



Digital Leadership Impacts on a Village-owned Enterprise Performance: A Moderation Effect of Artificial Intelligence

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study investigates the impact of digital leadership on the performance of village-owned enterprises, or VOEs emphasizing the moderating effect of artificial intelligence, or AI. As digital transformation reshapes the business landscape, effective digital leadership emerges as a crucial factor for enhancing organizational performance, particularly in rural settings. This study employs quantitative surveys and interviews from VOEs across various villages with 192 research sample

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size. The findings reveal that digital leadership significantly correlates with improved performance metrics, such as profitability, operational efficiency, and community values. Moreover, the integration of AI technologies further amplifies these effects, providing tools for better decision-making, resource allocation, and customer interaction. The moderation analysis indicates that the presence of AI not only enhances the effectiveness of digital leadership but also facilitates innovative practices within VOEs. This research also contributes to the understanding of how digital leadership, coupled with AI, can drive sustainable growth in village enterprises, offering practical implications for policymakers and community leaders aiming to leverage technology for rural development. Future studies are suggested to explore the long-term effects of these dynamics in diverse contexts.

Keywords: Digital leadership; artificial intelligence; SMEs; village-owned enterprise; organization performance.

1. INTRODUCTION

As small firms continue to play a vital role in economic and social development, the need to elucidate the relationship between leadership and organizational performance becomes increasingly pressing [1-3]. Leadership has been identified as a critical component in fostering positive program outcomes and employee commitment, especially within the community development context [4]. In the realm of rural development, the role of village-owned enterprises, or VOEs, has become increasingly crucial, serving as a catalyst for economic growth, social empowerment, and community resilience [5,6]. One critical factor that can determine the success or failure of these enterprises is the quality of leadership within the village. In addition, although these premises are often categorized by conventional production methods and resource limitations, they have a solid emphasis on community values [7]. Within the context of organizational studies, the research on VOEs has attracted many scholars' attention, given the fact that such enterprises have become one of the significant economic development triggers within a great number of rural communities around the world. As a result, the literature on VOE evolution has been discussed widely and extensively through several research topics, especially the role of technological advancements on VOEs. Following the said research topic, VOEs later deal with the presence of artificial intelligence technology, and interestingly, the multidisciplinary nature of artificial intelligence (AI) technology has received an increasing attention from a great number of scholars [8-10]. Yet this study finds that there is a lack of explanation in the literature, especially in determining the role of leadership on village-owned enterprise performance through the mediation effect of artificial intelligence.

Therefore, this study aims to explore the moderation role of artificial intelligence through the lens of leadership and organizational performance relationships.

2. MATERIAL AND METHODS

2.1 Digital Leadership

In order to investigate the impact of leadership on a village-owned enterprise, it is essential to consider the multifaceted nature of leadership and its influence on various aspects of the enterprise [11,12]. According to the study of de Araujo and Priadana [13], one of the current trends in leadership research is digital leadership (DL), which explains the role of technology and virtual teams in leadership practices. Digital leadership in organizational research refers to the practices and approaches that leaders employ to navigate and leverage digital technologies within their organizations. It encompasses a range of competencies, strategies, and frameworks that help organizations adapt to the rapid changes brought about by digital transformation. Some scholars [14,15] denote that the key indicators of digital leadership are (1) visionary thinking, or VT; (2) technological proficiency, or TP; and (3) agility, or A. Such 3 indicators mainly refer to the way in developing and communicating a strategic vision that incorporates digital innovation within organizations and the understanding and utilizing digital tools and platforms effectively of the organization as well as the organization's leaders.

