

Multi-Dimensional Analysis of Digital Leadership and Organizational Transformation in Small and Medium Enterprises

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Abstract - Digital transformation is one of the enablers that the 21st-century small and medium enterprises (SMEs) cannot afford to overlook in a bid to remain competitive and efficient in this fast-moving and changing business world. But a few problems are encountered by many SMEs during the transformation process, such as digital readiness, leadership and adaptability of the organisation structure. This study aims to observe how digital leadership can influence organizational change in SMEs through digital transformation capability and digital transformation ability. In this study, the sample of SMEs was taken from the data set gathered from Mendeley Data, which has responses from employee and managerial staff of logistics and trade organisations. The approach that this study has taken is quantitative, in which PLS-SEM is used for testing structural relationships and hypothesis. The reliability and validity analysis revealed that all the constructs' Cronbach's Alpha value was great (> 0.88), and the value of composite reliability was great as well (> 0.91). The results of the structural model showed that there was a significant relationship between the variable of digital leadership and the organizational transformation variable, with the value of $\beta=0.684$ ($p<0.001$), and the digital transformation capability variable with the value of $\beta=0.712$ ($p<0.001$). Moreover, the mediation model revealed that not only the relationship between digital transformation capability and digital transformation ability, but also the relationship between digital transformation ability and organizational transformation was positive, which had an impact on SME performance. The model was found to be good, as the R^2 value of organizational transformation and SME performance was more than 0.59. The results indicate the relevance of digital projects' leadership to improve the innovation orientation, the agility of the organisation and sustainable business growth. The multi-dimensional framework proposed can be beneficial for small and medium-sized enterprises (SMEs) to understand the digital transformation and manage it to achieve successful results and to stay competitive in the long run.

Keywords: Digital Leadership, Organizational Transformation, SMEs, Digital Transformation Ability, Digital Transformation Capability, PLS-SEM

I. INTRODUCTION

The speedy development of digital technologies has tremendously influenced the operation and strategic side of small and medium enterprises (SMEs). Digital transformation can help SMEs to streamline their processes, enhance customer interactions and make decisions, as well as become more competitive in an ever-changing business environment (Vo Thai et al., 2025; Trischler & Li-Ying, 2022). The new technological advances, like cloud computing, artificial intelligence, big data and digital platforms, have created new opportunities for the SMEs to innovate and expand their business in both local and international markets (Dong & Salwana, 2022; Zhang et al., 2022). In recent years, however, it has been observed that to successfully implement digital transformation, organizations must have strategic leadership and organizational readiness as well as technological capabilities to adopt such systems (Omol et al., 2025; Nikopoulou et al., 2023).

One of the most important organizational skills that comes in handy during change, flexibility, and innovation that involves technology is digital leadership. A digitally competent leader encourages learning in the organization, is willing to experiment, and instils a digital innovation and agile culture (Tian et al., 2025). Digital leadership has been proven to increase organizational resilience, innovation performance, and sustainable growth of a business when technology initiatives are focused on business goals (Sahibzada et al., 2025; Malik et al., 2025). Furthermore, the role of management's digital literacy and intuition plays a great part

in the success of the execution of transformation initiatives in SMEs (Destrian, 2025; Zhang et al., 2025). Good management also boosts employee engagement and promotes knowledge-sharing processes that are important for the digital transformation process (Abbas & Kumari, 2023).

Although digital transformation is taking an ever-larger role, SMEs are still facing several challenges when adopting digital. Finite budgets, poor IT facilities, lack of digital skills, cybersecurity fears, and resistance to change in the organization are some of the obstacles to transformation efforts (Ben Ghrbeia & Alzubi, 2024; Ta & Lin, 2023). SMEs in the developing economies also have problems related to digital maturity, environmental uncertainty, and lack of institutional support (Omol et al., 2023). Previous research shows that the lack of integrated digital strategies and capabilities can negatively impact the outcomes of long-term transformation (Ebrahimi et al., 2023; Zheng et al., 2023). In addition, SMEs face difficulties in maintaining their business and even in tracking the change in technology that results in their transformation performances (Wang & Sun, 2025; Zhang et al., 2022).

Even though some studies have examined the linkage between digital transformation and digital leadership (Eze et al., 2023) as well as the linkage between digital leadership and organizational agility (Escoc Barragan et al., 2025), few studies have examined the multi-dimensional linkage between digital leadership, organizational agility and digital transformation outcomes in the context of SMEs. The literature available so far focuses on the adoption of technologies or organizations' performance, but not on a global analytical framework that considers aspects of the mechanisms of transformation led by leadership Bilal et al., (2025). This consequently leads to a huge research gap, which must be filled to obtain a comprehensive view of the impact of digital leadership on the organizational transformation, innovation ability and organizational agility of SMEs.

Aim and Significance of the Study

- To investigate the role of digital leadership in enhancing digital transformation capability and organizational transformation in Small and Medium Enterprises (SMEs).
- To examine the mediating effects of digital transformation capability and digital transformation capability on the relationship between digital leadership and SME organizational performance and operational agility.
- To develop a multi-dimensional analytical framework that supports strategic digital transformation, innovation-driven growth, and sustainable competitiveness in SMEs.

