

Digital Leadership: Much Ado about Nothing?

Daniela Martins Diniz¹ , Antônio Moreira de Carvalho Neto² , Anderson de Souza Sant'Anna³ 

¹ Universidade Federal de São João del-Rei, Departamento de Ciências Administrativas e Contábeis, São João del-Rei, MG, Brazil

² Pontifícia Universidade Católica de Minas Gerais, Programa de Pós-Graduação em Administração, Belo Horizonte, MG, Brazil

³ Fundação Getúlio Vargas, Escola de Administração de Empresas de São Paulo, São Paulo, SP, Brazil

How to cite: Diniz, D. M., Carvalho Neto, A. M., & Sant'Anna, A. S. (2024). Digital leadership: Much ado about nothing?. *BAR-Brazilian Administration Review*, 21(3), e240035.

DOI: <https://doi.org/10.1590/1807-7692bar2024240035>

Keywords:

industry 4.0; leadership theories; digital leadership; relational leadership

JEL Code:

M1

Received:

March 05, 2024.

This paper was with the authors for one revision.

Accepted:

July 28, 2024.


Publication date:

August 08, 2024.


Corresponding author:

Daniela Martins Diniz
Universidade Federal de São João del-Rei,
Departamento de Ciências Administrativas e Contábeis
Av. Leite de Castro, n. 847, Fábricas, CEP 36301-182,
São João del-Rei, MG, Brazil


Editors-in-Chief:

Ivan Lapuente Garrido 
(Universidade do Vale do Rio dos Sinos, Brazil)

Editors:

Ricardo Limongi 
(Universidade Federal de Goiás, Brazil)

Associate Editor:

Dusan Schreiber 
(Universidade Feevale, Brazil)

Reviewers:

Two anonymous reviewers.

Editorial assistants:

Eduarda Anastacio and Simone Rafael
(ANPAD, Maringá, Brazil).

ABSTRACT

Objective: this study analyzes the theory of digital leadership, comparing it with other related theories in the field. This work results from 15 years of reflections by a group of researchers who have been studying leadership in Brazil. The question that guided this study was: Are new leadership attributes necessary, or will individuals capable of leading in the 4.0 Revolution combine existing attributes found in the literature? **Methods:** this is a theoretical study that provides a critical and comparative review of some theories in the field of leadership. **Results:** digital leadership reinforces several attributes highlighted in previous theories, whether in behavioral approach, by emphasizing the leader's importance in creating conditions for people's development; in relational theory, by establishing trust relationships with people, creating multilateral relational networks; in transformational theory, by articulating a collective vision legitimized by followers; or in situational theory, by being able to adapt to rapidly changing contexts. Therefore, the theory of digital leadership does not add anything really new. **Conclusions:** 'digital leadership' is a combination of behavioral, transformational, relational, and situational attributes with the addition of contextual variables from the 4.0 Revolution.

Data Availability: BAR – Brazilian Administration Review encourages data sharing but, in compliance with ethical principles, it does not demand the disclosure of any means of identifying research subjects.

Plagiarism Check: BAR maintains the practice of submitting all documents received to the plagiarism check, using specific tools, e.g.: iThenticate.

Peer review: is responsible for acknowledging an article's potential contribution to the frontiers of scholarly knowledge on business or public administration. The authors are the ultimate responsible for the consistency of the theoretical references, the accurate report of empirical data, the personal perspectives, and the use of copyrighted material. This content was evaluated using the double-blind peer review process. The disclosure of the reviewers' information on the first page is made only after concluding the evaluation process, and with the voluntary consent of the respective reviewers.

Copyright: The authors retain the copyright relating to their article and grant the journal BAR – Brazilian Administration Review, the right of first publication, with the work simultaneously licensed under the Creative Commons Attribution 4.0 International license (CC BY 4.0) The authors also retain their moral rights to the article, including the right to be identified as the authors whenever the article is used in any form.



INTRODUCTION

Klaus Schwab (2016), one of the pioneers of the debate around Industry 4.0, emphasizes that this revolution will significantly alter not only the business world but also how society lives, works, and relates. This new system is unlike anything humanity has experienced before and will generate both benefits and challenges (Herder-Wynne et al., 2017; Schwab, 2016). Conceptualized as a new technological system that adopts digital technologies, artificial intelligence, and advanced robotics, it induces intense integration and digitalization of the production/distribution of goods and services (Israel, 2021; Sant'Anna et al., 2022; Sartori et al., 2018).

Statistics highlight some transformations brought about by the latest technological revolution. A Deloitte (2018) study reveals that 71% of Brazilian executives participating in the research understand that Brazilian leaders and companies still lack the necessary skills to compete in this environment, and that their employees need to be trained to acquire these new characteristics.

Although Industry 4.0 is a global movement, disparities are observed among countries regarding the level of adoption of the technologies brought by this recent technological revolution. A KPMG Brazil (2022) study indicates that, although Brazilian executives participating in the study understand the concept of the Fourth Industrial Revolution, the organizations they are part of are still adapting to the stage called 3.0, which includes machine automation and process digitization. Executives also acknowledge that the evolution toward Industry 4.0 is an irreversible path and that developed countries are well ahead in this movement.

In the field of leadership, the movement around Industry 4.0 (Schwab, 2016) raises several research questions that have not yet been properly addressed. One of the current prominent questions in this field revolves around the attributes required of leaders in this context. Various research questions emerge: Does the so-called digital leadership (Erhan et al., 2022; Khaw et al., 2022) imply the creation of a new theory or the combination of different leadership theories? What attributes are required of leaders capable of leading in the context of the 4.0 Revolution? Based on this last question, we conducted an empirical study with 14 Brazilian researchers specializing in leadership and 77 executives associated with professional master's degrees and leadership training courses from four renowned business schools in Southeast Brazil. Initially, we proposed a theoretical model based on extensive literature review, which identified four dimensions required of individuals capable of leading in the context of the 4.0 Revolution, namely: (a) relational; (b) people-centered; (c) digital; (d) innovation and adaptability. Taking these dimensions as a starting

point, the research findings reveal, firstly, a high perception of importance for all these dimensions in the view of the Brazilian executives and researchers interviewed.

Therefore, according to the literature on digital leadership, individuals capable of leading in the context of the 4.0 Revolution should possess and/or develop attributes related to these four dimensions (relational, human, digital, and innovation). However, when comparing the perceptions of executives and Brazilian researchers about these four dimensions, it was observed that, in closed questions, they attributed greater importance to the human dimension, followed by the relational dimension; thirdly, the innovation dimension and the digital dimension were considered the least important. For the open questions, the order of importance is reversed between the first two: the relational dimension appears as the most relevant, followed by the human dimension (people-centered).

Therefore, although in reverse order in open and closed questions, the two most relevant dimensions for leadership in the digital age in the view of Brazilian executives and researchers are the relational and human dimensions already emphasized in leadership theories that emerged long before Industry 4.0.

It is noteworthy that in this era of Industry 4.0, characterized by intensive use of digital and intelligent technologies, characteristics most related to technology occupied the least important position in the view of researchers and executives. This finding raises questions related to the recent discussion about the need for a new leadership theory for the context of the 4.0 Revolution. Are new leadership attributes really necessary? Or will the digital leader capable of leading in this new environment combine old attributes in the face of a new technological context?

Due to the contemporary nature of the topic, there is still no consensus on this question, a gap in the literature that motivated this study, whose objective is to analyze the theory of digital leadership compared to previous theories in the field of leadership, particularly the behavioral approach, situational theory, transformational theory, and relational theory.

The choice of these four leadership theories was because the theoretical model of the digital leader identified four relevant dimensions for the leader in the context of the 4.0 Revolution, among them the human dimension (behavioral), the relational dimension, and the situational dimension (understood here as a contextual variable associated with the digital transformation movement). Transformational leadership was also included in this study because it deals with the human dimension and it is one of the dominant theories in the

mainstream originated in the USA and widely used in the field of leadership (Carvalho Neto et al., 2012).

From a historical perspective, in a synthesis, the hundred years of studies in the field of leadership can be visualized from some major theoretical currents. Among the most discussed are: (a) the behavioral approach (between 1950 and 1960); (b) the situational and contingency theories (between 1960 and 1970); (c) the new leadership approach (after the 1970s), which includes a wide variety of theories, among them transactional leadership (Bass, 1985; Bass & Avolio, 1990); transformational leadership (Bass & Avolio, 1990; Carvalho Neto et al., 2012; Gomes & Cruz, 2007; Vizeu, 2011); and, more recently, relational leadership (Sant'Anna et al., 2015), in addition to digital leadership (Guzmán et al., 2020; Kwiotkowska et al., 2021; Petry, 2018; Puhovichová & Jankelová, 2021). The focus of this study is on behavioral, situational, transformational, and relational theories, comparing them with the recent phenomenon of digital leadership.

To delimit these five theories, which are complex and comprehensive, the criterion used for delineation was the discussion around 'attributes required of the leader.' In other words, what each theory considers important for the leader to possess or develop for the exercise of their leadership. It is also emphasized that within each theory, four central aspects were discussed: (a) how the theory originated; (b) which studies/classic authors are associated with each theory; (c) attributes required of the leader; (d) criticisms of the theory.