2.2 Organizational Performance

Organizational performance (OP) tends to be associated with the effectiveness and efficiency with which an organization achieves its goals and

objectives. According to the study of Jensen, Potočník [16], organizational performance is the measurement of an organization's success in achieving its strategic objectives and operational goals. It includes both quantitative and qualitative assessments. Additionally, the key indicators of organizational performance are financial, operational, and employee performance, as well as customer satisfaction and social and environmental impact. Likewise, VOE's performance is associated with 3 key indicators, namely: (1) financial performance, or FP; (2) efficiency of operational, or EO; and (3) sustainability, or S [2,3,17]. The said indicators are seen primarily as the calculation of VOE's productivity levels, resource utilization, and service delivery effectiveness through the focus on the environmental impact and long-term viability of the enterprise. Also, the indicators do have relatedness to the evaluation of VOE's profitability, revenue growth, and cost management.

2.3 Artificial Intelligence

Artificial intelligence, or AI, is seen as the development of computer systems that later help a human discover specific ways of problem solving [9,15,18]. Other scholars [10,19] denote

that AI is seen as the robotics systems enhancements, and it is also created and designed to identify particular potential incoming threats and offers several better patterns and predictions of decision-making processes for organizations through the analysis of a number of data points. Moreover, literature also denotes that although numerous industries around the world have been revolutionized and improved by AI technology, nevertheless, some effects on ethical and social considerations have also existed. Such effects later become both the indicator and challenge of AI for organizations' leaders, which is data analysis–analytics of predictive, or DA-AP, which explains about (a) the algorithms of AI that can examine large datasets to optimize supply chains, forecast demand, and improve resource allocation; and (b) the ability of AI in providing the insights for organizations about market trends and/or consumer behavior that later helps VOE's to make informed decisions about products and services [8,15,18,20].

2.4 Research Framework and Hypothesis

Based on Fig. 1, this study proposes three (3) research hypotheses in Table 1, which are:

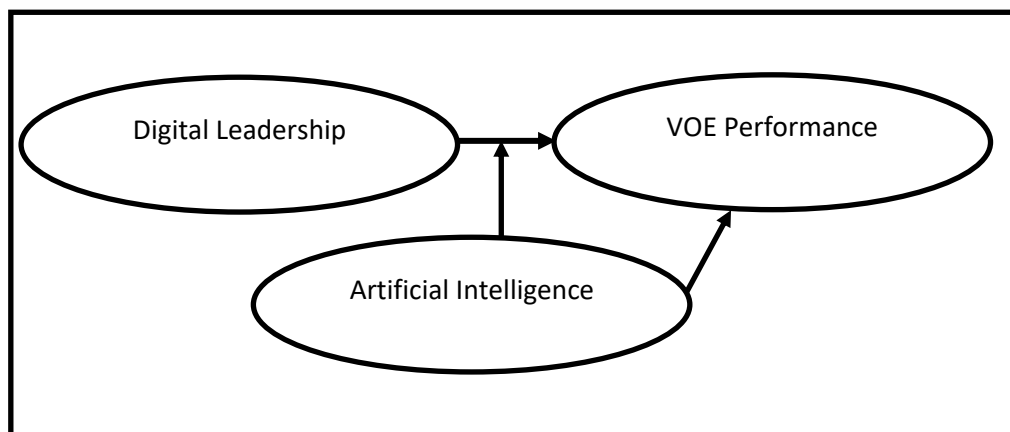


Fig. 1. Conceptual framework
(Data Generated, 2024)

Table 1. Research hypothesis

No	Hypothesis
H1	Digital Leadership affects significantly and positively VOE Performance.
H2	Artificial Intelligence affects significantly and positively VOE Performance
H3	Artificial Intelligence moderates significantly and positively the relationship between Digital Leadership and VOE Performance.

Source: Data Processed (2024)

As this study employs a quantitative research methodology, observations are made directly at the VOE location in South Sulawesi, Indonesia, serve as the primary data source for this study. Related literature and documents, such as sales reports, are the source of secondary data. Moreover, a sample size of 200 VOEs is used in this study, together with the application of the non-probability sampling technique. Research questionnaires and statistical measuring instruments, such as validity, reliability tests, and total effects tests using Smart-Partial Least Square software, or Smart-PLS, are additional research tools that are employed in this study. Eventually, this study gathers 192 completed questionnaires over the research period, which runs from March 2024 to September 2024. All the gathered questionnaires abovementioned meet the criteria to be statistically processed further.

