

THE IMPACT OF TRANSFORMATIONAL LEADERSHIP AND ICT UTILIZATION ON MSMEs PERFORMANCE: EXPLORING THE MEDIATING ROLE OF DIGITAL LITERACY

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ABSTRACT

Background: Transformational leadership is becoming increasingly relevant in the digital era, where the ability to rapidly adapt to new technologies and market changes is key to success. However, effective adoption of Information and Communication Technology (ICT) will not yield optimal impact without adequate digital literacy among MSME actors.

Purpose: This study aims to explore the relationship between transformational leadership, ICT utilization, and MSME performance, with digital literacy as a mediating variable.

Design/methodology/approach: This study uses a quantitative technique to investigate the correlations between pertinent variables using the SEM-PLS methodology. One hundred MSMEs in Yogyakarta, Indonesia, were the subject of the study, which used an online questionnaire to gather data.

Findings/Results: The findings of this study reveal that transformational leadership and ICT utilization have a positive and significant impact on MSME performance in the culinary, creative, and tourism sectors in Yogyakarta. Digital literacy is proven to be a mediating variable that strengthens the relationship between these two factors and MSME performance.

Conclusion: Transformational leadership, ICT utilization, and digital literacy significantly enhance MSME performance in Yogyakarta's culinary, creative, and tourism sectors. Transformational leadership improves productivity, product quality, profitability, and revenue growth, while ICT utilization, supported by digital literacy, strengthens MSME performance. Digital literacy acts as a key mediator, amplifying the effects of leadership and technology adoption through competencies like photo-visual, reproduction, branching, information, and socio-emotional literacy, enabling MSMEs to maximize technological and leadership benefits.

Originality/value (State of the art): This study uniquely integrates digital literacy as a mediating variable between transformational leadership, ICT utilization, and MSME performance in Yogyakarta's culinary, creative, and tourism sectors. It fills a gap in existing research by examining how digital literacy enhances the impact of transformational leadership and ICT on MSME success, offering new insights for digital transformation strategies in emerging markets.

Keywords: transformational leadership, ICT utilization, digital literacy, MSME performance

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INTRODUCTION

Transformational leadership is a leadership approach that encourages and motivates employees to exceed conventional limits and attain higher performance by fostering innovation, creativity, and adaptability to change (Ausat, Suherlan, et al. 2022). In the context of MSMEs, transformational leadership becomes increasingly relevant in the digital era, where the ability to quickly adapt to new technologies and market changes is key to success. However, the effective adoption of information and communication technology (ICT) will not yield optimal results without adequate digital literacy among MSME actors. Digital literacy involves more than just the technical know-how to use digital tools; it also includes the strategic understanding of how technology can enhance operational efficiency, expand market reach, and create additional value for customers.

Globally, the implementation of transformational leadership has been recognized as a key factor that can drive innovation and organizational performance, including within MSMEs. In countries such as South Korea and Singapore, known for their advanced digital ecosystems, transformational leadership is often combined with the strategic utilization of ICT, supported by high digital literacy levels among the workforce (Sharma et al. 2023). This combination allows MSMEs in these countries to become more adaptive to technological changes and the dynamic global market. For example, South Korea has implemented national policies promoting digital literacy across all sectors, including MSMEs, which has contributed to their enhanced global competitiveness. In Singapore, the government actively facilitates the digital transformation of MSMEs through initiatives such as the Smart Nation and Digital Economy Framework, aimed at improving the digital capabilities of MSMEs. Research in these countries shows that MSMEs led by visionary transformational leaders, supported by high levels of digital literacy, tend to experience significant performance improvements in terms of revenue growth and operational efficiency.

In Indonesia, MSMEs are vital to the national economy, accounting for more than 60% of the Gross Domestic Product (GDP) and employing approximately 97% of the workforce. However, despite their significant role, many MSMEs in Indonesia are still lagging

in digital technology adoption (Ausat & Suherlan, 2021). Data from the Ministry of Cooperatives and SMEs (Kemenkop UKM) shows that only about 13% of MSMEs have utilized digital technology in their operations. This low level of ICT utilization is largely due to the lack of digital literacy among MSME actors, which hinders their ability to recognize the opportunities offered by digital technology to enhance their business performance. This situation is further exacerbated by the lack of leadership that can direct and inspire a shift towards digitalization. This creates a significant gap between MSMEs that have integrated digital technology and those that have not, ultimately affecting their competitiveness in an increasingly global and digital market.