In addition to this introduction, we present in this study the concept and attributes of the digital leader. Subsequently, we discuss the assumptions of behavioral, situational, transformational, and relational theories, comparing them with the theory of digital leadership and highlighting convergences and divergences between them. We conclude the article by reflecting on whether there is a need for a theory of digital leadership, or if this would be a (not so) innovative combination of previously widely studied and used theories, some of

them for about half a century. We also bring forth alternative avenues for future research.

DIGITAL LEADERSHIP: CONCEPT AND ATTRIBUTES OF THE DIGITAL LEADER

While there are several definitions of digital leadership in the literature, such as Narbona's (2016) concept, which emphasizes the human aspect of leadership by adopting digital tools in the virtual world, or Sasmoko et al.'s (2019) definition, which describes digital leadership as a combination of leadership capabilities and digital technology to support the decision-making process (Sasmoko et al., 2019), many aspects of this literature remain obscure (Tigre et al., 2023). According to Erhan et al. (2022) and Khaw et al. (2022), digital leaders are those who manage digital transformation processes of companies and adapt multiple leadership theories. In this direction, Abbu et al. (2022) emphasize that digital leadership is multidimensional, comprising attributes of different leadership styles.

Before presenting the results of the studies addressing the attributes of digital leaders, it is worth explaining how the literature mapping process around the topic of digital leadership was conducted. Firstly, the largest international database of peer-reviewed literature abstracts and citations, Scopus, was consulted. Data collection was conducted on 04/27/2023 using Scopus's search engine with two keywords ('digital leadership' or 'leadership 4.0') in the document title, without temporal limitation, resulting in 47 publications within the business, management, and accounting area. Secondly, a search was conducted in the main Brazilian national database, *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES), where only one executive letter with the words 'digital leadership' in the title, by Figueiredo (2021), was identified. Thus, the literature mapping primarily focused on international publications.

The methodological approach for the literature mapping around the topic of digital leadership is summarized in Table 1.

Table 1. Description of the methodological path.

Phases	Description
Choosing the database and identifying keywords	Scopus Base, in the search for publications that contain one of the two expressions in English in the title: 'digital leadership' or 'leadership 4.0'. Search code: (TITLE ('leadership 4.0') OR TITLE ('digital leadership')) AND (LIMIT-TO (SUBJAREA , 'BUSI'))
Definition of selection criteria	No temporal delimitation, as it is a contemporary topic. Publications limited to the area of business, management, and accounting: 47 documents.
Data collection, organization, and analysis	Import of publications into Mendley software to organize references. - Number of publications found: 47. - Number of publications removed due to duplicity: 7. - Number of publications tracked (title and abstract reading): 40. - Number of publications removed due to little proximity to the central theme (skills required of the digital leader): 13. - Number of publications read in full and included in the sample: 27. - Identification of the most cited works.

Note. Developed by the authors based on the study by Moreira, J. F. A., & Rua, O. M. M. L. (2023). Linking emotional intelligence and transformational leadership: An application to technology sector firms' leaders. *Revista de Gestão e Secretariado*, 14(1), 1024-1048. <https://doi.org/10.7769/gesecv13i4.1569>

Therefore, this section presents the results of the most cited studies identified in the literature mapping, respecting the chronological order of the works.

Herder-Wynne et al. (2017), in an executive report from Oxford that deals with Leadership 4.0, highlight the need for leaders to be capable of "... navigating complexity, tolerating uncertainty & ambiguity, harnessing inner (re)sources of creativity and wisdom, connecting with a higher purpose, and ultimately creating the conditions for self and others to flourish." (p. 10) Additionally, leaders should be capable of transcending organizational boundaries and developing collaborative networks with external partners, over-

coming cultural differences in pursuit of common and collective objectives. The authors also mention the necessity of replacing the command and control-based leadership model with a shared leadership theory that promotes collaboration, autonomy, trust, and transparency (Herder-Wynne et al., 2017).

Mdluli and Makhube (2017) conducted research outside the African continent, involving industry leaders, aiming to understand how leadership competencies have changed in the context of the Revolution 4.0. The authors proposed six key characteristics of Leadership 4.0, showed in Table 2.

Table 2. Characteristics of Leadership 4.0.

Characteristics	Description
Intelligence Quotient (IQ)	The leader's ability to think and reason; enables leaders to learn and understand new business concepts and models.
Emotional Quotient (EQ)	The ability to understand and use emotions to promote higher levels of collaboration. Leaders with emotional intelligence exhibit traits such as self-awareness, self-regulation, empathy, and social skills.
Digital Quotient (DQ)	The ability to drive rapid adaptation and transformation by creating and implementing a digital mindset within the organization.
Agility and Adaptability Quotient (AAQ)	The ability to be flexible and agile, adapting to the rapidly changing global context.
Sociocultural Quotient (SCQ)	The ability to operate in different cross-cultural environments.
Creativity and Innovation Quotient (CIQ)	The ability to create creative and learning environments, implementing a culture of innovation at different levels of the organization.

Note. Developed by the authors based on Mdluli, S., & Makhube, O. (2017). Defining leadership competencies needed for the fourth industrial revolution: leadership competencies 4.0. Africa Expansion Project. Bank Seta South Africa. https://www.bankseta.org.za/wp-content/uploads/2018/08/Bankseta_Defining-Leadership_Siboniso-Mdluli-Olebile-Makhube.pdf

In 2018, Oberer and Erkollar (2018) conducted a theoretical study aiming to outline an image of what a leader should be like in the context of Industry 4.0. Leadership 4.0, from the authors' perspective, signifies:

Digital leadership (leadership 4.0) is a fast, cross-hierarchical, team-oriented, and cooperative approach, with a strong focus on innovation. The personal competence of the leader, their mindset as well as their ability to apply new methods and instruments such as design thinking, are critical dimensions for 4.0 leaders. Design thinking is a methodology used by designers to solve complex problems and find desirable solutions. A design mindset is a solution focused and action-oriented toward creating a preferred future (Oberer & Erkollar, 2018, p. 6).

Oberer and Erkollar (2018) developed a matrix of Leadership 4.0 considering two axes: (a) concern for innovation/technology; (b) concern for people. In each quadrant, there is a leadership style most suitable for the leader. For example, an individual highly

skilled in technology is likely to prefer a technology-oriented leadership style, such as the technology leader 4.0. An individual seeking the involvement of followers in the decision-making process is more likely to prefer a follower-centric leadership style, such as the social leader 4.0. The freshmen leader primarily focuses on the product with little orientation toward people and technologies. On the other hand, the social leader prioritizes relationships with people and generally possesses the ability to create a friendly environment for employees, regardless of innovation and technology. The technology leader 4.0 focuses on determining how new technologies can be leveraged to create value in organizations. In this case, orientation toward innovation and low concern for the human dimension prevail. Finally, the digital leader focuses on understanding how technology affects people and how the organizational model can combine technological and human aspects to create value. These are considered essential characteristics in the literature on digital leadership and therefore this would be the style considered most productive in the context of the 4.0 Revolution (Oberer & Erkollar, 2018).

Sartori et al. (2018), in a literature review-based study, concluded that seven competencies are fundamental for leaders in Industry 4.0: (a) vision and building the future: developing new solutions in new fields of knowledge, based on a long-term logic and digital technologies; (b) boldness and creativity; (c) tolerance for risk and error; (d) ability to build a transformative purpose that inspires individuals; (e) ability to establish valuable relational networks; (f) systematic interaction with the customer; (g) ability to ask relevant questions.

The book chapter written by Petry (2018) mentions the main characteristics of digital leadership that should be considered in environments of high volatility, uncertainty, complexity, and ambiguity (VUCA), namely: agile leadership (thinking in different scenarios and considering different options); participative leadership (valuing the autonomy of followers); network leadership (developing relational connections); open leadership (communicating well, giving and receiving feedback); confident leadership (demonstrating trust in followers).

Kelly's (2018) book presents leadership styles more suited to each phase of the industrial revolutions (IR). For the first IR, charismatic leadership is related to how the leader acts and mobilizes an organization through personal characteristics. The second IR was strongly shaped by scientific management, in which leaders take on a more top-down management style. In the third IR, leadership has a more relational and transformational nature, in the sense of encouraging followers' autonomy to innovate and collaborate. Finally, the fourth IR requires a combination of some characteristics from the previous phase plus new attributes, going beyond transformational and relational leadership. Among others, there is a need for a more specific focus on creating environments for experimentation, learning, and innovation.

The theoretical study by Suyanto et al. (2019) analyzes how the characteristics of transformational leadership reflect the character of the millennial generation in the Fourth Industrial Revolution. The authors point out that transformational leadership can help the millennial generation perform their roles optimally within an organization, as it is a leadership style based on inspiring principles and supporting individual development. These characteristics are very useful in facilitating individuals' adaptation to the constant changes resulting from the technological advancements of Industry 4.0. Additionally, transformational leadership is suitable for organizations operating in dynamic environments that demand high

levels of creativity and innovation (Suyanto et al., 2019).

