Prediction of Innovation Capability: the Role of Mediation in the Relationship between Digital Transformation and Competitiveness with the PLS-SEM Model

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A R T I C L E I N F O	A B S T R A C T
  	The importance of happiness management This study explores the mediating role of innovation capabilities (IC) on the relationship of digital transformation (DT) and competitiveness (CP), by proposing model construction. Four research questions and four hypotheses were posed. The survey method was carried out by distributing research instruments to 98 respondents, the collected data was used to analyze the relationship between digital transformation, innovation ability and competitiveness, also used to test hypotheses. Evaluation of predictions through structural equation models with partial least squares-structural equation modeling (PLS-SEM). Research findings show that digital transformation directly has a significant positive effect on competitiveness. Digital transformation directly has a significant positive effect on competitiveness. Digital transformation has a significant positive effect on innovation capabilities. The innovation capability has a significant positive influence on competitiveness. Innovation capabilities are proven to have a mediating effect on the influence of digital transformation on competitiveness.

INTRODUCTION

In Indonesia, MSMEs support the national economy. The large contribution of MSMEs to Gross Domestic Product (GDP) in 2021 reached 61.07 percent or worth IDR 8,573.89 (Kemenkeu RI, 2022). Theresilience and revival of MSMEs affect the superiority of competitiveness and national economic performance after COVID-19 (Wahdiniwaty & Firmansyah, 2022). An extraordinary phenomenon, the COVID-19 pandemic has had a serious impact on health, economy, transportation, and other industrial crises including MSME players (Saepuloh & Firmansyah, 2022; Wahdiniwaty et al., 2022). On the other hand, the development of the digital economy is underway, business digitalization in the Industrial Revolution (IR) 4.0 era shows the deviation of past expectations from MSME players, this signal has been seen with the massive progress and use of the Internet of Things (IoT) has disrupted various aspects of human life, especially in the economic field (Firmansyah, Suryana, & Rifa'i, 2022), Even now it has begun to enter the era of society 5.0. The development of digital technology is very helpful for MSME players in an effort to expand their market share quickly without having to meet directly with customers (Firmansyah & Saepuloh, 2022). This condition is an opportunity for MSME actors to rise, move up, MSMEs that are advanced, independent, and competitive and contribute to the national economy, of course, must be able to transform from conventional business to digital (Firmansyah et al., 2021).

Digital transformation is a topical issue worldwide, so important for all business actors in all sectors, because it is able to transform customer relationships, internal processes, and value creation (Zaoui & Souissi, 2020). Adaptation and transformation are the keys to success for MSMEs to survive, rise and develop in the digital era, especially where the business and market environment is rapidly changing (Firmansyah & Saepuloh, 2022a). The ability to adapt to high concepts with company-specific demands is a key factor to support SMEs to take advantage of technological opportunities in connection with the digitization process (Fechtelpeter et al., 2017). However, digital transformation is more than just the use of technology, it must also consider changes in talent, culture, and organizational structure (Kane et al., 2017). The implication is that individuals and business actors need to prepare and improve digital skills and readiness that are potentially needed in this era (Firmansyah, Rifa'i, et al., 2022). , the skill needed for business processes has changed renewably along with technology is digital literacy. Digital literacy emerged alongside the evolution of the internet and demanded knowledge of how to access, search, and critically analyze information (Liu et al., 2020; Farias-Gaytan et al., 2022; Firmansyah, 2022a). Although it must be emphasized that digital transformation is not about a single technology, but a major change based on a combination of information technology, computing, communication, and connectivity (Bharadwaj et al., 2013; Cichosz et al., 2020).

The ability of MSME involvement in adopting digital technology can be seen from the level of readiness to use technology and how to digitize several processes in their business activities, seen from the level of digital awareness, the level of digital investigation capabilities, digital collaboration, and digital

transformation capabilities (Oluwakemi, 2019). The digital transformation process shows that MSME players have creativity and innovation capabilities in line with changes in the business environment. This innovation capability strengthens the link between digital transformation and competitiveness. Innovation can be one of the key success factors that can help differentiate products, beat the competition, and attract more customers (Darroch & Mazerolle, 2013).