At the local level, particularly in Yogyakarta, MSMEs have great potential in the culinary, creative, and tourism sectors, three industries that heavily rely on innovation and technology to thrive. Yogyakarta, known as a cultural and educational city, has many MSMEs engaged in crafts, culinary, and tourism, all of which could benefit from digital technology adoption. This research focuses on MSMEs in Yogyakarta, with special attention to the culinary, creative, and tourism sectors. Yogyakarta, as a center of culture and education, has great potential to become a hub of innovation and creativity in Indonesia (Isdarmanto et al. 2021). However, many MSMEs in this region are still lagging in terms of digital technology adoption, despite being in a supportive environment. One of the main challenges faced by MSMEs in Yogyakarta is the lack of transformational leadership, where MSME leaders tend to adopt conventional management approaches and are less responsive to change (Heru Marwanto et al. 2023). This issue is compounded by the low level of digital literacy among MSME actors, which results in their inability to effectively utilize ICT to improve their business performance.

Furthermore, in studies related to MSME performance, many researchers have shown that transformational leadership and ICT utilization are aspects that cannot be overlooked. Previous research shows that transformational leadership can drive employees to achieve higher performance by increasing their motivation, commitment, and innovation. Effective transformational leaders can create a shared vision that inspires and guides employees to apply ICT in their daily operations, which in turn enhances the efficiency

and productivity of MSMEs (Birasnav et al. 2011). Transformational leaders often motivate employees to adopt new technology by emphasizing the importance of innovation and change as part of the company's long-term strategy. They inspire and empower employees to overcome fear or resistance to technology, enabling more effective ICT implementation. Additionally, ICT utilization allows MSMEs to automate routine tasks and reduce operational costs (Hendrawan et al. 2024). Transformational leadership ensures that employees understand the value of this efficiency and encourages them to use technology to optimize their work performance.

However, not all studies find a significant relationship between transformational leadership and ICT utilization with MSME performance. Some research indicates that despite transformational leadership initiatives and ICT investments, the results do not always positively impact MSME performance (Ikhrum W & Fuadiputra, 2021; Viana Feranita et al. 2020). This can occur for various reasons, including resistance to change, lack of digital skills, or limitations in technological infrastructure. Although transformational leaders strive to drive change through ICT adoption, employees may resist if they feel unprepared or uncertain about the benefits of the technology. This resistance can hinder the ICT adoption process and reduce its positive impact on MSME performance. On the other hand, in many MSMEs, particularly in less developed regions, technological infrastructure may not be adequate to support optimal ICT usage (Arjang et al. 2023). In such conditions, even with strong leadership, the ability to fully utilize technology remains limited, making its impact on business performance insignificant.

Therefore, although much research has explored the impact of transformational leadership and ICT on organizational performance, there are still limitations in the literature that examine the role of digital literacy as a mediating variable in the context of MSMEs in Indonesia, particularly in Yogyakarta's culinary, creative, and tourism sectors. This study aims to fill that gap by integrating these three variables and providing new insights into how digital literacy can strengthen the influence of transformational leadership and ICT on MSME performance. The hope is that this research will also provide new insights for the development of MSME management strategies in Yogyakarta and help MSMEs in this region to better prepare for the challenges of the digital era.

METHODS

The sample consists of Yogyakarta-based MSME owners and managers who actively integrate ICT into their operations in the tourism, creative, and culinary industries. Purposive sampling is used to make sure that participants fit the pertinent requirements of the study. Participants must be MSME owners or managers who actively use ICT and view digital literacy and transformational leadership as critical components of their workplace, according to the inclusion requirements. The study does not include people who do not use ICT or who do not think these characteristics are important. Out of the 121 responders who initially satisfied the inclusion criteria, the selection process resulted in a final sample of 100 participants. A purposive sample guarantees that the results are relevant to the Yogyakarta MSME context and permits extrapolation to comparable contexts.

SmartPLS 3.0 software is used to analyze data using Structural Equation Modeling-Partial Least Squares (SEM-PLS). SEM-PLS is chosen because of its ability to manage small to medium sample sizes and its efficacy in examining intricate interactions between latent variables. This method makes it easier to analyze measurement and structural models at the same time, offering insights into the connections between MSME performance, ICT use, digital literacy, and transformational leadership. An evaluation of the outer model, including its reliability, discriminant validity, and convergent validity, is the first step in the analytical process. Verifying that indicators within each construct show strong correlations and factor loadings over the 0.70 criterion verifies convergent validity. The explanatory strength and predictive significance of the inner model are next evaluated using R-square and Q-square analyses, which are essential for confirming the theoretical framework and bolstering the suggested links. Hypothesis testing provides empirical support for the research's theoretical claims by further confirming the presence and strength of the correlations between variables. By improving analytical accuracy and deepening comprehension of the dynamics inside Yogyakarta's MSMEs, the use of SEM-PLS in conjunction with SmartPLS 3.0 strengthens the validity of the findings and lays a strong basis for further study in this area.