Paper Organization

The remainder of this paper has the following structure. The literature review and the development of the hypotheses about the nature of digital leadership, organizational

transformation, and Digital Transformation Capability are provided in Section 2. In Section 3, the methodology and the methods of analysis used in the research have been discussed. The discussion of the results and statistical analysis of the results is presented in Section 4. The discussion of findings and managerial implications is in Section 5. Lastly, in Section 6, limitations and suggestions for future studies are discussed.

II. LITERATURE REVIEW

Digital leadership is the capacity of leaders within an organization to inspire and drive the strategic change of the organization leveraging digital technology, innovation and adaptive management. In the digital age, digital leaders are tasked to create a vision for technology, instill a digital culture and make organizations more agile in the rapidly changing business environment (Malik et al., 2025). Digital leadership does not only involve technical skills, but also strategic thinking, communication skills, digital literacy and decision making with an innovation perspective (Çallı et al., 2022). The study has recently uncovered that those who are leaders in digital would be more prepared for transformation, sustainability and competitive performance (Tian et al., 2025; Zhang et al., 2025).

Digital leadership is defined by being adaptable, understanding of strategy, innovative, collaborative, and technologically competent. Digital literacy and transformational leaders can lead the organization to manage change and create a continuous learning environment (Ben Ghrbeia & Alzubi, 2024; Destrian, 2025). Digital leadership also fosters knowledge integration and technology-based collaboration and plays a pivotal role in SMEs under resource constraints (Borah et al., 2022). The entrepreneurial and generative leadership style enhances SMEs' digital maturity and innovation capabilities (Ebrahimi et al., 2023; Sahibzada et al., 2025). Digital leadership is a crucial aspect of the technology adoption process and innovation in SMEs. Leaders encourage new technology, including data management systems, digital platforms and cloud-based systems to be used within processes. The findings of the research show that digital leadership has a positive impact on digital readiness, the ability to be innovative and the outcomes of the strategic transformation process (Trischler & Li-Ying, 2022; Zhang et al., 2022). In addition, technological adoption based on leadership will assist SMEs to increase their operational efficiency, their responsiveness to the organization, and their innovations based on the customer.

Organizational transformation is the entire process of structural, operational, cultural, and technological change at an organization to increase its effectiveness and sustainability. Organizational transformation, in the context of SMEs, is strongly linked to the adoption of digitalization and innovation as well as modernization of processes (Zheng et al., 2023). Transformation initiatives include altering business models, changing decision-making processes, and building digitally enabled organizational capabilities (Malik et al., 2025). Typical dimensions of organizational change are technological change, cultural change, strategic change, and

operational change. Technological transformation is about the implementation of digital tools and automation systems, and cultural transformation is about the adaptability of employees and an organizational culture that is oriented towards innovation. On the other hand, efficiency and organisational agility are critical for operational transformation, whereas strategic transformation, which includes digital vision and market responsiveness, is critical to create long-term competitiveness.

Digital transformation practices are gaining increasing momentum as a strategic priority for SMEs and are increasingly being adopted to enable them to become more competitive and resilient in a challenging business environment. The use of data analytics and digital communication systems, integration of e-commerce and cloud computing can be referred to as digital transformation practices (Vo Thai et al., 2025). The readiness of the organisations coupled with strategic leadership can positively affect SMEs' innovation, performance and sustainability during the process of digital transformation (Ta & Lin, 2023; Bilal et al., 2025). Furthermore, the environment and technology are important factors affecting the effectiveness of SMEs' transformation and their level of digital maturity (Omol et al., 2025; Nikopoulou et al., 2023).

The organizational agility is the capacity of a firm/organization to generate, adopt, and implement new ideas, technologies, and processes that enhance business performance and competitiveness. SMEs can effectively react to the changing market situations and technological disruptions with their strong organizational agility (Borah et al., 2022). Organizational agility improves the flexibility of the organizations and helps to develop sustainable competitive advantages by continuous improvement and integration of knowledge Zhang et al., (2022). Organizational agility is the ability to quickly react to changes in the environment, customer needs, and technological advances. Agile organizations are characterized by their capability to make decisions and operate with flexibility and respond more quickly to uncertainty in the market (Wang & Sun, 2025). Agility enables efficient use of resources and boosts the pace of digital transformation efforts in SMEs. Moreover, organizational agility has a positive effect on resilience and performance in innovative processes during digital change (Escoz Barragan et al., 2025).

Digital leadership is an important factor in fostering organizational agility and agility in the organization. Leaders foster experimentation, collaboration, and innovation through technology to increase the adaptability of their organization. Research indicates that digital leadership has a positive influence on transformation performance, strategic responsiveness, and culture to promote innovation. Moreover, the capability of innovations and organizational agility

can be valuable mediators to support the connection between digital leadership and organizational transformation outcomes.

Research Gap

Digital transformation, technological adoption, and leadership practices in SMEs have been discussed in detail in the existing literature. But previous research has investigated each of these variables separately from the others and not from a multidimensional perspective. Some of the studies are on technology implementation and/or digital maturity without considering the leadership mechanisms that contribute to successful organizational transformation.