Furthermore, the objectives of this study are primarily focusing on the more in-depth analysis of the impact of both digital leadership and AI on VOEs performance, which are specifically: (1) to investigate the way digital leadership affects the VOEs performance; (2) to examine the key leadership traits and strategies, which may enhance VOEs' digital transformation; (3) to identify the effect of AI implementation inside VOEs and AI's impact on VOEs operational efficiency; and (4) to discover the potential of moderation effect of AI in the relationship between digital leadership and VOEs performance. This study also suggests that due to the emphasis on the moderation effect analysis of AI, the complexity of both digital leadership as the independent variable in this study and AI as the moderation variable of this study tend to be completely captured because of the multilayered nature of both variables.

3. RESULTS AND DISCUSSION

3.1 Validity and Reliability Test Results

In order to ensure that the measured research constructs in quantitative research methodology are valid, Sekaran and Bougie [21] recommend

validity tests, in which must be carried out, and the r-count score must be emphasized in order to ascertain the validity of the research variable, and a construct's validity is validated when its r-count score exceeds its r-table score, and vice versa. Other scholars, such as Bell, Bryman [22] suggest that the reliability test is also essential for quantitative research since it helps with statistical measurement, which guarantees that data collecting and research designs yield consistent and trustworthy results. Furthermore, as for the validity and reliability test on collected data, Sekaran and Bougie [21] strongly advise that the rules of thumb for validity test results are that when the r-count result is higher than the r-table result, it can be concluded that the indicator is valid, and *vice versa*. Additionally, for reliability test results, the investigated variable becomes reliable when a Cronbach Alpha value > 0.60, and vice versa [15,23].

Table 2 shows that all variables, including X, Y, and Z of this study are valid. This is because the score of r-count of each variable is greater than 0.1417 (r-table). Correspondingly, the results in Table 2 describes that the Cronbach's alpha score of all variables within this study are higher than 0.06. As such, all variables in this study are valid, reliable, and appropriate to be used for further statistical measurements.

3.2 Total Effect Test Results

The results in Table 3 and Fig. 2 imply that the scores of original samples of all are positive and this indicates that all relationships among variables are positive relationship. For example, the relationship scores between AI and VOE performance, as well as DL and VOE performance are positive (original sample scores, or O), which are 0.146 and 0.572. Likewise, the scores of P values of all variables in this study are lower than 0.05, and it can be said that all research variables in this study affects each other significantly. In sum, based on the recommendation of Sekaran and Bougie [21] in determining and interpreting the results of total effect tests, Table 3 and Fig. 2 indicate that the research hypotheses in this study are accepted.

Table 2. The results of validity and reliability test

	Cronbach's α	rho_A	r-table	r-count	Results
DL (X)	0.723	0.724	0.1417	0.643	Valid and Reliable
OP (Y)	1.000	1.000	0.1417	1.000	Valid and Reliable
AI (Z)	0.773	0.777	0.1417	0.686	Valid and Reliable

Source: Data Processed (2024)

Table 3. The results of total effect test

	O	M	STDEV	T Stat.	P Values
AI -> VOE PERFORMANCE	0.146	0.146	0.059	2.471	0.014
DL -> VOE PERFORMANCE	0.572	0.575	0.058	9.880	0.000
DL->AI-> VOE PERFORMANCE	0.139	0.137	0.059	2.361	0.019

Source: Data Processed (2024)