However, Suyanto et al. (2019) reveal that the expected outcomes of transformational leadership can only be achieved when the leader inspires employees to be more aware of the importance of common goals and collective interests, paying attention to employees' self-esteem and self-actualization, providing constant challenges, and stimulating creativity. Moreover, a transformational leader must develop the ability to identify the different needs, capabilities, and aspirations of individuals, which may not be a simple task.

Guzmán et al. (2020) conducted a literature review of international literature on the key characteristics of leadership in the context of Industry 4.0, resulting in a model with four groups of skills: (a) cognitive, (b) interpersonal, (c) business, and (d) strategic. The authors conceptualize the skills as follows: (a) cognitive ability, including focus, attention, creative thinking, decision-making ability, and strategic problem-solving; (b) interpersonal skills, related to communication and relationship-building ability; (c) business skills, including the ability to organize, negotiate, and coordinate resources of different kinds; (e) strategic skills, associated with the ability to build the mission, vision, and business strategies.

Guzmán et al.'s (2020) analysis indicates that the skills that best suit the context of the 4.0 Revolution are cognitive, interpersonal, and strategic, with the exception of business skills, which showed the weakest relationship with the characteristics of the 4.0 Revolution. For the group of cognitive skills, the main characteristics identified were the leader's communication ability and active listening, encouraging collaboration, and building a culture of feedback and openness. In the group of interpersonal skills, the main ones are: negotiation, being able to establish agreements that favor collective objectives; persuasion, being able to inspire people to adopt an open and digital mindset; social perception, being able to understand how to develop people and ensure a climate of trust and collaboration. For strategic leadership, the most highlighted skills were: a leader capable of building a future vision collaboratively; and the ability to encourage problem-solving through experimentation.

Kwiotkowska et al. (2021) conducted a study in the energy industry to examine the relationship between leadership competencies (intellectual, managerial, emotional) and the effectiveness of Leadership 4.0. The authors used the following dimensions of leadership as reference: intellectual competencies (criti-

cal analysis, self-vision, strategic perspective); managerial competencies (communication, resource and result management, team development and empowerment); socio-emotional competencies (self-awareness, sensitivity, ability to influence and motivate).

The study results indicate that leaders can combine different leadership attributes. In the studied sector, the combination of these two groups of competencies seems to be especially relevant: managerial competencies with intellectual competencies or managerial competencies with emotional competencies. That is, managerial competencies are very important in the conditions of Industry 4.0, but alone they are not sufficient and should be combined with intellectual or socio-emotional competencies (Kwiatkowska et al., 2021).

The theoretical research by Puhovichová and Jankelová (2021) discusses the leadership characteristics most aligned with the context of Revolution 4.0. The authors stated that the main attributes of Leadership 4.0 are: the ability to communicate and understand changes; defining methods aligned with corporate culture; mentoring and coaching ability; orientation toward collective interests; ability to create a culture of openness, learning, transparency, and trust; people orientation.

Karippur and Balaramachandran's (2022) study analyzed the effectiveness of some attributes of digital leadership through an applied study with a sample of leaders and senior managers from the Asia-Pacific region. Creating a clear digital vision, having a high focus on creating innovation environments, aligning digitalization strategy with corporate strategy, and having the ability to formulate a digital strategy were the four attributes that had the greatest impact on leadership effectiveness, according to these authors.

Abbu et al. (2022) interviewed leaders in USA and German organizations to verify which qualities enhance the performance of digital leaders. The authors assumed that digital leadership is multidimensional, comprising elements of different leadership styles, and developed a scale of 15 attributes required of digital leaders, namely: honesty; humility; courage to change; ethical behavior; growth mindset; transparent agenda; data focus; ability to inspire individuals and teams; digital capabilities; storytelling; positive attitude; knowledge sharing; participative leadership style; skills acquisition; and ability to achieve results.

The empirical study by Erhan et al. (2022) conducted with 320 managers from the Turkish textile industry sought to demonstrate the relationship between digital leadership and innovative work behavior. The results showed that employees' perceptions of digital leadership have a positive and significant effect on all dimensions of an employee's innovative work behavior. Additionally, leaders with high digital skills were perceived positively by employees, who tend to adopt innovative behaviors when they have digitally proficient leaders.

A bibliometric study by Tigre et al. (2023) pointed out that although many essential leadership capabilities remain the same, the unique characteristics of the ongoing digital transformation also require new capabilities. The main change concerns the weight that innovation and adaptability issues have gained in the context of digital transformation. The authors pointed out as being central to the digital leader the following capabilities: (a) focus on people and interpersonal relationships (communication, transparency, trust); (b) personal aspects (ability to manage one's 'inner self,' deal with one's own emotions); (c) long-term vision (innovation, ability to provide a vision and direction); (d) task achievement, i.e., the ability to achieve the desired result through experience and digital skills.

It is worth noting, finally, that some studies had already introduced the notion of e-leadership before the rise of the Fourth Industrial Revolution, defining it as a leader who coordinates individuals and teams virtually (Avolio et al., 2014; DasGupta, 2011). Both leadership styles (e-leadership and digital leadership) face common challenges: how to overcome the physical distance from subordinates; how to communicate effectively with geographically dispersed teams; how to inspire followers electronically; how to build trust with someone the leader has never seen in person; and so on (DasGupta, 2011). Therefore, the growth of virtual work has reshaped how leaders interact with their followers (Bell et al., 2023). However, as seen throughout this section, the characteristics of a digital leader are more varied, encompassing other attributes beyond those required by a leader who coordinates teams virtually.

Based on the literature review, a table was prepared synthesizing the main attributes around the digital leader (Table 3).

Table 3. Attributes of the digital leader.

Dimension	No.	Attributes	Authors
1. Relational (focus on the collective)	1.1	Shared leadership that promotes high levels of collaboration	Mdluli and Makhupe (2017); Herder-Wynne et al. (2017); Oberer and Erkollar (2018); Kelly (2018); Abbu et al. (2022); Erhan et al. (2022); Tigre et al. (2023)
	1.2	Ability to develop transparent and trustworthy relationships	Herder-Wynne et al. (2017); Guzmán et al. (2020); Puhovichová and Jankelová (2021); Abbu et al. (2022); Erhan et al. (2022); Tigre et al. (2023)
	1.3	Capacity for communication and active listening	Petry (2018); Guzmán et al. (2020); Kwiotkowska et al. (2021); Puhovichová and Jankelová (2021); Tigre et al. (2023)
	1.4	Ability to establish relational networks	Petry (2018); Sartori et al. (2018); Erhan et al. (2022)
2. People-centered focus	2.1	Ability to create conditions for the development of individuals	Herder-Wynne et al. (2017); Oberer and Erkollar (2018); Guzmán et al. (2020); Kwiotkowska et al. (2021); Puhovichová and Jankelová (2021)
	2.2	Ability to mobilize people toward objectives	Oberer and Erkollar (2018); Sartori et al. (2018); Suyanto et al. (2019); Abbu et al. (2022)
	2.3	Dealing with and accepting diversity	Herder-Wynne et al. (2017); Mdluli and Makhupe (2017); Črešnar and Nedelko (2020); Karippur & Balaramachandran (2022)
	2.4	Ability to understand and manage both others' and one's own emotions	Mdluli and Makhupe (2017); Kwiotkowska et al. (2021); Puhovichová and Jankelová (2021)
3. Digital	3.1	Capacity to learn and apply new digital technologies	Oberer and Erkollar (2018); Sartori et al. (2018); Abbu et al. (2022); Tigre et al. (2023)
	3.2	Ability to lead teams in virtual environments	Avolio et al. (2014); Tigre et al. (2023)
	3.3	Capacity to implement a digital mindset within the organization	Mdluli and Makhupe (2017); Oberer and Erkollar (2018); Karippur & Balaramachandran (2022)
4. Innovation and adaptability	4.1	Ability to create a culture of learning	Mdluli and Makhupe (2017); Kelly (2018); Sartori et al. (2018); Herder-Wynne et al. (2017); Puhovichová and Jankelová (2021); Abbu et al. (2022); Karippur & Balaramachandran (2022); Erhan et al. (2022).
	4.2	Adaptability to rapidly changing contexts	Mdluli and Makhupe (2017); Petry (2018); Puhovichová and Jankelová (2021); Erhan et al. (2022); Tigre et al. (2023)
	4.3	Creative and innovative thinking	Mdluli and Makhupe (2017); Herder-Wynne et al. (2017); Sartori et al. (2018); Guzmán et al. (2020)
	4.4	Vision for the future	Oberer and Erkollar (2018); Sartori et al. (2018); Tigre et al. (2023)
	4.5	Acceptance and management of complexity and uncertainty	Herder-Wynne et al. (2017); Petry (2018); Karippur & Balaramachandran (2022)

Note. Developed by the authors.

Next, we will discuss the four chosen theories (behavioral, situational, transformational, and relational), comparing them with digital leadership and highlighting similarities and differences. Within each theory, four central aspects were discussed: how the theory originated; which studies/authors are considered classic for each theory; attributes required of the leader; and criticisms of the theory.

THE BEHAVIORAL APPROACH OF LEADERSHIP

The behavioral approach of leadership originated in the 1950s and emerged as an attempt to understand the best behaviors adopted by successful managers. This set of theories postulate that leadership can be developed/learned and the leaders can modify and adapt their behaviors to achieve better performance in the organization, usually balancing the dyad of people-oriented and task-oriented behaviors (Blake & Mouton, 1978; Carvalho Neto et al., 2012).

