

The Impact of Digital, Servant, and Green Leadership on Innovation in the Manufacturing Sector

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Abstract

In contemporary industrial times, the success of a company is largely dependent on having effective leadership. Additionally, a leader's capacity for change management is essential when confronted with novel difficulties and shifts. Effective leadership styles are important, as many studies have shown, but not all companies have been able to implement them successfully and witness increases in employee loyalty and performance. The positivist paradigm is applied in this study through empirical research, wherein hypotheses are tested using an empirical model that demonstrates the causal relationship between the model's components. The study's conclusions show how green leadership, digital leadership, and servant leadership improve and have notable effects on the performance of the industrial sector. This research implies that the industrial sector has benefited greatly from the three types of leadership in terms of increased productivity and creativity. In particular, it has been shown that digital leadership, green leadership, and servant leadership all improve an organization's performance as a whole. The study's findings add to the body of knowledge on leadership, support future research with empirical evidence, and have significant theoretical and practical implications for the administrative science community.

Keywords: Digital Leadership; Green Leadership; Innovation; Manufacturing Industry; Servant Leadership.

Effective leadership is a key factor in determining organizational success in the modern industrial era (Ashta & Stokes, 2023). Today, leadership is not only about directing and managing teams, but also inspiring and motivating employees. Team members dedication and loyalty can be increased by leaders who can foster a favorable and encouraging work environment. This will improve organizational performance and productivity.

In addition, in the face of change and new challenges, the ability of leaders to manage change is very important. Leaders must be able to identify and respond to changes in the technological era that can affect organizations (He et al., 2024). Technology can have a significant impact on how modern leadership develops. Technology use in leadership not only boosts productivity but also enables leaders to respond more quickly to new problems and requirements (Kim et al., 2020). On the other

hand, today's leaders place more emphasis on creating a work environment that supports, trusts, and motivates employees. They focus on employee well-being and satisfaction, creating high-performing teams and achieving organizational success.

The trends of green leadership and digital leadership are increasingly important in the context of global challenges such as climate change and the digital revolution (Zuber, 2021). Sustainable leadership focuses on implementing practices that support environmental sustainability in day-to-day business operations. This includes initiatives to reduce carbon footprints, improve energy efficiency, and promote environmental responsibility throughout the organization. Sustainable leaders seek to create a balance between economic gain and environmental responsibility, which can ultimately improve the company's image and reputation in the eyes of the public and stakeholders.

Success in implementing sustainable and digital leadership often depends on leaders' ability to integrate these two concepts into their business strategies (Ghasemy et al., 2022). For example, the use of digital technologies can help companies monitor and reduce their environmental impact more efficiently. In addition, leaders focused on sustainability and digitalization must also consider the social aspects of these changes. This includes ensuring that sustainability and digitalization initiatives not only benefit the organization, but also society at large. Leaders should look to create a positive impact on local communities and support inclusive economic development (Kandasamy et al., 2019). For example, digital training and skills development programs can help local communities adapt to the changing labor market influenced by digital technologies.

Furthermore, servant leadership emphasizes the importance of the leader to serve his or her team members with the primary goal of improving their well-being (Awasthi & Walumbwa, 2022). This leadership style focuses

on the needs and development of individuals in the team, so that they can reach their full potential. Servant leadership differs from traditional leadership styles that are often more authoritative and centered on the leader themselves (Davis, 2021). Servant leaders act as supporters and facilitators, rather than simply directors or supervisors.

A primary advantage of servant leadership is enhanced performance inside the organization. Team members are typically more driven and devoted to their task when they feel appreciated and supported (Sun et al., 2019). Increased productivity, creativity, and invention in the workplace can be the outcome of this sense of participation. Creating a positive workplace culture is another crucial function of servant leadership (Schowalter & Volmer, 2023). Leaders who prioritize service to their team create a supportive, inclusive, and collaborative work environment. This kind of culture not only improves employee well-being, but also helps in attracting and retaining top talent.

