

A Multi-level framework of Digital Leadership and Digital Transformation

A Multi-level framework of Digital Leadership and Digital Transformation

Mehreen Malik

NUST Business School
National University of Sciences and Technology (NUST),
H-12, Islamabad, Pakistan
mehreen.phd20nbs@student.nust.edu.pk

Muhammad Mustafa Raziq

College of Business Administration,
University of Sharjah, Sharjah, United Arab Emirates,
NUST Business School,
National University of Sciences and Technology, Islamabad, Pakistan
<https://orcid.org/0000-0002-7793-1597>
mustafa.raziq@yahoo.com

Naukhez Sarwar

NUST Business School
National University of Sciences and Technology (NUST),
Islamabad, Pakistan
naukhez.sarwar@nbs.nust.edu.pk

A Multi-level framework of Digital Leadership and Digital Transformation

ABSTRACT

Since the last decade, organizations have been exerting pressure on exploring new technologies and their impact on their operations to remain competitive, transforming how organizations compete and manage their digital transformation operations. Although digital transformation and leadership are imperative and timely topics, there is a lack of rigorous research to grasp this transformation. Meanwhile, this rapid advancement is changing the nature of leadership competencies needed for this digital transformation. We have developed a multi-level model for digital leadership and digital transformation. We have built our conceptual foundations on the 4I framework to explain the digital leadership role in four phases - intuition, interpretation, integration, and institutionalization for successfully implementing digital transformation. We present a conceptual model and future research agenda.

Keywords: Digital Transformation, Digital Leadership, Business Model Innovation, Organizational Culture

Track: Leadership and Leadership Development

Word count: (6478 excluding references)

A Multi-level framework of Digital Leadership and Digital Transformation

INTRODUCTION

Since the last decade, organizations have been pressured to explore new technologies and their impact on their operations to remain competitive (Heubeck, 2023, Korherr et al., 2022) hence, has transformed how the organizations are competing and managing their operations for digital transformation. Digital transformation is the technological-based disruptive change affecting every organization's processes (Henderikx and Stoffers, 2022). It requires integrating digital tools and technologies, which demand changes in the new leadership characteristics, organizational structures, processes, and production (Hess et al., 2016b). Thus, digital transformation requires combining technology and people (Nadkarni and Prügl, 2021, Abbu et al., 2022).

Moreover, digital transformation can offer numerous benefits to firms in terms of cost reduction (Chirumalla, 2021), increased security (Colin, 2015), data privacy (Charles, 2015) as well as effectiveness and transparency of data (Janssen and Van Der Voort, 2016, Janowski, 2015). However, as indicated, such transformation requires human capability, and integrating these technologies alone may not help the industries achieve sustainable competitive advantage (Blichfeldt and Faullant, 2021). Organizations must also transform their conventional leadership styles for successful digital transformation (Erhan et al., 2022) such as towards digital leadership.

Digital leadership combines their abilities with digital technologies to add value to the firm. They adapt multiple leadership approaches (transformational, democratic, etc.) with their digital competencies (Sow and Aborbie, 2018, Mihardjo et al., 2019, Erhan et al., 2022). Thus, it involves technology and innovation elements and differs from traditional leadership (Erhan et al., 2022). Therefore, it is equally essential for firms to have leadership with specific expertise and skills for their digital transformation.

There is fragmented research regarding the multi-level conceptualization of digital leadership roles in digital transformation. However, the idea of digital leadership for digital transformation is not new, but it is not well-integrated into the literature and is still nascent (Bresciani et al., 2021, George et al., 2022, Heubeck, 2023). The extant research has mainly relied on leadership skills, and there has been little focus on the skills, characteristics, and processes related to digital leadership (Banks et al., 2022, Malodia et al., 2023).

Extant research has focused on leadership traits such as general mindset, social attitude (Klein, 2020), antecedents of effective digital leadership (Klein, 2020), leadership skills, and relationship management (Gilli et al., 2023), as well as general characteristics of transformational leadership (Li, 2010) and transactional leadership (Porfirio et al., 2021). Moreover, leadership effectiveness has been studied with customer orientation (Yopan et al., 2022). Still, this research has not leveraged the various aspects of digital leadership, and little is known about this phenomenon.

Similarly, little is known about the influence of digital leadership in digital transformation at a multi-level (Trenerry et al., 2021). Existing research on digital leadership and digital transformation is fragmented in two ways. First, there is no consensus definition of digital leadership (Petry, 2018), and second, as stated earlier, a little focus on the skills, characteristics, and processes related to digital leadership (Banks et al., 2022, Malodia et al., 2023). The extant literature gives strong evidence of the role of digital leadership in organizational change (Matarazzo et al., 2021). However, the macro and micro-level research between managerial capabilities and firm-level strategies remains fragmented (George et al., 2022, Heubeck and Meckl, 2022). Therefore, multi-level research is required to understand digital leadership in the

A Multi-level framework of Digital Leadership and Digital Transformation

organization's digital transformation journey. The extant literature has failed to address a multilevel perspective of digital leadership and digital transformation.

Digital leadership holds great promise to address these issues in detail. We have addressed the research calls such as Banks et al. (2019) for taking a formal view of digital leadership to provide more significant insights into leadership behaviors to understand better the digital leadership process and digital leadership competencies for digital transformation. Additionally, a gap exists in the literature which connects leadership, context, and learning process in one study (Berson et al., 2006); this is particularly true in terms of literature on digital leadership and digital transformation.

Similarly, our integrative review differs from existing reviews as our review is the first to develop a multi-level model. Hence, a promising way of combining micro, meso-level, and macrolevel research as there is a lack of understanding of leadership and digitalization at multiple levels of analysis (Trenerry et al., 2021). Second, we propose research propositions based on the 4I framework (Crossan and Berdrow, 2003). Third, we create an integrated digital leadership framework and describe the relationship of digital leadership with different factors (skills, characteristics, digital culture, and business model innovation). Fourth, our study is the first to study the relationship between business model innovation and digital culture in the context of digital leadership and digital transformation in multi-level research.

To understand digital leadership as an emerging phenomenon, we have chosen an integrative review to understand the emergence of new perspectives in digital leadership scholarship. Furthermore, an integrative review is vital in advancing the literature and yielding new valuable insights (Elsbach and van Knippenberg, 2020). Owing to the absence of a concrete connection between the digital leader competencies, 4I frameworks, and digital transformation, we have based our research on conceptual structuring in which "the main concepts of the topic provide a framework around which the review can be organized" (Torraco, 2016). The integrative review was performed using Scopus, Science Direct, and Google Scholar databases.

Our initial search included 149 articles to identify digital leadership in connection with digital transformation, business model innovation, and organizational culture. The titles and abstracts of articles were reviewed, and 100 articles were included after removing those that did not meet the above criteria. The shortlisted articles were divided into three categories of microlevel research (digital leadership skills and styles), meso-level research (team communication and collaboration), and macro-level (digital leadership, digital transformation, business model innovation, and organizational culture). We also limited our search to "1999 onwards," considering empirical and conceptual research. We also restricted our key search to peer-reviewed journal articles while eliminating the books and editorials.

Our review suggests that digital leadership scholarship has been ignored at multiple levels. Similarly, digital leadership research ignores a few aspects, such as in digital transformation literature, the role of digital leadership skills, capabilities, and competencies (at the micro level) and on team level digital leader skills (team communication and collaboration), contextual support and followers' intrinsic motivation. We also focus on macro-level research by examining the role of digital leadership in business model innovation and organizational culture. Lastly, we address these gaps in digital transformation and leadership scholarship through the organizational learning 4I framework (Berson et al., 2006, Crossan et al., 1999).

A Multi-level framework of Digital Leadership and Digital Transformation

We aim to improve our understanding of scholarship on the process of digital transformation and digital leadership at multiple levels. We have based our conceptualization on the 4I framework by offering a multi-level view of digital leadership and transformation. We have provided propositions and a framework. Our research suggests several contributions.

