Volume 1 Number 5 July 2024
E-ISSN: 3047-2903

https://economic.silkroad-science.com/index.php/IJAIFD

DIGITAL LEADERSHIP ON INDIVIDUAL PERFORMANCE: A META ANALYSIS

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Article Info

Article history:
Received Jun 10, 2024
Revised Jul 05, 2024
Accepted Jul 10, 2024

Keywords:
Digital Leadership, Individual Performance, Meta Analysis

ABSTRACT

In the era of digital transformation, the capability of digital leadership has become increasingly crucial for organizational success. This study explores the impact of digital leadership on individual performance through a meta-analysis. Based on the analysis of 19 studies, digital leadership consistently shows a positive relationship with individual performance across various countries and industrial sectors. Digital leadership is seen to create a more collaborative and adaptive work environment, ultimately positively affecting individual performance. This research strengthens existing literature and provides new insights into the effectiveness of digital leadership in modern organizational contexts.

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DOI: https://doi.org/10.61796/ijaifd.v1i5.89

INTRODUCTION

In this era, information technology has become a central element in operations and the achievement of business goals. Digital transformation is no longer optional, but rather a necessity for organizations to remain competitive (Porfírio, et al., 2020; Abbu, et al., 2022; Türk, 2023). The success of organizations now depends heavily on the ability of Human Resources (HR) which is considered a strategic asset, not just a means of production. Organizations must be responsive to changes in the internal and external environment, as well as adopt digital systems to increase employee output. Digitalization is an integral part of HR Management to improve cross-level performance, while ensuring organizational comparative advantage (Gunawan, et al., 2023; Muniroh, Hamidah, and Abdullah, 2022; Hidayat, et al., 2023; Raharjo, 2023).

Individual performance refers to how well an employee fulfills the duties and responsibilities given in the workplace. This concept includes effectiveness in achieving goals as well as contributing to overall organizational outcomes. Performance appraisals are usually carried out by superiors or managers that affect various organizational outcomes. Various theories in the literature suggest that leaders' positive behavior towards

employees can improve performance through the principle of reciprocity, where employees who feel positive treatment tend to work harder (Sagbas et al., 2023; Obadimeji and Oredein, 2022). Social capital theory also emphasizes the importance of coordination, communication channels, and information sharing in shaping an organizational culture that supports high performance (Muniroh, Hamidah, and Abdullah, 2022).

In the context of digital technology, individual performance has undergone significant developments. Technology and information sharing are widely used to measure performance, triggered by the ease of obtaining information through various software. Knowledge sharing among organizational members increases participation in management, effective decision-making, reduces information loss, and encourages innovation, all of which have a positive impact on individual and organizational performance (Hidayat et al., 2023). The Performance Triarchy Model in Pradhan and Jena (2017) shows that performance is influenced by personal, leadership, team, system, and contextual factors. In the digital age, technology plays a crucial role in supporting these factors by providing tools and platforms that enable better coordination, smoother communication, and quick access to relevant information. For example, a technology-based performance management system can provide real-time feedback and continuous assessment that helps employees achieve their targets more efficiently (Raharjo, 2023; Mohamed, 2022). The application of digital technology not only supports performance appraisal but also enriches the performance improvement process through effective knowledge management and continuous innovation (Sagbas et al., 2023; Muniroh, Hamidah, and Abdullah, 2022; Obadimeji and Oredein, 2022).

In the midst of this transformation, digital leadership is crucial. Digital leaders are not only required to have a technical understanding, but also the ability to manage change in innovative ways, creating an organizational culture that is adaptive to new technologies. Digital leadership combines individual capabilities with digital technology to achieve organizational goals, as well as supporting individual performance through more effective information management and decision-making (Gunawan et al., 2023; Sagbas et al., 2023; Artüz and Bayraktar, 2021). In this context, digital leaders hold a central role in directing digital transformation and improving performance (Rosa, 2022; Pratiwi, Putra, and Iswati, 2022).

