Unraveling Endogeneity: A Systematic Review of Methodologies in Digital Leadership and Remote Work Research

Ahmed Asfahani, Dina Dahlan and Maysaa Alnajem
University of Business and Technology, Jeddah, Saudi Arabia

a.asfahani@ubt.edu.sa (Corresponding Author)
d.dahlan@ubt.edu.sa
wcm019@st.ubt.edu.sa

Abstract: In the evolving landscape of digital leadership and remote work, methodological challenges, particularly endogeneity, have emerged as significant concerns. Endogeneity, which arises when independent variables correlate with regression error terms, can introduce biases that compromise the validity of research findings. This systematic review examines the methodological underpinnings of research in digital leadership and remote work, focusing on how studies have addressed or overlooked the challenges posed by endogeneity. Drawing from 45 seminal articles published between 2019 and 2023, the review reveals a predominant preference for quantitative approaches, with a subset exploring qualitative narratives. While 15 studies directly tackled endogeneity using rigorous methodologies, 10 did not address it, indicating potential gaps in their investigative rigor. This study not only provides clarity and direction for future research endeavors but also supports the advancement of research methodology in business and management by emphasizing the need for methodological rigor in the study of digital leadership and remote work dynamics. By systematically evaluating the methods used to address endogeneity, this research advances the field of business and management research methodology by identifying best practices and highlighting areas for improvement. Specifically, it advocates for the adoption of advanced econometric techniques, such as instrumental variables and fixed effects models, to mitigate biases and enhance the reliability of research outcomes. Furthermore, this review underscores the importance of integrating both quantitative and qualitative approaches to capture the multifaceted nature of digital leadership and remote work, thereby contributing to a more comprehensive understanding of these domains. The study also highlights the influence of unobserved factors on outcomes such as employee productivity, leadership effectiveness, and team cohesiveness. In sum, this research provides a foundational framework for scholars aiming to enhance the robustness and validity of their studies in digital leadership and remote work, aligning with the broader goals of advancing research methodologies in business and management.

Keywords: Digital leadership, Remote work, Endogeneity, Methodological rigor, Systematic review

1. Introduction

In the contemporary professional milieu, significant transformations have been observed, most notably the ascendance of digital leadership and the proliferation of remote work as quintessential attributes of the present-day workplace (Kupiek, 2021). Such metamorphoses, underpinned by the confluence of technological innovations and salient global events, principally the COVID-19 pandemic, have engendered a comprehensive reconfiguration of organizational operations and leadership paradigms (Dirani *et al.*, 2020; Hitt, Holmes and Arregle, 2021). As delineated by Espina-Romero *et al.* (2023) and Luo, He and Li (2023), the exigencies placed upon contemporary leaders have undergone an augmentation. Beyond the realm of conventional managerial responsibilities, leaders find themselves navigating, with increasing alacrity, the intricacies of the digital domain.

Nevertheless, as the academic sphere penetrates deeper into these nascent dimensions, it persistently grapples with methodological conundrums, the preeminent of which is endogeneity (Shaver, 2020; Selezneva and Evdokimova, 2022). Endogeneity, manifesting when independent variables exhibit correlation with regression error terms, has the propensity to introduce profound biases into analytical frameworks (Jean *et al.*, 2016). Such biases jeopardize the veracity of scholarly interpretations by potentially obfuscating authentic relationships or inducing the perception of specious ones (Shaver, 2020). Ranging from simultaneity biases to challenges stemming from omitted variable concerns, these biases cast aspersions on the authenticity of academic conclusions (Jean *et al.*, 2016; Selezneva and Evdokimova, 2022).

The domains of digital leadership and remote work are particularly vulnerable to these analytical challenges due to their inherent complexities and rapid evolution (Banks *et al.*, 2022). Research on digital leadership often seeks to understand the impact of various leadership styles on remote team dynamics, encountering frequent methodological hurdles (Antonakis *et al.*, 2019). Similarly, studies on remote work may overlook individual

preferences for different remote work setups, inadvertently heightening bias risks (Banks *et al.*, 2017; Cooper *et al.*, 2020).