In addition, servant leadership can help in managing conflict and promoting teamwork. Servant leaders are more likely to listen intently and comprehend the wants and worries of their team members, which helps them deal with problems in a kind and productive way (Meulemans & Matlin, 2019). By creating an atmosphere of mutual trust and respect, servant leaders can encourage open and effective communication, which is essential for conflict resolution and good teamwork.

This modern concept of leadership has attracted the attention of many researchers in recent decades. Eva et al. (2019) found that the growth of this theory still lacks coherence and clarity, despite the publication of over 100 articles in the last four years. A thorough analysis of 285 publications on servant leadership published between 1998 and 2018 was carried out, and the articles featured new definitions, assessments of the measures that were already in place, and theoretical and nomological networks. This review offers a comprehensive overview of

the evolution of the literature as well as potential future research areas.

The increasing recognition of environmental issues has also led to an increased emphasis on sustainable leadership, commonly known as "green leadership." According to a study by Luu (2019), green human resource management, or green HRM, is a crucial part of organizational citizenship behavior for the environment (OCBE). This study emphasizes the significance of environment-specific servant leadership in optimizing the benefits of green HRM on OCBE for individuals and teams. The results show how important it is for leaders to moderate the association between green practices and pro-environmental behavior among their staff members.

The study conducted by Darvishmotevali and Altinay (2022) investigated the correlation between green HRM, environmental consciousness, and pro-environmental performance within the hospitality business. According to the study, there is a mediating role for environmental knowledge in the relationship between green HRM and employees' proactive pro-environmental performance. It is also possible that the influence of leadership is more contextual and nuanced than previously believed because environmental stewardship leadership did not lessen the relationship between green HRM and environment-related task performance.

Digital leadership is also a major focus in modern leadership literature. Digital technologies, such as artificial intelligence and data analytics, have changed the way leaders interact with their teams. Digital leaders utilize these tools to improve operational efficiency and make faster decisions. Studies show that leaders who adopt digital technologies can create new value for customers and improve organizational competitiveness. Success in the digital age also largely depends on an organization's capacity to foster an innovative culture and manage technology change.

An further significant factor in encouraging green creativity among staff members is servant leadership. Tuan (2020) found that ecologically relevant servant leadership can promote green creativity through the dual mediation channels of green role identification and green crafting. These results demonstrate the critical role that leaders play in creating an environment that supports green innovation. This is particularly important for the travel and tourism industry, among other sectors of the economy. This study adds to our understanding of the elements that contribute to employee green innovation, especially in companies that deal with sustainability.

Furthermore, through green intrinsic motivation, a study by Faraz et al. (2021) emphasizes the part servant leadership plays in influencing workers' pro-environmental behavior. This study shows how the impact of green servant leadership on pro-environmental behavior is mediated by employees' innate green drive. Moreover, green self-efficacy among employees serves as a moderator in this association. These results shed light on how pro-environmental behaviors can be encouraged and motivated among staff members by servant leadership, which is crucial for accomplishing corporate sustainability goals.

Despite numerous studies demonstrating the importance of effective leadership styles, not all organizations have successfully implemented them with a positive impact on employee performance and loyalty. This suggests a lack of understanding of the factors that determine the successful implementation of specific leadership styles in various industry contexts. On the other hand, there is no clear consensus on the most effective communication skills and risk management capabilities for leadership in the face of change and uncertainty.

Furthermore, the application of technology in leadership often does not reach its full potential in improving organizational efficiency and responsiveness. Likewise, people-oriented leadership has not been fully understood in the

context of different industries, especially in terms of creating employee well-being and satisfaction. The researcher also views that there are not many studies that comprehensively combine the concepts of sustainable leadership and digital leadership in an integrated business strategy.

This research is important and urgent given the increasingly complex role of leadership in the dynamic and challenging modern industrial era. This research is vital because it is necessary to comprehend how several leadership philosophies—namely, servant leadership, digital leadership, and green leadership—can affect productivity and creativity in the industrial sector. Organizations must be able to adapt and grow in the face of global issues like climate change and the digital revolution by fully utilizing the potential of technology- and sustainability-focused leadership. The results of this study are significant because they provide a thorough strategy for enhancing organizational performance via the employment of the appropriate leadership style and holistic problem-solving techniques.