Digital leadership first emerged as a leadership approach that aims to follow and implement changes that arise due to technological developments in the Industry 4.0 era. A digital leader is expected to be a visionary, sympathetic, agile, risk-taking, and always open to collaboration. Digital leaders must be able to create an effective organizational culture by developing social capital, which includes elements of overall organizational success, not just individual success (Sagbas et al., 2023). Digital leadership also involves the ability to manage innovation by leveraging digital technology effectively to achieve organizational growth and success. In the framework of dynamic capacity theory, the value of all organizational resources, including human resources, capital, and production capabilities, will be higher when synergistically combined by the right leader (Hanandeh et al., 2024).

Digital leaders not only rely on good business skills, but must also have practical knowledge, problem-solving abilities, and competencies to use and teach digital tools. Digital leadership includes a strategic approach that blends digital technology with managerial capabilities to steer the organization towards achieving sustainable

competitive advantage. Digital leaders are expected to have strong communication skills through digital media, be able to make quick decisions, and maintain uninterrupted communication with customers. In addition, digital leaders must be able to integrate organizational culture with digital competencies to utilize technology optimally (Öngel et al., 2023). These skills enable leaders to navigate a dynamic and innovation-focused business landscape, ultimately improving performance (Topcuoglu et al., 2023; Karollah et al., 2023). Digital leaders have an important role in guiding digital transformation and ensuring the long-term success of organizations through effective management of digital resources (Muniroh, Hamidah, and Abdullah, 2022; Mohamed, 2022).

Empirically, several studies prove that digital leadership correlates with improved individual performance. Digital leaders are able to improve communication in business through technology that is more efficient, transparent, and accessible. The use of digital tools in team communication allows for easier access and creates a more cooperative environment among stakeholders, which shows increased efficiency in tasks completed on time with minimal error rates, thereby improving individual performance (Sagbas et al., 2023). Digital leaders also make more functional decisions because they can access real-time data, so decisions are made more consistently and healthily, which further increases work output. The transformation experienced through digital leadership can also generate new ideas and approaches that can accelerate growth and improve performance (Hanandeh et al., 2024).

Additionally, digital leadership includes the ability to effectively leverage digital technologies to achieve organizational success, foster innovation, and create a dynamic and inclusive work environment. Digital leaders must have a clear strategic vision of how technology can be used to improve business processes, customer interactions, and overall organizational effectiveness. Competence in change management, teamwork facilitation, and strategic use of technology is essential to gain a competitive advantage (Ain, Haqqani, and Zeshan, 2024). The digitization of business processes through information technology and telecommunications makes the flow of information between units easier and more efficient, encouraging improved individual performance (Artüz and Bayraktar, 2021). Digital leadership not only directs organizations towards digital maturity, but also plays a crucial role in improving individual performance through the integration and effective utilization of digital technology (Mulyani, 2024; Zulfitri and Sari, 2024). Effective implementation of digital leadership creates an environment where digital technologies are not only implemented but also integrated into the core of the business, resulting in improved performance (Mohamed, 2022; Karollah et al., 2023).

This study was conducted to understand how digital leadership affects individual performance in different contexts from previous studies. Meta-analysis is relevant to gain more holistic empirical insights into the effectiveness of digital leadership in improving individual performance. In practical terms, this research is expected to help organizations develop more effective and adaptive leadership strategies, especially in optimizing digital technology adaptation to achieve organizational goals.

METHODS

This study uses a meta-analysis method to examine the influence of Digital Leadership on Individual Performance. Meta-analysis is a systematic and quantitative approach to synthesize the results of various studies that have been conducted before, so

that it can provide more comprehensive conclusions and stronger generalizations. The process of searching, filtering and selecting articles in the analysis follows a systematic flow, as can be seen in the following image:

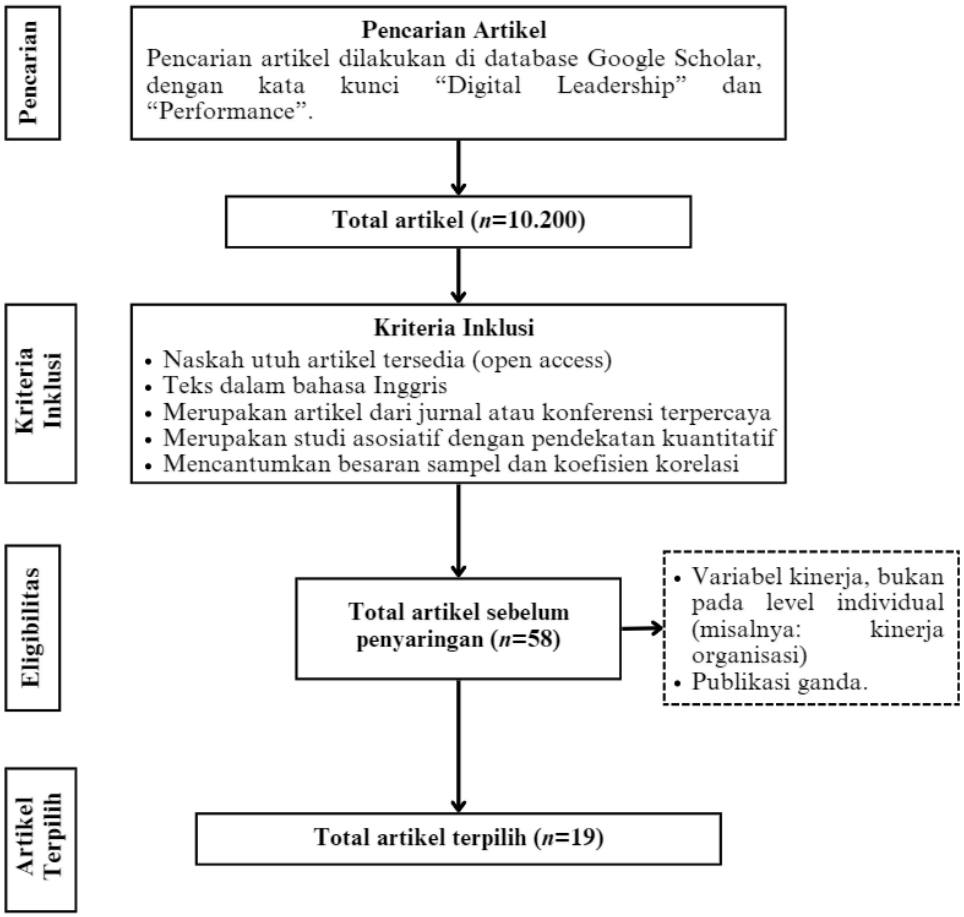

Figure 1. Search Flow Diagram and Article Selection
(*Source: Researcher, 2024*)

The search and selection process for articles in this meta-analysis began with an initial search in the Google Scholar database using the keywords "Digital Leadership" and "Performance," resulting in 10,200 articles. Initial selection based on inclusion criteria significantly reduces the number of articles. The articles considered are those that have an open access manuscript, written in English, come from a trusted journal or conference, use a quantitative approach in associative studies, and include the sample size and correlation coefficient. From this initial selection, 58 articles met the inclusion criteria. Furthermore, further screening was carried out to ensure that the performance variables discussed were at the individual, not organizational, level, and to eliminate duplicate publications. This process ended up producing 19 articles that were worthy of inclusion in the meta-analysis. Each stage of selection is carried out with high rigor to ensure that only relevant and high-quality studies are analyzed, ensuring the validity and reliability of the findings of the meta-analysis related to the influence of Digital

Leadership on Individual Performance. The descriptive characteristics of the analyzed articles are summarized in the following table:

Table 1. Descriptive Characteristics of Selected Studies

No	Researchers	Sample Size	Cor (r)	Country	Industry / Type	Significance
1	Gunawan, et al. (2023)	150	0.233	Indonesia	IT	Unsupported
2	Sagbas, et al. (2023)	390	0.166	Turkey	IT	Supported
3	Hanandeh, et al (2024)	327	0.330	Jordan	Finance	Supported
4	Bayraktar from Artüz (2021)	234	0.235	Turkey	Finance	Supported
5	Muniroh, Hamidah, and Abdullah (2022)	160	(0.043)	Indonesia	IT	Unsupported
6	Rose (2022)	100	0.070	Philippines	Education	Supported
7	Topcuoglu, et al. (2023)	308	0.272	Turkey	Manufacture	Supported
8	Obadimeji and Oredein (2022)	644	0.127	Nigeria	Education	Supported
9	Hidayat, et al. (2023)	104	0.136	Indonesia	Finance	Supported
10	Pratiwi, Putra, and Iswati (2022)	77	0.817	Indonesia	Education	Supported
11	Obadimeji and Oredein (2022)	643	0.143	Nigeria	Education	Supported
12	Raharjo (2023)	120	0.179	Indonesia	Education	Supported
13	Ann, Haqqani, Dan Zeshan (2024)	220	0.430	Pakistan	Multi Sector's	Supported
14	- Mullini (2024)	314	0.351	Indonesia	Public Service	Supported
15	Zulfitri and Sari (2024)	100	0.499	Indonesia	IT	Supported
16	Karollah, et al. (2023)	350	0.464	Indonesia	SME's	Supported
17	Mohamed (2022)	200	0.227	Indonesia	Automotive	Supported
18	Öngel, et al. (2023)	348	(0.007)	Turkey	Multi Sector's	Unsupported
19	Widyaputri and Sary (2022)	140	0.570	Indonesia	Multi Sector's	Supported

Source: Researcher, 2024.

This meta-analysis is carried out by following several systematic stages to ensure the accuracy and validity of the results. First, articles that met the inclusion criteria were analyzed using Pearson's correlation coefficient to measure the strength of the relationship between Digital Leadership and Individual Performance. Each correlation coefficient obtained from an individual study is converted into Fisher's Z-score to normalize the distribution of the data.

Furthermore, the average effect size is calculated using a random effects model. This model was chosen because it considers variability between studies, which includes differences in country and industry contexts. Heterogeneity between studies was measured using Q and I^2 statistics. The significant degree of heterogeneity suggests that the variability of the effect is not only due to sample error (Simske, 2019).

After obtaining the correlation of the results of the meta-analysis of the entire article, a sub-group analysis was carried out by country and industry. This analysis aims to identify whether the cultural context in a particular country and industry affects the strength of the relationship between Digital Leadership and Individual Performance. The decision in hypothesis testing is based on a 95% confidence interval and a p-value < 0.05 to determine statistical significance (Simske, 2019).

RESULTS AND DISCUSSION

Testing Meta Instruments and Models

In order to ensure that the residual variability of the analyzed article does not depend on the predicted value, a heteroscedasticity test is performed. This test is crucial to ensure the accuracy and validity of the model estimates in the meta-analysis. The results of the heteroscedasticity test can be seen in Table 2.

Table 2. Heteroscedasticity Test

tau^2	Q(df=18)	It. p-Value	I^2
0.038	189.631	< 0.001	90.508

Source: *Data processing results, 2024.*

In Table 2. It was shown that the Q value was 189.631 with a degree of freedom (df) of 18 and a p-value of less than 0.001, indicating that the heterogeneity between the studies was significant. A tau^2 value of 0.038 indicates considerable effect variability between studies. The I^2 index of 90.508% shows that almost all of the total variability is due to apparent heterogeneity rather than sampling error. Thus, it can be concluded that there is significant heteroscedasticity in the data, which shows substantial differences in effects between the articles in the meta-analysis of this study. Therefore, the use of a random-effects model in this analysis is very appropriate to capture variability between different studies.

Analisis Effect Size

Effect size analysis was carried out to measure how much influence Digital Leadership has on Individual Performance in the analyzed articles. The mean correlation value is calculated to provide an overview of the strength and direction of this relationship.

Table 3. Meta-Analysis Results of Fisher Z Correlation Values

Estimate	Lower bound	Upper bound	Std. error	p-Value
0.296	0.202	0.39	0.048	< 0.001

Source: *Data processing results, 2024.*

In Table 3. It is shown that the estimated average correlation value is 0.296 with a lower limit of 0.202 and an upper limit of 0.390. The standard error of 0.048 and the p-value < 0.001, indicate that the relationship between Digital Leadership and Individual Performance is statistically significant. Specifically, it can be stated that there is a strong positive relationship between the two variables, where the improvement of Digital Leadership on average contributes to the improvement of Individual Performance.

The following figure presents a Forrest Plot that illustrates the distribution of correlation values of each of the analyzed articles. This graph helps in visualizing the variation in effect size of the analyzed article.