In response to the complexities posed by endogeneity and its related concerns, many scholars have turned to a variety of methodological tools and strategies. The use of instrumental variables, as discussed by Papies, Ebbes and Feit (2023), emerges as a strong approach to clarify causality issues. Guide and Ketokivi (2015) emphasize the importance of fixed effects models, which, by accounting for certain latent variables, increase the robustness and rigor of empirical designs. The advocacy for sophisticated econometric methodologies further strengthens the defense against challenges associated with endogeneity (Hill *et al.*, 2021; Li *et al.*, 2021). Notable scholars, including Banks *et al.* (2022) and Luu (2023), have highlighted the evolving dynamics of leadership in this digital era, underscoring both its promises and challenges. Despite this extensive body of knowledge, gaps remain, especially regarding methodological rigor and the problems associated with endogeneity.

Against this complex scholarly background, this manuscript identifies its focus. Our goal is to provide a detailed analysis of the methodological foundations in research on digital leadership and remote work, particularly how studies have either effectively addressed or overlooked the nuanced challenges posed by endogeneity. This involves examining various approaches used by researchers, such as the implementation of instrumental variables (Papies, Ebbes and Feit, 2023) and fixed effects models (Guide and Ketokivi, 2015), which have shown promise in mitigating endogeneity issues. By integrating these methodologies, scholars can enhance the robustness of their studies and better capture the realities of digital leadership and remote work dynamics. In undertaking this academic exploration, we aim to shed light on the current state of the field and pave the way for future research endeavors that are methodologically rigorous and relevant to the varied realities of this digital era. Our central question is: "How have scholarly efforts navigated the methodological intricacies, focusing on the pitfalls of endogeneity, in their exploration of digital leadership within the context of remote work?" With this analytical approach, we aim to provide clarity, academic coherence, and critical insight to a field that remains dynamic and essential.

2. The Review Methods

2.1 Eligibility Criteria

In conducting the systematic review, a rigorous methodology anchored by clearly defined eligibility criteria was crucial to ensure both precision and comprehensive coverage (McCrae, Blackstock and Purssell, 2015). The pivotal starting point was the decision to rely exclusively on the Elsevier database, a choice driven by its vast collection of scholarly content pertinent to the domains of interest (Ballew, 2009). However, such exclusivity presents a limitation, potentially overlooking seminal works available in other databases (Gusenbauer and Haddaway, 2020).

Transitioning from source selection to temporal scope, the period from January 2019 to September 2023 was chosen as the focus. This wasn't a random selection; there was a noticeable uptick in discussions surrounding digital leadership and remote work starting in 2019 (Sheninger, 2019; Gierlich-Joas, Hess and Neuburger, 2020). Nevertheless, this specific timeframe, while providing a contemporary perspective, may inadvertently omit relevant insights from earlier periods.

Moving on to language as a filtering criterion, the review honed in on English publications, a pragmatic choice ensuring consistent interpretation (Alexander, 2020). Yet, this linguistic limitation inevitably risks missing significant contributions from non-English scholarship (Walpole, 2019). Delving into the search mechanics, the central theme revolved around the interplay between leadership and the diverse world of remote work. To illustrate, a sample search in Elsevier included the query: (Leadership) AND ("remote work" OR "telework" OR "telecommuting" OR "virtual work" OR "work from home").

Set against the backdrop of Business, Management, and Accounting, clear boundaries for this exploration were drawn. However, defining inclusion also brings the challenge of exclusion into the spotlight. While thematic relevance remained paramount, a more nuanced evaluation was undertaken, considering methodological clarity and thematic depth. There was a clear preference for empirical studies, aiming to derive concrete insights, but this exists alongside an acknowledgment of the richness offered by theoretical works. To conclude this criterion description, the emphasis on peer-reviewed articles, while appearing restrictive, underscores a steadfast dedication to maintaining academic rigor, yet also acknowledges the potential value within the wider academic domain (Amir-Behghadami and Janati, 2020; Harari *et al.*, 2020).