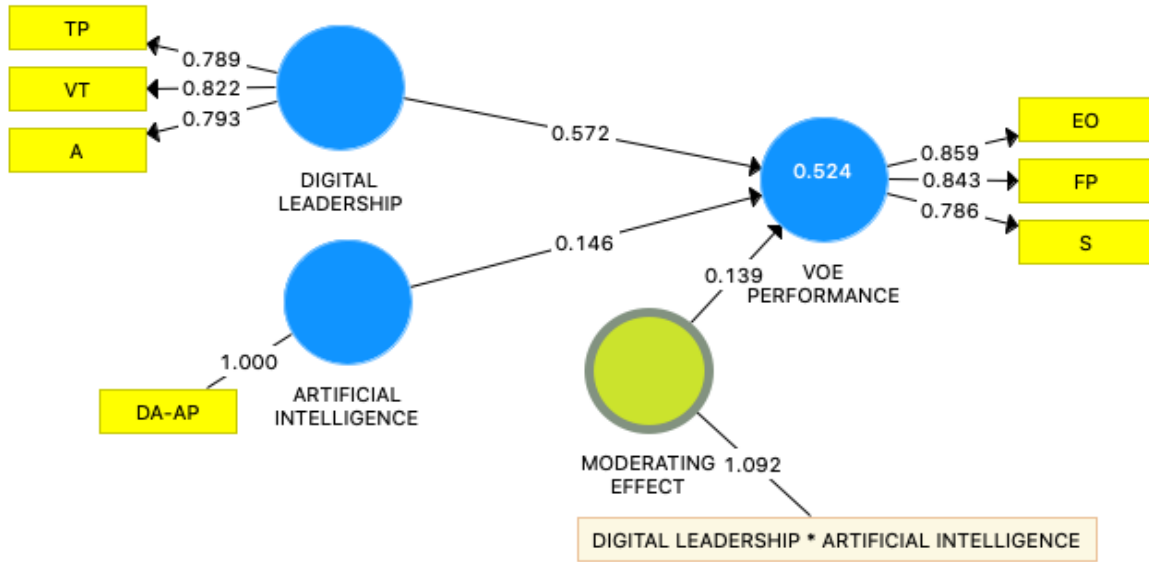


Fig. 2. Total effect test results framework
(Data Processed, 2024)

In other words, this study concludes that (1) H1 is accepted, or digital leadership affects VOE performance significantly and positively; (2) H2 is accepted, or artificial intelligence affects VOE performance significantly and positively; and (3) H3 is accepted, or artificial intelligence moderates significantly and positively the relationship between digital leadership and VOE performance.

4. CONCLUSION AND RECOMMENDATION

To fill the gap of the research within the literature, this study aims to contribute both theoretically and managerially by providing the conclusions and recommendations of the findings of this study, which are: (a) The digital leadership affects VOE performance significantly and positively due to several reasons. The first reason is because visionary thinking, technological proficiency, as well as agility, affect the VOE's productivity levels, resource utilization, and service delivery effectiveness through the focus on the environmental impact and long-term viability of the enterprise. The second reason is due to the way VOE develops and communicates

a strategic vision, and the understanding and utilizing digital tools and platforms effectively of the organization significantly affects their (VOE) financial performance, efficiency of operations, and sustainability; (b) artificial intelligence affects VOE performance significantly and positively. This is because the algorithms of AI that can examine large datasets to optimize supply chains, forecast demand, and improve resource allocation, and the ability of AI to provide insights for organizations about market trends and/or consumer behavior do affect positively and significantly the productivity levels, resource utilization, and service delivery effectiveness of VOE; and (c) artificial intelligence moderates significantly and positively the relationship between digital leadership and VOE performance. In other words, this study concludes that the existence of both data analysis and analytics of predictive behavior of AI, which are used by VOE, significantly and positively affect the relationship between VOE's improvement of visionary thinking, technological proficiency, as well as agility and the application of AI algorithms and AI insights related to market trends and consumer behavior. Moreover, this study contributes managerially by recommending

a guideline for VOE in Indonesia in planning, executing, and evaluating the proper, effective, and efficient digital leadership strategy for better performance and with the help of AI technology. Moreover, this study also suggests that long-term impacts of digital leadership and AI integration across diverse region. For example, AI and digital leadership are potentially important for developed areas especially for greater access to technology; and cross-regional collaborations of digital leadership and AI that can provide knowledge sharing and joint ventures, which eventually nurturing the innovation enhancement.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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