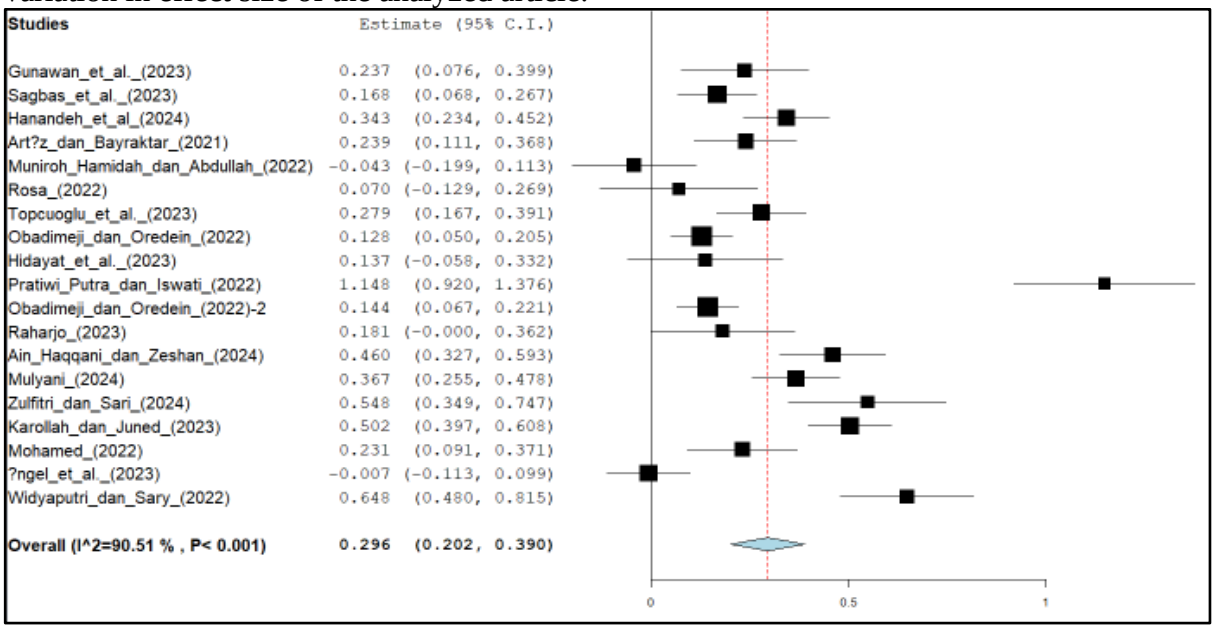

Figure 2. Forrest Plot
(Source: Data Results, 2024)

In Figure 2. It was shown that most studies showed a positive correlation value between Digital Leadership and Individual Performance. The study of Pratiwi, Putra and Iswati showed a very high effect, while the study of Muniroh, Hamidah, and Abdullah (2022) and Öngel, et al. (2023) showed a correlation value with a negative direction that did not show any significance. Overall, the Forrest Plot confirms that a 1-point increase in the Digital Leadership unit, significantly (p < value of 0.001) contributed to a 0.296 increase in the Individual Performance unit, although there was substantial variation between studies.

Publication Bias

In order to ensure that the results of the meta-analysis are not affected by the tendency of the publication of studies with significant results only, a publication bias test

is carried out. Figure 3 shows the Funnel Plot used to assess the symmetry of the effect size distribution.

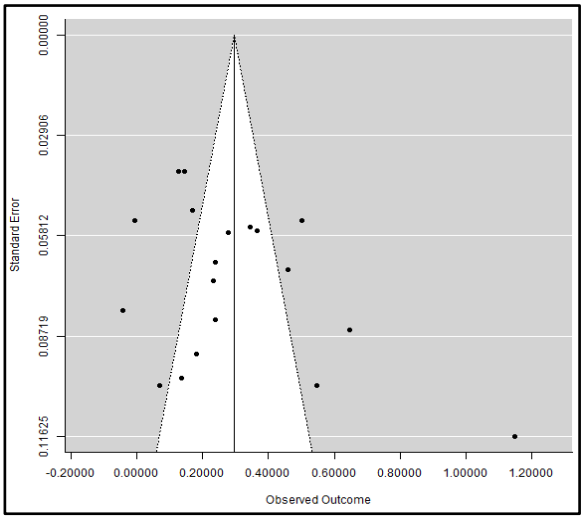

Figure 3. Funnel Plot
(Source: Data Results, 2024)

