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Exploring the role of digital leadership and digital transformation on the performance of the public sector organizations

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A B S T R A C T

Previous studies rarely discuss how digital leadership influences the performance of public organizations. So far, those who have conducted research only discuss the performance of public organizations. The purpose of this research is to analyze the relationship between digital leadership and organizational performance, digital leadership and digital transformation and the relationship between digital transformation and organizational performance in public government organizations. The research method is a quantitative survey, research data obtained by distributing online questionnaires to 765 employees of public organizations. Data analysis used a structural equation model (SEM) with SmartPLS 3.0 software. The stages of data analysis are validity, reliability and significance tests. The sampling technique used is non-probability sampling. The questionnaire used in this study uses a Google form distributed to respondents. The questionnaire measurement method uses a Likert scale of 5. The independent variables used in this study are digital leadership and digital transformation. The dependent variable used in this study is the performance of the public organizations. The results of this study indicate that digital leadership had a positive and significant effect on organizational performance, digital leadership had a positive and significant effect on digital transformation and digital transformation had a positive and significant effect on organizational performance.

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1. Introduction

Utilization of information technology in various fields is of course very helpful for organizations to obtain the expected goals (Abbu et al., 2022). Along with the development of the 4.0 industrial revolution and the 4.0 government revolution, it became fundamental in the transformation of government in adopting the use of technology. It is hoped that with the help of information technology it will simplify and speed up the process of service delivery. The industrial revolution 4.0 encourages automation systems at all stages of public services through information systems that combine resources, information technology, and information relations. These reforms resulted in the successful installation of an advanced digital government infrastructure. It is universally accepted that digital technology is improving administrative accountability, efficiency, and transparency, helping reduce expenses, and result in better governance. The role of leadership in implementing digital transformation in the government sector is certainly a necessity (Henderikx et al., 2022). Leadership is central in adopting the use of technology in the industrial era 4.0. In the digital age, leaders need to be well-equipped with digital and emotional agility to operate in uncertain and complex environments. Today, in process decision-making and innovation, efficient leaders operate in rapid learning cycles. The digital age we live in is changing people's perceptions of life and work to a degree that rivals the impact of the industrial revolution. The social stage of the digitization process is marked by a level of connectivity never seen,

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both on a personal and professional level (Pierro et al., 2013). Today, data transfer is used to communicate not only between people, but also between things in ordinary life, such as connecting an entire house to new Wi-Fi technology. Digital leadership is a combination of leadership styles and the use of digital technology in realizing digital transformation. A digital leader must have characteristics and behaviors that enable him or her to achieve digital transformation goals (Abraham et al., 2022).

Developments that occur in the current digital era have changed various fields for digital transformation. This can happen by adjusting to change, including for organizations to be able to adapt technology as a digital transformation process. Organizations can transform digitally if they are led by leaders who can bring change to the organization to achieve its goal of digital transformation known as digital leadership. According to Erhan et al. (2022) digital leadership is a combination of culture and leader competence in optimizing the use of digital technology resources to create value for the company. Some of the reasons needed for an organization to be able to adapt to digital transformation are to develop and maintain competitive advantages, to deal with technological changes so that organizations can create value for new customers and organizational stakeholders. digital leadership to be able to drive digital transformation within their organizations (Desky et al., 2020). The term digital leadership first appeared with the term e-leadership or electronic leadership introduced. In their research, it was stated that in the digital era work processes in organizations can be carried out through information technology, especially via the internet. In addition, the process of communication in gathering and disseminating information between followers and leaders can occur through electronic media. This was the beginning of the development of digital leadership research which was then carried which describes digital leadership into six dimensions or aspects, namely: (1) Communications skills, (2) Social skills, (3) Team building skills, (4) Change management skills (Benitez et al., 2022; Erhan et al., 2022).