We have built our conceptual foundations on the 4I framework to explain the digital leadership role in four phases - intuition, interpretation, integration, and institutionalization for successfully implementing digital transformation. For managers, we offer a practical guideline to implement a structured and systematic digital change by utilizing their digital competencies in four processes. Additionally, we have brought together the bits and pieces of extant literature to make a comprehensive multi-level model and have structured the model into the process model. Hence, this model can be a first-hand tool and guide for the practitioners on various digital leadership competencies required at each phase and how they can innovate their business models and organizational culture through these skills.

Our conceptual framework has integrated the dispersed literature on this subject. Theoretically, we have contributed to the leadership scholar by explicitly linking digital leadership and digital transformation with the 4I framework. We have also built a multi-level process model to implement digital transformation successfully.

This study contributes to the strategic management literature by bridging the existing research gap between micro and macro-level research (Foss and Saebi, 2017, Foss, 2016). This research postulates that leadership skills strongly influence digital transformation at the microlevel. At the macro level, it links leadership skills with business model innovation and organizational culture. At the meso-level, it explains the link of digital leadership with the followers for successful digital transformation. Understanding these micro, meso-level, and macro-level foundations is significant in achieving successful digital transformation.

THEORETICAL FOUNDATIONS

Digital Transformation

Firms today have realized that digital transformation is not just about installing advanced technologies (Henriette et al., 2015) but also aligning business strategies, culture, people, and leadership styles with this significant technological shift (Goran et al., 2017). It has been realized that digital transformation is a continuous process required for the prosperity and survival of organizations (Porfirio et al., 2021). It will continue for a long time and benefit the firms that innovate and upgrade themselves regularly (Kane et al., 2021).

These advancements have immensely attracted academia, and researchers have sought to give various conceptualizations and definitions of digital transformation (Gong and Ribiere, 2021). In doing so, the term digitalization has often been confused with a similar term such as digitization which is the conversion of information from analog to digital form - while digitalization is the usage of information technology for performing business activities (Verhoef et al., 2021). Gong and Ribiere (2021) develop a unified definition of digital transformation, which is stated as: "a fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders". In other words, digital transformation can be defined as a complete transformation of processes through digital technology involving business

A Multi-level framework of Digital Leadership and Digital Transformation

model innovation, redefining production processes, and transforming leadership styles. Hence, digital transformation redefines business capabilities, products, relationships with partners, and the evolutionary path of business models (Hanelt et al., 2021).

Digital Transformation and Organizational Levels

Based on Berson et al. (2006) work on organizational learning and leadership, we have studied organizational learning (a strategic change for achieving competitive advantage) and the 4I framework with digital transformation, which is also a strategic change for achieving sustainable competitive advantage. Therefore, we argue that digital transformation can take place at three organizational hierarchy levels – micro (individual), meso-level (team), and macro (organizational). At the micro level, new ideas are generated based on organizational goals and responses toward the digital transformation journey. While at the meso-level active group discussions and inter-group discussions take place to interpret those new ideas for the successful implementation of digital transformation. In the last stage, this information is converted into action and distributed among the organization's various divisions to implement ideas.

This idea generation to idea implementation journey continuously takes place rather than a bottom-up or top-down approach. This multi-level analysis would provide an opportunity for uncovering the digital leadership role in facilitating digital transformation. Literature on digital transformation has mainly focused on explaining the phenomenon but has not explained who initiates such processes (Annarelli et al., 2021, Vial, 2021). To date, there is limited research on directly linking the role of digital leadership and digital transformation at each level of analysis. Few studies have used learning variables to measure leadership, such as transformational leadership (e.g., Amitay et al., 2005), or have studied leadership roles in specific settings (e.g., Edmondson, 1999). However, as said earlier, little is known about the digital leadership role in digital transformation at each level of analysis.

4I framework

Crossan et al. (1999) proposed the 4I framework, which measures the sub-processes within a system of an organization learning. Its four significant processes involve intuition, interpretation, integration, and institutionalization. Intuition is an individual-level phenomenon where individuals recognize the possibilities of patterns of their experiences (Weick, 1995). Interpretation is the process of explaining the insights of a phenomenon through actions and words to others. Integration is the shared understanding among individuals and teammates. Integrating ideas is everyday work that becomes formal when institutional-level discussions occur. Therefore, institutionalization is defined as a process when actions are ensured; tasks are defined and distributed among the members. Thus, it is an embedded process that ensures jobs are formed at the individual and group levels (Crossan et al., 1999).

These four learning processes occur at three organizational levels because this learning process naturally flows from one level to another; hence, one cannot precisely say when one ends and the next starts (Crossan et al., 1999). These three levels are individual level, group level, and organizational level. As per Crossan et al. (1999) 4I framework, intuition occurs at the individual

A Multi-level framework of Digital Leadership and Digital Transformation

level. Interpretation acts as a bridge between individual and group levels, while integration links the organizational and group level, and institutionalization occurs at the organizational level.

The flow of information between these processes (intuition to interpretation to integration) uses the creativity and innovation mechanism known as the exploration process (Crossan and Berdrow, 2003). Exploration consists of constructs like innovation and creativity (March, 1991). Similarly, the flow of information from integration to institutionalization and back to intuition uses the knowledge adaptation and transfer mechanism known as the exploitation process (Crossan and Berdrow, 2003). Exploitation consists of constructs like transfer of knowledge and adaptation (March, 1991).

Digital Leadership

Leadership is a complex social influence process requiring an interdisciplinary theoretical lens (Antonakis et al., 2019). The emerging wave of digital transformation has entered leadership scholarship in the digital era (Banks et al., 2019, Banks et al., 2022). This DT requires integrating digital tools and technologies, which demands several changes in the new leadership characteristics and organizational structures (Hess et al., 2016b).

For successful digital transformation, firms must update their human resources per market demands (Ireland and Hitt, 2005, Jones and Pitelis, 2015). Doing so helps the firms gain a competitive advantage and build a thriving, flexible, and updated working environment (Eisenhardt et al., 2010). The firm leader plays a significant role in embracing those evolutionary trends to keep their firms flexible and updated (Eisenhardt et al., 2010). They do this by obliterating ancient structures and business models and bringing in newer flexible models. However, the role of leadership in the digital transformation process is unclear, and there is, hence, particular interest among researchers in improving understanding on the phenomena.

Several researchers are calling for studying shifts in leadership behaviors and strategies from the traditional ones to those more focused on digitalization (El Sawy et al., 2016, Bharadwaj et al., 2013, Anderson et al., 2017). Various scholars have investigated different leadership styles, such as ethical leadership (Ahmed Iqbal et al., 2020), transformational leadership (Li, 2010), and transactional leadership (Porfirio et al., 2021). They have discussed these leadership styles with innovative work behavior. Some researchers have investigated the digital leader's role in teaching (Richardson et al., 2012) and in the higher education field (Antonopoulou et al., 2020). However, there is still a scarcity of literature on the role of digital leadership in shaping the organization's digital transformation (Erhan et al., 2022). There is, hence, a need to explore and examine those particular digital leadership characteristics, styles, and skills conducive to and critical for digital transformation.

While most leadership theories focus on the role of leaders and followers, some of these, such as transformational leadership, look at transforming team members. However, digital leadership requires an equal level of transformation at the leader level, primarily involving developing digital skills to lead teams efficiently and effectively. It is argued that, among others, technological skills required by leaders are counted as the most prized skills (Groysberg, 2014). Similarly, innovating strategies and business models as per customers and market demand (Porfirio et al., 2021), as well as coordinating and communicating a culture of digitalization to embark the

A Multi-level framework of Digital Leadership and Digital Transformation

entire firm towards digital transformation (Singh and Hess, 2017) are some of the critical roles of digital leadership.

Similarly, in the ongoing process of digital transformation, it is of significant importance to advance the leadership theory to understand the development process of a leader - an overarching theoretical development of the topic is required for the change that digital transformation is bringing in the organizations (Day et al., 2021). This is because past research on leadership literature focused on aspects such as job satisfaction, employee performance, employerleader relationship, and employee commitment (Judge and Piccolo, 2004, Han and Jekel, 2011, Harris et al., 2009, Lim et al., 2017). Aspects of digitalization were ignored, and very few management scholars knew about it.