MSME creativity includes creative aspects of personality, motivation, intelligence, thinking style, and relevant knowledge (Mcmullan & Kenworthy, 2016). The process of continuous innovation is very important for business development in the modern era, in terms of profit generation and competitiveness (Marković et al., 2020). Where the creation and exploitation of knowledge plays an important role in better positioning companies in the global market so as to strengthen business performance amid intense competition. Therefore, the exploitation and integration of digital technology often affects most companies at various scales and even beyond their limits, by affecting products, business processes, sales channels, and supply chains to be able to create sustainable competitive advantages (Firmansyah & Saepuloh, 2022). The digital transformation process explains the importance of multiliteracy to support the innovation process to strengthen competitiveness (Krumsvik, 2015).

This research explores digital transformation and literacy practices as well as the role of innovation mediation to predict competitiveness in micro and small enterprises in Sukabumi, West Java, Indonesia. Business potential in the region can be explored and developed along with the shift of traditional business practices, face-to-face relying on visitors who come to digital practices along with the emergence of various digital platforms as a place to market products (marketplaces) digitally or a combination of both. The existence of innovation capabilities is needed to encourage and ensure the success of business model transformation practices in a new face that is flexible and more adaptive in responding to changes in the business environment in the digital economy era in order to create new ones so that they can survive and continue to grow with better performance and competitiveness in a sustainable manner. The contribution of this research broadens the horizons on the effectiveness of highly competitive businesses in this era, where digital transformation capabilities, digital skills and innovation capabilities must be prepared.

LITERATURE REVIEW
Digital Transformation
Digital transformation practices are relevant to the demands of change, as well as being part of marketing strategies so that businesses can survive (Firmansyah, Wahdiniwaty, et al., 2023). Because, digital business transformation is an objective process that responds to changes in the business environment (Firmansyah & Saepuloh, 2022). Digital transformation is the use of digital technology (Negroponte, 1995; Morze & Strutynska, 2021), which fundamentally increases productivity and corporate value (Westerman et al.,

2014). Successful digital Transformation requires organizations and actors involved to have digital literacy readiness and develop various capabilities according to the business context and needs (Reis et al., 2018). Business digital transformation as a form of business model and process innovation to find and create new ones, relevant to the development of the renewable economy in the current digital economy era (Firmansyah, Mulyadi, et al., 2023),

Digital transformation is closely related to: the use and alignment of digital technologies within an enterprise, making organizational change, enabling activities, creating and capturing new opportunities and value (e.g., Jeansson & Bredmar, 2019; Firmansyah & Saepuloh, 2022a). In today's era of renewable economy, the focus of business actors and their personnel from actively competing industries around the world (Morze & Strutynska, 2021), exerts pressure to go digital before anyone else does, striving to survive and achieve competitive advantage (following, Bharadwaj, 2000; Reis et al., 2018); (Firmansyah et al., 2022). The practice of digital transformation as part of the ability to adapt to high concepts, can simultaneously create innovation capabilities to answer company-specific demands which is a key factor to support SMEs to take advantage of technological opportunities in connection with the digitization process (Fechtelpeter et al., 2017). In the digital era, business tourism has shifted from traditional to digital, including for SMEs, business transformation and digitalization are strategic and relevant practices but must be followed by adaptability and continuous innovation to get through it (Wahdiniwaty, Firmansyah, Suryana, et al., 2022).

Innovation Capabilities

Innovation is the elixir of life in the journey of one's life that is full of creativity and appropriate in taking advantage of opportunities to always grow and continue to develop. Innovation is a firm's ability to strategically sense and respond to opportunities and threats increasing competitive advantage (Liu et al., 2014). Innovation as the ability to change more in accordance with the demands of the environment that occurs (Herrera, 2015). Measurement of innovation can be seen from investment into technology, innovation processes, product development and marketing, development of new sources of supply, and discovery of new markets. relevant business innovation practices are needed in this era to improve competitiveness better (for example, Firmansyah & Saepuloh, 2022).

Innovation arises from creativity, where creativity includes creative aspects of personality, motivation, intelligence, thinking style, and relevant knowledge (Mcmullan & Kenworthy, 2016). The digital transformation process shows that MSME players have creativity and innovation capabilities in line with changes in the business environment. This innovation capability strengthens the relationship between digital transformation and competitiveness (Darroch & Mazerolle, 2013). Relevant business innovation practices are needed in this era to improve entrepreneurial performance with better competitiveness (Firmansyah, Wahdiniwaty, et al., 2023).