The Funnel Plot in Figure 3 shows the distribution of the analyzed articles is asymmetrical or not evenly distributed as reviewed from the estimated outcome and error standard of each article. However, it should be noted that the symmetry interpretation of the funnel plot, especially with the limitations of the articles analyzed, is often subjective and does not always provide a complete picture of publication bias. Therefore, it is difficult to make definitive decisions based solely on the analysis of these images, so additional tests such as the Fail-Safe N Test are required for further confirmation. The Fail-Safe N test was performed to measure the number of non-significant studies required to negate the results of the meta-analysis. The results of this analysis are presented in Table 4.

Tabel 4. Uji Fail Safe-N

Fail Drawer Analysis			
Rosenthal	**Fail-safe N**	**Target Significance Level**	**Observed Significance Level**
	2334	0.05	<.0001

Source: *Data processing results, 2024.*

The results of the Fail-Safe N Test in Table 4 show that the observed significance level value is < 0.0001, which means that the probability of random results obtained is very small, showing very strong evidence to support the research hypothesis. The target significance level is 0.05, describing the general significance level used to determine whether the results obtained are statistically significant. A fail-safe value of N of 2,334 indicates the number of additional articles with insignificant results required to change the results of this meta-analysis to insignificant. The high fail-safe value of N supports that the results of the meta-analysis in this study are very stable and not easily altered by additional studies with insignificant results. Thus, it can be concluded that the results of this study are very strong and valid, not influenced by publication bias.

Sub-Group Analysis

This sub-category analysis aims to look at the variation in effect size by country and industry, so as to provide a more detailed understanding of the correlation of Digital Leadership to Individual Performance in various contexts. First, the analysis of sub-groups by country can be seen in table 5.

Table 5. Country Sub-Group Analysis

Studies	K	Estimate	Lower bound	Upper bound	Std. error	p-Val
Indonesia	10	0.39	0.221	0.558	0.086	< 0.001
Turkey	4	0.168	0.042	0.293	0.064	0.009
Jordan	1	0.343	0.234	0.452	0.056	ON
Philippines	1	0.07	-0.129	0.269	0.102	ON
Nigeria	2	0.136	0.081	0.191	0.028	< 0.001
Pakistan	1	0.46	0.327	0.593	0.068	ON
Overall		0.296	0.202	0.39	0.048	< 0.001

Source: *Data processing results, 2024.*

In Table 5. variation in effect size was shown based on the country in which the selected study was conducted, which included: Indonesia, Turkiye, Jordan, the Philippines, Nigeria and Pakistan. In general, the effect size of the overall country variation showed a positive and significant value with a p-value < 0.001, meaning that Digital Leadership had a positive and significant effect on Individual Performance in the cross-country study analyzed. Studies conducted in Jordan, the Philippines and Pakistan cannot be interpreted, as there is only 1 article each for each country, so no variation can be analyzed. In the context of Indonesia, Turkiye and Nigeria, a p-value of less than 0.001 and a positive correlation estimate indicate that there is a positive and significant correlation between Digital Leadership and Individual Performance in these countries. Furthermore, an analysis of sub-groups by industry was carried out to see how the effect size varied in various industry sectors.

Table 6. Industry Sub-Group Analysis

Studies	K	Estimate	Lower bound	Upper bound	Std. error	p-Val
IT	4	0.219	0.02	0.418	0.102	0.031
Finance	3	0.261	0.151	0.37	0.056	< 0.001
Education	5	0.318	0.079	0.556	0.122	0.009
Manufacture	1	0.279	0.167	0.391	0.057	ON
Multi Sector's	3	0.363	-0.036	0.762	0.203	0.074
Public Service	1	0.367	0.255	0.478	0.057	ON
SME's	1	0.502	0.397	0.608	0.054	ON
Automotive	1	0.231	0.091	0.371	0.071	ON
Overall		0.296	0.202	0.39	0.048	< 0.001