Methodology

The present work addresses the following research question: what are the drivers of digital leadership for successful digital transformation? The answer to this question can be achieved by addressing these objectives; 1: Identifying skills and characteristics of digital leadership 2: Taking a multi-level perspective digital leadership process and digital leadership competencies for digital transformation 3: Suggesting propositions based on the literature review 4: propose a future research agenda.

Consistent with the breadth of our research question and to understand digital leadership as an emerging phenomenon, we have chosen an integrative review to understand the emergence of new perspectives in digital leadership scholarship. Furthermore, an integrative review is vital in advancing the literature and yielding new valuable insights (Elsbach & van Knippenberg, 2020). Owing to the absence of a concrete connection between the digital leader competencies, 41 frameworks, and digital transformation, we have based our research on conceptual structuring in which "the main concepts of the topic provide a framework around which the review can be organized" (Torraco, 2016, p. 12). The integrative review was performed using Scopus, Science Direct, and Google Scholar databases.

Our initial search included 149 articles to identify digital leadership in connection with digital transformation, business model innovation, and organizational culture. In the identification phase, the combined terms digital transformation, digital leadership, and business model innovation were used in the Title-Abstract-Keywords (TITLE-ABS-KEY). The titles and abstracts of articles were reviewed. In the screening phase, pre-selected filters of language, document type, and source were applied. In the eligibility phase, duplicated articles and those which did not fulfil the criteria were removed. 100 articles were included after eliminating those that did not meet the requirements (table 1).

A Multi-level framework of Digital Leadership and Digital Transformation

Table 1: Literature Search Process

Step	Digital Transformation & Digital Leadership	Digital leadership, Business Model Innovation, Organizational Culture & 4I framework
Step 1: Identification Search for the grey literature and peer-reviewed articles from databases of Scopus, Google Scholar & Science Direct	Search keywords included: "digitalization"" digital transformation"" "digital leadership"" "e-leadership" "innovative leadership"	Search keywords included: "Digital leadership"" ""business model"" ""business model innovation"" "leadership skills," "digital leader skills," "4I framework"
Step 2: Inclusion and Exclusion criteria used to refine results	1: Articles are written in English 2: Articles published from 1990 onwards 3: At least two keywords from step 1 appeared in the title or abstract 4: Peer-reviewed articles were considered, while books, conference papers, and editorials were not included	1: Articles are written in English 2: Articles published from 1990 onwards 3: At least two keywords from step 1 appeared in the title or abstract 4: Peer-reviewed articles were considered, while books, conference papers, and editorials were not included

The shortlisted articles were divided into three categories of micro-level research (digital leadership skills and styles), meso-level research (team communication and collaboration), and macro-level (digital leadership, digital transformation, business model innovation, and organizational culture). We also limited our search to "1999 onwards," considering empirical and conceptual research. We also restricted our key search to peer-reviewed journal articles while eliminating the books and editorials.

Way Forward for Digital Leadership and Digital Transformation Research at Multiple levels

The proposed conceptual model of this research connects digital transformation and digital leadership with the 4I framework of organizational learning. We argue that digital transformation is a continuous process that happens in distinct processes of intuition, interpretation, integration, and institutionalization. These processes occur in two types of mechanisms, as explained earlier, viz. the exploration process, which consists of innovation and change, and the exploitation process, which consists of adaptation, knowledge creation, and transfer (Berson et al., 2006). In the following section, we propose propositions on the digital leadership competencies for successful digital transformation in the lens of exploration and exploitation processes for each learning process.

Micro-Level

Exploration

It is a process of new knowledge creation through intuition, interpretation, and integration. This process is driven by individuals' innovative and creative capabilities (Berson et al., 2006).

A Multi-level framework of Digital Leadership and Digital Transformation

Intuition Phase

In this stage of learning, individuals initiate the learning process by identifying unique and new approaches (Behling and Eckel, 1991). The extant literature indicates that leaders have a significant and direct role in innovation and creative ideas (e.g., Amabile et al., 1996, Redmond et al., 1993). In organizations, the most common form of intuition is where the leaders convert their knowledge into shared experiences at the workplace. These leaders seek knowledge through their novel ideas for generating new insights (Wenger and Snyder, 2000, Koestler). Hence, the intuition of leaders focuses on exploring novel ideas which may lead to innovative changes (Berson et al., 2006).

Intuition is a future-oriented phase of the learning process in which leaders explore new possibilities and goals (Grah et al., 2016) through their competencies. Digital transformation requires unique skills for leaders (Santo et al., 2019) to support the innovation process of organizations (Ciarli et al., 2021). Digital transformation and the leadership skills required for this transformation coevolve together. However, besides understanding digital leadership characteristics and styles, digital leaders must also understand the skills needed for digital transformation. An MIT Sloan and Deloitte survey showed that 90% of the respondents (executives, managers, and analysts) emphasized workforce upskilling for survival in the digital era (Kane et al., 2018). According to Guzmán et al. (2020), for digital leaders, cognitive skills, social skills, and digital and technological skills are critical for successful digital transformation.

As digital leadership is a cross-hierarchical and team-oriented process with a strong focus on innovation (Oberer and Erkollar, 2018), using participative leadership skills in the decision-making process encourages the intuition of leaders. It increases the chances of successful digital transformation. Similarly, the intuition phase cannot be successful without participative leadership and may impact the follower's intuition. For instance, a research study by Oldham and Cummings (1996) found that leaders who use their intuition capabilities successfully encourage followers to adopt changes. A leader may help the followers by redirecting their work Sternberg et al. (2003), which as a result, will help them embrace the new innovative changes. Thus, digital leaders' participative competency will allow their followers to be more committed and highly receptive to digital transformation.

Moreover, the leader brings change and solves organizational problems through technology and innovation (Şen and Eren, 2012). In the context of digitalization, the leader possesses the ability to work with a mixture of humans and machines (teams of employees, gig workers, and artificial intelligence) for a successful digital transformation. Additionally, they create a shared vision aligning the values of the workers with those of the organization (Blanchard and Broadwell, 2018, Sen, 2007). Innovative leadership is, hence, an essential driver for triggering successful digital transformation (Ratnasari, 2020) in the micro-level intuition process. Their innovative mindset is highly relevant for bringing change (Shaari et al., 2015) and success in such conditions (Kremer et al., 2019, Li et al., 2016, Ratnasari, 2020).

Similarly, transformational leaders use their intellectual stimulation to bring innovative changes, and several studies have found a positive link between transformational leadership and innovation (Howell and Higgins, 1990). Both transformation and democratic leadership styles are likely to be more effective in the exploration of ideas (Vera and Crossan, 2004). It is argued that digital leadership requires transformational capabilities and a democratic environment (Prince, 2018) through which their organization may develop a strategic competitive advantage over other firms (Sow and Aborbie, 2018). Furthermore, research links transformational leaders' digital skills

A Multi-level framework of Digital Leadership and Digital Transformation

and capabilities with higher information-sharing and problem-solving orientation (Jansen et al., 2009, Jung et al., 2003). Thus, a transformational leadership style is ideal for successful digital transformation. An appropriate one for the digital work environment that is decentralized and requires individuals to be creative and innovative (Oberer and Erkollar, 2018). Hence, a democratic leader having digital skills will more likely be able to transform the organization digitally. We argue that the democratic and transformational leadership styles mediate the relationship between digital leadership skills and digital transformation because the digital leader uses intuition to manage the disruptive situation in the intuition process. Such a process is smoother if the leader's transformational and democratic styles mediate the transformation process.

However, in the emerging environment of digital transformation, where quick action is needed, leaders often have to rely on their intuition. Such a situation may create uncertainty among the teams and leaders. Still, such a situation can be avoided through technological, digital, innovative, and participative skills, which are key drivers of digital change. Such a relationship may be more robust when transformational and democratic leadership styles mediate the relationship. Thus, a digital leader's advanced knowledge is essential in the intuition phase to exploit the full benefits of digital transformation. Based on our above discussion, we propose the following propositions:

Proposition 1: There is a direct positive relation between the digital leader competencies and the exploration process of digital transformation.