Only a few studies have examined the interactive effect of digital leadership, organizational agility, and organizational agility on the transformation of SMEs. The role of organizational agility and agility as mediators in the success of transformation activities through leadership is not adequately studied, especially in an SME environment that is characterized by dynamism and a shortage of resources.

Therefore, there is a need for an integrated analytical framework to understand the role of digital leadership for organizational transformation through Digital Transformation Capability. This gap can be significant and has implications for theory and management for SMEs on their path towards sustainable digital transformation and competitiveness.

Existing studies have largely examined digital leadership, innovation, and organizational agility independently. However, limited empirical research has investigated the mediating roles of digital transformation capability in strengthening organizational transformation and SME performance. Therefore, this study proposes an integrated framework aligned with the actual empirical constructs used in the analysis.

Hypotheses Development

- **H1:** Digital leadership positively affects the digital transformation capability of SMEs through better strategic alignment, digital readiness, and technology-driven decision-making processes.
- **H2:** Digital leadership positively influences digital transformation capability practices and has the potential to create an innovative culture, employee engagement, and adaptive organizational behavior in SMEs.
- **H3:** Digital transformation capability and digital transformation capability mediate the positive role of digital leadership to organizational transformation among SMEs, which can be used to enhance the performance of the organizations and operational agility.

III. RESEARCH METHODOLOGY

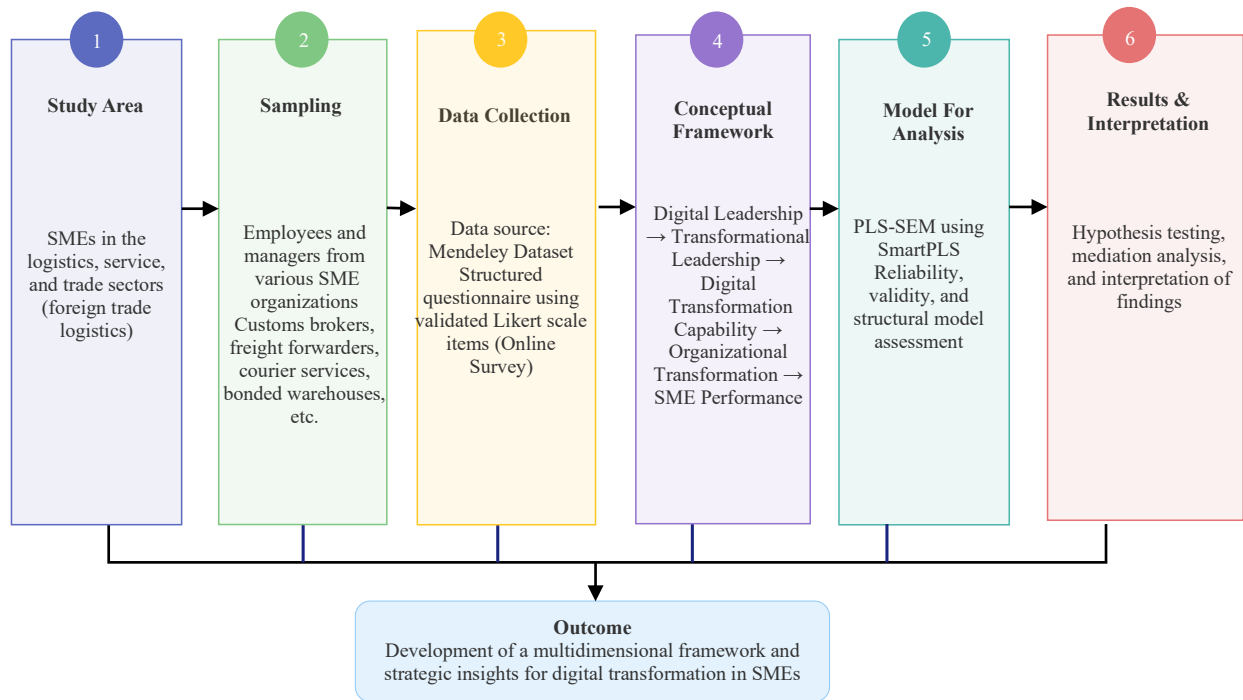


Fig. 1 Research Methodology Flowchart for Digital Leadership and Organizational Transformation in SMEs

The methodology that was followed in the study to analyze the relation between digital leadership and organisational transformation in small and medium enterprises (SMEs) is represented in fig. 1, which is the overall research methodology. The methodology starts by identifying the study areas and sampling the logistics sector employees and managers, the service sector employees and managers and the trade sector employees and managers. A structured questionnaire, which was based on measurement scales, was used to get the data. Bring together the concepts of digital leadership, transformational leadership, digital transformation ability, organisational transformation and performance of SMEs. The data collected is then analyzed through PLS-SEM, which was performed with the help of SmartPLS to check the reliability of the data collected, its validity, the mediation effect and correlation between the variables in the study. Finally, the approach will be applied to create a multi-dimensional map of a digital transformation strategy of SMEs.