Competitiveness

Competitiveness is the ability for good performance (Garengo et al., 2005), for another implies the creation and sustainability of sources of competitive advantage (Ceptureanu, 2015). On the other hand, emphasizing the competitive strategy approach (Porter et al., 2008), competitiveness is also a relative concept, relating to how competitive a firm is when compared to other industries. Ajitabh & Momaya (2004), mentioned that focusing on key competitiveness resources at the company level and classifying literature related to competitiveness within the asset-process-performance (APP) framework (Ceptureanu, 2015). In the era of digital economy, digital transformation is a new approach for companies to gain competitive advantage in the context of fierce and dynamic market competition. Technology and environmental factors drive digital transformation which has a positive impact on the ability of organizations to create their competitiveness, digital literacy plays an important role in adopting technology and adapting the environment for successful digital transformation (Zhang et al., 2022).

Following Firmansyah et al., (2023), which mentions the ability to carry out business digital transformation as a form of business model innovation to find and create new ones with a commitment to market orientation, both business processes and products or services that meet expectations and even exceed customer orientation as the target market that is the most important stakeholder, as well as relevant business model and process practices in line with economic development renewable in the current digital economy era, so that it will directly or indirectly strengthen competitiveness and increase competitiveness in a sustainable manner. The digital transformation process explains the importance of digital literacy and multiliteracy to support the innovation process to strengthen competitiveness (Krumsvik, 2015). In the era of digital economy, digital transformation (DT) is a new approach for companies to gain competitive advantage in the context of fierce and dynamic market competition. Technological and environmental factors drive digital transformation which has a positive impact on the ability of organizations to create innovation capabilities for their competitiveness, multiliteracy plays an important role in adopting technology and adapting the environment for successful digital transformation (Zhang et al., 2022).
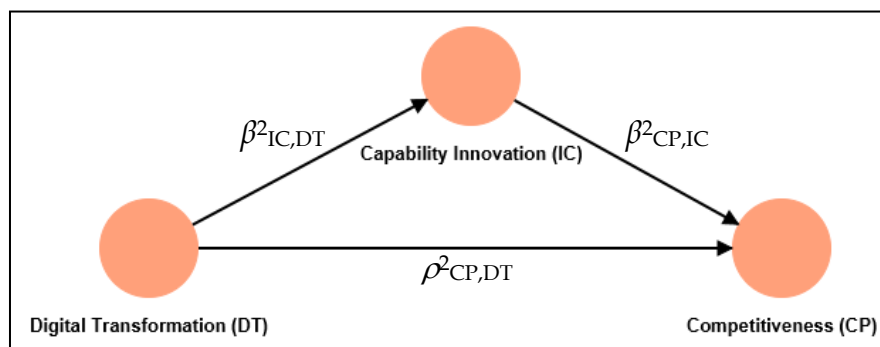

Figure 1. Conceptual framework model
Source: Developed Authors (2023)

Research hypothesis statement

H_1 : Digital transformation affects competitiveness

H_2 : Digital transformation affects innovation capabilities

H_3 : The ability to innovate affects competitiveness

H_4 : Innovation capabilities mediate the impact of digital transformation on competitiveness

METHODOLOGY

This research is a survey research with a quantitative approach. Survey research seeks to quantitatively describe the tendencies, attitudes, or opinions of a particular population by examining a sample of that population (Creswell, 2014). Quantitative research is an approach to test objective theories by examining relationships between variables (Creswell, 2014). A total of 98 respondents became the sample of this study, selected by purposive sampling techniques developed with convenience sampling techniques related to the ease of reach of respondents ' existence with consideration of existing respondents and can participate in the research (Taherdoost, 2016; Hibberts et al., 2012; Firmansyah, 2022), but understanding and habits of using digital technology are considered. Therefore, the nomination of respondents specifically based on criteria is selected to meet a specific goal. Data collection techniques, face-to-face questionnaire dissemination and Google Form dissemination through social media, but the combination of both showed better results, guaranteeing that the questionnaire criteria and answers were again accepted according to the number of items questioned related to the concept studied, but the research team remained independent.