Proposition 2: Digital Leaders facilitate intuition of digital transformation ideas by utilizing their digital, technological, participative, and innovative skills. Such a relationship is stronger when transformative and democratic digital leadership characteristics mediate the relationship between leadership skills and intuition of ideas for digital transformation.

Meso- Level

The Interpretation Stage

In the interpretation stage, leaders can make sense of their knowledge (Huff, 1990). We argue that digital leaders play a vital role in realizing and implementing digital transformation in the interpretation phase of process learning, particularly among their followers and team members.

Leaders frame their experiences and turn them into action (Smircich and Morgan, 1982). Thus, leaders help followers in setting the meaningful learning and action domain.

In the interpretation phase of learning, leaders' communication and listening skills are significant in persuading followers to achieve a common goal (Leung, 2005). Similarly, in the digital transformation phase, when the followers and other team members face difficulty interpreting organizational digital transformational goals, digital leaders, through their communication and team collaboration skills, help the team members interpret. Typically, leaders use different metaphors, such as telling their personal experiences, to guide the actions of team members. As a result, this helps them better understand the organizational goals, and they are more able to connect with them (Berson et al., 2006). Hence, using team communication and collaboration skills at the meso-level allows leaders to facilitate digital transformation among their team members. In this process of information flow from the intuition stage at the micro level to

A Multi-level framework of Digital Leadership and Digital Transformation

the meso-level at the interpretation phase via exploration, the leader's relationship with their employees and followers plays a significant role in successfully interpreting and implementing the idea (Clarke, 2010).

Digital leaders are also open to change and tackle problems with an open mind, enabling successful digital transformation. Bringing change and innovation at the strategic level requires digital leaders to communicate their innovative ideas across all levels. Furthermore, a digital leader must be responsive, open to innovation, learning to create a digital transformation culture (Sivathanu and Pillai, 2018), and adaptive to change (Kelly, 2018).

Furthermore, the extant literature suggests that exploration happens when input is given by both leaders and followers, thus hinting at the team collaboration and communication of ideas (Pearce and Conger, 2002). Similarly, such relationships are stronger when the team members are more open, willing, and adaptive toward change acceptance (Sarin and McDermott, 2003). A study conducted by Shin and Zhou (2003) at a group level of Korean firms found that the followers' intrinsic motivation positively impacts transformational leadership and innovation. Therefore, we argue that communication and collaboration between leaders and followers are more assertive when the followers are willing to adopt the changes. Therefore, based on the above discussion, we propose that:

Proposition 3: Digital leader facilitates the interpretation of ideas for digital transformation through team communication and collaboration. Such a relationship is stronger when the intrinsic motivation of the followers mediates the relationship between digital leadership competencies (communication and collaboration) and digital transformation.

Mediation by Contextual Support

Moreover, in the exploration phase, shared context and interactions with others play a significant role. (Nonaka et al., 2000). Here again, leaders play an essential role in context formation, which helps maximize follower creativity and supports the adoption of organizational innovativeness (Ford, 1996, Mumford, 2000, Shalley and Gilson, 2004). The extant research shows the positive impact of the role of leaders in the interpretation of ideas in the exploration phase and in creating a shared vision at the team level (Amabile et al., 1996, Ford, 1996, Nonaka et al., 2000, Oldham and Cummings, 1996, Scott and Bruce, 1994, Shalley and Gilson, 2004). Similarly, Redmond et al. (1993) found that leaders can promote the innovativeness of team members by building organizational contexts. A research study of Taiwanese firms found a positive impact of leadership in supporting innovation in firms (Jung et al., 2003). Leaders keep the organizational changes by creating a context that allows team members to grow, learn from mistakes, and develop innovative ideas (Ron et al., 2006, Halbesleben et al., 2003). Responding to the call of Berson et al. (2006) to study the relationship of organizational context with other mediators, we propose that :

Proposition 4: Digital leaders facilitate the exploration of digital transformation ideas among their followers by providing them with contextual support. Such a relationship is stronger when contextual support from the leaders mediates the relationship between digital leadership and digital transformation.

A Multi-level framework of Digital Leadership and Digital Transformation

The Integration Phase

As mentioned earlier, the organizational learning process is continuous, and each process leads to the development of others (Berson et al., 2006). In the interpretation phase, the shared communication built between the leader and followers takes the next step in the integration phase. In this phase, the integration of ideas between the leaders and followers is achieved by a shared understanding of goals and ideas (Crossan et al., 1999).

Various existing models of leadership support the idea of integration. Such as leader member exchange (LMX theory) (Graen and Uhl-Bien, 1995, Scott and Bruce, 1994) helps us understand the dyadic relationship between the leader and followers to facilitate the integration of knowledge, ideas, and goals, which later becomes part of the organizational shared vision (Waldman et al., 2005). Thus, in the integration phase, the ideas are converted into shared action by collective team members action (Grah et al., 2016). Therefore, at the integration phase, we propose that digital leaders are entirely responsible for creating shared understanding through their shared vision competencies and facilitating digital transformation by utilizing them.

Proposition 5: Digital leaders facilitate the integration of ideas by utilizing their shared understanding competencies. Such a relationship is stronger when at the meso-level, the digital leader creates a shared understanding of digital transformation goals among their followers, leading to successful digital transformation.

Macro Level

Exploitation Phase

This section will discuss the relationship between digital leadership, digital transformation, institutionalization, and exploitation. Exploitation consists of constructs like transfer of knowledge and adaptation (March, 1991). The flow of information from integration to institutionalization and back to intuition uses the knowledge adaptation and transfer mechanism known as the exploitation process (Crossan and Berdrow, 2003).

Institutionalization

In this phase, the newly created knowledge is transferred to organizations' routines, processes, and structure (Grah et al., 2016, Argote and Todorova, 2007). There is limited research on the leadership role in these processes (Berson et al., 2006). At the organizational level, the real implication of knowledge is made realistic by the leadership, and thus leadership plays a significant role here. These leaders develop knowledge and strategies within the firm to facilitate the change Hackett (2000) and develop new business models and organizational culture. However, these leadership roles are still scarce in the literature and need further evaluation, particularly in digital leadership and digital transformation. Similarly, as per the Upper Echelon theory, in the institutionalization process, a leader's characteristics and styles impact organizational learning (Hambrick and Mason, 1984, Finkelstein and Hambrick, 1996).

Moreover, we argue that in the institutionalization process, digital leaders exploit the existing business model for the innovation of organizations. A business model is holistic, multidimensional, and complex (Li, 2020). The business model's success depends upon a good fit between the product and its successful implementation. Different economic and business

A Multi-level framework of Digital Leadership and Digital Transformation

conditions require firms to upgrade and revise their business models per the market demands and successfully provide customer services (Bohnsack et al., 2021). Likewise, the emerging market disruption toward digital transformation creates new value-creation opportunities for firms (Lanzolla et al., 2021, Hacklin et al., 2018).

Digital transformation of business models involves using automation techniques such as big data, artificial intelligence, blockchain technology, etc., for value creation and provision of services to customers (Schallmo and Daniel, 2018). The objective of digitalization of business models is the timely delivery of products and services, cost reduction, product quality, and building better customer relationships. In doing so, the digital leader must play a crucial role.

Building on the role of leadership in the institutionalization process, we argue that digital leaders influence the business model innovation for the practical implementation of knowledge created in the early phases. Digital leaders must update business models for digital transformation. To do this, the digital leader should transform their roles, skills, and styles; develop a culture of digitalization, vision, values, and structures; and develop individuals, knowledge, and collaboration in the organization (Eberl and Drews, 2021). Thus, a digital leader may develop a business model by updating their skills, characteristics, and styles; at the same time, at the organizational level, change the organizational culture and strategies, and collaborate and communicate digital change at the individual level. Digital leadership, hence, can influence innovation and business model innovation (Kreutzer et al., 2017, Wasono and Furinto, 2018). Therefore, we propose that:

Proposition 6: There is a direct positive relation between the digital leader competencies and the exploitation process of digital transformation.