The effects of transformational leadership and ICT use on MSME performance in Yogyakarta's culinary, creative, and tourism sectors are examined quantitatively in this study, with digital literacy acting as a mediating variable. A quantitative approach is selected because it may produce quantifiable, objective data and allow for in-depth statistical investigation of the connections between the study variables. Using quantitative methods, the main goal is to provide outcomes that are scientifically sound and generalizable to other MSME scenarios. To effectively gather data from a wide population in a short amount of time, a survey research design is used. A Google Forms-distributed online survey will be used to gather data from early May to the end of July 2024 from MSME owners and managers in Yogyakarta. Because of its effectiveness, affordability, and capacity to reach a geographically scattered audience, this approach is recommended. In order to measure respondents' opinions of transformational leadership, ICT use, digital literacy, and MSME performance, the poll uses a Likert scale. This enables standardized data analysis to spot patterns and trends.

Transformational Leadership Theory

The Transformational Leadership Theory, introduced by James MacGregor Burns in 1978, distinguishes between transactional and transformational leadership. Burns explained transformational leadership as a process where leaders and followers mutually elevate each other's motivation and moral levels (Burns, 1978). Bernard M. Bass expanded on this concept in 1985, identifying four key dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. Transformational leaders inspire their followers to reach their full potential, drive positive change, and focus on individual development. These leaders foster innovation and a strong organizational culture, which is crucial in a complex business environment. Success is achieved when leaders create an environment that promotes creativity, high commitment, and long-term organizational success.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), introduced by Fred Davis in 1989, explains how individuals adopt technology based on two key factors: perceived usefulness and perceived ease of use (Davis, 1989).

Perceived usefulness refers to how much a person believes that using the technology will enhance their performance, while perceived ease of use reflects the belief that the technology will be easy to learn and use. These factors shape an individual's attitude toward technology and influence their intention to adopt it. In the context of MSMEs, TAM helps understand how small business owners and employees perceive and adopt ICT for business improvement. External factors such as government support, competitive pressure, and organizational readiness also affect these perceptions. Applying TAM to MSMEs can guide strategies for promoting digital transformation, boosting productivity, and competitiveness.

Digital Literacy Theory

Digital literacy theory encompasses a wide range of competencies, including technical, cognitive, social, and ethical skills needed to effectively and responsibly use digital technology (Spante et al. 2018). It involves the ability to search, evaluate, and manage digital information critically while adhering to ethical norms. Yoram Eshet-Alkalai contributed to the development of this theory by identifying five key dimensions: photo-visual literacy, reproduction literacy, information literacy, branching literacy, and socio-emotional literacy (Alkali & Amichai-Hamburger, 2004). In MSMEs, digital literacy is crucial as it enables business owners and employees to optimize ICT use, improve operational efficiency, expand markets, and adapt to changes in the business environment. MSMEs can utilize digital tools like e-commerce and data analytics to craft competitive strategies, enhance performance, and drive sustainable growth with strong digital literacy.

MSME Performance

MSMEs' performance results from the synergy of various factors within the organization (Ausat & Peirisal, 2021). It reflects how well MSMEs achieve business objectives such as revenue growth, market expansion, and operational efficiency. Additionally, performance includes long-term sustainability, where MSMEs not only compete but also grow and adapt to ongoing changes (Novela et al. 2024). Key factors influencing performance include transformational leadership, ICT utilization, and digital literacy. Leadership provides clear direction, ICT enhances efficiency and market access, while digital literacy enables smarter technology use, improving overall

performance. MSMEs that perform well consistently innovate, maintain competitive advantages, and meet customer expectations (Sutrisno et al. 2024). Achieving sustained performance requires adaptability, capability development, and seizing market opportunities.

The Relationship between Variables

Transformational leadership is a leadership style that inspires and motivates employees to achieve higher performance by encouraging them to prioritize organizational goals over personal interests, thereby fostering a dynamic and innovative work environment (Karimi et al. 2023). In the context of Micro, Small, and Medium Enterprises (MSMEs), transformational leaders empower employees to overcome challenges such as resource limitations and market uncertainty through capacity building (Aviyanti & Widyastuti, 2024). Consequently, effective ICT utilization directly impacts MSME performance, resulting in increased revenue, operational efficiency, and market penetration (Sutrisno, 2023). Consequently, effective ICT utilization directly impacts MSME performance, resulting in increased revenue, operational efficiency, and market penetration (Aziz, 2019).