The theories of the behavioral approach sought to compare behaviors of leaders considered effective versus ineffective, as well as to study the correlation between leader behavior and organizational performance. It was possible, therefore, to identify the most recommended behaviors and develop managers to

achieve the desired results (Blake & Mouton, 1978; Carvalho Neto et al., 2012).

One of the several classic theories of this approach is Likert's (1961), which proposes four leadership styles with different behaviors regarding relationships with people and decision-making processes. The style called 'coercive authoritarian' is considered very inappropriate because these leaders are authoritarian, centralized figures who adopt coercion mechanisms to obtain desired behaviors from subordinates. Even the 'benevolent authoritarian' style is also considered inappropriate because these paternalistic leaders reward goal achievement but still punish undesired behavior and centralize the decision-making process (Likert, 1961).

On the other hand, in the 'consultative participative' style, considered appropriate, followers are heard, although leaders continue to make decisions. Finally, in the 'total participation' style, considered very appropriate, decisions are made collectively based on team consensus. For Likert (1961), the latter would be the most effective style to achieve high levels of productivity and job satisfaction.

Another classic study of the behavioral approach is Blake and Mouton's (1964), which propose a managerial training program based on the Managerial Grid. The authors seek to explain people's behavior through two

orientations: production and/or people, which crossed and, varying in intensity levels, can generate combinations of up to 81 different leadership styles that impact the degrees of satisfaction and productivity of followers.

The people-oriented orientation relates to the leader's attention to the needs, interests, and well-being of followers. Generally, high people-oriented leaders are concerned about creating a positive work environment, developing healthy relationships, and supporting the development of their followers. On the other hand, production-oriented leaders are much more concerned about tasks, efficiency, and results. Leaders strongly oriented toward production are focused on achieving goals and maximizing productivity (Blake et al., 1964). The most effective leadership style here is one that can balance attributes of both orientations. Therefore, leadership styles are not fixed and can change over time, for example, through leadership development programs.

Theories within the behavioral approach of leadership have contributed to the creation of widely adopted leadership development instruments and programs by consulting firms until today. A common criticism addressed to the behavioral approach is the excessive emphasis on behavior, ignoring environmental and contextual factors that affect the exercise of leadership (Carvalho Neto et al., 2012; Fiedler, 1981). Moreover, to what extent is people's behavior a predictive variable? (Fiedler, 1981; Hersey & Blanchard, 1986). Questions like these have been widely addressed by subsequent studies.

THE BEHAVIORAL APPROACH VERSUS THE DIGITAL LEADERSHIP

Drawing comparisons between the assumptions of the theories within the behavioral approach and digital leadership, some common and some divergent points emerge. Firstly, it is worth noting that one of the constant dimensions in the digital leadership model is the focus on people, a central aspect of the behavioral theories of leadership. Thus, digital leadership reinforces important leader attributes already mentioned by the authors of behavioral theories, such as: creating conditions for people's development; mobilizing people toward goals; understanding and dealing with people's and their own emotions.

Another common point is that behavioral theories seek to identify desirable behaviors for managers to achieve desired results (Blake & Mouton, 1978; Carvalho Neto et al., 2012). In digital leadership, there is also this concern to identify desirable behaviors for leadership to deal with the intended objectives of digital transformation of organizations.

In the managerial grid of Blake and Mouton (1964), the people-oriented leaders pay much attention to the needs, interests, and well-being of followers, aspects closely related to the 'people focus' dimension of digital leadership theory.

In the leadership style called 'total participation' in Likert's (1961) model, decisions are made collectively based on team consensus, contributing to high levels of job satisfaction. In this direction, according to the theory of digital leadership, people's involvement in the decision-making process is considered an important factor, as evidenced in item "1.1 – Shared leadership that promotes high levels of collaboration."

A divergent point between the behavioral approach and the digital leader lies in the former's excessive emphasis on leader behavior, neglecting environmental and contingent factors that affect the exercise of leadership (Carvalho Neto et al., 2012; Fiedler, 1981). On the other hand, the digital leadership theory strongly considers contextual and contingent elements, visualized from three items in particular: 4.2 – Ability to adapt to rapidly changing contexts; 4.3 – Creative and innovative thinking; 4.5 – Accepting and dealing with complexity and uncertainty.

THE SITUATIONAL THEORY OF LEADERSHIP

As a counterpart to the internal emphasis given by behavioral theory, situational theory emerged in the late 1960s, highlighting the contextual and ever-changing nature of leadership, where not only the leader but also the followers and the situation (internal or external) are changing variables that determine the leadership process (Fiedler, 1967; Hersey & Blanchard, 1969). Here there is no best way as in the behavior approach.

Team performance is moderated by the leadership style, the level of acceptance of the leader's authority by followers, the degree of task structuring, and the leader's formal authority. The more leaders adapt their behavior style to meet the specific situation and the needs of their followers, the more effective they will be in achieving personal and organizational goals (Hersey & Blanchard, 1969). Situational theory thus posits the nonexistence of an ideal leadership style as opposed to the behavior approach. Therefore, there are no universally accepted leadership attributes, depending on variables such as the leader's style, the maturity of the follower, and the situation/context.

A classic work is that of Fiedler (1967), which proposes the contingency model. According to the author, group effectiveness depends on the interaction between leadership styles and the degree to which situations allow leaders to exert influence. page 15 highlights

an important variable in the process called 'favorability,' associated with the degree to which a given situation allows the leader to exert influence over the group. In this direction, a task-oriented style will be the most appropriate in favorable leadership situations; a relationship-oriented style will be better in intermediate situations; and a task-oriented style will be more effective in unfavorable group situations.

Regarding the effectiveness of leadership styles, Hersey and Blanchard (1986) developed the situational leadership model, which is based on the premise that effective leadership is a function of three variables: the leader's style, the maturity of the follower, and the situation/context. Three aspects determine whether a situation is favorable to leaders: (a) personal relationships between the leader and group members (positive, such as loyalty and friendship, or negative, such as lack of trust and openness); (b) power position, related to the leader's hierarchical position and his ability to confer rewards or punishments; (c) the nature of the task, which can be structured or unstructured.

Situational leadership theory is criticized for its excessive simplicity and lack of consideration of other important factors that influence leadership effectiveness, given its emphasis on how the environment can strongly influence the leadership process. Furthermore, situational theory focuses on the leader-follower relationship and the environment in which they operate, neglecting the multilateral relationships among different agents, an aspect emphasized by relational leadership theory.

THE SITUATIONAL THEORY VERSUS THE DIGITAL LEADERSHIP

When drawing comparisons between the assumptions of situational theory and those of digital leadership, both commonalities and divergences emerge. One of the consistent dimensions in the digital leadership model is the ability to adapt to rapidly changing contexts (Mdluli & Makhube, 2017; Petry, 2018; Puhovichová & Jankelová, 2021), which is aligned with the assumption of situational theory that highlights the contingent and evolving nature of leadership (Hersey & Blanchard, 1969). Both theories recognize that the leader must deal with uncertainties in the internal and external environments of the organization and that these contextual variables interfere with the exercise of leadership. Another common point is the recognition of social relations between leaders and followers as relevant in leading, emphasizing aspects such as trust and openness.

One point of divergence between situational and digital theories is the notion of the leader's hierarchical position and their ability to confer rewards or pun-

ishments to followers, an aspect emphasized by situational theory. On the other hand, digital leadership acknowledges that the leader does not necessarily occupy a formal hierarchical position in the organization and may emerge at any level. Additionally, it emphasizes a shared leadership nature that promotes high levels of collaboration (Abbu et al., 2022; Erhan et al., 2022; Oberer & Erkollar, 2018).

THE TRANSFORMATIONAL THEORY OF LEADERSHIP

The theory of transformational leadership, one of the dominant theories in the mainstream of the USA, was introduced by Burns (1978) and refined by Bass (1985). Since its inception, different theories have been linked to this perception, such as charismatic leadership (House, 1977) and visionary leadership (Vizeu, 2011). Although each of these theories presents peculiarities, they all have in common the investigation of characteristics associated with the transformational theory of leadership, such as charisma, the ability to articulate a collective vision, and the importance attributed to collective values (Gomes & Cruz, 2007; Moreira & Rua, 2023; Podsakoff et al., 1996).

However, none of these mentioned theories, including the transformational theory, surpasses later theories regarding the focus on the relationship with people (such as relational leadership theory, which will be addressed later), and they ended up focusing on leader behaviors, neglecting the role of followers in this relationship (Vizeu, 2011), not considering the follower as an actor but as a supporting character.

A pioneer in this line of research, Burns (1978) proposed a transformational leadership that involves the transformation of attitudes, motivations, and behaviors of both leaders and followers. The transformational leader prepares followers to perform tasks beyond their expectations (Gomes & Cruz, 2007; McDowelle, 2009; Soardo et al., 2020; Vizeu, 2011).