Proposition 7: Digital leaders facilitate the institutionalization of digital transformation ideas through business model innovation by utilizing their competencies. Such a relationship is stronger when technological, digital, innovative, and participative skills mediate the relationship between digital leadership and digital transformation.

Moderation by Organizational Culture

Likewise, the role of organizational context in the exploration phase, at the organizational level, firms' culture plays a significant role in the institutionalization of ideas and knowledge being established in the earlier stages. In traditional firms, there is generally a separation between IT and other business functions (Haffke et al., 2017). However, the disruption caused by digital transformation requires firms to change their existing culture (Hartl and Hess, 2017) to utilize the benefits of digitalization at multiple levels fully.

Karimi and Walter (2015) suggest that for firms to build capabilities for digital transformation, they must create an innovative culture that orients all employees' mindsets toward the standard language. Firms must be ready to take the risk of cultural change to successfully implement digital transformation and start at a smaller scale for the overall successful digital implementation (Fehér et al., 2017, Dremel et al., 2017). In doing so, firms can achieve agility and successfully implement digital transformation (Jöhnk et al., 2017). Organizational culture plays a significant role in transformation through digitalization (McAfee et al., 2011, Hess et al., 2016a).

A Multi-level framework of Digital Leadership and Digital Transformation

In all this, a digital leader plays a key role. A digital leader with the required skill set, characteristics, and style, hence, can significantly impact changes in organizational culture for the successful digital transformation of organizations (Mengü et al., 2020). Building on the role of leadership in the institutionalization process, we argue that organizational culture moderates the relationship between the digital leader competencies and the exploitation process of digital transformation for the practical implementation of knowledge created in the early phases. Therefore, we propose that:

Proposition 8: Organizational culture moderates the relationship between the digital leader competencies and the exploitation process of digital transformation.

We have provided a graphical representation of the conceptual framework (figure 1).

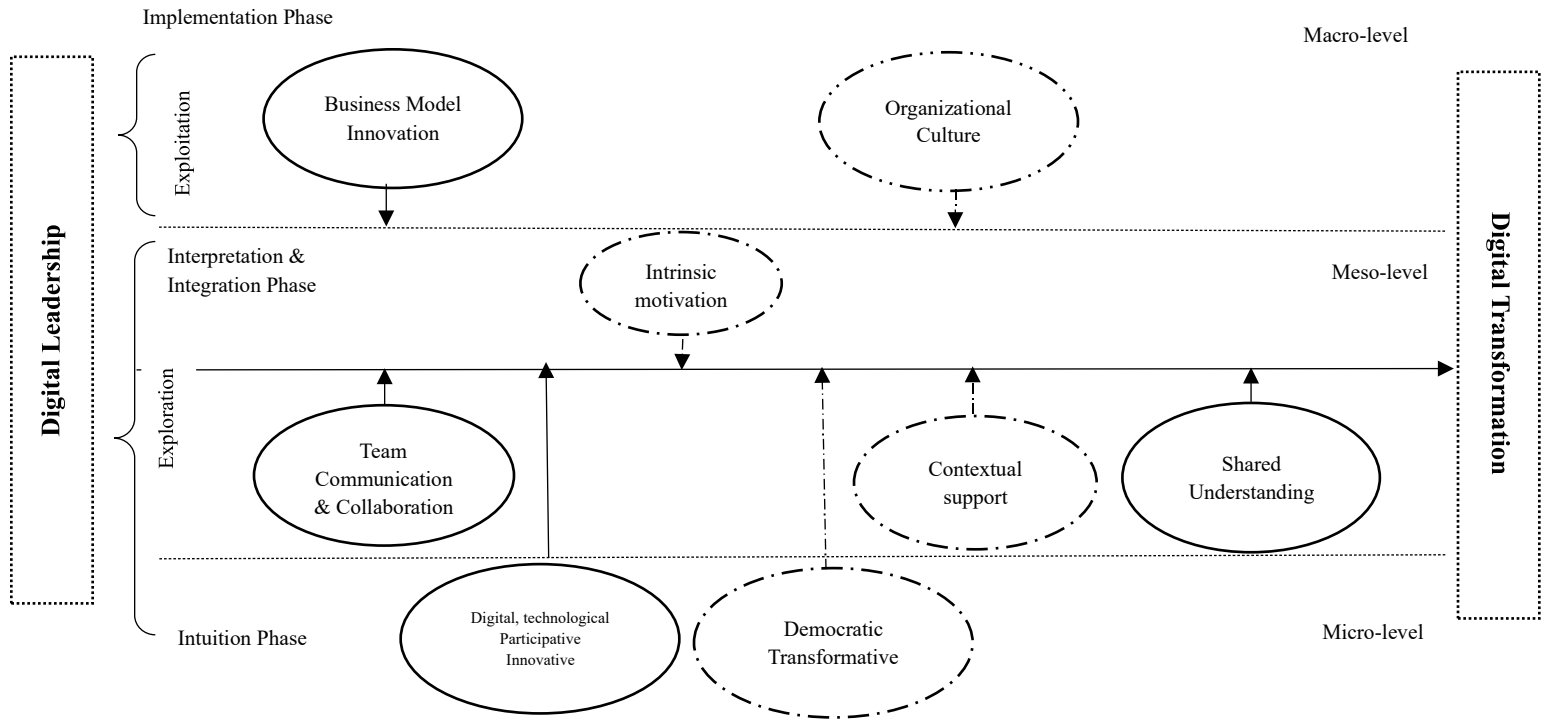


Figure 1: Conceptual Framework

A Multi-level framework of Digital Leadership and Digital Transformation

Discussion

In this conceptual paper, we have argued that digital leadership and digital transformation are continuous processes that occur at a multi-level. The multi-level structure of digital leadership and digital transformation is developed by the integration of the 4I framework. We believe that this conceptual framework has the following five prime contributions. First, at multiple levels, we suggest how digital leaders use their digital competencies for digital transformation. Second, based on the careful review of extant literature, we have identified various constructs such as digital leadership competencies, contextual support, intrinsic motivation, business model innovation, and organizational culture for successful digital transformation at multiple levels. Third, we have offered the propositions which lead toward future avenues. Fourth, we have covered contextual support and shared leadership at the meso-level for a successful digital transformation process. Fifth, our research has integrated the 4I organizational learning framework in digital leadership and digital transformation scholarship by incorporating various multi-level constructs in a single study, which is missing in the extant literature. In other words, we have contributed to the extant literature by adopting deep-integrative level research to understand the digital leadership role, along the various processes of 4I and multi-level, in the success of the digital transformation. Our study contributes to the scholarship of leadership and organizational change and may advance knowledge.

Limitations and Future Research

This study focused on the digital leader because of its particularly significant position in the digital transformation process of organizations (Erhan et al., 2022). However, during the review process, it was evident that most of the literature has focused on the senior management role in digital transformation, which has left room for the different managerial levels and at the group level. Therefore, we suggest that future research should focus on the role of middle managers in the digital transformation process. Additionally, we recommend that future research cover the grey literature on the followers' role in the digital transformation process and how the digital leadership and follower dyad would play their role in an organization's digital transformation journey.

We suggest further research on the standalone theory for digital. In the ongoing process of transformation, it is of significant importance to advance the leadership literature to understand the development process of the leader (Day et al., 2021). An integrated review by Vogel et al. (2020) reveals that leadership theories have not been investigated comprehensively. Therefore, an overarching theoretical development of the field is required to develop and understand leadership, especially concerning the changes digitalization is bringing the organizations. Lastly, we suggest empirical testing of our study model in different contexts, especially in emerging economies, traditional businesses, new businesses, and various industry sectors (El Sawy et al., 2016, Malik and Raziq, 2021, Malik et al., 2021).