Primary data sources are used by deploying research instruments as data collectors, Likert scales ranging from 1-5 are used. Digital transformation (DT) with six statements (DT1-DT6); innovation capability (IC) with eight statements (IC1-IC8); and Competitiveness (CP) with seven statements (CP1-CP7). The collected data were analyzed with Partial least squares-structural equation modelling 4 (PLS-SEM4) selected for use in analyzing model construction. Model measurements are based on convergent and discriminant validity, $C\alpha$ value > 0.70 (Hair et al., 2011), AVE > 0,50 (Henseler et al., 2016), full collinearity of VIF ≤ 3.3 (Kock, 2017), Fornell-Larcker criterion (Fornell & Larcker, 1981), and Heterotrait-Monotrait (HTMT) < 0.90 (Hair et al., 2021; Franke & Sarstedt, 2019) or far < 1 (Henseler et al., 2016). Evaluation of model fit, where R^2 ranges values of 0,75, 0,50 and 0.25; strong to low (Henseler et al., 2016; Hair et al., 2019: p.18), the strength of partial or full mediating effect f^2 values ranges from 0.02, 0.15, and 0.35 (Cohen, 1988; Hair et al., 2019: p.19), SRMR < 0.10 fit model achieved (Henseler et al., 2016), NFI criteria refer to Henseler et al., (2016); and Hair et al., (2017). Significance of direct and indirect effect = t stat > 1,96 pada α = 0.05. The magnitude of the structural mediating effect of the pathway, statistical upsilon $(v) = \beta^2_{YM.X} - (R^2_{Y.MX} - \rho^2_{YX})$ (Lachowicz et al., 2018; Ogbeibu et al., 2021), then in this study $v = \beta^2_{IC,DT}\beta^2_{CP,IC.DT}$. Effect

size criteria = 0.175 strong, 0.075 moderate, and 0.01 small mediated effect (Cohen, 1988; Ogbeibu et al., 2021), also comes with a VAF value.

RESEARCH RESULT

Measurement Model

Latent variable constructs are used to check the PLS-SEM measurement model. Convergent and discriminant validity are used to measure the construct of each indicator. Discriminant validity is done to ensure that each construct is similar to the item with other latent constructs. Improvement of the model for factor analysis is possible, if the loading factor of the latent variable is not at the minimum required value (< 0,60).
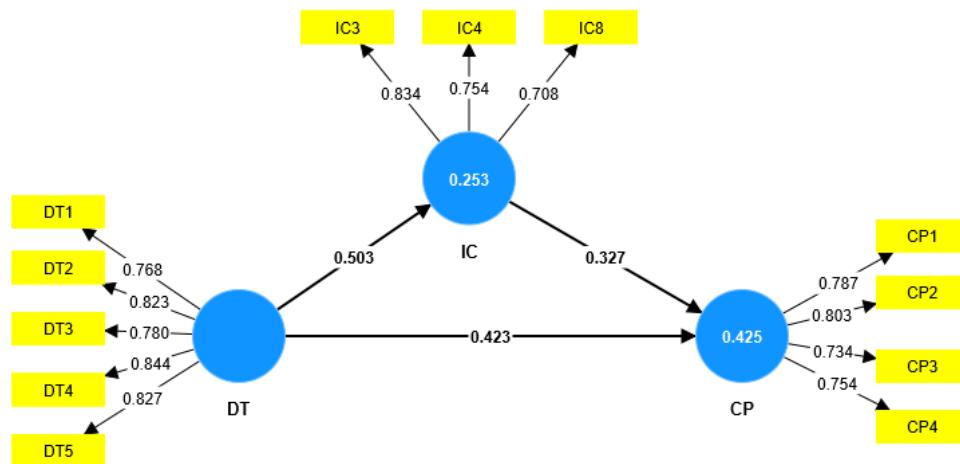

Figure 2. Structural model after factor improvement

Table 1. Model Measurement Results After Repair

Latent Variables	Question items (after factor improvement)	Factors Loading	Cα	CR	AVE	VIF IM List	VIF OM Matrix
Digital Transformation (DT)	DT1	0.768	0.868	0.904	0.654	1.744	
	DT2	0.823				2.046	
	DT3	0.780				1.839	1.339
	DT4	0.844				2.439	
	DT5	0.827				2.310	
Innovation Capability (IC)	IC3	0.733	0.647	0.810	0.588	1.445	
	IC4	0.703				1.345	1.339
	IC8	0.784				1.174	
Competitiveness (CP)	CP1	0.784	0.772	0.853	0.593	1.842	
	CP2	0.804				2.086	
	CP3	0.734				1.288	
	CP4	0.784				1.528	