The linkage of digital leadership is inseparable from organizations related to technology such as startup companies. The definition of a startup according to Peng et al. (2022) is a temporary organization that is used to look for repeatable and measurable business models. Understanding the concept of repeatable business models indicates that being able to re-implement the same practices over and over again can create predictable results in startup companies, be it in terms of revenue or user growth. Whereas for a measurable business according to Jardak and Ben Hamad (2022) it has the following criteria characteristics: (1) There is global ambition balanced with internal processes that enable businesses to grow quickly, (2) Raising external capital from investors, venture capital funds, or private equity companies to be able to meet demand and business development, and (3) Discovery of new technologies that can be used to help users do things in a more effective and efficient way.

Previous research rarely discusses research that proves how digital leadership influences the performance of public organizations. So far, those who have conducted research only discuss the performance of public organizations. Therefore, this study aims to prove the effect of digital leadership on the performance of public organizations. This is since companies with digital leadership certainly have a fast, cross-hierarchical, group-oriented, and cooperative approach, with a strong focus on innovation. This of course can bring an organization/company to have better performance with the role of digital leadership.

2. Literature review and hypothesis development

2.1 Digital Transformation

According to Purwanto et al. (2023a), digital transformation consists of the combined effect of several digital innovations and technologies that create new structures, practices, values, arrangements, and beliefs that change, replace, or complement existing rules in organizations, ecosystems, and industries. Digital transformation is important for all industrial companies and the government sector which is highly dependent on systems, information technology, strategy, and human resources. Digital transformation is about releasing value from business processes and returning it to customers and using data and analytics to create new and innovative experiences. The digital transformation journey will make analytics-driven organizations and embedding AI technologies a habit. Digital transformation is widely regarded as a driver of change in all contexts, especially in the business context, and affects all aspects of human life based on the use of technology and digitalization (Maduwinarti & Taali, 2022). Digital technology has transformed the public sector by influencing applications, processes, culture, structure, and the responsibilities and duties of civil servants. Digital transformation can be defined as the modification of business models, resulting from the dynamic pace of technological advancement and innovation that triggers changes in consumer and social behavior (Kurniasih et al., 2022).

2.2 Digital Leadership

Leadership is described as the capacity to guide a company towards achieving its goals and building a sustainable competitive advantage. To maintain a sustainable competitive advantage, companies must have products and technical systems that accelerate and enable production, communication and cost reduction, as well as the ability to optimally use these products and systems. According to Luecha et al. (2022), digital leadership is a combination of digital culture and digital competence. The study of digital leadership is part of the study of leadership discourse based on the upper echelon theory developed by Jardak and Ben Hamad (2022) where the results can be predicted by the character of a manager. Digital leadership is a leadership style focused on implementation of digital transformation in an organization. This leadership model allows companies and organizations to digitize their work environment and work culture. According to Peng et al. (2022) digital leaders visionaries,

change motivators, able to combine ideas in business for projects, and build connections through creating new opportunities for partnerships/joint ventures/outsourcing and other forms of collaboration (Purwanto et al.,2023b).

3. Previous Research and Hypotheses Development

Nayal et al. (2022) and Nieken (2022) focus on analyzing and clarifying the concept of digital transformation, building a shared understanding of digital transformation as a driving force for introducing beneficial changes to strategies in administrative institutions, administrative reform, the relationship between digital transformation and administrative reform. Digital transformation has become a popular topic that is recognized and interested in by the government. According to Ruloff and Petko (2022), the government also urges administrative agencies to implement digital transformation strategies. Especially in the context of social distancing, the relationship between the people and government agencies as well as between administrative agencies and civil servants in law enforcement activities and public services is not easy to do. According to Lyu et al. (2022) and Li et al. (2022) during the Covid-19 pandemic the effectiveness of the transformation became even more urgent for administrative reform. Digital transformation is an irresistible trend, so that government agencies have taken positive steps to realize digital transformation. Digital transformation has been used in the implementation of public services, and has delivered many positive results (Novitasari, 2022).