Thus, the purpose of this study is to determine how innovation and efficiency in the manufacturing sector are impacted by servant leadership, digital leadership, and green leadership. In addition to analyzing the ways in which these three leadership philosophies can be successfully implemented to enhance organizational performance, this study will pinpoint the critical elements involved in such implementations. It is therefore expected that this research will make a substantial contribution to the field of leadership studies and offer practical guidance to business executives on how to address current problems.

Methodology

This research uses a positivist paradigm through empirical research, where hypotheses are evaluated using empirical models that show the causal relationships between the variables

involved (Johnson, 2014). A quantitative approach is used by translating psychological phenomena into numerical data which is then tested quantitatively in an applied research setting. This research was conducted in the field with the aim of developing a model through correlational analysis, using non-experimental variables.

The population in this study were manufacturing managers in Makassar. The research sample consisted of 180 managers selected using purposive sampling technique, where the selected respondents were considered representative of the population. The chosen respondents received electronic questionnaires via the internet (Ly & Ly, 2024). The following table illustrates the format of the questionnaire along with the response options and their scores:

Table 1: Illustrates The Format Of The Questionnaire Along With The Response Options

Response Options	Skor
Completely Concur (CC)	5
Accepted (A)	4
Impartial (I)	3
Negative (N)	2
Completely Disagree (CD)	1

Source: Prepared by the author (2024)

Using SmartPLS software version 3.0, the Partial Least Square (PLS) technique was used for data processing and analysis. In this work, the variance-based Structural Equation Modeling (SEM) technique known as the PLS method is employed for the purpose of hypothesis testing. The age distribution of the respondents makes up the descriptive data. There are 50 respondents under 30, 70 between 30 and 40, and 60 beyond 40 years old. In terms of tenure, forty respondents had worked for five years or less, sixty for five to ten years, and eighty for ten years or more. There were eighty ladies and one hundred men among the responders.

The following table illustrates the research hypothesis based on the existing theoretical framework and previous studies:

Table 2: The Existing Theoretical Framework And Previous Studies

Hypothesis	Description
H1	Green leadership affects organizational performance
H2	Digital leadership affects organizational performance
H3	Organizational performance is impacted by servant leadership and green leadership
H4	Employee performance is impacted by servant leadership, digital leadership, and green leadership

Source: Prepared by the author (2024)

Results And Discussion

This study looks at how innovation in the industrial sector is impacted by servant leadership, digital leadership, and green leadership. All of the indicators had outer loadings above 0.40 and AVE values above 0.50, according to convergent validity tests, meaning that the construct accounts for more than half of the variation in the indicators.

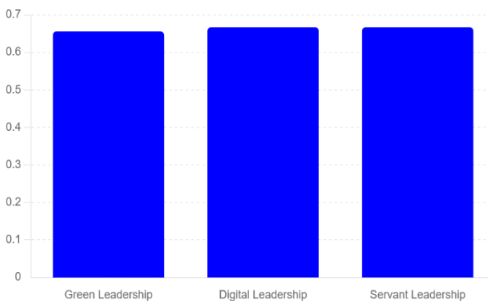


Figure 1: Outer Loadings of Leadership Variables

Source: Data Processed, 2024

Good internal consistency was shown by the Cronbach's Alpha and Composite Reliability

scores, both of which were higher than the cutoff mark of 0.70.

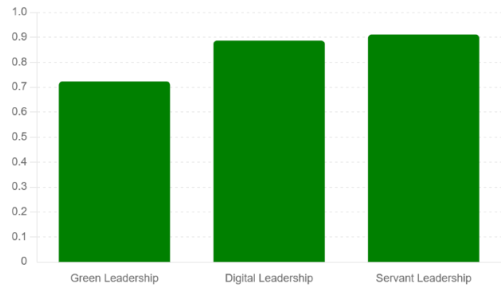


Figure 2: Composite Reliability of Leadership Variables

Source: Data Processed, 2024

Every construct has a square root AVE value that is bigger than the relationship with other latent constructs, according to the discriminant validity test. These findings suggest that the discriminant validity of the model is strong enough to support the clear separation of the various constructs. When the VIF score is less than 5, it means that there are no collinearity issues in this model. With a R Square value of 0.888, the bootstrapping technique's findings demonstrated that the factors of servant leadership, digital leadership, and green leadership explain 88.8% of the variance in industrial performance.