Note: The significance value (***) of all indicators is at the level of 0,001 ($p < 0.001$)

The loading factor of the remaining twelve items was received, each having a value of Cα > 0,70 (between 0,708 and 0,844) after repairs and as many as nine items from the construct having a value of < 0,70 were discarded. In

figure 2 and table 3, showing that each construct of DT, IC and CP has a value of Cα and CR > 0,70, and the required reliability scale is stated to be met (Hair et al., 2011), konstruk memiliki konsistensi yang baik. the construct has good consistency. In addition, validity is also acceptable (see table 1) known AVE values for all constructs are greater than 0.5, constructs have reliability (Henseler et al., 2016), all three constructs have a match with the model.

The results of collinearity detection between constructions, known cutt-off is met for all constructions with a VIF value of < 3.3 for all constructs, there is no full collinearity in the model (Kock, 2017). The square root of the AVE and the correlation coefficients among the constructs were used to see the validity of the discriminant (table 2).

Table 2. Discriminant Validity Test Results (Fornell-Larcker)

Latent Variables	AVE	DT	IC	CP
DT	0.654	0.770		
IC	0.588	0.588	0.809	
CP	0.593	0.540	0.503	0.767

Note: In columns DT, IC to CP, the topmost value diagonally indicates the square root value of the AVE.

Referring to the Fornell-Larcker criterion (Hair et al., 2019), the square root value of AVE for discriminant validity with provisions must have a value greater than the correlation of its latent variables. The test results show that the value of the diagonal square root of AVE > the value of the correlation coefficient of other latent variables on the matrix, the evaluation of discriminant validity is fulfilled.

Tabel 3. Heterotrait-Monotrait (HTMT) Correlation Test Results

Latent Variables	DT	IC	CP
DT			
IC	0.676		
CP	0.701	0.749	

Note: Correlation DT, IC; DT, CP; and ICs with CP, each < 0.90.

Heterotrait-Monotrait (HTMT) is an estimate of factor correlation or rather, upper limit (Henseler et al., 2016). The robustness of the HTMT correlation ratio criterion between constructions should be < 0.90 or much less than 1. Test results (table 3) all values less than 0,90 (0,676; 0,701; 0,749 < 0,90; < 1,0) these evaluation results conclude good discriminant validity. In this study, model measurements on constructs were concluded to be reliable and valid.

Model Fit Evaluation

The analysis is carried out by model evaluation, the aim is to determine the predictive power of the proposed model seen from the value of the coefficient of determination (R^2) of endogenous latent construction. IC has an R^2

value of 0,253, and CP has an R^2 value of 0,425 (tends to be moderate) bermakna meaning that the model has moderate predictive power so that it can reflect all endogenous constructs (Henseler et al., 2016; Hair et al., 2019: p.18).

Table 4. Model Fit Verification and Evaluation

Path Relationship	R^2	Adj. R^2	f²	SRMR	NFI	d_ULS	d_G
DT--➤IC	0.253	0.413	0.339				
IC --➤CP	0.425	0.245	0.159				
DT--➤CP			0.232				
				0.095	0.735	0.702	0.253

Note: R^2; f², being on the threshold, SRMR; NFI, d_ULS; d_G, the criteria of the fit model.

In addition, f² is the ability to explain effects (Huang, 2021), in explaining dependent constructs in structural models (Hair et al., 2019). The magnitude of the effect size seen from the values of f² for H_1 = 0,232 (moderate), H_2 = 0,339 (strong), and H_3 = 0,159 (weak) are all at the thresholds of 0,02, 0,15, and 0,35, as suggested (Cohen, 1988; Hair et al., 2019). It can be concluded that exogenous variables have the ability to explain endogenous variables, with the criterion of explanatory effect values being in the medium category.

The Normed fit Index (NFI) value of 0,735 is lower than the required criteria to be > 0,90, the fit model (Hu & Bentler, 1998). In this study, the evaluation and criteria for using NFI for model fit refer to Hair et al., (2021). NFI NFI has a value range between 0 to 1, the greater the NFI value, the better (Huang, 2021), NFI of 0,735 model fit is achieved. Also obtained Standardized Root Mean Square Residual (SRMR) value of 0,095 smaller than 0.10 (SRMR = 0,095 < 0,10), model fit can still be achieved (Hu & Bentler, 1998; Henseler et al., 2016). Meanwhile, d_ULS and d_G have values lower than the upper limits of 95% and 99% (Narzary, 2022; Alabdali & Salam, 2022), this ensures that the model fits.