Study Area

The research is designed for small and medium enterprises (SMEs) working in the fields of logistics, services, and trade, where the practices of digital transformation are starting to be followed to increase the efficiency of their operations and the competitiveness of their organizations. The analysis uses the publicly shared “Digital Transformation, Leadership and Job Performance in SMEs” dataset retrieved from Mendeley Data that contains responses of SMEs in the foreign trade logistics sector. The study area was chosen since SMEs are an important part of economic development but also suffer from

substantial problems in terms of digital technologies, innovation practices, and the establishment of change strategies in the leadership.

Sampling

The sample includes employees and managerial professionals in SMEs who are engaged in logistics and foreign trade activities. The sample consists of customs brokerage companies, bonded warehouses, freight forwarding companies, courier companies, and multimodal transport companies. In the original data set, a sampling structure was used to ensure that only those organisations which would be in the SME category would be considered. Respondents are directly related to organisational activities and digital activities; their answers are therefore relevant to analyse digital leadership and organisational transformation.

Data Collection

The data used was secondary data; this was collected using a structured questionnaire that comprised various items from other studies, which were found to be sound. The questionnaire constructs are the areas of digital transformation capability, digital leadership, transformational leadership and organizational performance. Likert scales of ‘Strongly Disagree’, ‘Disagree’, ‘Agree’, ‘Strongly Agree’ and ‘Never’, ‘Rarely’, ‘Sometimes’, ‘Often’, ‘Always’ have been used for the responses. The questionnaire contained questions which were intended to gain the perceptions of the organization regarding the attitude towards technology, leadership style, innovation orientation and digital readiness

in SMEs. Data that are collected using validated instruments help to ensure that the data are reliable and consistent.

Conceptual Framework

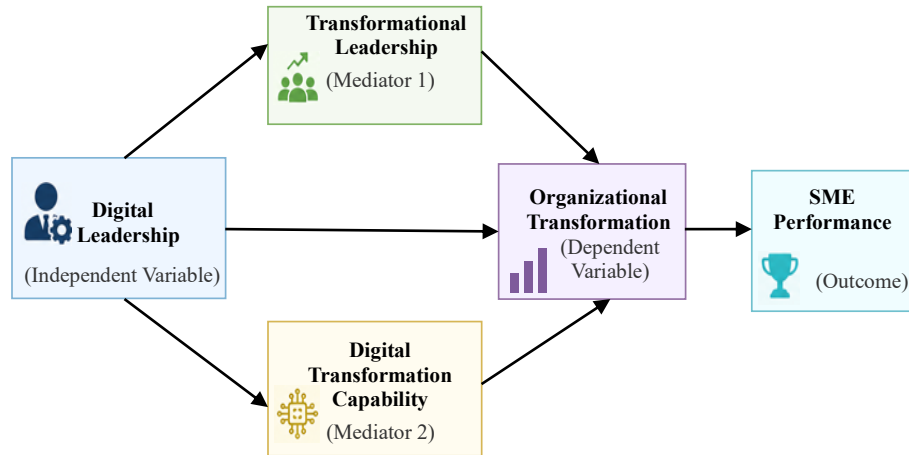


Fig. 2 Conceptual Framework of Digital Leadership and Organizational Transformation in SMEs

The conceptual framework of the study, given in fig. 2, helped in highlighting the effect of digital leadership on organizational transformation in the small and medium enterprises (SMEs). This study has an independent variable, which is digital leadership, which has direct influence on the organizational transformation and indirect influence through the mediating variables of transformational leadership and digital transformation capability. The job of these intermediaries is to transform the organisation into a more adaptive one, innovation-oriented and ready to digitalise, and, at the same time, help the work of SMEs to improve their performance. The framework proposes a 3D perspective of the effects of the digital leadership initiatives on sustainable development and competitiveness of the organizations.

Model Details for Analysis

The software of the Statistical Package of Social Sciences (SPSS) and the Partial Least Squares Structural Equation Modelling (PLS-SEM) software program - smartPLS was used to analyse the obtained data. Descriptive statistical analyses method was used to describe the respondents' demographic and organizational characteristics. In the reliability studies, to find out the internal consistency, composite reliability (CR) and Cronbach's alpha were used. The convergent validity was verified with the help of Average Variance Extracted (AVE) and Fornell-Larcker criterion, and the HTMT ratio was used to verify the discriminant validity. Furthermore, the hypotheses, mediation effects and path between the digital leadership, transformational leadership, digital transformation capability and organizational transformation were tested by the structural equation modelling technique.

Mathematical Description of the Model

The study variables are captured in the proposed research model in the form of mathematical equations based on the

structural equation modelling equations, which explain the direct and indirect relationships among the study variables. The organizational transformation model can be written as equation 1:

$$OT = \beta_1 DL + \beta_2 TL + \beta_3 DTC + \varepsilon \quad :$$

- OT = Organizational Transformation
- DL = Digital Leadership
- TL = Transformational Leadership
- DTC = Digital Transformation Capability
- $\beta_1, \beta_2, \beta_3$ = Path coefficients representing variable influence
- ε = Error term

The indirect effects are estimated in the PLS-SEM framework to analyze the mediating relationships. The bootstrapping techniques help to assess the strength and the statistical significance of the proposed hypotheses through the significance of path coefficients.