Another classic work is that of Bass (1985), who was a critic of transactional theory. The author believed that if the goal was achieved, the follower does not feel encouraged to perform tasks that exceed the agreed-upon expectations because the agreement regarding what they expect to receive has already been met. Hence, the emergence of the new transformational theory, where the leader is seen as an agent of change (Bass, 1985), capable of transforming situations, environments, and behaviors. Thus, the transformational leader seeks potential motives in followers to satisfy higher-level needs.

Transformational leadership goes beyond the exchange of incentives and presupposes self-development and intellectual stimulation of followers so that

they transcend their individual interests in favor of collective objectives (Carvalho Neto et al., 2012). The leader seeks to influence followers through shared values and an articulated vision that is recognized as legitimate (Gomes & Cruz, 2007; Howell & Avolio, 1993; Vizeu, 2011). The influence capacity of the transformational leader comes more from shared values than from the formal power derived from the position occupied. The performance of the transformational leader largely stems from the ability to influence followers and accept their influence. As a result, these leaders are able to achieve higher levels of performance and commitment from their teams, allowing followers to perform beyond expectations (Burns, 1978; Vizeu, 2011).

Bass (1985) suggests that the transformational leader possesses four main characteristics that distinguish them. Firstly, idealized influence represents the leader's ability to influence followers through an ideal recognized as legitimate by followers and shared values, surpassing individual interests (Carvalho Neto et al., 2012). This attribute was originally presented by Bass (1985) under the term 'charisma.' It is from this aspect that the transcendence of selfish interests emerges, which is an important condition for the transformational leadership (Vizeu, 2011).

Inspirational motivation, on the other hand, is understood as the transformational leader's ability to build a vision and communicate it enthusiastically to followers, inspiring them to find new possibilities and inducing them to make efforts beyond expectations (Avolio et al., 1991; Carvalho Neto et al., 2012). Intellectual stimulation relates to the leader's ability to provoke reflection, helping the follower to question their thoughts. According to Vizeu (2011), this aspect relates to the leader's argumentative ability to make the followers go beyond their own view of things. Individualized consideration, finally, concerns attention to the needs of each follower, seek-

ing to guide and support followers so that they develop within the organization. To do so, leaders seek to know each follower well, listen to their individual expectations and concerns, recognize differences among them, and provide systematic feedback (Carvalho Neto et al., 2012; McDowelle, 2009).

The theory of transformational leadership has been a relevant part of the leadership literature since the early 1980s. However, critics point out that such studies have focused on examining the effects of the leader on individual and organizational performance as well as focusing on internal factors of the organization. Thus, they have devoted little attention to investigating external variables that impact the exercise of leadership (Howell & Avolio, 1993). According to Carvalho Neto et al. (2012), transformational theory combines characteristics of several previous theories, "... arriving at a naive characterization of the leader as a superman, with all possible and imaginary qualities for a world of 'perfect' organizations." (p. 36).

THE TRANSFORMATIONAL THEORY VERSUS THE DIGITAL LEADERSHIP THEORY

When drawing comparisons between the transformational and digital leadership theories, several common points and some divergent ones emerge. Firstly, both theories stem from a deified view of leadership (Carvalho Neto et al., 2012), as if the leader had a diverse and immense set of competencies capable of mobilizing individuals toward results. Moreover, both consider that the leader combines different leadership attributes (Abbu et al., 2022). It is also observed that several aspects highlighted in the transformational theory of leadership reappear in digital theory. Table 4 illustrates such similarities.

Table 4. Transformational versus digital leadership theories.

Transformacional	Digital
Capacity to articulate a collective vision (Gomes & Cruz, 2007; Podsakoff et al., 1996)	Vision for the future (Oberer & Erkollar, 2018; Sartori et al., 2018); Ability to mobilize people toward goals (Oberer & Erkollar, 2018; Sartori et al., 2018; Suyanto et al., 2019)
Importance attributed to collective values (Gomes & Cruz, 2007; Podsakoff et al., 1996)	Relational dimension: focus on the collective (Erhan et al., 2022; Tigre et al., 2023)
Emphasize the emotional side of the leader-follower relationship (Vizeu, 2011)	Ability to understand and deal with the emotions of people and their own (Kwiotkowska et al., 2021; Mdluli & Makhupe, 2017)
Goes beyond the exchange of incentives and presupposes the self-development and intellectual stimulation of followers (Carvalho Neto et al., 2012)	Create conditions for the development of people (Guzmán et al., 2020; Puhovichová & Jankelová, 2021)
Individualized consideration: leaders seek to know each follower well, listen to their expectations, recognizing the differences between them (Bass, 1985; Carvalho Neto et al., 2012; McDowelle, 2009; Vizeu, 2011)	Dealing with and accepting diversity (Črešnar & Nedelko, 2020; Herder-Wynne et al., 2017; Mdluli & Makhupe, 2017); Ability to understand and deal with people's emotions and one's own (Kwiotkowska et al., 2021; Mdluli & Makhupe, 2017)
Intellectual stimulation refers to the leader's ability to provoke reflection, helping the followers to question their thoughts (Bass, 1985; Vizeu, 2011)	Ability to create a learning culture (Abbu et al., 2022; Erhan et al., 2022; Karippur & Balaramachandran, 2022)
Providing systematic feedback (Bass, 1985; Carvalho Neto et al., 2012; McDowelle, 2009; Vizeu, 2011)	Communication and active listening skills (Guzmán et al., 2020; Kwiotkowska et al., 2021; Petry, 2018; Puhovichová & Jankelová, 2021)

Note. Developed by the authors.

Regarding the differences, it is observed that the transformational theory focuses on internal organizational factors, dedicating little attention to investigating external and environmental variables that impact the leadership phenomenon (Howell & Avolio, 1993). On the other hand, the digital leadership theory recognizes the strong influence of context on leadership exercise in the dimension of innovation and adaptability, particularly in the following items: ability to adapt to rapidly changing contexts (Mdluli & Makhube, 2017; Petry, 2018; Puhovichová & Jankelová, 2021); accept and deal with complexity and uncertainty (Herder-Wynne et al., 2017; Karippur & Balaramachandran, 2022; Petry, 2018). Furthermore, the theory of digital leadership arises precisely as a reflection of the environmental transformations brought about by Industry 4.0, being therefore a construct strongly associated with the external context.

THE RELATIONAL LEADERSHIP THEORY

The relational theory of leadership places multilateral relationships at the center of analysis, not only the leader-follower dyadic relationship proposed in the LMX theory (leader-member-exchange), but a set of dynamic interactions between individuals in specific contexts. It involves, therefore, analyses in different directions: leader-follower, follower-follower, leader-organization, leader-society, follower-society, follower-other leaders within and outside the organization, etc. (Ospina et al., 2014; Uhl-Bien, 2006; Uhl-Bien & Arena, 2018).

Although the concept of relationship-oriented behavior has existed since behavioral leadership classic theories, the relational theory is contemporary, encompassing studies after the 2000s (Akram et al., 2016; D'Ávila et al., 2020). The relational theory advances by overcoming the notion of leadership as an individual process, in which the leader exerts influence top down, while followers, the process, other individuals involved, and the context appear to be secondary variables (Fairhurst & Uhl-Bien, 2012).

Along this line, relational leadership is understood in a more real way when also capturing the perspective of followers and the multiple, multilateral relationships, provoked by the context and the several layers of a myriad of human relationships, not only between leaders and followers (Versiani et al., 2017).

Uhl-Bien (2006), the main proponent of relational theory, defines leadership as a process of social influence resulting from the links between the individual, the organization, and the environment in which they are inserted. Therefore, leader and follower do

not exist independently, but in a complex and dynamic process of socially constructed multilateral interactions (Akram et al., 2016; Mendes et al., 2021; Soela et al., 2024; Turano & Cavazotte, 2016).

Uhl-Bien (2003) proposes four foundations of relational leadership: (a) leadership occurs when individuals use their influence to create change; (b) leadership is a behavior and not a formal position; (c) leadership generates change through effective relationships; (d) leadership effectiveness is enhanced by the individual's ability to build effective relationships with others.

The second foundation of relational leadership is widely discussed in leadership literature. Several studies start from the premise that leadership is not linked to the individual's formal position in the organization. People with the ability to build and maintain effective relationships can influence others, regardless of the position they hold (Soela et al., 2024; Uhl-Bien, 2003). Thus, leadership is a behavior that can manifest independently of the position (Schyns & Meindl, 2005). A manager is not necessarily a leader.

The relational dimension of leadership, then, can be characterized by interest and concern for people and the numerous relationships that build this leadership (Cunliffe & Eriksen, 2011; Mendes et al., 2021; Uhl-Bien, 2006). Relational leaders seek to establish trusting relationships in the networks they build within and outside organizations, contributing positively to individual job satisfaction and strengthening their identification with the organization (Uhl-Bien, 2006).

Sant'Anna et al. (2015), seeking to characterize the relational leader more objectively, identify some attributes associated with these leaders: (a) they have the ability to deal with dynamic and uncertain environments; (b) they build effective social ties with people; (c) they perceive that relationships have an affective and supportive dimension; (d) they build teams with complementary and synergistic competencies; (e) they have the ability to inspire and mobilize individuals' competencies in their relationships; (f) they stimulate the creation of an organizational context conducive to the emergence of high-performance teams; (g) they are able to deal in different environments with different stakeholders.