Structural Equation Modeling Analysis

The bootstrapping procedure is performed to measure the indirect effects of the mediation role, as recommended by Hair et al., (2011). Meanwhile, the PLS-SEM path analysis model for parameter estimation of direct effects is presented below:

Table 5: Parameter Estimates of Direct Effect, Path Analysis Verification

Hypothesis	Path Relationship	OS	Path Coefficient	T-Statistics	p-value	Results
H1	DT--➤CP	0.588	0.423	8.936***	0.000	Accepted
H2	DT--➤IC	0.503	0.503	5.283***	0.000	Accepted
H3	IC --➤CP	0.327	0.327	3.382**	0.001	Accepted

Note: OS, original sample; path coefficient (β), parameter of direct effect; ** significant at $p < 0.01$; *** significant at $p < 0.001$ (verification in figure 2 and figure 3).

The verification results of direct path analysis show that all original sample values have positive values, meaning that DT and CP, DT and IC, and IC and CP have a unidirectional relationship. The findings also showed that DT with CP had a positive correlation (β = 0,423), significantly at p-value = 0,000 (t stat > 1,96), proving H_1 acceptable. A positive correlation between DT and IC was also found with β = 0,503 and significant at p-value = 0,000 (t stat > 1,96), H_2 was provenly accepted. IC path analysis with CP had a positive correlation with β = 0,327 and significant at p-value = 0,001 (t stat = 3,382 > 1,96), H_3 proved acceptable. The results of verification and parameter estimation of the direct influence conclude all accepted hypotheses.
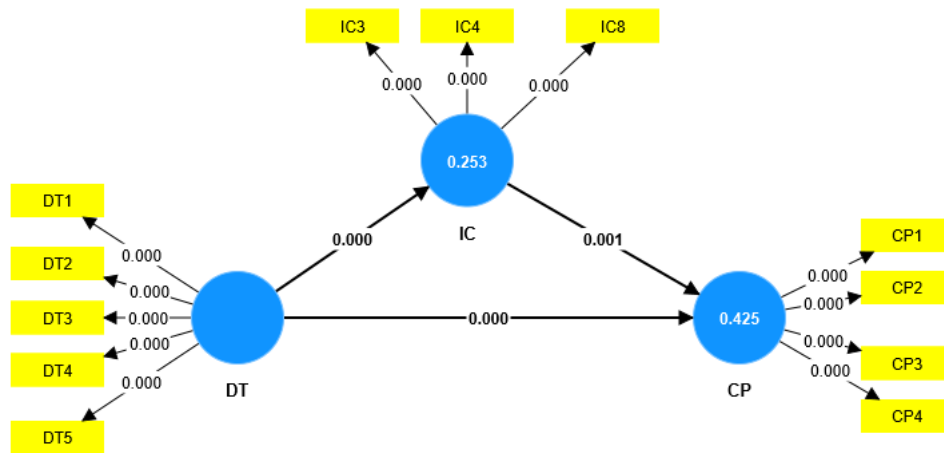

Figure 3. Structural model of bootsrapping procedure

Mediation Role Analysis

Detection of influence from the role of intermediaries can be seen from the t value of indirect influence (Huang, 2021). A comparison of the value of 1,96 with the statistical t was carried out, the stat value > 1,96 showed there was a mediation effect. To determine the magnitude (partial or full) of the mediating effect on some relevant literature, variance of VAF values with VAF value criteria VAF >20% or VAF value >80%, as prescribed by (Hair et al., 2012; Huang, 2021). In this study, structurally, the strength of the effect size of the mediation role was obtained from the upsilon statistic $(\nu) = \beta^2_{YM.X} - (R^2_{Y.MX} - \rho^2_{YX})$ as nested and developed by Lachowicz et al., (2018); and Ogbeibu et al., (2021), then $\nu = \beta^2_{IC,DT}\beta^2_{CP,IC \cdot DT}$.

Table 6: Estimates of Indirect Effect, Verification of Mediation Path Analysis

Hypothesis	Path Relationship	IDE	TE	T Statistics	p-value	VAF	Results
H4	DT --➤ IC --➤ CP	0.027	0.530	2.303*	0.021	0.0601	Accepted

Note: IDE, indirect effect; TE, total effect; * signifikan at $p < 0.05$; ** significant at $p < 0.01$.