Digital literacy, defined as the ability to effectively and efficiently use technology, is essential for MSMEs to adapt to technological advancements and competitive market conditions. Organizations with high levels of digital literacy tend to be more innovative and can adopt new technologies more rapidly, utilizing data effectively for informed decision-making (Titin et al. 2024). This competency significantly contributes to MSMEs' performance, particularly in areas of productivity, innovation, and growth (Rosyidiana & Narsa, 2024). Transformational leadership influences MSME performance not only directly but also through fostering digital literacy among employees. Transformational leaders enhance employees' digital competencies by motivating and supporting continuous learning and skill development, which strengthens their ability to leverage technology in their daily tasks (Chatterjee et al. 2023). Adequate digital literacy is vital for the successful utilization of ICT, as it enables employees to effectively operate software, analyze data, and navigate digital platforms to achieve business objectives (Nikou et al. 2022). Thus, digital literacy serves as a mediator

that enhances the relationship between ICT utilization and MSME performance, ensuring that higher levels of digital literacy lead to greater positive impacts of ICT on efficiency, innovation, and competitiveness (Rakib et al. 2023).

The hypotheses in this study are formulated based on the theoretical and empirical evidence linking transformational leadership, ICT utilization, and digital literacy to MSME performance. Transformational leadership fosters an innovative and growth-oriented culture, enabling businesses to adapt to market dynamics and technological advancements. ICT utilization is critical in optimizing operational efficiency, customer engagement, and business expansion, but its effectiveness depends largely on the digital literacy of employees. Digital literacy acts as both a direct enabler of business performance and a mediator that amplifies the positive effects of transformational leadership and ICT utilization. Therefore, integrating these constructs into a cohesive framework allows for a comprehensive understanding of their impact on MSME sustainability and competitiveness.

- H1: Transformational Leadership has a Positive and Significant Impact on MSMEs' Performance.
- H2: ICT Utilization has a Positive and Significant Impact on MSMEs' Performance.
- H3: Digital Literacy has a Positive and Significant Impact on MSMEs' Performance.
- H4: Transformational Leadership has a Positive and Significant Impact on MSMEs' Performance through Digital Literacy.
- H5: ICT Utilization has a Positive and Significant Impact on MSMEs' Performance through Digital Literacy

The conceptual framework illustrates the relationship between transformational leadership, ICT utilization, digital literacy, and MSME performance (Figure 1). Transformational leadership directly enhances MSME performance while also fostering digital literacy among employees, which further improves performance outcomes. Similarly, ICT utilization directly impacts MSME performance, with digital literacy acting as a mediator that strengthens this relationship by ensuring the effective adoption and implementation of technology in business operations.