PLS analysis used for hypothesis testing shows that every study variable significantly and favorably affects performance. All of the hypotheses are accepted because the p-value is less than 0.05 and the T-statistic is higher than the crucial value of 1.96. This indicates that industry performance is greatly enhanced by servant leadership, digital leadership, and green leadership.

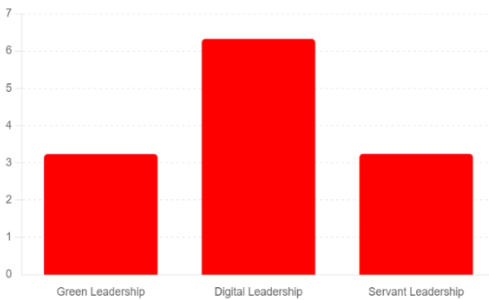


Figure 3: T-Statistics of Leadership Variables
Source: Data Processed, 2024

A t-statistic of 3.243 and a p-value of 0.002 corroborate the further studies demonstrating the noteworthy and advantageous effects of servant leadership on performance. The 0.002 p-value and 2.261 t-statistic values demonstrated the considerable improvement in business performance that came from green leadership. The manufacturing sector's performance is positively impacted by digital leadership, as evidenced by a t-statistic value of 6.325 and a p-value of 0.002.

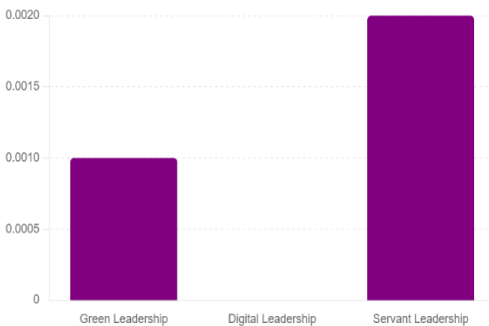


Figure 4: P-Value of Leadership Variables
Source: Data Processed, 2024

The findings of this investigation significantly close the current research gap. Not all industrial industries have effectively implemented effective leadership styles with a favorable impact on employee performance and loyalty, despite numerous studies demonstrating their value. According to this study, industrial

performance is positively and significantly impacted by green, digital, and servant leadership. These findings indicate that a better understanding of the factors that determine the successful implementation of certain leadership styles can improve the performance of the manufacturing industry. Thus, this study offers fresh perspectives on the significance of comprehending and utilizing the appropriate leadership style in various industry circumstances.

In the context of technology implementation in leadership, this study shows that digital leadership significantly improves the performance of the manufacturing industry. Although many manufacturing industries have not fully utilized the potential of technology to improve the efficiency and responsiveness of the manufacturing industry, the results of this study show that digital leadership can drive innovation and performance improvement through effective implementation of digital technology. The findings reinforce the view that leadership's ability to manage digital technology is key to achieving higher manufacturing industry efficiency. This strategy aligns with the opinions of Clarence et al. (2021), who stress the value of digital leadership in raising industry standards of performance.

This study also highlights the importance of people-oriented leadership in fostering employee wellbeing and satisfaction. The concept of servant leadership places a strong emphasis on the value of providing for employees' needs and creating a happy work environment. It has been shown to significantly and favorably affect performance. This outcome is consistent with study by Bantha & Sahni (2021), which demonstrates that enhancing employee wellbeing through servant leadership can enhance industry performance.

Findings on green leadership suggest that sustainable green practices can improve industry performance. This suggests that manufacturing industries that implement green leadership can achieve better performance through efficient

management of natural resources and other environmentally friendly practices. The findings of this study corroborate those of Cai et al. (2024), who highlighted the significance of green leadership in raising industry performance via sustainable practices. As a result, these results support the claim that adopting a green leadership stance is a wise way to gain a competitive edge and improve performance over time.