2.2 Studies Selection

Initiating the research endeavor, a comprehensive search was conducted within the Elsevier database. This search yielded a total of 396 articles elucidating the intricacies of digital leadership and remote work. Given the substantial number of initial findings, it became imperative to employ a systematic filtration strategy. In the preliminary phase, titles and abstracts underwent rigorous screening to ascertain alignment with the research objectives. This critical process refined the pool to 76 pertinent articles.

In the subsequent selection phase, these 76 articles were meticulously examined in terms of their full texts. A particular emphasis was placed upon the robustness of their methodological constructs and their congruence with the theme of endogeneity in digital leadership, a central tenet of the current research. This rigorous assessment culminated in the isolation of 45 seminal articles, each published between 2019 and September 2023, and firmly anchored in the disciplines of Business, Management, and Accounting. Upholding a commitment to thoroughness, the reference lists of these 45 articles were scrupulously inspected to ensure that no pivotal works, potentially of significant contribution to the systematic review's narrative, were inadvertently omitted.

2.3 Data Collection Process

Upon commencing data extraction, it became evident that a structured and systematic approach was essential (Lunny *et al.*, 2017). This approach was established through a series of subsidiary research questions, each tailored to foster a deeper understanding of the topic. The primary focus was on methodologies, with the aim of determining their role in ascertaining causality within the realm of digital leadership in remote work environments. This investigation was prompted by the question: "Which specific methodologies have been commonly employed to ensure causality in studies of digital leadership in remote work contexts?" Such an assessment is vital because establishing causality provides a robust foundation for informed decision-making and policy development in the rapidly evolving domain of digital leadership in remote work settings (Antonakis *et al.*, 2014; Martin *et al.*, 2021).

As the analysis advanced, the emphasis transitioned towards assessing the methodological rigor of the chosen studies, especially concerning endogeneity. The guiding question at this point was: "To what extent have studies on digital leadership in remote settings employed experimental designs, instrumental-variable estimation, or other stringent methods?" Simultaneously, potential omissions of critical variables in some studies were examined to determine whether such lapses led to ambiguous or misleading outcomes. This evaluation provided a comprehensive view of the predominant methodologies and their potential limitations (Antonakis *et al.*, 2010; Boyd, Gove and Solarino, 2017; Cheng and Choi, 2022).

Beyond merely evaluating the current state of research, the process aimed to identify gaps and set the stage for future scholarly endeavors (Mengist, Soromessa and Legese, 2020). The examination focused on the most glaring gaps in the literature, particularly regarding methodological robustness, and made suggestions for forthcoming research.

To validate the accuracy of this extraction process, a pilot review was conducted on a sample of articles (Long, 2014). This preliminary step sets the standard for the comprehensive extraction process. Each article underwent a meticulous review concerning the subsidiary questions, with results systematically documented. To bolster the reliability of the review (Waffenschmidt *et al.*, 2019; Haby *et al.*, 2023), every fifth article was reevaluated by a separate reviewer, following consistent guidelines. Differences in interpretations were resolved by reaching a consensus or, if necessary, through third-party mediation.

3. Results and Analysis

3.1 Methodological Approaches and Endogeneity Concerns

The journey through the academic milieu of digital leadership and remote work began with an expansive collection of studies. Upon meticulous scrutiny, 45 pivotal studies were earmarked for their crucial insights and distinctive contributions (Flavian, Guinalíu and Jordan, 2019; Norman *et al.*, 2020; Leonardelli, 2022). Predominantly, the selected research landscape veered towards a quantitative approach, a choice evident in 33 studies. This suggests a marked emphasis on empirical evidence and quantifiable metrics in this realm (e.g., Bae, Lee and Sohn, 2019; Muttaqin, Taqi and Arifin, 2020; Allgood, Jensen and Stritch, 2022). However, an insightful subsection of 8 studies delved into the qualitative narrative, aiming to unearth the intricacies and lived experiences of individuals navigating the digital leadership and remote work ecosystems (e.g., Daraba *et al.*, 2021; Abalkhail, 2022; Ferreira, Pinto-Moreira and Larguinho, 2023). An intriguing blend of both of these

paradigms was showcased by four studies, emphasizing the depth and breadth the mixed-method approach brings to the table (e.g., Johnson & Mabry, 2022; Leonard *et al.*, 2023; Mutha & Srivastava, 2023).