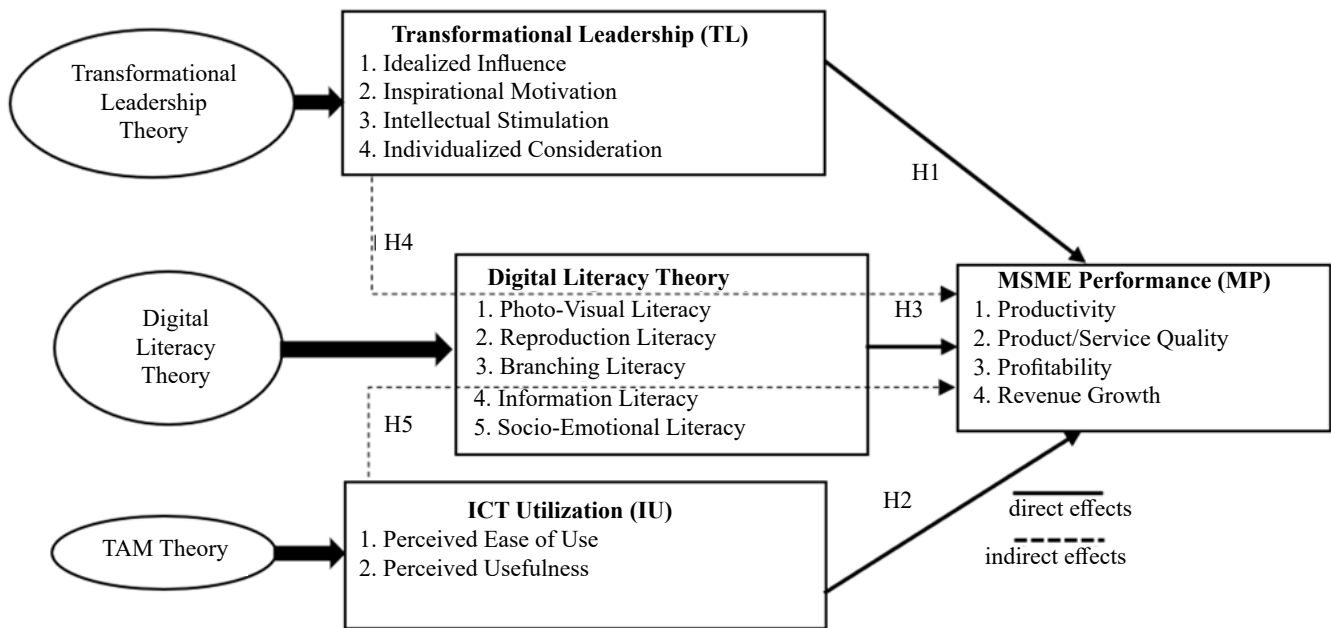


Figure 1. Research framework

RESULTS

Respondent Characteristics

The MSME owners and managers in Yogyakarta who actively employ ICT in their business activities in the tourism, creative, and culinary industries make up the research sample. Out of the 121 responders who initially met the inclusion criteria, a final sample of 100 participants was obtained through the selection process (Table 1). While enabling the generalization of findings to comparable contexts, the purposive sample technique guarantees that the research's conclusions are pertinent to the MSME situation in Yogyakarta.

The data reveals the largest components in various categories. For firm age, 44% of businesses are 6 to 10 years old, indicating moderate experience. In terms of gender, 63% of respondents are male, showing a gender imbalance. In the MSMEs industry category, 38% are in the culinary sector, showing a strong presence of food-related businesses. WhatsApp Business is the most used social media platform, at 41%, reflecting its popularity for business communication. Shopee dominates e-commerce platforms with 51% usage. All respondents report implementing transformational leadership, showing its universal application, and the businesses are concentrated in Yogyakarta.

Outer Model

The outer model is assessed in the first stage of the Structural Equation Modeling-Partial Least Squares (SEM-PLS) analysis to make sure the constructs satisfy crucial validity and reliability requirements. In order to ensure that the data utilized for subsequent analysis is accurate and consistent, this step is essential.

Convergent Validity

The study of convergent validity looks at how strongly indicators within a construct correlate with one another. Each manifest variable should preferably have a loading factor higher than 0.70 when evaluated with SmartPLS 3.2 software in order to prove this. By applying this criterion, indicators are guaranteed to measure the same underlying construct. All of the construct-related indicators in our analysis show loading factor values more than 0.70, as shown in Table 2. This shows that the measures are consistently reflecting the intended constructs and validates that the constructs attain the required level of convergent validity.

Discriminant Validity

Comparing the square root of the Average Variance Extracted (AVE) for each construct with the correlations between constructs is how discriminant validity is assessed. If a construct's square root of the AVE is higher than its correlations with other constructs,

discriminant validity is verified. Each construct is guaranteed to be unique and not unduly connected with the others, thanks to this comparison. The higher squared AVE values in comparison to the correlation values indicate that the model satisfies the discriminant validity criterion, as indicated by the study presented in Table 3. Each construct is sufficiently different from the others, according to this finding.

Reliability Test

Cronbach's Alpha and Composite Reliability are assessed as part of reliability testing to make sure the constructs are dependable and consistent. For constructs containing reflexive indicators, satisfactory reliability is indicated by values surpassing 0.60. The constructs' abilities to accurately measure their corresponding variables are guaranteed by this threshold. All Cronbach's Alpha and Composite Reliability values are greater than 0.60, according to the results, which are shown in Table 2. This validates that the research constructs are measured consistently across many indicators and have sufficient reliability.

Table 1. Characteristics of the Respondents

Demographic	Frequency	Percentage
Firm Age		
1-5 years	21	21%
6-10 years	44	44%
11-15 years	27	27%
>15 years	8	8%
Gender		
Male	63	63%
Female	37	37%
MSMEs Industry		
Culinary	38	38%
Creative	29	29%
Tourism	33	33%
Social-Media (ICT utilization)		
WhatsApp	41	41%

Demographic	Frequency	Percentage
Facebook	22	22%
TikTok	20	20%
Instagram	17	17%
E-commerce Platforms (ICT utilization)		
Tokopedia	26	26%
Shopee	51	51%
Bukalapak	15	15%
Lazada	8	8%
Transformational Leadership Implementation		
Yes	100	100%
No	0	0%
Business Location		
Yogyakarta	100	100%