The role of innovation capability (IC) in mediating the relationship between digital transformation (DT) and competitiveness (CP), indirect

influence (IDE) seen from the VAF value of 0,0601 (< 20%), the range shows a low mediation effect (Hair et al., 2012; Huang, 2021). Meanwhile, when viewed from the effect of the IDE size obtained at 0,027, the effect of small size towards moderate. It can be concluded that H_4 is proven to be acceptable, innovation ability (IC) has a mediating effect on the effect of digital transformation (DT) on competitiveness (CP), and is significant at p value = 0,021 (t stat = 2,202 > 1,96).

DISCUSSION

Digital transformation (DT) has a correlation with innovation capability (IC) and competitiveness (CP), as well as IC with CP. Where the direction of the relationship between the three is confirmed to be positive. The courage and ability to carry out digital transformation among SMEs can be followed by their innovation and competitiveness capabilities. The practice of digital transformation supported by the ability to innovate is one of the relatively new important approaches that needs to be done incrementally on the basis of the flow of change from time to time so that businesses remain competitive in a tight and dynamic market competition.

Research findings show that digital transformation directly has a significant positive effect on competitiveness (H_1). This finding is in line with the results of Firmansyah & Saepuloh (2022) research, the exploitation and integration of digital technology often affects most companies at various scales and even beyond their limits, by affecting products, business processes, sales channels, and supply chains to be able to create sustainable competitive advantages. The use and alignment of digital technology in an enterprise, making organizational change, enabling activities, creating and capturing new opportunities and value (Jeansson & Bredmar, 2019; Firmansyah & Saepuloh, 2022a). In today's renewable economy era, the focus of businesses and their personnel from actively competing industries around the world exerts pressure to go digital before anyone else does, striving to survive and achieve a competitive advantage (Morze & Strutynska, 2021; Bharadwaj, 2000; Reis et al., 2018).

The findings also show that digital transformation has a significant positive effect on competitiveness (H_2). There is a greater influence of the influence of digital transformation on the ability to innovate than the direct influence of digital transformation on competitiveness. The practice of digital transformation as part of the ability to adapt to high concepts can simultaneously create innovation capabilities to answer company-specific demands which is a key factor to support SMEs to take advantage of technological opportunities related to the digitization process. These findings are in line with (Fechtelpeter et al., 2017; Firmansyah & Saepuloh, 2022a; Zaoui & Souissi, 2020; Wahdiniwaty et al., 2022).

Predictions of innovation capability were found to have a significant positive effect on competitiveness (H_3). The ability to innovate is able to strengthen business competitiveness. Innovation arises because of creativity that includes creative aspects of personality, motivation, intelligence, thinking style, and relevant multiliteracy. Creativity and continuous innovation ability

as the key to success for business in the modern era. This finding is in line with the research of Mcmullan & Kenworthy (2016); and Darroch & Mazerolle (2013), this confirms thatrelevant business innovation practices are needed in this era to improve entrepreneurial performance with better competitiveness (Firmansyah, Wahdiniwaty, et al., 2023).

As for the mediation path, the findings prove that innovation ability has a mediating effect on the influence of digital transformation on competitiveness (H_4). This finding is reinforced by the results of research Darroch & Mazerolle, (2013); Firmansyah, Mulyadi, et al., (2023); Zhang et al., (2022); Firmansyah & Saepuloh (2022a); and Krumsvik (2015). This innovation capability strengthens the link between digital transformation and competitiveness. Toidentify and recognize opportunities for digital market expansion, it is necessary to have the courage of digital adoption in business processes. This condition increasingly intervenes in the ability of SMEs to carry out business digital transformation as a form of business model and process innovation to find and create new ones, relevant to the development of the renewable economy in the current digital economy era, so that it will directly or indirectly strengthen the competitiveness of micro and small businesses in a sustainable manner. Technological and environmental factors drive digital transformation that has a positive impact on the ability of organizations to create innovation capabilities for their competitiveness, multiliteracy plays an important role in adopting technology and adapting the environment for successful digital transformation (Zhang et al., 2022). The digital transformation process explains the importance of digital literacy and multiliteracy to support the innovation process to strengthen competitiveness.