Endogeneity, a concern of paramount importance, garnered varied attention across the reviewed corpus (Cooper *et al.*, 2020; Hill *et al.*, 2021). A commendable 15 studies tackled it head-on, employing rigorous methodologies such as experimental designs or instrumental-variable estimation (e.g., Darics, 2020; Junça Silva, Almeida and Rebelo, 2022; Mohanan and Rajarathinam, 2023). An additional 20 studies acknowledged it partially, suggesting a cautious approach to the topic (e.g., Bhumika, 2020; Barhate, Hirudayaraj and Nair, 2022; Islam *et al.*, 2022). Surprisingly, 10 studies did not address this concern, indicating potential gaps in their investigative rigor (e.g., Günther, Hauff and Gubernator, 2022; Imhanrenialena *et al.*, 2023). Of particular note were studies that not only acknowledged endogeneity but also pioneered innovative techniques or applied especially rigorous methodologies to counteract its implications. Abalkhail (2022), for instance, stood out for its nuanced instrumental-variable approach, while Mohanan and Rajarathinam's (2023) employed panel data and fixed-effects models, offering a robust defense against potential endogeneity pitfalls. Likewise, Ferreira, Pinto-Moreira and Larguinho's (2023) experimental design, meticulously crafted, serves as a beacon of methodological excellence in this arena.

Amidst these methodological nuances, certain thematic areas emerged prominently. Employee productivity in remote settings garnered significant attention (Choudhury, Foroughi and Larson, 2021; Straus *et al.*, 2023). Studies such as Liebermann *et al.* (2021), Sanhokwe (2022), and Santiago-Torner (2023) delved deep into the influencing variables and potential unobserved factors. Leadership effectiveness in digital contexts was another spotlight area, explored extensively by studies like Müller and Niessen (2019), Johnson and Mabry (2022), and Lee and Kim (2023). Additional domains, including team cohesiveness, employee well-being, and innovation in remote teams, were meticulously charted by studies such as those developed by Norman et al. (2020), Eichenauer, Ryan and Alanis (2022), and Pereira and Marcolino (2023).

In synthesis, while the selected studies span a diverse spectrum of methodological strategies, their collective approach to endogeneity highlights both the progress made and the challenges that persist in the rigorous study of digital leadership and remote work dynamics.

3.2   Outcomes and Potential Influences by Unobserved Factors

Delving into the myriad facets of digital leadership and remote work research derived from the compilation of 45 reviewed studies, several pivotal outcomes or dependent variables emerged as the cynosure of academic intrigue. First and foremost, a large number of studies, notably those exemplified by Müller and Niessen (2019), Islam *et al.* (2022), and Barhate, Hirudayaraj and Nair (2022), centered their investigations around the metrics of employee productivity in remote environments. It is crucial to underscore the lurking shadows of unobserved factors (Rutz and Watson, 2019; Li *et al.*, 2021). Individual motivation, inherent distractions in the home environment, or even the caliber of digital tools employed could potentially sway productivity readings. For instance, Islam *et al.* (2022) meticulously factored in the influence of individual motivation using control variables. In contrast, Barhate, Hirudayaraj and Nair (2022) seemed to give mere cursory acknowledgment to the potential perturbations caused by distractions in the home environment.

Leadership effectiveness in the digital medium, as focused upon in studies like Norman et al. (2020), Krehl and Büttgen (2022), and Mander and Antoni (2023), also garnered significant scholarly attention (Torre and Sarti, 2020; Tigre, Curado and Henriques, 2023). However, the uncharted waters of leaders' digital literacy, their antecedent rapport with teams, and adaptability to the digital metamorphosis could arguably modulate the findings (Bartsch *et al.*, 2021). In this context, Krehl and Büttgen (2022) provided an illuminating approach by incorporating leader adaptability as a moderator. Yet many studies frequently overlook the nuanced interplay of these unobserved elements.