Table 2. Measurement Model Analysis

Variable	Item	Factor Loading	Cronbach's Alpha	Composite Reliability	AVE
Transformational Leadership (TL)	TL.1	0.912	0.842	0.856	0.693
	TL.2	0.837			
	TL.3	0.828			
	TL.4	0.915			
ICT Utilization (IU)	IU.1	0.824	0.808	0.787	0.611
	IU.2	0.899			
Digital Literacy (DL)	DL.1	0.830	0.791	0.738	0.633
	DL.2	0.813			
	DL.3	0.778			
	DL.4	0.765			
	DL.5	0.729			
MSME Performance (MP)	MP.1	0.826	0.776	0.719	0.638
	MP.2	0.783			
	MP.3	0.797			
	MP.4	0.859			

Table 3. Discriminant Validity

Var/Ind	Transformational Leadership (TL)	ICT Utilization (IU)	Digital Literacy (DL)	MSME Performance (MP)
TL.1	0.912	0.388	0.418	0.423
TL.2	0.837	0.341	0.308	0.447
TL.3	0.828	0.310	0.416	0.450
TL.4	0.915	0.419	0.444	0.496
UI.1	0.328	0.824	0.355	0.334
UI.2	0.318	0.899	0.371	0.440
DL.1	0.490	0.456	0.830	0.407
DL.2	0.423	0.472	0.813	0.488
DL.3	0.522	0.433	0.778	0.418
DL.4	0.458	0.527	0.765	0.581
DL.5	0.455	0.448	0.729	0.529
MP.1	0.501	0.370	0.446	0.826
MP.2	0.532	0.382	0.383	0.783
MP.3	0.418	0.399	0.464	0.797
MP.4	0.477	0.321	0.448	0.859

Inner Model

The inner model is tested in the following stage of SEM-PLS analysis, and its performance is assessed using R-square, Q-square, and hypothesis testing techniques.

R-Square

The degree to which external constructs impact endogenous constructs is evaluated using R-squared. Table 4 shows that factors like transformational leadership and ICT utilization account for 62.2% of the variance in digital literacy, with an R-square value of 0.622. Factors outside the scope of this investigation account for the remaining 37.8% of the variance. Furthermore, an R-square value of 0.645 indicates that digital literacy, ICT utilization, and transformational leadership together account for 64.5% of the variance in MSME performance, with external factors accounting for 35.5% of the variance. According to Hair et al. (2011), SEM models have moderate-to-strong explanatory capability when their R-square values are greater than 0.50.

Q² Predictive Relevance

Predictive relevance is evaluated by calculating the Q² value, where a value greater than 0 indicates adequate predictive capability (Hair et al. 2011). The formula for computing Q² is $Q^2 = 1 - (1 - R^2) \times (1 - R^2)$. Using the obtained R-square values. A Q² value of

0.865 indicates the model's effectiveness in accurately predicting observed values (Hair et al. 2011).

$$Q^2 = 1 - (1 - 0.622) \times (1 - 0.645)$$

$$Q^2 = 1 - (0.378 \times 0.355)$$

$$Q^2 = 1 - 0.13419$$

$$Q^2 = 0.86581$$

Hypothesis Testing

A P-value of less than 0.05 is typically used as a threshold for a meaningful correlation in hypothesis testing, which determines whether path coefficients are statistically significant (Hair et al. 2011). Table 5 provides a full summary of the hypothesis testing results. This assessment makes sure that the suggested connections between the model's variables are meaningful and pertinent, offering a strong basis for additional research.

The Significant Relationship between Transformational Leadership and MSME Performance

Transformational leadership has a positive and direct effect on MSME performance, especially in Yogyakarta's culinary, creative, and tourism sectors, as it fosters significant organizational growth, supporting previous studies (Yusuf & Yulianeu, 2022). The four core components of transformational leadership—idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration—have been identified as key drivers

of MSME success. Idealized influence builds trust and credibility, motivating employees to embrace the leader's vision and perform with greater dedication. Inspirational motivation instills a shared sense of purpose and hope, driving enhanced quality in products and services. Intellectual stimulation promotes a culture of innovation, empowering employees to tackle challenges and continuously improve, which is particularly vital in industries undergoing rapid change. Individualized consideration ensures that employees feel valued and supported, increasing loyalty and commitment. Together, these leadership qualities stimulate higher levels of productivity, improve competitiveness, and foster sustainable revenue growth in fast-evolving sectors like culinary, creative, and tourism, where staying ahead of market trends and customer expectations is crucial. As such, transformational leadership plays a pivotal role in positioning MSMEs for long-term success and resilience in these dynamic industries.