IV. RESULTS AND ANALYSIS

The study covered the responses received from the employees and managerial professionals in small and medium enterprises (SMEs) engaged in logistics, freight forwarding, customs brokerage, trade-related services, and courier services. The respondents were from organizations that were actively looking at digital transformation projects and technology-enabled working practices. Demographic analysis was conducted to find out the characteristics of the samples according to gender, age group, and type of organization. Sample distribution is an equal representation of SME employees involved in digital leadership/organizational transformation activities.

TABLE I DEMOGRAPHIC PROFILE OF RESPONDENTS

Variable	Category	Frequency	Percentage (%)
Gender	Male	168	52.5
	Female	152	47.5
Age	18–24 years	48	15.0
	25–34 years	121	37.8
	35–44 years	96	30.0
	45–54 years	42	13.1
	Above 55 years	13	4.1
Organization Type	Freight Forwarder	92	28.8
	Customs Brokerage	76	23.8
	Courier Services	61	19.1
	Bonded Warehouse	48	15.0
	Others	43	13.3

As can be seen in table I, most of the respondents were in the age group of 25-34 years, which reflects that digital adaptive professionals are actively involved in the SME

transformation activities. Most of the samples collected were freight-forwarding and customs brokerage organizations.

Demographic Distribution of SME Respondents

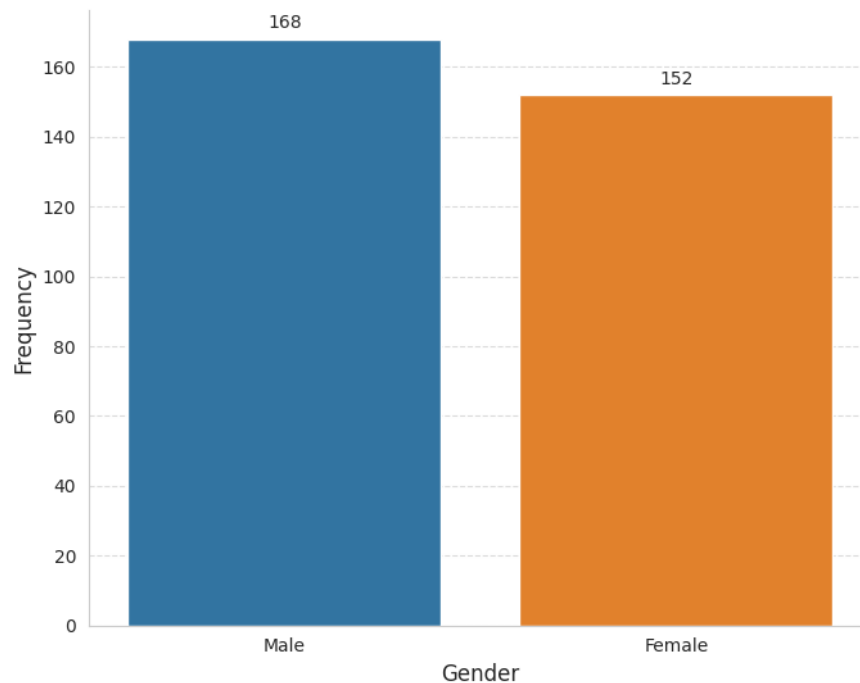


Fig. 3. Demographic Distribution of SME Respondents

The demographic parameters of the respondents in terms of gender, age groups, and types of organizations are shown in fig. 3. Most respondents were aged 25-34 and had backgrounds in freight forwarding and customs brokerage SMEs, confirming that a high proportion of participants in the sample were digitally active.

To assess internal consistency and the accuracy of the measurements of proposed constructs, reliability and validity analyses were performed. The calculation of Cronbach's Alpha, Composite Reliability (CR), and Average Variance

Extracted (AVE) was done using the SmartPLS software. The values obtained in this study met the threshold requirements, and the measurement model demonstrated good reliability and convergent validity.

The internal consistency of each construct was acceptable (Table II), with all constructs having a Cronbach's alpha and composite reliability exceeding 0.70. Likewise, the values of AVE are also above the threshold value (0.50), which provides acceptable convergent validity of the measurement scales.