Along this line, Sant'Anna et al. (2015) are based on the notion that the leader is located in the center of three dimensions: individual-organization-society. The individual dimension is understood as the leader's ability to inspire and mobilize individuals' competencies in their multiple relationships. The

organizational dimension is related to the leader's ability to stimulate the creation of an organizational context conducive to the emergence of high-performance teams. Finally, the societal dimension is associated with the leader's ability to navigate in different environments with different stakeholders (D'Ávila et al., 2020; Mendes et al., 2021; Sant'Anna et al., 2015).

Uhl-Bien and Arena (2018) also emphasize the importance of the role of relationship networks in the innovation process. In this study, the authors present two leadership styles: the adapter, who presents fewer original ideas but is more able to find implementable solutions; and the innovator, who is able to recombine apparently unrelated perspectives and information.

Regarding the limitations of relational theory, critics point out that it is strongly theoretical and complex, not presenting elements for its implementation in practice. Furthermore, there is an excessive focus on relationships, putting aspects such as effectiveness and goal achievement in the background.

THE RELATIONAL LEADERSHIP THEORY VERSUS THE DIGITAL LEADERSHIP THEORY

One of the dimensions present in the theory of digital leadership is the focus on relationships, a central aspect of relational leadership theory. Therefore, digital leadership reinforces important attributes of the leader already mentioned by the authors of relational theory, including shared leadership that promotes high levels of collaboration (Herder-Wynne et al., 2017; Mdluli & Makhube, 2017) the ability to develop trust relationships (Abbu et al., 2022; Guzmán et al., 2020; Puhovichová & Jankelová, 2021); communication and active listening skills (Petry, 2018; Tigre et al., 2023); and the ability to establish relational networks within and outside the organization (Erhan et al., 2022; Sartori et al., 2018).

Referring to the different directions in which leadership is exercised in relational theory (leader-follower, follower-follower, leader-organization, leader-society, follower-society), it is observed that in the leader-follower relationship, digital leadership theory reinforces the importance of developing trust relationships, communication with followers, and

active listening (Puhovichová & Jankelová, 2021; Tigre et al., 2023).

The leader-organization relationship emphasized by relational theory can be understood as the leader's ability to create favorable organizational conditions for individual, team, and organizational development. In this sense, it can be observed that the following items of digital leadership are associated with this leader-organization dimension, specifically: the leader's ability to implement a digital mindset in the organization and their ability to create a culture of learning (Karippur & Balaramachandran, 2022; Mdluli & Makhube, 2017); and even the leader's ability to create conditions for people's development (Puhovichová & Jankelová, 2021), as well as mobilizing people toward goals (Abbu et al., 2022).

In the leader-society relationship emphasized by relational theory, understanding society as the environmental context in which the organization is inserted, common items with digital leadership theory can also be observed, particularly: the leader's ability to adapt to rapidly changing contexts (Mdluli & Makhube, 2017; Petry, 2018); accepting and dealing with complexity and uncertainty (Herder-Wynne et al., 2017; Petry, 2018); dealing with the 4.0 Revolution; and even the leader's ability to establish relational networks with actors external to the organization.

Regarding differences, while relational theory places multilateral relationships at the center of analysis, digital leadership does not emphasize this aspect significantly. Furthermore, when observing the follower-follower relationship emphasized by relational theory, it is noted that digital theory does not emphasize the follower-follower relationship.

COMPARATIVE ANALYSIS BETWEEN BEHAVIORAL, TRANSFORMATIONAL, SITUATIONAL, AND RELATIONAL LEADERSHIP THEORIES

Table 5 presents a comparative analysis of the fundamentals and criticisms of the leadership theories investigated in this study. It is worth noting that all theories share the idea that leadership is behavior and/or relationship and not a formal position of the individual in the organization (Schyns & Meindl, 2005).

Table 5. Comparative analysis between leadership theories.

	Behavioral	Transformational	Situational	Relational	Digital
Referenced authors	Likert (1961); Blake & Mouton (1978)	Burns (1978); Bass (1985); Bass and Avolio (1990); Gomes and Cruz (2007); McDowelle (2009); Vizeu (2011); Carvalho Neto et al. (2012)	Fiedler (1967); Hersey & Blanchard (1969)	Uhl-Bien (2003, 2006); Ospina et al. (2014); Sant'Anna et al. (2015); Uhl-Bien and Arena (2018); Mendes et al. (2021)	Mdluli and Makhube (2017); Herder-Wynne et al. (2017); Oberer and Erkollar (2018); Kelly (2018); Abbu et al. (2022); Erhan et al. (2022); Tigre et al. (2023)
Concept of leadership	Leadership is behavior and therefore is not a personality trait. The goal is to understand the behaviors adopted by effective leaders.	Leadership is the ability to influence and mobilize followers through an ideal recognized as legitimate by the followers and shared values.	Leading is an adaptive and dynamic process, influenced by: the followers profile, behavior and relationship, the situation and the context (internal and external to the organization).	Leadership is a process of social influence resulting from the links between the individual, the organization, and the environment, occurring in different directions. It places multilateral relations at the center of the analysis.	It refers to the combination of leadership attributes with digital technologies that support the decision-making process. Leaders manage the digital transformation processes of organizations and adapt multiple leadership theories.
Leadership attributes	They vary on a continuum: concern for people and concern for production (tasks, efficiency, and goals). The effective leader generally has a high orientation toward people, paying attention to the needs, interests, and well-being of subordinates.	The leader's ability to articulate a collective vision and communicate it enthusiastically. Importance that the leader gives to collective values, surpassing individual interests.	The attributes of an effective leader depend on both internal and external variables. Therefore, there is no universally accepted leadership model, as situational theory highlights the contingent and changing nature of leadership.	Ability to build and maintain relationships with people within and outside the organization. Ability to communicate and build bonds of trust with people.	It involves social relationship skills; human skills (focus on people); digital and technological capabilities; and adaptability and innovation skills.
Criticism	Excessive focus on the figure of the leader and their behaviors. Places contextual and situational variables in the background. Little emphasis on vision and values to inspire individuals.	Excessive focus on internal factors of the organization. Little dedication to investigating environmental variables that impact leadership. Naive characterization of the leader as a superman, possessing all possible qualities.	It is criticized for its excessive simplicity and lack of consideration for other factors that influence leadership effectiveness. Focuses on the leader-follower relationship and the environment in which they operate, neglecting the multilateral relationships among different agents.	It is a complex and somehow abstract theory, lacking elements for its practical implementation. Excessive focus on relationships, overshadowing aspects such as effectiveness and goal attainment. Leaders who focus on pleasing everyone can be negatively influenced.	Excessive emphasis on the technological dimension. Isn't it more of the same? In other words, competencies already emphasized in previous theories? Naive characterization of the leader with all possible qualities.

Note. Developed by the authors.

FINAL REMARKS

We can explicitly point out the direct relationship between each attribute of digital leadership with

the attributes of behavioral, relational, transformational, and/or situational leadership, returning to Table 6:

Table 6. Digital leadership attributes related to previous theories.

Dimension	Digital leadership attributes related to previous theories
Relational	Shared leadership that promotes high levels of collaboration as well as in the relational theory
	Ability to develop transparent and trustworthy relationships as well as in the relational theory
	Capacity for communication and active listening as well as in the transformational theory
	Ability to establish relational networks as well as in the relational theory
People-centered focus	Ability to create conditions for the development of individuals as well as in the relational, behavioral, transformational, and situational theories
	Ability to mobilize people toward objectives as well as in the relational, behavioral, transformational, and situational theories
	Dealing with and accepting diversity as well as in the relational theory
Digital	Ability to understand and manage both others' and one's own emotions as well as in the relational theory
	Capacity to learn and apply new digital technologies as well as in the situational theory
	Ability to lead teams in virtual environments as well as in the situational theory
	Capacity to implement a digital mindset within the organization as well as in the situational theory
Innovation and adaptability	Ability to create a culture of learning as well as in the relational theory
	Adaptability to rapidly changing contexts as well as in the situational theory
	Creative and innovative thinking as well as in the transformational theory
	Vision for the future as well as in the transformational theory
	Acceptance and management of complexity and uncertainty as well as in the situational theory

Note. Developed by the authors.

In summary, the comparative analysis between the digital leadership theory and the behavioral, situational, transformational, and relational theories reveals, first and foremost, that digital leadership reinforces various attributes already highlighted in these previous theories. The behavioral dimension also emphasizes the leader's importance in creating conditions for individual development, addressing the needs, expectations, and well-being of each individual as well as the digital leadership. The relational dimension of the digital leadership establishes transparent and trusting relationships with people, creating internal and external relational networks within the organization; these are attributes of the relational leadership theory as in [Uhl-Bien \(2006\)](#), being also the attributes of transformational leadership, by articulating a collective vision legitimized by followers. In digital leadership, the context is as important as in the situational leadership, recognizing the need to adapt to internal and external changes (4.0 Revolution).

Therefore, digital leadership, concerning behavioral, situational, relational, and transformational theories, does not add anything new. In fact, it builds upon previous leadership theories that are certainly much more robust than the digital one (behavioral theory has existed since the 1950s). It is also worth noting that the ability to lead teams in virtual environments had already been addressed in studies around e-leadership, understood as leaders who coordinate individuals and teams virtually ([Avolio et al., 2014](#)).

