and encourage innovation inside an organization, according to research that was conducted in the past [10]. To succeed in an ever-changing business environment, digital leadership requires a deep understanding of technology and conventional leadership skills.
3. Digital knowledge, an essential foundation for a digital leader, involves an in-depth understanding of digital tools and how these technologies affect organizational structures and operations. In digital transformation, digital knowledge not only serves as support but is also a significant driver for enhancing the value and capabilities of organizations. According to

previous research, leaders lacking digital knowledge skills can hinder an organization's progress in adopting new technologies and responding to evolving trends [9]. Therefore, the presence of leaders with strong digital knowledge will contribute significantly to more effective and proactive development in the face of technological changes and trends in this digital era.

4. Collaboration is crucial. Digital leaders must be able to form relationships that can inspire individual and material innovation. Previous research findings highlighted that collaboration strengthens synergies between team members across aspects such as location, time, and culture [30]. Leaders who understand how to facilitate and leverage digital collaboration can lead teams and organizations more efficiently in the face of challenges and opportunities in this digital age.

5. Agility is essential for digital leaders, requiring the ability to simultaneously maintain focus on a long-term vision and closely monitor day-to-day activities. Agility is the ability to adjust quickly to changes in the work process [24]. These include innovation, openness of mind, adaptability, and change of direction. Important factors include the ability to adapt to changing technologies and markets. Agile leaders enable organizations to innovate, compete, and add value in digital transformation.

6. In today's digital age, adaptive leaders are essential to deliver competitive advantage and guide organizations through change. To stay focused on their goals in a constantly changing environment, digital leaders need to have strong adaptability. In previous research, this adaptive role was identified through four main aspects: having extensive knowledge and information awareness, planning and prioritizing activities, and making decisions decisively and quickly [1].

7. A smart risk-taker, an essential element in the digital leadership role, involves the readiness to take risks and allocate investments to efforts that may not guarantee a high level of success [30]. Leaders who are intellectual enough to take risks are the ones who are responsible for creating organizational cultures that are imaginative, adaptive, and sensitive to change for their organizations. They use risk as a tool to achieve strategic goals and guide organizations toward success in the digital age.

5 Conclusion

The findings from this study reflect the variety of characteristics, roles, and skills associated with digital leadership. Through a literature review involving 30 selected articles, this research identified 73 keywords related to digital leadership derived from literature citations. In the process, researchers found 20 digital leadership characteristics that appeared most frequently in the literature, including visionary, digital skills, digital knowledge, collaboration, agility, adaptation, smart risk taker, inspirational, transparency, communication, innovation, supportive leader, strong leadership, digital literacy, forward-thinking, strategic, decision-making, empowerment, commitment, and proactive. In addition, the study highlights seven critical aspects of digital leadership that can influence the success of digital transformation: vision, digital skills, digital knowledge, collaboration, agility, adaptability, and smart risk-taking. Based on our results, we indicate crucial paths for additional inquiry into how to measure digital leadership and the degree to which digital transformation is effective.

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