According to Nayal et al. (2022) and Nieken (2022), digital leadership can be a competitive advantage in the ability of individual leaders who have influence on their organizations in order to improve performance. This is because leaders with digital skills and knowledge have influence on organizations to provide strategies that can adapt to change and can transform digitally. This is in accordance with the concept of Resource Based Theory (RBT) (Kozlenkova et al., 2014) and its relation to digital leadership that can be an important resource and ability to understand sources of sustainable competitive advantage for companies. With these digital capabilities and knowledge, it will encourage companies to achieve superior performance that can make the company gain more profits compared to its competitors (Li et al.,2022; Borah, 2022). These results are also in accordance with the study adding that the company's ability does not only come from tangible assets but also exists in intangible assets such as capabilities and knowledge in the digital field owned by leaders can be regarded as a competitive advantage that can have a positive effect on the company's financial performance. This is in accordance with the opinion that the role of digital leadership can make innovative decisions to increase profits.

H_1: *Digital leadership has a positive and significant effect on organizational performance.*

H_2: *Digital leadership has a positive and significant effect on digital transformation.*

The results of this study are supported by previous research conducted by Jung and Avolio (1999) that digital leadership can become a competitive advantage that can be an influence on the organization in order to improve the company's non-financial performance. Linkage with Resource Based Theory (RBT), the role of digital leadership is a competitive advantage for companies in the form of an individual leader's ability to be able to compete in the digital era. This advantage can become a resource that companies can utilize for their interests in achieving digital transformation.

H_3: *Digital transformation has a positive and significant effect on organizational performance.*

4. Method

This research method is a quantitative survey, research data obtained by distributing online questionnaires to 765 employees of public organizations. Data analysis used a structural equation model (SEM) with SmartPLS 3.0 software. The stages of data analysis are validity, reliability and significance tests. The sampling technique used is non-probability sampling. The questionnaire used in this study uses a Google form which will be distributed to respondents. This questionnaire measurement method uses a Likert scale of 5, namely Strongly Disagree (STS), (2) Disagree Answers (TS), (3) Neutral Answers (N), (4) Agree Answers (S), Strongly Agree (SS). The independent variables used in this study is digital leadership, digital transformation. The dependent variable used in this study is the performance of public organizations.

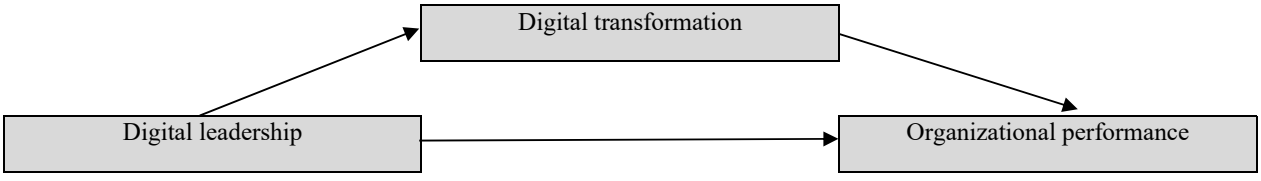

Fig. 1. Research Method

5. Result and discussion

Research data obtained by distributing online questionnaires to 765 employees of public organizations. The distribution of respondent profiles is as follows:

Table 1
Respondent profile

Criteria		Total	%
Gender	Male	456	59.61%
	Female	309	40.39%
Age	< 20 Years	213	27.84%
	21 - 30 Years	165	21.57%
	31 - 40 Years	89	11.63%
	41- 50 Years	134	17.52%
	> 51 Years	164	21.44%
Work Experiences	< 5 Years	254	33.20%
	6 - 10 Years	178	23.27%
	11 - 15 Years	109	14.25%
	16- 20Years	156	20.39%
	> 21 Years	68	8.89%
Education Background	Senior High School	245	32.03%
	Diploma	189	24.71%
	Bachelor	107	13.99%
	Master	106	13.86%
	Doctor	118	15.42%

Most respondents' gender was Male, which was 59.61%, Most of the respondents had Age < 20 Years, which was 27.84%, Most respondents had work experiences < 5 Years, 33.20% and most of the respondents had senior high school background education, namely 32.03%. The tests carried out in the analysis of variance-based SEM have two stages, namely the outer model and the inner model test. The explanation of the test is as follows:

Test Outer Model

The convergent validity test on the outer model aims to determine whether the indicators with latent variables are valid, with a validity value above 0.70 (Hair et al., 2012).