Additionally, this study demonstrates that the manufacturing industry's performance can be more significantly impacted by the combination of servant leadership and green leadership. This highlights the importance of an integrated approach to managing leadership that focuses on environmental sustainability and employee well-being. This approach is in line with the views of Bauer et al. (2019) who point out that a combination of different leadership styles can significantly improve industry performance. As such, this research provides practical guidance for industry leaders to implement a holistic and integrated leadership strategy.

The research also identified a lack of consensus on the most effective communication skills and risk management capabilities for leadership in the face of change and uncertainty. The study's findings demonstrate that the manufacturing sector's performance is positively impacted by each of the three leadership philosophies that were examined: servant, digital, and green leadership. This emphasizes the importance of flexibility and adaptability in leadership skills to deal with challenges arising from change and uncertainty.

To avoid the gaps or problems that have been identified in this study, the manufacturing industry must pay attention to several important things. First, it is important for the manufacturing industry to understand the factors that determine the success of implementing a particular leadership style. Training and development for leaders in understanding and implementing green, digital and servant leadership is highly recommended. By doing so,

the manufacturing industry can significantly improve employee performance and loyalty.

Second, in the face of technology implementation challenges, the manufacturing industry should invest in digital leadership training. Leaders who are able to effectively manage and utilize digital technology can drive innovation and improve the efficiency of the manufacturing industry. Proper technology implementation can ensure that the manufacturing industry achieves higher efficiency and better responsiveness to change and uncertainty.

Third, the manufacturing industry should adopt a people-oriented leadership approach to create employee well-being and satisfaction. Servant leadership that pays attention to employee needs can improve the overall performance of the manufacturing industry. Manufacturing industries that implement leadership practices that focus on employee well-being will see improvements in employee productivity and loyalty. Fourth, the implementation of green leadership is critical to improving industry performance through sustainable green practices. The manufacturing industry should prioritize efficient natural resource management and implement other sustainability practices. This will not only improve industry performance but also help the manufacturing industry achieve competitive advantage in the long run.

Fifth, the manufacturing industry is advised to adopt an integrated approach to leadership, which combines green leadership and servant leadership. This approach will ensure that the manufacturing industry can manage environmental sustainability and employee well-being simultaneously. Thus, the manufacturing industry can achieve better performance and create a harmonious working environment.

However, if the manufacturing industry has already faced these problems, it is advisable to pay attention to the solutions that have been found in the results of this study. By applying the research findings on green, digital and servant

leadership, the manufacturing industry can overcome the existing problems and improve performance and innovation in the manufacturing industry. The results of this study offer useful recommendations that can be used to successfully manage an efficient leadership style that is adaptable to the difficulties encountered.

Conclusion

The results of the study lend credence to the idea that the performance of the industrial sector is considerably and favorably impacted by servant leadership, digital leadership, and green leadership. This research implies that the industrial sector has benefited greatly from the three types of leadership in terms of increased productivity and creativity. Specifically, it has been demonstrated that servant leadership, digital leadership, and green leadership enhance overall organizational performance.

The study's conclusions have important theoretical and practical ramifications for the field of administrative science. Theoretically, the results of this study enrich the literature on

leadership by confirming that various leadership styles can make a significant contribution to organizational performance. The findings also provide empirical evidence that can be used as a basis for further research on the interaction between different types of leadership and organizational performance. Practically, the findings can be used by practitioners in the management field to develop more effective leadership strategies that suit the needs of the manufacturing industry. By implementing green leadership, digital leadership, and servant leadership, companies can improve operational efficiency and innovation, and contribute to environmental sustainability.

Nevertheless, this study has some limitations, including the limitation to a sample that only includes managers in one city and the use of quantitative methods that may not capture certain nuances of leadership. It is projected that future research will use mixed approaches and expand its geographic coverage in order to have a more full grasp of the impact of various leadership styles on organizational performance.

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