Furthermore, the cohesive fabric of remote teams, often termed "team cohesiveness," (Palos-Sanchez, Baena-Luna and Silva-O'Connor, 2023) was the focus of seminal works such as Darics (2020), Sanhokwe (2022), and Nguyen and Tsang (2023). Nevertheless, the subterranean currents of pre-existing team dynamics, individual predilections towards remote work, or even the efficacy of communication tools, as delineated in the study by Darics (2020), might have an overarching influence on the observed outcomes.

Other salient outcomes such as employee well-being and mental health; innovation and creativity in remote teams; and organizational commitment and employee retention were also recurrent themes, explored in studies such as Daraba *et al.* (2021), Willermark and Islind (2022), and Ferreira, Pinto-Moreira and Larguinho (2023), respectively. From the socio-emotional impact of global events on well-being, as marginally addressed in the

study by Daraba *et al.* (2021), to the intrinsic motivation of team members influencing innovation, the realm of unobserved factors is vast and often uncharted.

While the selected studies lay a robust groundwork in encapsulating the essence of digital leadership and remote work outcomes, the omnipresent and multifaceted unobserved factors pose both a challenge and an opportunity. It beckons researchers to not only recognize these lurking variables but to ingeniously integrate them into the research paradigm, paving the way for a more holistic understanding of the domain.

3.3 Identified Gaps and Shortcomings in the Literature

The scholarly pursuit of understanding digital leadership and remote work, as evidenced by the compendium of 45 reviews, has produced a breadth of knowledge. However, deep within these analyses, various methodological gaps and study shortcomings have emerged. While these gaps might be unavoidable in emerging research areas, they are crucial for the future direction of academic exploration in this field (Mukherjee, 2019).

A primary chasm in the methodological landscape pertains to the treatment of endogeneity. Endogeneity, the bane of causal inference, remains an under-addressed concern (Hill *et al.*, 2021), with a myriad of studies potentially skirting around its nuanced complexities. Take, for instance, Norman *et al.* (2020) and Krehl and Büttgen (2022). While both delve deep into the intricacies of digital leadership dynamics, neither appears to sufficiently address potential endogeneity issues, leaving the door open to potential biases in their conclusions. This lapse is of particular concern given the multifaceted nature of digital leadership, where omitted variables and reverse causality could play a significant role.

The tapestry of methodological gaps is further intensified by the noticeable reliance on convenience sampling, a method which has been criticized for its potential biases and limitations in ensuring representativeness (Emerson, 2021), in several studies including those by Hafermalz and Riemer (2020) and Johnson and Mabry (2022). By potentially targeting specific industries or geographical regions, these studies may inadvertently encase their findings within a bubble, limiting the broader applicability and generalizability of their results.

Cross-sectional designs, valuable for snapshot analyses (Spector, 2019), have also emerged as a prevalent shortcoming in investigations (Wang and Cheng, 2020) such as those by Miglioretti *et al.* (2021), Willermark and Islind (2022), and Susita *et al.* (2023). The ephemerality of these designs curtails the depth of insight, particularly in understanding the evolving dynamics of digital leadership and its long-term implications for remote work.

Adding to the litany of concerns is the propensity of certain studies (e.g., Kwon and Jeon, 2020; Eichenauer, Ryan and Alanis, 2022) to hinge predominantly on self-reported measures. Such measures, while valuable for capturing individual perceptions, have been noted for their potential to introduce biases and compromise the objectivity of results (Krohn *et al.*, 2013). In particular, an overreliance on self-assessment can lead to the introduction of certain biases, including the often-encountered social desirability bias, thereby potentially skewing the study's conclusions.

The reviewed literature also shows a tendency to overemphasize certain variables, often sidelining others (Wang and Eastwick, 2020). For instance, the allure of popular metrics such as productivity or well-being, as spotlighted in the work of both Liebermann *et al.* (2021) and Junça Silva, Almeida and Rebelo (2022), might have overshadowed other seminal facets of remote work, such as innovation or organizational commitment.

Lastly, a discernible neglect of cultural nuances, underscored by foundational work on the significance of cross-cultural considerations in leadership and remote work (Tahirkheli, 2022), is evident across these 45 studies. In an era where remote work often transcends borders, the potential lack of cross-cultural considerations in studies like Bhumika (2020) and Ferreira, Pinto-Moreira and Larguinho (2023) appears as a glaring omission. This oversight could be limiting our understanding of how cultural dynamics interplay with digital leadership practices.