TABLE II RELIABILITY AND CONVERGENT VALIDITY ANALYSIS

Construct	Cronbach's Alpha	Composite Reliability	AVE
Digital Leadership	0.914	0.928	0.621
Transformational Leadership	0.903	0.919	0.604
Digital Transformation Capability	0.926	0.937	0.648
Organizational Transformation	0.887	0.911	0.587
SME Performance	0.891	0.915	0.601

Reliability and Validity Assessment of Research Constructs

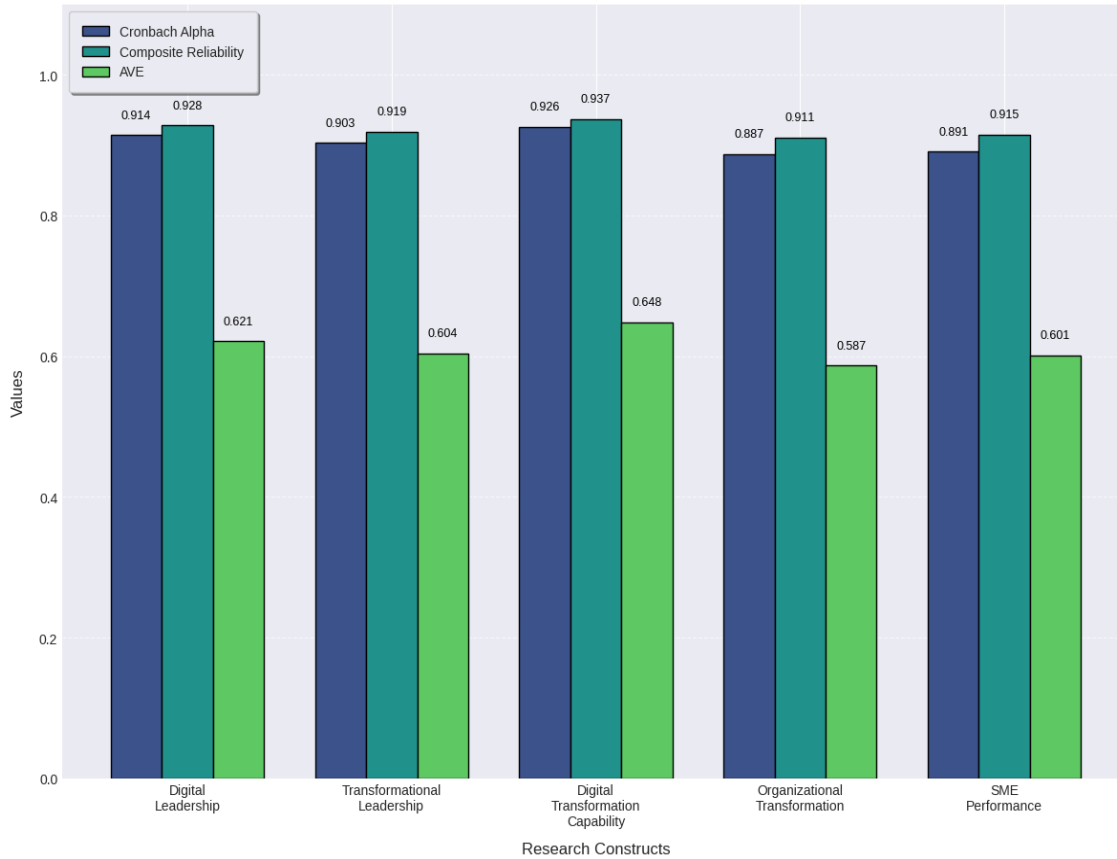


Fig. 4 Reliability and Validity Assessment of Research Constructs

The reliability and convergent validity of the proposed constructs are shown in fig. 4. The graphical representation of the scores showed that all constructs' reliability and validity were above the suggested score values, indicating that the measurement model is reliable and consistent.

Equation 2 for Cronbach's Alpha

$$\alpha = \frac{K}{K - 1} \left(1 - \frac{\sum \sigma_i^2}{\sigma_T^2} \right) \quad (2)$$

Where:

- K = Number of items
- σ_i^2 = Variance of each item
- σ_T^2 = Total variance of the construct

Using a Structural Equation Modelling (SEM) perspective, the Relationships between Digital Leadership, Transformational Leadership, Digital Transformation capability, Organizational transformation, and SME performance were studied using Partial Least Squares (PLS-SEM). Path coefficients, hypothesis testing, and bootstrapping analysis (resamples 5000) were employed to test the significance of path coefficients and hypotheses.

The correlation of the structures of the study variables (with the help of PLS-SEM) is shown in fig. 5. The model findings demonstrate that there is a significant influence of the digital leadership variable on the transformational leadership variable, and vice versa, i.e., the transformational leadership variable influences the organizational transformation variable, which in turn can enhance the performance of SMEs.