Given the above, are new digital attributes truly necessary, or is the digital leader capable of leading in this new environment by combining a set of attributes proposed by previous theories? The main change refers to the emphasis that 'digital' and 'innovation' themes have gained in the context of digital transformation. Obviously, in previous theories there was no such emphasis, as this scenario came later. However, when traditional theories like situational leadership have long focused on context, the fact that this context is now the Fourth Industrial Revolution certainly fits within the situational theory.

Therefore, what has changed is the emphasis given to the digital context and the consequent innovation. Hence, it can be inferred that the so-called digital leadership is a combination of very current competencies established from behavioral, transformational, relational, and situational theories with the addition of contextual variables stemming from the Fourth Industrial Revolution, highlighting digital and innovative capabilities.

It can be affirmed, then, that the digital leadership model does not constitute a new theory but rather a combination of previous leadership theories.

Regarding its relevance, this study mainly contributes in two directions. Firstly, several studies have pointed out that the global discussion on leadership and the Fourth Industrial Revolution together is contemporary, important, and necessary. That is, it is a current topic with many open research questions. Therefore, this study portrays the competencies required of leaders in the digital age from the perspective of various authors in the field, providing clear indications of which attributes matter for a leader to act in the context of the Fourth Industrial Revolution.

Secondly, no national/international study has articulated and compared the digital leadership theory with previous theories, bringing this critique of whether it is indeed something new or a combination of traditional and new characteristics. Therefore, this research constitutes a unique contribution to national and international studies in the field of leadership.

Regarding limitations, when considering five different theories from the field of leadership, the article may have lacked in terms of depth of discussion. In addition, the study provided a critical review of some important theories in the field of leadership, but did not advance in proposing a theoretical framework nor did it empirically test the theoretical discussion carried out, based on the application of the study in an organization or a group of leaders. Furthermore, the study compared four leadership theories (behavioral, situational, relational, and transformational) with the so-called digital leadership theory. Other leadership theories could be compared in future studies, such as ethical leadership, understood as the process of influencing people and groups to achieve goals in a socially responsible way ([Den Hartog & De Hoogh, 2009](#)). In this sense, the digital leadership model did not consider the attribute of sustainability, which is a very significant topic in the context of ESG (environmental, social, and governance). One can also compare the digital leadership theory with the complexity leadership theory by [Uhl-Bien and Arena \(2017\)](#), which brings the notion of adaptive space.

Practical suggestions for future research could be to explore how specific attributes of digital leadership (intelligence, emotional, digital, agility and adaptability, sociocultural, creativity, and innovation quotients), as a whole or separately, impact organizational performance in companies in the service sector and in industries. We also suggest, as research methods for these future studies, longitudinal studies, qualitative, quantitative, and mixed methods, which can address the limitations of current studies.

REFERENCES

- Abbu, H., Mugge, P., Gudergan, G., Hoeborn, G., & Kwiatkowski, A. (2022). Measuring the human dimensions of digital leadership for successful digital transformation. *Research-Technology Management*, 65(3), 39-49. <https://doi.org/10.1080/08956308.2022.2048588>
- Akram, T., Lei, S., Hussain, S. T., Haider, M. J., & Akram, M. W. (2016). Does relational leadership generate organizational social capital? A case of exploring the effect of relational leadership on organizational social capital in China. *Future Business Journal*, 2(2), 116-126. <https://doi.org/10.1016/j.fbj.2016.06.001>
- Avolio, B. J., Sosik, J. J., Kahai, S. S., & Baker, B. (2014). E-leadership: Re-examining transformations in leadership source and transmission. *The Leadership Quarterly*, 25(1), 105-131. <https://psycnet.apa.org/doi/10.1016/j.leaqua.2013.11.003>
- Avolio, B. J., Waldman, D. A., & Yammarino, F. J. (1991). Leading in the 1990s: The four I's of transformational leadership. *Journal of European Industrial Training*, 15(4). <https://doi.org/10.1108/03090599110143366>
- Bass, B. M. (1985). *Leadership and performance beyond expectations*. Free Press Google Schola 2. <https://doi.org/10.1002/hnm.3930250310>
- Bass, B. M., & Avolio, B. J. (1990). Developing transformational leadership: 1992 and beyond. *Journal of European industrial training*, 14(5). <https://doi.org/10.1108/0309059910135122>
- Bell, B. S., McAlpine, K. L., & Hill, N. S. (2023). Leading virtually. *Annual Review of Organizational Psychology and Organizational Behavior*, 10, 339-362. <https://doi.org/10.1146/annurev-orgpsych-120920-050115>
- Blake, R. R., Mouton, J. S., Louis B., Barnes, Larry E., & Greiner. (1964). *Breakthrough in organization development*. Graduate School of Business Administration, Harvard University.
- Blake, R. R., & Mouton, J. S. (1978). Toward a general theory of consultation. *The Personnel and Guidance Journal*, 56(6), 328-330. <https://doi.org/10.1002/j.2164-4918.1978.tb04640x>
- Burns, G. P. (1978). *The Principles of Leadership*. ERIC Clearinghouse.
- Carvalho, A. M., Neto, Tanure, B., Santos, C. M. M., & Lima, G. S. (2012). Executivos brasileiros: na contramão do perfil deficiente da liderança transformacional. *Revista de Ciências da Administração*, 14(32), 35-49. <https://doi.org/10.5007/2175-80772012v14n32p35>
- Črešnar, R., & Nedelko. (2020). Understanding Future Leaders: How Are Personal Values of Generations Y and Z Tailored to Leadership in Industry 4.0? *Sustainability*, 12, 1-19. <https://doi.org/10.3390/su12114417>
- Cunliffe, A. L., & Eriksen, M. (2011). Relational leadership. *Human relations*, 64(11), 1425-1449.
- DasGupta, P. (2011). Literature review: e-Leadership. *Emerging Leadership Journeys*, 4(1), 1-36. https://www.regent.edu/wp-content/uploads/2020/12/dasGupta_V411_pp1-36.pdf
- D'Ávila, P. R., de Oliveira, F. B., Diniz, D. M., & de Souza Sant'Anna, A. (2020). Brazilian army leadership in mission in Haiti. *Revista Pensamento Contemporâneo em Administração*, 14(4), 1-19. <https://doi.org/10.12712/rpca.v14i4.47191>
- Deloitte. (2018). *Preparing tomorrow's workforce for the Fourth Industrial Revolution*. Creative Services.
- Den Hartog, D. N., & De Hoogh, A. H. (2009). Empowering behaviour and leader fairness and integrity: Studying perceptions of ethical leader behaviour from a levels-of-analysis perspective. *European Journal of Work and Organizational Psychology*, 18(2), 199-230.
- Erhan, T., Uzunbacak, H. H., & Aydin, E. (2022). From conventional to digital leadership: Exploring digitalization of leadership and innovative work behavior. *Management Research Review*, 45(11), 1524-1543. <http://doi.org/10.1108/MRR-05-2021-0338>
- Fairhurst, G. T., & Uhl-Bien, M. (2012). Organizational discourse analysis (ODA): Examining leadership as a relational process. *The leadership quarterly*, 23(6), 1043-1062. <https://doi.org/10.1016/j.leaqua.2012.10.005>
- Fiedler, F. E. (1967). *A theory of leadership effectiveness*. McGraw-hill series in management. McGraw-Hill.
- Fiedler, F. E. (1981). Leadership effectiveness. *American Behavioral Scientist*, 24(5), 619-632.
- Figueiredo, J. A. L. (2021). Os desafios de uma liderança digital. *Revista de Administração Contemporânea*, 25(4), e210043.
- Gomes, A. R., & Cruz, J. (2007). Abordagem carismática e transformacional: Modelos conceituais e contributos para o exercício da liderança. *Psicologia USP*, 18, 143-161. <https://doi.org/10.1590/S0103-65642007000300008>
- Guzmán, V. E., Muschard, B., Gerolamo, M., Kohl, H., & Rozenfeld, H. (2020). Characteristics and Skills of Leadership in the Context of Industry 4.0. *Procedia Manufacturing*, 43, 543-550. <http://doi.org/10.1016/j.promfg.2020.02.167>
- Herder-Wynne, F., Amato, R., & Weerd, F. U. (2017). Leadership 4.0: A review of thinking. *ResearchReport*. <https://www.oxfordleadership.com/wp-content/uploads/2017/10/OL-Leadership-4.0-%E2%80%93-A-review-of-the-thinking.pdf>
- Hersey, P., & Blanchard, K. H. (1969). *Management of organizational behavior: Utilizing human resources*. Prentice Hall.
- Hersey, P., & Blanchard, K. H. (1986). *Psicologia para administradores: A teoria e as técnicas da liderança situacional*. Editora Pedagógica e Universitária.
- House, R. J. (1977). A theory of charismatic leadership. *Leadership: The cutting edge*. Southern Illinois University Press.
- Howell, J. M., & Avolio, B. J. (1993). Transformational leadership, transactional leadership, locus of control, and support for innovation: Key predictors of consolidated-business-unit performance. *Journal of applied psychology*, 78(6), 891.
- Israel, C. R. Q. (2021). Uma Análise sobre Liderança: da Teoria dos Traços à Liderança 4.0. *Boletim Do Gerenciamento*, 24(24), 21-30. <https://nppg.org.br/revistas/boletimdogerenciamento/article/view/557>
- Karipppur, N. K., & Balaramachandran, P. R. (2022). Antecedents of effective digital leadership of enterprises in Asia Pacific. *Australasian Journal of Information Systems*, 26.
- Kelly, R. (2018). *Constructing leadership 4.0: Swarm leadership and the fourth industrial revolution*. Springer.
- Khaw, T. Y., Teoh, A. P., Abdul Khalid, S. N., & Letchmunan, S. (2022). The impact of digital leadership on sustainable performance: A systematic literature review. *Journal of Management Development*, 41(9/10), 514-534.
- KPMG Brazil. (2022). *Indústria 4.0 no Brasil: Cenários e Perspectivas*. https://materiais.kpmgbrasil.com.br/industria-4-0-no-brasil-todos-os-capitulos?gad_1&gclid=EAIaQobChMzVQ96rIggMVG1hIAB26DQwNEAAAYASAAEgIvrmvD_BwE
- Kwiatkowska, A., Gajdzik, B., Wolniak, R., Vveinhardt, J., & Gębczyńska, M. (2021). Leadership competencies in making Industry 4.0 effective: the case of Polish heat and power industry. *Energies*, 14(14), 1-22. <http://doi.org/10.3390/en14144338>
- Likert, R. (1961). *New patterns of management*. McGraw-Hill.
- McDowelle, J. O. (2009). A contemporary consideration of transformative leadership. *Journal of Curriculum and Instruction*, 3(2), 1.
- Mendes, L. D., Sant'Anna, A. D. S., & Diniz, D. M. (2021). Liderança relacional e modernidade organizacional em firmas de advocacia de Belém do Pará. *Revista Direito GV*, 17, e2140.
- Mdluli, S., & Makhupe, O. (2017). Defining leadership competencies needed for the fourth industrialrevolution: leadership competencies 4.0. *Africa Expansion Project*. Bank Seta South Africa. https://www.bankseta.org.za/wp-content/uploads/2018/08/Bankseta_Defining-Leadership_Siboniso-Mdluli-Olebile-Makhupe.pdf
- Moreira, J. F. A., & Rua, O. M. M. L. (2023). Linking emotional intelligence and transformational leadership: An application to technology sector firms' leaders. *Revista de Gestão e Secretariado*, 14(1), 1024-1048. <https://doi.org/10.7769/gesec.v13i4.1569>
- Narbona, J. (2016). Digital leadership, twitter and pope francis. *Church, Communication and Culture*, 1(1), 90-109. <https://doi.org/10.1080/23753234.2016.1181307>
- 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. <https://doi.org/10.33844/ijol.2018.6033>
- Ospina, S. M., Kersh, R., & Quick, K. S. (2014). Taking a relational turn in leadership studies. *Public Administration Review*, 74(4), 542-544. <https://www.jstor.org/stable/24029443>
- Petry, T. (2018). Digital leadership. In *Knowledge management in digital change: New findings and practical cases* (pp. 209-218). Springer.
- Podsakoff, P. M., MacKenzie, S. B., & Bommer, W. H. (1996). Transformational leader behaviors and substitutes for leadership as determinants of employee satisfaction, commitment, trust, and organizational citize. *Journal of management*, 22(2), 259-298. [https://doi.org/10.1016/S0149-2063\(96\)90049-5](https://doi.org/10.1016/S0149-2063(96)90049-5)
- Puhovichová, D., & Jankelová, N. (2021). Leadership in conditions of industry 4.0. In *SHS Web of Conferences* (Vol. 115, p. 03013). EDP Sciences.
- Sant'Anna, A. S., Diniz, D. M., Carvalho Neto, A. M., Santos, C. M. M., & Lima-souza (2022). Mulheres profissionais na transição para a Quarta Revolução Industrial: Um olhar brasileiro. *Revista de Carreiras e Pessoas*, 12(1), 9-30. <https://doi.org/10.23925/recape.v12i1.49766>
- Sant'Anna, A. D. S., Nelson, R. E., & Carvalho Neto, A. M. (2015). Fundamentos e dimensões da liderança relacional. *DOM-Revista da Fundação Dom Cabral*, 9, 16-21.
- Sartori, G., Zanutto, M. P., & Fachinelli, A. C. (2018). Liderança em Tempos de Indústria 4.0: Novos Papéis para um Novo Perfil? 18ª Mostra de Iniciação Científica, Pós-graduação, Pesquisa e Extensão, Caxias do Sul.
- Sasmoko, S., Mihadjo, L. W. W., Alamsjah, F., & Elidjen, E. (2019). Dynamic capability: The effect of digital leadership on fostering innovation capability based on market orientation. *Management Science Letters*, 9(10), 1633-1644. <https://doi.org/10.5267/j.msl.2019.5.024>
- Schwab, K. (2016). *A quarta revolução industrial*. Edipiro.