In summation, while the tapestry of reviewed literature has undeniably enriched the discourse on digital leadership and remote work, the identified gaps and shortcomings serve as both a cautionary tale and a clarion call. They underscore the imperative for future research to weave a more intricate, holistic, and methodologically robust narrative that can stand the test of scrutiny in this ever-evolving domain.

3.4 Emerging Trends and Noteworthy Observations

In the intricate tapestry of research that focuses on digital leadership and remote work, certain discernible patterns and emergent trends have become evident (Pellegrini *et al.*, 2020; Karakose *et al.*, 2022). The past

decade, characterized by a surge in remote work dynamics, has seen the academic landscape adapt, innovate, and evolve in response to the shifting paradigms of leadership and digital workspaces (Bresciani *et al.*, 2021).

One conspicuous trend observed across the 45 reviewed studies is the increasing gravitation towards mixed-method research designs. Earlier, quantitative approaches held predominant sway, as evidenced by the prevalence of such methods in studies like those by Müller and Niessen (2019) and Chaudhuri *et al.* (2022). However, recent additions to the corpus, such as Mutha and Srivastava (2023) and Leonard *et al.* (2023), showcase an amalgamation of quantitative and qualitative insights. This hybrid approach suggests a broader recognition of the necessity to capture both statistical rigor and the nuanced human experiences inherent to remote work and leadership dynamics.

In this climate of methodological evolution, a handful of studies have carved a niche for themselves with groundbreaking methodologies. For instance, Allgood, Jensen and Stritch (2022) introduced an innovative use of machine learning algorithms to parse and understand the dynamics of digital leadership communications. This harnessing of technological expertise for academic inquiry signals a promising confluence of technology and the social sciences.

Equally noteworthy is the apparent shift toward addressing endogeneity concerns (Lu *et al.*, 2018). The specter of endogeneity has long cast a shadow over causal inferences in this domain (Güntner *et al.*, 2020). Early studies, like those by Norman *et al.* (2020) and Krehl and Büttgen (2022), revealed potential gaps in their treatment of endogeneity. Yet, a clear evolution is discernible in the more recent contributions to literature. Consider, for example, Pham et al. (2023), who employ instrumental-variable estimation, and Tworek *et al.* (2023), who adopt a propensity score matching technique. Both signify a growing awareness of and a concerted effort to grapple with the confounding intricacies of endogeneity.

Beyond the bounds of methodology, another emergent observation is the increasing focus on the psychological and emotional facets of remote work. While earlier studies might have been more oriented towards metrics of productivity and operational efficiency, works like those by Lee and Kim (2023) and Santiago-Torner (2023) underscore the emotional well-being, mental health, and intrinsic motivations of remote workers. This shift perhaps reflects the broader societal recognition of mental health's centrality in the contemporary work ecosystem (Stratton *et al.*, 2021).

The realm of academic inquiry into digital leadership and remote work, as exemplified by the reviewed studies, is neither static nor monolithic. It's a dynamic, ever-evolving landscape, shaped by technological advancements, societal shifts, and the inexorable march of time. The emerging trends and observations offer both a barometer of the current academic climate and a compass pointing towards future research horizons.

4. Recommendations and Future Research

Upon meticulous examination of 45 scholarly studies, a detailed depiction emerges, highlighting the advancements made in the domain of digital leadership and remote work. These comprehensive analyses, while thoroughly detailing the known, also indicate areas yet to be fully explored. This presents potential avenues for deeper scholarly exploration in this emerging domain. Based on this synthesis, a trajectory is proposed, advocating for the combination of quantitative methodologies with the depth of qualitative research. Foundational works, such as those by Chaudhuri et al. (2022) and Müller and Niessen (2019), underscore the merits of quantitative designs. However, a thorough review of contemporary literature highlights the need for holistic approaches, as demonstrated by recent studies like Johnson and Mabry (2022) and Leonard et al. (2023). This suggests a harmonization where both statistical rigor and the nuance of human experiences come together, particularly in the context of remote work.