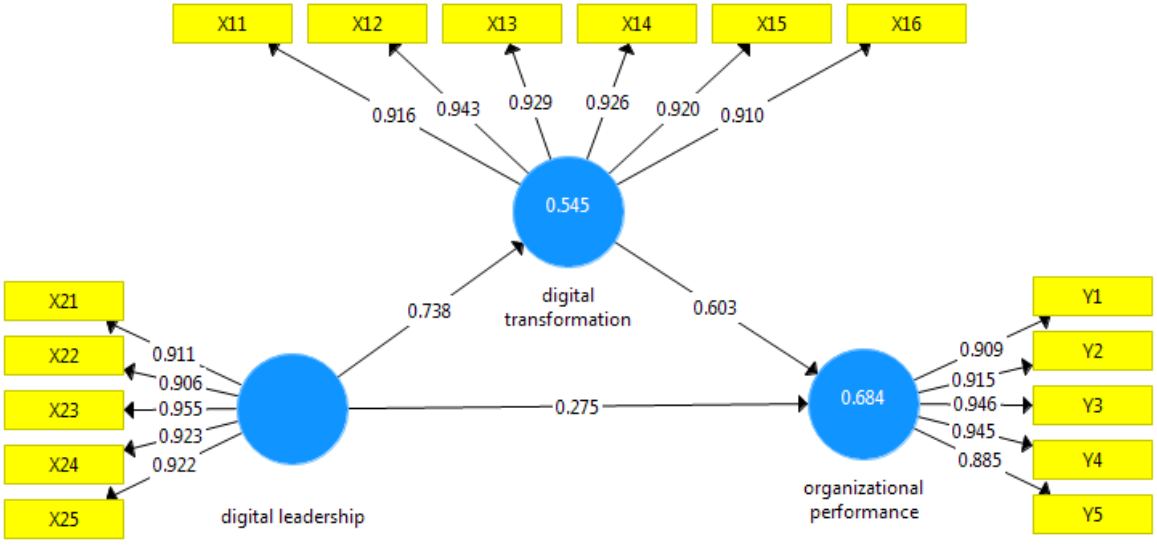

Fig. 2. Convergent Testing

Fig. 2 shows that the validity value of each indicator is above 0.7, so all research indicators are declared valid. In the outer model test in addition to convergent validity, there is also validity reliability testing. The test aims to determine the reliability of the indicator in measuring the variable, while the variable is said to be valid if it has an AVE value above 0.5 and a Cronbach Alpha value above 0.7 (Hair et al., 2012), the following is a discriminant validity test in this study:

Table 2
Average Variance Extracted (AVE)

Variables	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
digital leadership	0.787	0.864	0.632
digital transformation	0.731	0.834	0.635
Organization performance	0.787	0.813	0.687

Table 2 shows that all Cronbach alpha and average variance extracted values exceed the minimum limit so that all variables are declared valid.

Inner model test

The inner model test contains an explanation of the R-Square, while the R-square value in this study is as follows:

Table 3
R Square

Variable	R-Square	Adjusted R-Square
Organizational Performance	0.558	0.565

From the R square table, it can be concluded that 72.1 % of customer satisfaction is influenced by Product Quality, Price Perceptions and Digital Marketing, while the remaining 2.79 % is influenced by other variables outside the study. In addition to reliability in the inner model test there is also a hypothesis test, while the hypothesis test in this study is as follows:

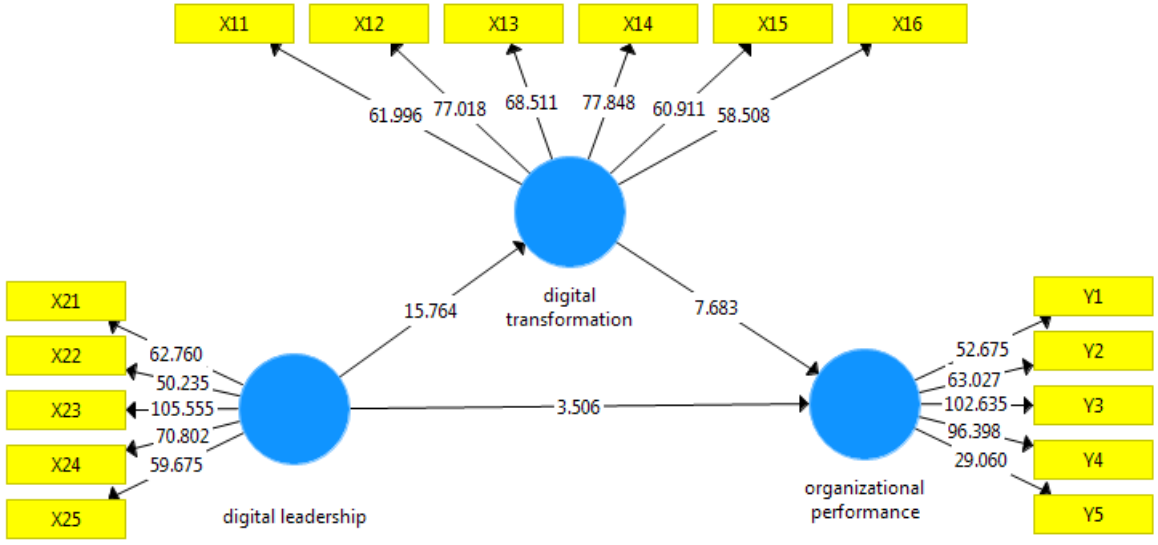

Fig. 3. Hypotheses Testing

Table 4
Hypotheses Testing Summary

	Original Sample (O)	T Statistics	P Values	Result
Digital leadership on public organization performance	0.756	15.289	0.001	Supported
Digital transformation on public organization performance	0.876	4.966	0.001	Supported
Digital leadership on digital transformation	0.654	6.143	0.001	Supported

From the value of the hypothesis testing table, it is known that all hypotheses in the study are accepted because they have a p-value below 0.05.

f^2 Effect Sizes Evaluation

Hair (2017) explains that the guidelines for assessing $\mathbf{f^2}$ are those values of 0.02 (= small), 0.15 (= moderate), and 0.35 (= large), respectively, representing small, medium, and low effects. large (Hair et al. 2012).

Table 4
f^2 Effect Sizes Evaluation

	Organization performance
Digital leadership	0.41
Digital transformation	0.31
Performance	0.25

For the Organization performance variable, the $\mathbf{f^2}$ value of 0.41represents a big effect, for the Organization performance variable, the $\mathbf{f^2}$value of 0.31 represents a large effect, and for the visiting decisions, the $\mathbf{f^2}$value of 0.25 represents a large effect. For the Interest in Visiting variable, the $\mathbf{f^2}$value of 0.25 represents a large effect.

Q^2 Evaluation

Q^2 value is greater than 0 indicates that the model has predictive relevance for certain endogenous constructs. Conversely, values of 0 and below indicate a lack of predictive relevance (Hair et al., 2012).

Table 5
Q^2 Evaluation

Construct	Q2
Organization Performance	0.512

The value of Q^2 for the performance variable is 0.512> 0.000, meaning that this variable has predictive relevance.

5.1 The first hypothesis: The effect of digital leadership on organizational performance

The results of this study are supported by previous research conducted by Jasin et al. (2022) and digital leadership can be a competitive advantage in the ability of individual leaders who have influence on their organizations to improve performance. This is because leaders with digital skills and knowledge have influence on organizations to provide strategies that can adapt to change and can transform digitally. This is in accordance with the concept of Resource Based Theory (RBT) (Kozlenkova et al., 2014) with its relation to digital leadership which can be an important resource and ability to understand the sources of sustainable competitive advantage for companies (Nayal et al., 2022). The digital capabilities and knowledge will encourage companies to achieve superior performance to gain more profits compared to their competitors. These results are also in accordance with the study adding that the company's ability does not only come from tangible assets but also exists in intangible assets such as capabilities and knowledge in the digital field owned by leaders can be regarded as a competitive advantage that can have a positive effect on the company's financial performance. This is in accordance with the opinion that the role of digital leadership can make innovative decisions to increase profits.