Schyns, B., & Meindl, J. R. (Eds.). (2005). *Implicit leadership theories: Essays and explorations*. IAP. Soardo, E. S., Fanton, J. P., & Goulart, E. Júnior (2020). Liderança transformacional e transacional: Uma revisão bibliográfica narrativa. *Revista Eletrônica Gestão e Serviços*, 11(2), 3098-3129.

Soela, V., Carvalho Neto, A., Versiani, F., & Diniz, D. M. (2024). A prática de CEOs experientes: Líderes relacionais enfrentando situações de crise. *Contextus – Revista Contemporânea de Economia & Gestão*, 22, e91199. <https://doi.org/10.19094/contextus.2024.91199>

Suyanto, U. Y., Mu'ah, M., Purwanti, I., & Sayyid, M. (2019). Transformational Leadership: Millennial Leadership Style In Industry 4.0. *Manajemen Bisnis*, 9(1). <https://doi.org/10.22219/jmbv9i1.9437>

Tigre, F. B., Curado, C., & Henriques, P. L. (2023). Digital leadership: A bibliometric analysis. *Journal of Leadership & Organizational Studies*, 30(1), 40-70. <https://doi.org/10.1177/15480518221123132>

Turano, L. M., & Cavazotte, F. (2016). Conhecimento científico sobre liderança: uma análise bibliométrica do acervo do The Leadership Quarterly. *Revista de Administração Contemporânea*, 20, 434-457. <https://doi.org/10.1590/1982-7849rac2016140075>

Uhl-Bien, M. (2003). Relationship development as a key ingredient for leadership development (pp. 129–147). In S. Murphy & R. Riggio (Eds.), *The future of leadership development*. Lawrence Erlbaum Associates.

Uhl-Bien, M. (2006). Relational Leadership Theory: Exploring the social processes of leadership and organizing. *The Leadership Quarterly*, 17(6), 654-676. <https://doi.org/10.1016/j.leaqua.2006.10.007>

Uhl-Bien, M., & Arena, M. (2017). Complexity leadership: Enabling people and organizations for adaptability. *Organizational Dynamics*, 46(1), 9-20. <https://psycnet.apa.org/doi/10.1016/j.orgdyn.2016.12.001>

Uhl-Bien, M., & Arena, M. (2018). Leadership for organizational adaptability: A theoretical synthesis and integrative framework. *The leadership quarterly*, 29(1), 89-104. <https://doi.org/10.1016/j.leaqua.2017.12.009>

Versiani, F., de Lima Caeiro, M., & Neto, A. C. (2017). Líder versus liderado? Percepções a partir do grid gerencial. *Revista de Administração FACES Journal*, 16(3), 88-104. <https://www.redalyc.org/pdf/1940/194052716006.pdf>

Vizeu, F. (2011). Uma aproximação entre liderança transformacional e teoria da ação comunicativa. *RAM. Revista de Administração Mackenzie*, 12, 53-81. <https://repositorio.fgv.br/bitstreams/7a3b82f7-e339-49a7-9170-52728f86260a/download>

Authors

Daniela Martins Diniz 

Universidade Federal de São João del-Rei, Departamento de Ciências Administrativas e Contábeis

Av. Leite de Castro, n. 847, Fábricas, CEP 36301-182, São João del-Rei, MG, Brazil
danidiniz09@yahoo.com.br

Antonio Moreira de Carvalho Neto 

Pontifícia Universidade Católica de Minas Gerais, Programa de Pós-Graduação em Administração

Av. Itaú, n. 525, Dom Cabral, CEP 30535-012, Belo Horizonte, MG, Brazil
carvalhoneto@pucminas.br

Anderson de Souza Sant'Anna 

Fundação Getúlio Vargas, Escola de Administração de Empresas de São Paulo

Av. Nove de Julho, n. 2029, Bela Vista, CEP 01313-902, São Paulo, SP
anderson.santanna@fgv.br

Authors' contributions

1st author: conceptualization (lead), investigation (lead), supervision (lead), validation (lead).

2nd author: conceptualization (supporting), formal analysis (lead), visualization (supporting), writing – original draft (supporting).

3rd author: conceptualization (supporting), validation (supporting), visualization (supporting), writing – review & editing (supporting).