Furthermore, among these methodological considerations, literature emphasizes the importance of addressing endogeneity. Seminal methodologies, illustrated by studies such as Pham et al. (2023) with its instrumental-variable estimation and Tworek et al. (2023) using propensity score matching, emerge as standards for robust research designs. Therefore, subsequent research should clearly navigate causal relationships with methodological precision. At the same time, an evident trend underscores the dynamic nature of digital leadership and remote work, highlighting the need for temporal examinations. While cross-sectional studies offer specific advantages, there is a growing preference for longitudinal designs in the literature. These promise deeper insights into the changing dynamics of remote teams and leadership modalities.

Adding to this complex landscape is the integration of technology into traditional scholarly investigations. This intersection is exemplified by the innovative approach of Allgood, Jensen and Stritch (2022), where technological

advancements like machine learning and artificial intelligence merge with academic pursuits. This alliance indicates an expansive horizon ripe for future academic exploration. Moreover, the vast scope of the literature suggests numerous areas awaiting scholarly attention. Topics such as the role of trust in digital leadership, the complex interplay of creativity in remote environments, and the challenges of leading geographically dispersed teams remain relatively under-studied.

In addition to these methodological considerations, future research could benefit from a mixed methods approach to capture the nuances of digital leadership and remote work more effectively. Mixed methods research, which combines quantitative and qualitative approaches, offers significant advantages in studying complex phenomena. By integrating quantitative data with qualitative insights, researchers can address endogeneity and provide a more comprehensive understanding of the multifaceted dynamics in digital leadership and remote work. For instance, quantitative analysis could be complemented with qualitative methods such as interviews or focus groups to explore underlying reasons behind observed patterns, thereby enriching the findings and offering deeper insights

In conclusion, the collective assessment of the literature suggests that while current studies provide a solid foundation, the academic exploration surrounding digital leadership and remote work is still evolving. The upcoming landscape promises a blend of methodological precision, innovative research approaches, and investigations into previously under-researched areas, all aiming to produce more nuanced, comprehensive, and impactful scholarly contributions.

5. Practical Implications

In today's organizational landscape, digital transformation and remote work have rapidly evolved from mere buzzwords to fundamental strategic considerations (Li, 2020). This shift emphasizes the urgent need to understand the intricacies and challenges these domains pose. Central to this understanding is decision-making, a foundational element of organizational strategy (Hanandeh *et al.*, 2023). Profoundly influenced by clear and rigorous research on digital transformation and remote work, our systematic review highlights the critical importance of addressing endogeneity. This phenomenon, in which certain variables might be correlated in ways that could skew research findings, is vital to comprehend (Cooper *et al.*, 2020; Hill *et al.*, 2021). Grasping this issue allows organizations to base decisions on a solid academic foundation, yielding more informed and effective strategies.

Moreover, as we traverse the intricacies of the digital world, the significance of leadership development becomes apparent (Cortellazzo, Bruni and Zampieri, 2019). Tailored training, such as programs that focus on digital communication tools, virtual team dynamics, and the nuances of remote team motivation, emerges as an essential requirement for today's leaders (McCauley and Palus, 2021). This focus on leadership is deeply intertwined with broader organizational dynamics. Beyond leadership, the formulation of effective remote work policies is vital (Wang *et al.*, 2021). An in-depth grasp of individual preferences, technological tools, and potential distractions is crucial. By integratively considering these factors, organizations can develop policies that harmoniously balance productivity with employee satisfaction.

On the technological side, while digital tools are indispensable in this era, they also present unique challenges (Marion and Fixson, 2021). Drawing on specific insights from our review, like the effectiveness of particular digital tools and platforms, organizations can realize tangible benefits (Hanelt *et al.*, 2021). Informed technological investments ensure organizations utilize tools that genuinely amplify digital leadership and remote work capabilities.