The Significant Relationship between ICT Utilization and MSME Performance

ICT utilization significantly impacts MSME performance, particularly in Yogyakarta's culinary, creative, and tourism sectors, by enhancing operational efficiency, product quality, and market reach,

confirming previous research (Basak et al. 2022). The two dimensions of ICT utilization—perceived ease of use and perceived usefulness—are crucial in driving this improvement. Perceived ease of use fosters efficiency by enabling MSMEs to adopt user-friendly technologies such as digital inventory systems, online ordering platforms, and social media marketing tools, leading to more streamlined operations and better resource management. This enhanced operational capacity allows businesses to focus on growth strategies, improving time and cost management. On the other hand, perceived usefulness highlights the value ICT brings, particularly in enhancing product and service offerings, which attracts broader customer bases through e-commerce platforms and social media, thus boosting customer satisfaction and reputation. Moreover, ICT's role in automating processes, reducing costs, and leveraging data analytics for customer relationship management (CRM) helps MSMEs cut operational expenses while expanding their market presence. This increase in efficiency and market access drives profitability and revenue growth, which is essential for staying competitive in fast-paced sectors like culinary, creative, and tourism. Thus, ICT utilization optimizes internal operations and positions MSMEs to adapt to market dynamics, ensuring sustained performance and competitiveness.

Table 4. R-Square Test

Variable	R-Square
Digital Literacy (DL)	0.622
MSME Performance (MP)	0.645

Table 5. Hypothesis Testing Results

Hypothesis	Path Coefficient	T Value	P Values	Decision
Transformational Leadership (TL) → MSME Performance (MP)	0.784	8.310	0.000	Accepted
ICT Utilization (IU) → MSME Performance (MP)	0.686	7.501	0.000	Accepted
Digital Literacy (DL) → MSME Performance (MP)	0.542	5.734	0.000	Accepted
Transformational Leadership (TL) → Digital Literacy (DL) → MSME Performance (MP)	0.337	3.427	0.025	Accepted
ICT Utilization (IU) → Digital Literacy (DL) → MSME Performance (MP)	0.342	3.541	0.015	Accepted

The Significant Relationship between Digital Literacy and MSME Performance

Digital literacy significantly influences MSME performance, particularly in Yogyakarta's culinary, creative, and tourism sectors, as it empowers businesses to effectively navigate and leverage digital tools and platforms, supporting findings from previous research (Mangawing et al. 2023). The five indicators of digital literacy—photo-visual literacy, reproduction literacy, branching literacy, information literacy, and socio-emotional literacy—each contribute to performance enhancement in unique ways. Photo-visual literacy allows MSMEs to create engaging digital visuals, such as high-quality product photos or promotional graphics, which increases customer engagement and boosts marketing effectiveness. Reproduction literacy enables the adaptation and customization of digital content, fostering innovation in product offerings and improving their quality, ultimately leading to greater profitability. In culinary sectors, for example, creating captivating recipe videos helps businesses stand out and attract more customers. Branching literacy is essential for managing multiple digital platforms simultaneously, enabling MSMEs to respond quickly to market shifts and expand their reach, thus driving revenue growth. Information literacy ensures that MSMEs can access and analyze relevant data for strategic decision-making, improving product quality and market positioning. Socio-emotional literacy plays a critical role in building strong customer relationships in digital environments by enhancing communication and fostering trust, which increases customer loyalty and strengthens brand image. Collectively, these digital literacy skills improve operational efficiency and support innovation, responsiveness, and customer engagement, contributing to higher productivity, revenue, and overall MSME growth.

The Significant Mediation Relationship between Transformational Leadership with MSME Performance through Digital Literacy

Transformational leadership plays a pivotal role in enhancing MSME performance, particularly in Yogyakarta's culinary, creative, and tourism sectors, by inspiring and motivating employees to reach higher levels of innovation and dedication. The key elements of transformational leadership—idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration—serve to foster a work

environment conducive to growth, creativity, and performance improvement. This effect is significantly amplified when combined with digital literacy as a mediating factor. Transformational leaders actively encourage the development of digital literacy among their employees, guiding them to understand, modify, and effectively utilize digital tools in their business operations. Through intellectual stimulation, leaders promote the innovative use of digital technologies, which improves employees' ability to create high-quality digital content for marketing and product promotion, thereby enhancing product quality and driving profitability. Inspirational motivation further supports the development of skills necessary to manage digital information effectively, enhancing decision-making processes and supporting business growth. Additionally, through individualized consideration, leaders nurture employees' socio-emotional literacy, strengthening customer relationships and fostering positive online networks. This holistic approach improves the internal capabilities of MSMEs and boosts their external customer engagement, which translates into increased revenue, a stronger brand image, and sustained business success in the competitive sectors of culinary, creative, and tourism industries.