5.2 The second hypothesis: The effect of digital leadership on digital transformation

The results of this study are supported by previous research conducted by Lyu et al. (2022) and digital leadership can become a competitive advantage that can be an influence on the organization to improve the company's non-financial performance. According to Teng et al. (2022), Yu et al. (2022) and Kurniawan et al. (2022), the role of digital leadership is a competitive advantage for companies in the form of an individual leader's ability to be able to compete in the digital era. This advantage can become a resource that companies can utilize for their interests in achieving digital transformation.

5.3 The third hypothesis: The effect of digital transformation on organizational performance

In the current era, transformation in the digital world is a necessity and this event is a form of evolution. Even in the program launched by the United Nations (UN) in the 2015 Sustainable Development Goals (SDGs) emphasize on technology and connectivity. In terms of technology and connectivity, it will indirectly lead to the use of internet technology by many people. Using Internet technology can be understood as a form of skill from manual to digital use. Many things need to be adjusted to suit the ethos that is called digital, one of which is to first understand the meaning of digital itself and related issues. According to Khiong et al. (2022) and Zhai et al. (2022), e-leadership capability is defined as the way leaders use information technology to achieve government goals. Each government depends on the level of e-government it has, and the quality of e-government varies. A successful digital transformation means bringing a very different way of working within an organization. The use of information technology in facilitating services is a very important part of a government organization in the field of public services. To make this happen, of course it is necessary to have a leader who can lead and utilize digital technology in improving organizational performance.

According to Mulyandi and Tjandra (2022) and Shen et al. (2022), the goal of digital transformation for companies and organizations is clearly to save money by creating good digital services for many people to use. Service orientation to consumers carried out by Amazon and Netflix where they do not need to train people to use the services they create, makes these two companies actively schedule the needs of their service users. Digital implementation in the government sector will provide

enormous benefits. Digitalization will facilitate and accelerate the process of public services and decision making. Implementation is the only way to translate policy ideals into policy reality and policy goals into policy benefits. The fact that a policy is created does not mean that it is implemented automatically; there is a gulf between the two. Therefore, the implementation of competence is the ability to implement policies and achieve the goals that have been set.

6. Research Implication

Theoretical implications of this research: the results reinforce previous theories and research that digital leadership has a positive and significant influence on performance, digital transformation has a positive and significant influence on organizational performance. The practical implications of this research are that digital leadership is applied in organizations public to encourage performance improvement and need to implement digital transformation to improve organizational performance.

7. Conclusion

The results of this study have indicated that digital leadership had a positive and significant effect on organizational performance, digital leadership had a positive and significant effect on digital transformation, digital transformation had a positive and significant effect on organizational performance. This study has examined how digital leadership can have a positive effect on the performance of public organizations, the performance examined in this study has included that financial performance and non-financial performance. The success of startup companies in this case is due to the existence of digital leadership to improve company performance that excels during competition from public organizations that are always innovating on technological developments and increasing the number of users. In this study, digital leadership can be the key to success for public organizations in improving their performance where the performance examined in this study includes financial performance and non-financial performance can increase. The reason for this increase is due to the ability, knowledge and experience possessed by the board of directors who have digital leadership qualifications in dealing with various problems faced by public organizations. Therefore, to be able to promote startup companies, it is necessary to have a board of directors with digital leadership qualifications so that they can improve company performance with resources and capabilities that can become a sustainable competitive advantage. To create a competitive advantage, companies must also be able to have goals, so that the process can generate profits for the company. The existence of these goals can lead companies to move in the right direction to be able to accept change by means of digital transformation, so that this can be used by companies as a basis for competitive advantage. The development of information technology requires every organization and company, including the government sector, to adopt it. However, it is important to remember that success in carrying out digital transformation in the government sector will be realized if there is an understanding of its benefits. To make it happen, it is important to improve the ability of both leaders and staff in understanding the use of information technology. In addition, digital literacy and digital culture need to be developed so that everyone involved understands digital transformation well.

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