6. Conclusion

The meticulous analysis of 45 pivotal studies within the realm of digital leadership and remote work unveils a detailed matrix of research trends, methodologies, and emergent themes. This investigation reveals a predominant reliance on quantitative approaches, with approximately one-third of the examined studies prioritizing this method. However, a notable subset has gravitated towards the depth of qualitative insights, or the equilibrated viewpoint proffered by mixed methods designs. For example, studies like Müller and Niessen (2019) and Islam *et al.* (2022) employed control variables to account for individual motivation and home environment distractions.

A central finding is the varied treatment of endogeneity, a foundational concern in such explorations. While 15 studies demonstrated diligent efforts to navigate potential methodological pitfalls through the use of instrumental variables and fixed effects models, an additional 20 studies only partially addressed these issues,

and 10 studies did not address them at all. This inconsistency highlights significant gaps in the robustness of research designs in the field, underscoring the need for more stringent methodological rigor.

Transitioning to the pivotal issue of endogeneity, a foundational concern in such explorations, it is observed that it has been addressed with differing levels of rigor. For instance, Krehl and Büttgen (2022) provided an illuminating approach by incorporating leader adaptability as a moderator. However, many studies frequently overlooked the nuanced interplay of unobserved elements, such as leaders' digital literacy and adaptability. Studies like Norman *et al.* (2020) and Mander and Antoni (2023) did not fully consider these factors, which could significantly influence leadership effectiveness in digital contexts. A commendable proportion of studies have demonstrated diligent efforts to navigate potential methodological pitfalls. However, a significant segment seems to have either inadequately addressed or altogether bypassed this crucial facet, thereby casting potential aspersions on the robustness of their conclusions.

Further analysis of the studies reveals a gamut of primary outcomes. These span considerations from gauging employee productivity in remote settings and assessing the efficacy of digital leadership to delving into the intricacies of team cohesion, employee well-being, and organizational commitment within digital contexts. For example, studies like Darics (2020) and Sanhokwe (2022) highlighted the importance of pre-existing team dynamics and communication tools. However, the potential influence of unobserved variables, such as individual preferences for remote work, remained under-explored. Simultaneously, the latent influence of unobservable variables on these outcomes repeatedly emerges, underscoring the multifaceted nature of such investigations.

The literature also tacitly reveals methodological gaps, suggesting avenues for enhanced rigor. Challenges related to sampling biases, the prevailing dominance of cross-sectional designs, and an exacerbated reliance on self-reported measures pinpoint critical areas necessitating methodological fortification in subsequent research endeavors. Studies such as Hafermalz and Riemer (2020) and Johnson and Mabry (2022) illustrate the reliance on convenience sampling and self-reported measures, potentially limiting the generalizability and objectivity of their findings. Conversely, certain emergent trends augur well for the domain's trajectory, with select studies elucidating pioneering methodologies and innovative paradigms that bode well for future scholarly pursuits.

A key finding of this study is the importance of integrating more advanced analytical methods to enhance the understanding of digital leadership and remote work dynamics. Methods such as structural equation modeling, longitudinal studies, and mixed methods can provide deeper insights into the causal relationships and process dynamics that are often complex and multifaceted. Additionally, incorporating graphical representations, such as digraphs, can offer a more intuitive understanding of the interconnections and processes involved in digital leadership and remote work. Although not explicitly mentioned in the existing literature, these tools can be a valuable addition to future research methodologies.

At the heart of this research lies an unwavering emphasis on methodological rigor. Given that digital leadership and remote work manifest as dynamic and intricate constructs, they indubitably necessitate research methodologies adept at capturing their nuances while upholding analytical validity and reliability. The researchers posit that addressing endogeneity extends beyond academic convention; it stands as an imperative to ensure causal relationships are discerned, devoid of underlying variables potentially distorting outcomes.

Although the extant literature on digital leadership and remote work is both expansive and enlightening, it mirrors a goldmine replete with myriad untapped avenues. To unearth its full potential and further scholarly understanding, it is crucial to employ diverse and robust methodologies, including advanced statistical techniques and graphical analysis tools, which can highlight the complex interplay of factors influencing digital leadership and remote work. The imperatives for fellow researchers stand clear: maintain unwavering methodological rigor, accord primacy to endogeneity considerations, and remain committed to innovative approaches, thereby enriching the nuanced discourse on leadership and remote work in this digital epoch.

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