The Significant Mediation Relationship between ICT Utilization with MSME Performance through Digital Literacy

The impact of ICT utilization on MSME performance in Yogyakarta's culinary, creative, and tourism sectors is significantly enhanced by digital literacy, as it enables businesses to fully capitalize on the benefits of ICT tools. The perceived ease of use and perceived usefulness of ICT tools improve operational efficiency and accelerate the digitalization process, streamlining business operations and facilitating strategic growth. However, the extent to which MSMEs can leverage ICT effectively depends heavily on the digital literacy of both owners and employees (Shahadat et al. 2023). For instance, photo-visual literacy empowers employees to create engaging digital content, such as promotional videos and product images, which enhance marketing effectiveness and drive product appeal, ultimately increasing productivity. Reproduction literacy enables MSMEs to modify and tailor digital content to meet evolving market demands, improving their responsiveness and adaptability. Branching literacy helps manage multiple digital platforms, such as e-commerce and customer relationship management

(CRM) systems, improving customer interactions, reducing operational costs, and boosting overall efficiency. Information literacy equips MSMEs with the ability to analyze data generated by ICT tools, leading to better decision-making, enhanced product quality, and improved profitability. Socio-emotional literacy strengthens the ability to create personalized digital customer experiences, fostering customer loyalty and driving revenue growth. Collectively, these aspects of digital literacy maximize the benefits of ICT and enhance MSME competitiveness, enabling them to thrive in a digital-first environment while ensuring sustained growth and success.

Managerial Implication

The findings of this study have important implications for the development of MSMEs in the culinary, creative, and tourism sectors in Yogyakarta. The implementation of effective transformational leadership can drive innovation, motivation, and efficiency in business operations, ultimately enhancing the competitiveness and sustainability of MSMEs. Additionally, ICT utilization, supported by strong digital literacy, can enhance MSMEs' ability to adopt new technologies, optimize business processes, and improve service quality to customers. Therefore, it is crucial for MSMEs to focus on technology adoption while also developing their employees' digital literacy to maximize the potential of ICT in supporting business growth.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study reveals that transformational leadership, the utilization of ICT, and digital literacy significantly influence the performance of MSMEs in the culinary, creative, and tourism sectors in Yogyakarta. Transformational leadership, which includes idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration, has been proven to enhance productivity, product quality, profitability, and revenue growth for MSMEs. Furthermore, the utilization of ICT, measured through perceived ease of use and perceived usefulness, also has a significant positive impact on MSME performance, especially when supported by high digital literacy. Digital literacy plays a crucial role as a mediating variable, strengthening the impact of transformational

leadership and ICT utilization on MSME performance. Digital literacy, encompassing photo-visual literacy, reproduction literacy, branching literacy, information literacy, and socio-emotional literacy, enables MSMEs to more effectively leverage technology and transformational leadership in improving their business performance. These findings support the growing body of research that emphasizes the critical role of leadership, ICT, and digital skills in driving MSME success. The results are consistent with previous studies that highlight how transformational leadership fosters a conducive work environment for innovation and how ICT adoption, when combined with digital literacy, leads to improved operational efficiency, product quality, and profitability, especially in dynamic and competitive sectors like culinary, creative, and tourism industries.

Recommendations

Based on the study results, it is recommended that MSME owners and managers in Yogyakarta prioritize the application of transformational leadership in their business management. They should motivate employees, encourage innovation, and provide personalized attention to maximize individual and team performance. Additionally, MSMEs are advised to continuously enhance their adoption and utilization of ICT in their operations, ensuring that employees possess adequate digital literacy levels. Continuous digital literacy training is also recommended to strengthen employees' abilities to operate technology, understand digital information, and communicate effectively in a digital environment.

It is important to acknowledge the various limitations of this study. First, the study was limited to MSMEs in Yogyakarta, which might have limited the results' applicability to other areas. Second, the use of an online survey method may not fully capture the complexity of the relationships between variables, particularly those involving the qualitative aspects of leadership and digital literacy. Third, the relatively small sample size may affect the analysis results and the validity of the findings. Future research should consider expanding the geographical scope of this study to other regions in Indonesia to enhance the generalizability of the findings. Additionally, in-depth qualitative research could be conducted to further explore how transformational leadership and digital literacy are applied in daily practice within MSMEs. Future studies

are also encouraged to use mixed methods to provide a more comprehensive understanding of the relationships between transformational leadership, ICT utilization, digital literacy, and MSME performance. Finally, studies with larger and more diverse samples will improve the validity of the research results and provide deeper insights into the dynamics within MSMEs.

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