A Multi-level framework of Digital Leadership and Digital Transformation

References

- ABBU, H., MUGGE, P., GUDERGAN, G., HOEBORN, G. & KWIATKOWSKI, A. 2022. Measuring the Human Dimensions of Digital Leadership for Successful Digital Transformation: Digital leaders can use the authors' Digital Leadership Scale to assess their own readiness and ability to accelerate digital transformation. *Research-Technology Management*, 65, 39-49.
- AHMED IQBAL, Z., ABID, G., CONTRERAS, F., HASSAN, Q. & ZAFAR, R. 2020. Ethical leadership and innovative work behavior: The mediating role of individual attributes. *Journal of Open Innovation: Technology, Market, and Complexity*, 6, 68.
- AMABILE, T. M., CONTI, R., COON, H., LAZENBY, J. & HERRON, M. 1996. Assessing the work environment for creativity. *Academy of management journal*, 39, 1154-1184.
- AMITAY, M., POPPER, M. & LIPSHITZ, R. 2005. Leadership styles and organizational learning in community clinics. *The Learning Organization*.
- ANDERSON, H. J., BAUR, J. E., GRIFFITH, J. A. & BUCKLEY, M. R. 2017. What works for you may not work for (Gen) Me: Limitations of present leadership theories for the new generation. *The Leadership Quarterly*, 28, 245-260.
- ANNARELLI, A., BATTISTELLA, C., NONINO, F., PARIDA, V. & PESSOT, E. 2021. Literature review on digitalization capabilities: Co-citation analysis of antecedents, conceptualization and consequences. *Technological Forecasting and Social Change*, 166, 120635.
- ANTONAKIS, J., BANKS, G., BASTARDOZ, N., COLE, M., DAY, D., EAGLY, A., EPITROPAKI, O., FOTI, R., GARDNER, W. & HASLAM, A. 2019. The leadership quarterly: State of the journal. *The Leadership Quarterly*, 30, 1-9.
- ANTONOPOULOU, H., HALKIOPOULOS, C., BARLOU, O. & BELIGIANNIS, G. N. 2020. Leadership types and digital leadership in higher education: behavioural data analysis from university of Patras in Greece. *International Journal of Learning, Teaching and Educational Research*, 19, 110-129.
- ARGOTE, L. & TODOROVA, G. 2007. Organizational learning. *International review of industrial and organizational psychology*, 22, 193.
- BANKS, G., DIONNE, S., SAYAMA, H., SCHMID, M. & SPECIAL, M. 2019. Leadership in the Digital Era: Social Media, Big Data. *Virtual Reality, Computational Methods, and Deep Learning. The Leadership Quarterly*, 30, 30120-1.
- BANKS, G. C., DIONNE, S. D., MAST, M. S. & SAYAMA, H. 2022. Leadership in the digital era: A review of who, what, when, where, and why. Elsevier.
- BEHLING, O. & ECKEL, N. L. 1991. Making sense out of intuition. *Academy of Management Perspectives*, 5, 46-54.
- BERSON, Y., NEMANICH, L. A., WALDMAN, D. A., GALVIN, B. M. & KELLER, R. T. 2006. Leadership and organizational learning: A multiple levels perspective. *The leadership quarterly*, 17, 577-594.
- BHARADWAJ, A., EL SAWY, O. A., PAVLOU, P. A. & VENKATRAMAN, N. V. 2013. Digital business strategy: toward a next generation of insights. *MIS quarterly*, 471-482.
- BLANCHARD, K. & BROADWELL, R. 2018. *Servant leadership in action: How you can achieve great relationships and results*, Berrett-Koehler Publishers.

A Multi-level framework of Digital Leadership and Digital Transformation

- BLICHFELDT, H. & FAULLANT, R. 2021. Performance effects of digital technology adoption and product & service innovation—A process-industry perspective. *Technovation*, 102275.
- BOHNSACK, R., KURTZ, H. & HANELT, A. 2021. Re-examining path dependence in the digital age: The evolution of connected car business models. *Research Policy*, 50, 104328.
- BRESCIANI, S., FERRARIS, A., ROMANO, M. & SANTORO, G. 2021. *Digital transformation management for agile organizations: A compass to sail the digital world*, Emerald Group Publishing.
- CHARLES, C. 2015. IRS chief says he won't blame data breach on budget crunch. *Government Executive*, June, 2.
- CHIRUMALLA, K. 2021. Building digitally-enabled process innovation in the process industries: A dynamic capabilities approach. *Technovation*, 102256.
- CIARLI, T., KENNEY, M., MASSINI, S. & PISCITELLO, L. 2021. Digital technologies, innovation, and skills: Emerging trajectories and challenges. *Research Policy*.
- CLARKE, N. 2010. Emotional intelligence and learning in teams. *Journal of Workplace Learning*, 22, 125-145.
- COLIN, D. 2015. Personnel Chief's Resignation Doesn't Address Prevention of More Data Breaches. *LA Times (July 10)*.
- CROSSAN, M. M. & BERDROW, I. 2003. Organizational learning and strategic renewal. *Strategic management journal*, 24, 1087-1105.
- CROSSAN, M. M., LANE, H. W. & WHITE, R. E. 1999. An organizational learning framework: From intuition to institution. *Academy of management review*, 24, 522-537.
- DAY, D. V., RIGGIO, R. E., TAN, S. J. & CONGER, J. A. 2021. Advancing the science of 21st century leadership development: Theory, research, and practice. *The Leadership Quarterly*.
- DREMEL, C., WULF, J., HERTERICH, M. M., WAIZMANN, J.-C. & BRENNER, W. 2017. How AUDI AG Established Big Data Analytics in Its Digital Transformation. *MIS Quarterly Executive*, 16.
- EBERL, J. K. & DREWS, P. Digital Leadership—Mountain or molehill? A literature review. International Conference on Wirtschaftsinformatik, 2021. Springer, 223-237.
- EDMONDSON, A. 1999. Psychological safety and learning behavior in work teams. *Administrative science quarterly*, 44, 350-383.
- EISENHARDT, K. M., FURR, N. R. & BINGHAM, C. B. 2010. CROSSROADS—Microfoundations of performance: Balancing efficiency and flexibility in dynamic environments. *Organization science*, 21, 1263-1273.
- EL SAWY, O. A., KRÆMMERGAARD, P., AMSINCK, H. & VINTHER, A. L. 2016. How LEGO built the foundations and enterprise capabilities for digital leadership. *MIS quarterly executive*, 15.
- ELSBACH, K. D. & VAN KNIPPENBERG, D. 2020. Creating high-impact literature reviews: An argument for 'integrative reviews'. *Journal of Management Studies*, 57, 1277-1289.
- ERHAN, T., UZUNBACAK, H. H. & AYDIN, E. 2022. From conventional to digital leadership: exploring digitalization of leadership and innovative work behavior. *Management Research Review*.
- FEHÉR, P., SZABÓ, Z. & VARGA, K. 2017. Analysing digital transformation among hungarian organizations. *BLED*.