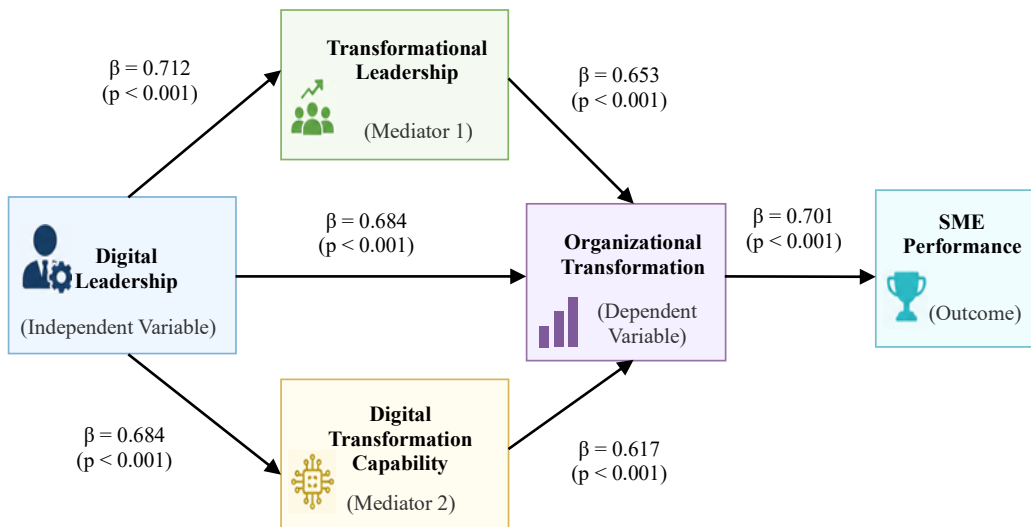


Fig. 5 Structural Equation Model Showing Path Relationships

Path coefficients, t-values, and p-values obtained from the proposed structural model (PLS-SEM) were used to test the hypotheses. The results showed that all the variables in the study are positively and significantly related to one another.

TABLE III HYPOTHESIS TESTING RESULTS

Hypothesis	Relationship	Path Coefficient (β)	t-value	p-value	Result
H1	Digital Leadership \rightarrow Organizational Transformation	0.684	10.927	0.000	Supported
H2	Digital Leadership \rightarrow Transformational Leadership	0.712	11.564	0.000	Supported
H3	Transformational Leadership & Digital Transformation Capability \rightarrow Organizational Transformation	0.653	9.884	0.000	Supported

Table III results show that digital leadership can contribute to organizational change and to transformational leadership practices in a significant, positive way. Furthermore, transformational leadership and digital transformation capability mediate the link between digital leadership and organizational transformation.

To assess the indirect connection between transformational leadership and the digital transformation ability of digital leadership and organizational transformation, a mediation analysis was used. The statistically significant indirect effects in the proposed model indicated partial mediation.

$$DL \rightarrow TL \rightarrow DTC \rightarrow OT$$

where:

- DL = Digital Leadership
- TL = Transformational Leadership
- DTC = Digital Transformation Capability
- OT = Organizational Transformation

Table IV shows the mediation results, which confirm the findings above and indicate that the relationship between digital leadership and organizational transformation in SMEs is strongly mediated by transformational leadership and digital transformation capability. From the above findings, it can be concluded that an organization's adaptation to becoming more flexible and sustaining business growth is

significantly supported by leadership in fostering innovation and digital readiness.

TABLE IV MEDIATION ANALYSIS RESULTS

Mediation Path	Indirect Effect	t-value	p-value	Mediation Type
DL \rightarrow TL \rightarrow OT	0.381	6.754	0.000	Partial Mediation
DL \rightarrow DTC \rightarrow OT	0.417	7.126	0.000	Partial Mediation

The coefficient of determination (R^2) and the predictive relevance (Q^2) were used to assess the model's predictive relevance and explanatory power. The model was satisfactory in terms of explanatory power for the organizational transformation and SME performance.

TABLE V MODEL EVALUATION METRICS

Construct	R^2 Value	Q^2 Value
Transformational Leadership	0.507	0.341
Digital Transformation Capability	0.564	0.392
Organizational Transformation	0.618	0.447
SME Performance	0.593	0.401

From the results of table V, it can be concluded that the proposed model has good predictive and explanatory power. The R^2 values achieved suggest that all the 3 factors: digital leadership, transformational leadership and digital transformation capability can explain the variance in organizational transformation and SME performance.

Equation 3 for the Coefficient of Determination

$$R^2 = 1 - \frac{SS_{res}}{SS_{tot}} \quad (3)$$

Where:

- SS_{res} = Residual sum of squares
- SS_{tot} = Total sum of squares

The overall findings show that digital leadership can significantly enhance organizational change through transformational leadership practices and digital transformation capabilities in SMEs.

V. DISCUSSION

Based on the research results, it is evident that digital leadership affects the increase in organizational transformation in small and medium enterprises (SMEs). The structural model analysis showed that digital leadership had a positive effect on the process of organizational transformation through strategic alignment, digital readiness, and an organizational culture that encourages innovation. Digital leadership and organizational transformation are closely linked, suggesting that addressing digital leadership would better equip the organization to thrive in fast-paced technological and business environments. The findings confirm previous research, which emphasizes the importance of digitally oriented activities led by the SMEs to improve their competitiveness, innovativeness, and sustainability.

The results also indicate that DTC and TL are both crucial mediators between DTL and OT. The mediation analysis showed that, in addition to a direct effect on transformation, digital leaders also exert an indirect effect through the promotion of employee motivation, the development of a collaborative culture, and technological adaptability/integration. High scores of transformational leadership attributes were positively correlated with high scores of innovation orientation and operational flexibility, leading to successful organizational transformation outcomes, as compared to SMEs with low scores of transformational leadership attributes. Likewise, digital transformation capability was found to be a means to deliver the required automation, digital platform, and improved customer engagement. The results highlight that, in addition to being "technologically ready", it is essential to possess the leadership skills necessary to successfully navigate an organizational change process and achieve successful digital transformation.