Source: *Data processing results, 2024.*

In Table 6. The variation in effect size is shown based on the industry that is the object of research from the selected study, which includes: IT, Finance, Education, Manufacture, Multi Sector's, Public Service, SME's and Automotive. In general, the

effect size of the overall industry variation showed a positive and significant value with a p-value of < 0.001, meaning that Digital Leadership had a positive and significant effect on Individual Performance in the study across 8 industries/types of research objects analyzed. Studies conducted in the Manufacture, Public Service, SME's and Automotive sectors cannot be interpreted, because there is only 1 article each for each industry/type of research object, so there is no variation that can be analyzed. In the context of the industry/type of research object: IT, Finance, Education, and Multi Sector's, a p-value of less than 0.001 and a positive correlation estimate value indicate that there is a positive and significant correlation between Digital Leadership and Individual Performance across the industry/type of research object.

Discussion

The results of the meta-analysis show that digital leadership has a positive and significant relationship with individual performance. This correlation indicates that digital leadership contributes to improving individual performance, in accordance with the findings of Sagbas et al. (2023) which stated that the use of digital technology by leaders increases work efficiency and productivity. Digital leadership is considered to be able to create a more transparent and collaborative work environment, which contributes to improving individual performance. It is consistent with the study of Ain, Haqqani, and Zeshan (2024) that effective digital leadership provides clear direction and improves team performance through the use of digital tools and technologies.

However, not all studies show consistent results. Studies by Muniroh, Hamidah, and Abdullah (2022) and Öngel et al. (2023) reported an insignificant negative correlation. This variation may be due to differences in cultural context, technology adoption rates, and leadership styles within the organization. Hanandeh et al. (2024) highlight that digital leadership requires adaptive and proactive strategies to face challenges and opportunities in the digital era. As such, the effectiveness of digital leadership can vary depending on how leaders adopt and integrate technology in business processes.

The publication bias analysis showed an uneven distribution of articles, but the Fail-Safe N test with a score of 2,334 showed that the results of this meta-analysis were stable and not easily influenced by insignificant additional studies. This shows strong evidence to support the hypothesis that digital leadership contributes positively to individual performance.

The analysis of sub-groups by country shows that digital leadership has a positive and significant effect on individual performance in countries such as Indonesia, Turkiye, and Nigeria. Studies in Jordan, the Philippines, and Pakistan could not be interpreted due to the limited number of articles. Hanandeh et al. (2024) emphasized the importance of adaptive and proactive leadership strategies in the digital age to achieve organizational success, which supports the finding that local contexts play a crucial role in digital leadership effectiveness.

The analysis of sub-groups by industry shows that digital leadership has a positive and significant effect on individual performance in various sectors such as IT, Finance, Education, and Multi Sector's. Industries such as Manufacture, Public Service, SME's, and Automotive show data limitations. These findings show that the right adoption of digital technologies and effective change management can improve performance across

various sectors. Digital leadership involves the ability to navigate and utilize digital technologies to achieve strategic goals and drive innovation (Mulyani, 2024).

Leadership that is able to leverage digital technology for better communication, more informative decision-making, and more effective change management can create a more efficient and productive work environment (Sagbas et al., 2023). Digital literacy and innovation culture are crucial to achieving competitive advantage. Thus, digital leadership not only affects individual performance, but also has far-reaching implications for organizational success in the digital era (Hanandeh et al., 2024).

The study successfully achieved its goal by confirming a significant positive relationship between digital leadership and individual performance through meta-analysis. However, there are some limitations in this study, including the limited number and variety of articles analyzed, which may affect the generalization of the findings. New research opportunities can be focused on increasing the number of studies from different countries and industries to obtain a more comprehensive picture. Additionally, further research can explore the specific mechanisms of how digital leadership affects individual performance as well as moderating factors such as organizational culture and technology adoption rates.

CONCLUSION

This study successfully proved that leaders who are effective in utilizing digital technology can improve the performance of individuals in their organizations. The sub-group's analysis also revealed that the effects of digital leadership are consistent across different countries and industry sectors, although there are contextual variations that require further attention. This study emphasizes the importance of digital leadership in the era of industrial revolution 4.0 towards 5.0, where technology plays a central role in business operations and strategies. The study also supports previous literature on the benefits of digital leadership in improving individual performance through better efficiency, communication, and decision-making.

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