A Multi-level framework of Digital Leadership and Digital Transformation

- FINKELSTEIN, S. & HAMBRICK, D. C. 1996. *Strategic leadership: Top executives and their effects on organizations*, Citeseer.
- FORD, C. M. 1996. A theory of individual creative action in multiple social domains. *Academy of Management review*, 21, 1112-1142.
- FOSS, N. J. 2016. Reflections on a decade of microfoundations research. *Revista de Administração (São Paulo)*, 51, 117-120.
- FOSS, N. J. & SAEBI, T. 2017. Fifteen years of research on business model innovation: How far have we come, and where should we go? *Journal of management*, 43, 200-227.
- GEORGE, N., KARNA, A. & SUD, M. 2022. Entrepreneurship through the lens of dynamic managerial capabilities: A review of the literature. *Journal of Management & Organization*, 1-27.
- GILLI, K., LETTNER, N. & GUETTEL, W. 2023. The future of leadership: new digital skills or old analog virtues? *Journal of Business Strategy*.
- GONG, C. & RIBIERE, V. 2021. Developing a unified definition of digital transformation. *Technovation*, 102, 102217.
- GORAN, J., LABERGE, L. & SRINIVASAN, R. 2017. Culture for a digital age. *McKinsey Quarterly*, 3, 56-67.
- GRAEN, G. B. & UHL-BIEN, M. 1995. Relationship-based approach to leadership: Development of leader-member exchange (LMX) theory of leadership over 25 years: Applying a multilevel multi-domain perspective. *The leadership quarterly*, 6, 219-247.
- GRAH, B., DIMOVSKI, V., C SNOW, C. & PETERLIN, J. 2016. Expanding the model of organizational learning: Scope, contingencies, and dynamics. *Economic and Business Review*, 18, 3.
- GROYSBERG, B. 2014. The seven skills you need to thrive in the C-suite. *Harvard Business Review*, 18.
- 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.
- HACKETT, B. Beyond knowledge management: New ways to work and learn. 2000. Conference Board, Incorporated, The.
- HACKLIN, F., BJÖRKDAHL, J. & WALLIN, M. W. 2018. Strategies for business model innovation: How firms reel in migrating value. *Long range planning*, 51, 82-110.
- HAFFKE, I., KALGOVAS, B. & BENLIAN, A. 2017. The transformative role of bimodal IT in an era of digital business.
- HALBESLEBEN, J. R., NOVICEVIC, M. M., HARVEY, M. G. & BUCKLEY, M. R. 2003. Awareness of temporal complexity in leadership of creativity and innovation: A competency-based model. *The Leadership Quarterly*, 14, 433-454.
- HAMBRICK, D. C. & MASON, P. A. 1984. Upper echelons: The organization as a reflection of its top managers. *Academy of management review*, 9, 193-206.
- HAN, G. & JEKEL, M. 2011. The mediating role of job satisfaction between leader-member exchange and turnover intentions. *Journal of nursing management*, 19, 41-49.

A Multi-level framework of Digital Leadership and Digital Transformation

- HANELT, A., BOHNSACK, R., MARZ, D. & ANTUNES MARANTE, C. 2021. A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies*, 58, 1159-1197.
- HARRIS, K. J., WHEELER, A. R. & KACMAR, K. M. 2009. Leader–member exchange and empowerment: Direct and interactive effects on job satisfaction, turnover intentions, and performance. *The Leadership Quarterly*, 20, 371-382.
- HARTL, E. & HESS, T. 2017. The role of cultural values for digital transformation: Insights from a Delphi study.
- HENDERIKX, M. & STOFFERS, J. 2022. An exploratory literature study into digital transformation and leadership: Toward future-proof middle managers. *Sustainability*, 14, 687.
- HENRIETTE, E., FEKI, M. & BOUGHZALA, I. 2015. The shape of digital transformation: a systematic literature review. *MCIS 2015 proceedings*, 10, 431-443.
- HESS, T., BENLIAN, A., MATT, C. & WIESBÖCK, F. 2016a. How german media companies defined their digital transformation strategies. *MIS Quarterly Executive*, 15, 103-119.
- HESS, T., MATT, C., BENLIAN, A. & WIESBÖCK, F. 2016b. Options for formulating a digital transformation strategy. *MIS Quarterly Executive*, 15.
- HEUBECK, T. 2023. Managerial capabilities as facilitators of digital transformation? Dynamic managerial capabilities as antecedents to digital business model transformation and firm performance. *Digital Business*, 100053.
- HEUBECK, T. & MECKL, R. 2022. More capable, more innovative? An empirical inquiry into the effects of dynamic managerial capabilities on digital firms' innovativeness. *European Journal of Innovation Management*, 25, 892-915.
- HOWELL, J. M. & HIGGINS, C. A. 1990. Champions of technological innovation. *Administrative science quarterly*, 317-341.
- HUFF, A. S. 1990. *Mapping strategic thought*, Wiley.
- IRELAND, R. D. & HITT, M. A. 2005. Achieving and maintaining strategic competitiveness in the 21st century: The role of strategic leadership. *Academy of Management Perspectives*, 19, 63-77.
- JANOWSKI, T. 2015. Digital government evolution: From transformation to contextualization. Elsevier.
- JANSEN, J. J., VERA, D. & CROSSAN, M. 2009. Strategic leadership for exploration and exploitation: The moderating role of environmental dynamism. *The Leadership Quarterly*, 20, 5-18.
- JANSSEN, M. & VAN DER VOORT, H. 2016. Adaptive governance: Towards a stable, accountable and responsive government. Elsevier.
- JÖHNK, J., RÖGLINGER, M., THIMMEL, M. & URBACH, N. 2017. How to implement agile IT setups: A taxonomy of design options.
- JONES, G. & PITELIS, C. 2015. Entrepreneurial imagination and a demand and supply-side perspective on the MNE and cross-border organization. *Journal of International Management*, 21, 309-321.
- JUDGE, T. A. & PICCOLO, R. F. 2004. Transformational and transactional leadership: a metaanalytic test of their relative validity. *Journal of applied psychology*, 89, 755.

A Multi-level framework of Digital Leadership and Digital Transformation

- JUNG, D. I., CHOW, C. & WU, A. 2003. The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. *The leadership quarterly*, 14, 525-544.
- KANE, G. C., NANDA, R., PHILLIPS, A. N. & COPULSKY, J. 2021. The Digital Superpowers You Need to Thrive. *MIT Sloan Management Review*, 63, 1-6.
- KANE, G. C., PALMER, D., PHILLIPS, A.-N., KIRON, D. & BUCKLEY, N. 2018. Coming of age digitally. *MIT Sloan Management Review and Deloitte Insights*, 59, 1-10.
- KARIMI, J. & WALTER, Z. 2015. The role of dynamic capabilities in responding to digital disruption: A factor-based study of the newspaper industry. *Journal of Management Information Systems*, 32, 39-81.
- KELLY, R. 2018. *Constructing leadership 4.0: Swarm leadership and the fourth industrial revolution*, Springer.
- KLEIN, M. 2020. Leadership characteristics in the era of digital transformation.
- KOESTLER, A. The Act of Creation (London: Hutchinson, 1964). *KoestlerThe Act of Creation*1964.
- KORHERR, P., KANBACH, D. K., KRAUS, S. & MIKALEF, P. 2022. From intuitive to datadriven decision-making in digital transformation: A framework of prevalent managerial archetypes. *Digital Business*, 2, 100045.
- KREMER, H., VILLAMOR, I. & AGUINIS, H. 2019. Innovation leadership: Best-practice recommendations for promoting employee creativity, voice, and knowledge sharing. *Business Horizons*, 62, 65-74.
- KREUTZER, R. T., NEUGEBAUER, T. & PATTLOCH, A. 2017. Digital business leadership. *Digital Transformation–Geschäftsmodell-Innovation–agile Organisation–ChangeManagement*.
- LANZOLLA, G., PESCE, D. & TUCCI, C. L. 2021. The digital transformation of search and recombination in the innovation function: Tensions and an integrative framework. *Journal of Product Innovation Management*, 38, 90-113.
- LEUNG, A. S. 2005. Emotional intelligence or emotional blackmail: A study of a Chinese professional-service firm. *International Journal of cross cultural management*, 5, 181-196.
- LI, C. 2010. *Open leadership: How social technology can transform the way you lead*, John Wiley & Sons.
- LI, F. 2020. The digital transformation of business models in the creative industries: A holistic framework and emerging trends. *Technovation*, 92, 102012.
- LI, W., LIU, K., BELITSKI, M., GHOBADIAN, A. & O'REGAN, N. 2016. e-Leadership through strategic alignment: An empirical study of small-and medium-sized enterprises in the digital age. *Journal of Information Technology*, 31, 185-206.
- LIM, A., LOO, J. & LEE, P. 2017. The impact of leadership on turnover intention: The mediating role of organizational commitment and job satisfaction. *Journal of Applied Structural Equation Modeling*, 1, 27-41.
- MALIK, M. & RAZIQ, M. M. 2021. Digital leadership and the GIG Economy. *Sustainability in the GIG Economy: Perspectives, Challenges and Opportunities in Industry 4.0*. Springer Nature.
- MALIK, M., RAZIQ, M. M., ALLEN, M. M. & AHMAD, M. 2021. The Digitalization of Pakistan's Universities?: An Opportunity to Re-Focus and Re-Purpose Toward Hybrid