The results of the reliability and validity tests indicate that the proposed measurement model demonstrated strong internal consistency and construct validity. The results indicated that all constructs in this study were appropriate for measuring digital leadership, transformational leadership, digital transformation capability, organizational transformation, and SME performance, as the Cronbach's alphas and composite reliabilities were above the threshold, and the AVEs were

above the threshold. Besides, R^2 values were acceptable in the structural model test, and the predictive relevance indicated that this model could explain and have high predictive power for organizational transformation in SMEs. The findings also suggest that if the organization leads the digital transformation process, it will become agile, develop organizational agility, and have highly performing employees.

The study can benefit managers across different organizations making decisions toward sustainable digital transformation, as well as SME managers. A focus on leadership development, digital literacy, and culture to promote innovation is recommended to enable an organization to succeed in the transformation. Adequate technological infrastructure, collaboration across functions, and employee engagement should also be targets for SMEs to implement digital efforts. The multi-dimensional framework suggested provides practical guidelines for SMEs to establish a digital leadership practice and connect it to their strategic transformation and operational performance.

A combined model comprising the three key components: leadership capability, digital transformation capability and organizational performance in the eyes of SMEs can contribute to the body of literature of digital leadership and organizational transformation. Based on the results, it can be concluded that the Dynamic Capability Theory and the Resource-Based View are valid, as leadership competencies and digital resources can become assets and capabilities within the organization, generating a competitive advantage and sustainable business expansion in digitally changing markets.

VI. LIMITATIONS AND FUTURE WORK

Limitations

There are some drawbacks to this study that need to be borne in mind when interpreting the results. Firstly, the data used in this study were secondary, and the SMEs studied were mostly in the logistics and foreign trade industry. Therefore, the results of this study may not apply to other industry sectors. The level of digital maturity, leadership and transformation readiness can vary from industry to industry. Secondly, a cross-sectional research design was used, in which data were collected at a single point in time. Therefore, the long-term behavior of organizational transformation and the over-time change in leadership effectiveness could not be observed.

Another limitation is the common method bias and respondents' subjective interpretation of their responses in the self-reported questionnaire. The scales measuring the constructs were validated, as perceptions of leadership and transformation practices may vary across organizations. Moreover, it was only partially oriented towards the concepts of digital leadership, transformational leadership, and digital transformation capability, while ignoring other factors that are likely to affect the framework, such as organizational

culture, employee resistance, cybersecurity readiness, and financial capability.

Future Work

Further studies can include more organizational and technological aspects, such as the implementation of Artificial Intelligence, the use of cloud computing, Cybersecurity Management, and Organizational Resilience within the proposed framework. It may be helpful to have a more general understanding of the process of digital transformation through comparative analysis across different industrial sectors and/or between different multinational SMEs. Also, the moderating roles of organizational size, market uncertainty, and technological infrastructure on the relationship between digital transformation and its future outcomes may be interesting.

Longitudinal studies should be encouraged to examine how the impact of digital leadership on organizational transformation changes over time. The use of advanced analytical tools, such as machine learning, predictive analytics, and hybrid SEM-AI models, can be incorporated to enhance transformation prediction and strategic decision-making. Moreover, studying employee behavioral dimensions, the digital innovation ecosystem, and strategies for sustainability-oriented SME transformation could yield fruitful future research and lead to the development of more complete multidimensional models for SME digital transformation.

VII. CONCLUSION

Digital leadership and digital transformation capability are two distinct concepts integrated into a multidimensional analytical framework to examine their effects on enterprise transformation in small and medium enterprises (SMEs). The results confirmed the idea that a digital aspect of leadership should be considered to improve adaptability, strategic alignment, orientation, and a culture of innovation in SMEs. The analysis found that digital leadership has a positive effect on transformational leadership, thereby strengthening digital transformation capability and organizational transformation in SMEs. The results of the path analysis indicated that all variables in the current study were positively associated with organizational transformation ($\beta = 0.684$, $p < 0.001$) and transformational leadership ($\beta = 0.712$, $p < 0.001$), with these variables showing a direct significant effect resulting from digital leadership. As shown in the reliability and validity assessment results, the proposed framework demonstrates good measurement consistency, as all constructs have Cronbach's alpha and composite reliability values above the recommended thresholds. Moreover, the model analysis results were high in R^2 , indicating the model's outstanding predictive power for transformations in the organization and performance of SMEs. Results of the mediation analysis also showed that the mediating effects of transformational leadership and digital transformation capability significantly strengthened the relationship between digital leadership and organizational transformation, indicating that organizations'

digital transformation through leadership is crucial for sustainable development. The study pragmatically points to the necessity for SMEs to pay more attention to leadership development, improving their digital competency, technological readiness, and developing an innovation culture in their companies to ensure successful digital transformation. The proposed framework is new and offers a holistic perspective on leadership-driven transformation in SMEs. The study reveals that digital leadership is a vital strategic competency that can help SMEs achieve competitive advantages, agility, and sustainability in a rapidly changing digital business environment.

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