A Multi-level framework of Digital Leadership and Digital Transformation

- Learning. *Global Trends, Dynamics, and Imperatives for Strategic Development in Business Education in an Age of Disruption*. IGI Global.
- MALODIA, S., MISHRA, M., FAIT, M., PAPA, A. & DEZI, L. 2023. To digit or to head? Designing digital transformation journey of SMEs among digital self-efficacy and professional leadership. *Journal of Business Research*, 157, 113547.
- MARCH, J. G. 1991. Exploration and exploitation in organizational learning. *Organization science*, 2, 71-87.
- MATARAZZO, M., PENCO, L., PROFUMO, G. & QUAGLIA, R. 2021. Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective. *Journal of Business Research*, 123, 642-656.
- MCAFFEE, A., FERRARIS, P., BONNET, D., CALMÉJANE, C. & WESTERMAN, G. 2011. Digital transformation: A roadmap for billion-Dollar organizations. *MIT Sloan Management Review*.
- MENGÜ, S., MENGÜ, M. M., GÜÇDEMİR, Y. & CANAN, A. S. 2020. The Nature of Digital Leadership in Managing Employees Through Organizational Culture. *Business Management and Communication Perspectives in Industry 4.0*. IGI Global.
- MIHARDJO, L., SASMOKO, S., ALAMSJAH, F. & ELIDJEN, E. 2019. Digital leadership role in developing business model innovation and customer experience orientation in industry 4.0. *Management Science Letters*, 9, 1749-1762.
- MUMFORD, M. D. 2000. Managing creative people: Strategies and tactics for innovation. *Human resource management review*, 10, 313-351.
- NADKARNI, S. & PRÜGL, R. 2021. Digital transformation: a review, synthesis and opportunities for future research. *Management Review Quarterly*, 71, 233-341.
- NONAKA, I., TOYAMA, R. & KONNO, N. 2000. SECI, Ba and leadership: a unified model of dynamic knowledge creation. *Long range planning*, 33, 5-34.
- OBERER, B. & ERKOLLAR, A. 2018. Leadership 4.0: Digital leaders in the age of industry 4.0. *International Journal of Organizational Leadership*.
- OLDHAM, G. R. & CUMMINGS, A. 1996. Employee creativity: Personal and contextual factors at work. *Academy of management journal*, 39, 607-634.
- PEARCE, C. L. & CONGER, J. A. 2002. *Shared leadership: Reframing the hows and whys of leadership*, Sage Publications.
- PETRY, T. 2018. Digital leadership. *Knowledge Management in Digital Change*. Springer.
- PORFÍRIO, J. A., CARRILHO, T., FELÍCIO, J. A. & JARDIM, J. 2021. Leadership characteristics and digital transformation. *Journal of Business Research*, 124, 610-619.
- PRINCE, K. A. 2018. *Digital Leadership: Transitioning into the digital age*. James Cook University.
- RATNASARI, S. W. Digital Transformation of Organizations: Perspectives from Digital Citizenship and Spiritual Innovative Leadership. Conference on Complex, Intelligent, and Software Intensive Systems, 2020. Springer, 485-489.
- REDMOND, M. R., MUMFORD, M. D. & TEACH, R. 1993. Putting creativity to work: Effects of leader behavior on subordinate creativity. *Organizational behavior and human decision processes*, 55, 120-151.

A Multi-level framework of Digital Leadership and Digital Transformation

- RICHARDSON, J. W., BATHON, J., FLORA, K. L. & LEWIS, W. D. 2012. NETS• A scholarship: A review of published literature. *Journal of Research on Technology in Education*, 45, 131-151.
- RON, N., LIPSHITZ, R. & POPPER, M. 2006. How organizations learn: Post-flight reviews in an F-16 fighter squadron. *Organization Studies*, 27, 1069-1089.
- SANTO, V., SACAVÁ, A. N., DOS REIS, I. P. & SAMPAIO, M. C. 2019. 4.0 Leadership skills in hospitality sector. *Journal of Reviews on Global Economics*, 8, 105-117.
- SARIN, S. & MCDERMOTT, C. 2003. The effect of team leader characteristics on learning, knowledge application, and performance of cross-functional new product development teams. *Decision sciences*, 34, 707-739.
- SCHALLMO, A. & DANIEL, R. 2018. *Digital Transformation Now! Guiding the Successful Digitalization of Your Business Model*, Springer.
- SCOTT, S. G. & BRUCE, R. A. 1994. Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of management journal*, 37, 580-607.
- SEN, A. 2007. Leadership with a shared vision in the 21st century: Lessons from Atatürk. *Journal of Global Strategic Management*, 2, 13-30.
- ŞEN, A. & EREN, E. 2012. Innovative leadership for the twenty-first century. *Procedia-Social and Behavioral Sciences*, 41, 1-14.
- SHAARI, Z. H., AMAR, A., ZAINOL, M. R. & HARUN, A. B. 2015. Linking leadership studies to corporate brand management: a review. *International Journal of Business Administration*, 6, 26.
- SHALLEY, C. E. & GILSON, L. L. 2004. What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. *The leadership quarterly*, 15, 33-53.
- SHIN, S. J. & ZHOU, J. 2003. Transformational leadership, conservation, and creativity: Evidence from Korea. *Academy of management Journal*, 46, 703-714.
- SINGH, A. & HESS, T. 2017. How chief digital officers promote the digital transformation of their companies. *MIS Quarterly Executive*, 16.
- SIVATHANU, B. & PILLAI, R. 2018. Smart HR 4.0—how industry 4.0 is disrupting HR. *Human Resource Management International Digest*.
- SMIRCICH, L. & MORGAN, G. 1982. Leadership: The management of meaning. *The Journal of applied behavioral science*, 18, 257-273.
- SOW, M. & ABORBIE, S. 2018. Impact of leadership on digital transformation. *Business and Economic Research*, 8, 139-148.
- STERNBERG, R. J., KAUFMAN, J. C. & PRETZ, J. E. 2003. A propulsion model of creative leadership. *The leadership quarterly*, 14, 455-473.
- TORRACO, R. J. 2016. Writing integrative literature reviews: Using the past and present to explore the future. *Human resource development review*, 15, 404-428.
- TRENERRY, B., CHNG, S., WANG, Y., SUHAILA, Z. S., LIM, S. S., LU, H. Y. & OH, P. H. 2021. Preparing workplaces for digital transformation: An integrative review and framework of multi-level factors. *Frontiers in psychology*, 822.
- VERA, D. & CROSSAN, M. 2004. Strategic leadership and organizational learning. *Academy of management review*, 29, 222-240.

A Multi-level framework of Digital Leadership and Digital Transformation

- VERHOEF, P. C., BROEKHUIZEN, T., BART, Y., BHATTACHARYA, A., DONG, J. Q., FABIAN, N. & HAENLEIN, M. 2021. Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889-901.
- VIAL, G. 2021. Understanding digital transformation: A review and a research agenda. *Managing Digital Transformation*, 13-66.
- VOGEL, B., REICHARD, R. J., BATISTIČ, S. & ČERNE, M. 2020. A bibliometric review of the leadership development field: How we got here, where we are, and where we are headed. *The Leadership Quarterly*, 101381.
- WALDMAN, D., BERSON, Y. & PEARCE, C. 2005. Toward an understanding of shared vision and organizational learning: The complementary roles of vertical and shared leadership. *Academy of Management, Honolulu, HI*.
- WASONO, L. W. & FURINTO, A. 2018. The effect of digital leadership and innovation management for incumbent telecommunication company in the digital disruptive era. *International Journal of Engineering and Technology*, 7, 125-130.
- WEICK, K. E. 1995. *Sensemaking in organizations*, Sage.
- WENGER, E. C. & SNYDER, W. M. 2000. Communities of practice: The organizational frontier. *Harvard business review*, 78, 139-146.
- YOPAN, M., KASALI, R., BALQIAH, T. E. & PASARIBU, M. 2022. The role of digital leadership, customer orientation and business model innovation for IoT companies. *International Journal of Business*, 27, 1-22.