CONCLUSIONS AND RECOMMENDATIONS

The results of the model measurement showed that reliability with good consistency, and the correlation coefficient between constructs for validity were met, judging from criteria $C\alpha$, HTMT and AVEalso found no indication of collinearity (VIF) for all constructs. The results of the evaluation of model suitability, it is known that the value of R^2 for the construct of each latent variable is in the medium category, as well as for the size of the effect f^2 all values are at the threshold, the criteria for the explanatory effect value are in the medium category. In addition, evaluation results based on SRMR, NFI, d_ULS and d_G show model fit is achieved and ensure model fit. From the results of path analysis. Findings from the results of structural model path analysis, show that: first digital transformation directly has a significant positive effect on competitiveness (H_1 is proven to be acceptable). Second,digital transformation has a significant positive effect on innovation capabilities (H_2 has proven acceptance). Third, the ability of innovation has a significant positive influence on competitiveness (H_3 is proven to be acceptable). Fourth, innovation capabilities have a mediating effect on the effect of digital transformation on competitiveness (H_4 proved acceptable).

The contribution of this research, empirically proven that digital transformation and innovation capabilities affect competitiveness in the scope

of small and medium enterprises in the creative industry based on hand made (crafts, souvenirs, pashion, snacks and the like) even though they are located in the area, coastal or even jaun from urban areas. This potential can be explored and developed along with the shift in traditional business practices, face-to-face relying on visitors who come to digital practices along with the emergence of various digital platforms as a place to market products (marketplace) digitally or a combination of both. Apart from the vision, mission to achieve business goals through various strategies selected to be implemented at the SME level, business digital transformation practices supported by the ability to innovate and adapt become strategic and releva approaches in this era to survive and develop with better business competitiveness. It is also expected to broaden horizons on the effectiveness of highly competitive businesses in this era, where digital transformation capabilities, digital skills and innovation capabilities must be prepared.

ADVANCED RESEARCH

This research is inseparable from the rigor of the methodology applied, this study has several limitations that need to be considered when interpreting the findings and conducting future research. Obstacles and success factors of digital transformation among small and medium enterprises (SMEs) in an effort to increase competitiveness are not only digital transformation and innovation capabilities that affect it, relevant multiliteracy that is potentially needed by individuals and business actors in the digital economy era, such as skills, readiness, digital competencies and skills (digital literacy), social capital, digital talent, talent management, Digital-based business training needs to be considered to strengthen business competitiveness and ensure the accuracy of sustainable business success predictions. In addition, from a methodological aspect using a combination of other research methods, it is possible to identify and examine the size and maturity of digital.

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REFERENCES

Ajitabh, A., & Momaya, K. (2004). Competitiveness of firms: review of theory, frameworks and models. *Singapore Management Review*, *26*(1), 45–61.

Alabdali, M. A., & Salam, M. A. (2022). The impact of digital transformation on supply chain procurement for creating competitive advantage: An empirical study. *Sustainability*, *14*(19), 12269. https://doi.org/10.3390/su141912269

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. v. (2013).

Digital business strategy: toward a next generation of insights. *MIS Quarterly*, 471–482.

Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: an empirical investigation. *MIS Quarterly*, 169–196.

Ceptureanu, S. I. (2015). Competitiveness of SMES. *Business Excellence and Management*, *5*(2), 55–67.

Cichosz, M., Wallenburg, C. M., & Knemeyer, A. M. (2020). Digital transformation at logistics service providers: barriers, success factors and leading practices. *The International Journal of Logistics Management*, *31*(2), 209–238. https://doi.org/10.1108/IJLM-08-2019-0229

Cohen, J. (1988). Statistical power analysis for the behavioural sciences, 2nd edn New York. *NY: Lawrence Erlbaum Associates.[Google Scholar]*.

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approach* (Fourth Edi). SAGE Publication Inc.

Darroch, S., & Mazerolle, L. (2013). Intelligence-led policing: A comparative analysis of organizational factors influencing innovation uptake. *Police Quarterly*, *16*(1), 3–37. https://doi.org/https://doi.org/10.1177/10986111124674

Farias-Gaytan, S., Aguaded, I., & Ramirez-Montoya, M.-S. (2022). Transformation and digital literacy: Systematic literature mapping. *Education and Information Technologies*, *27*(2), 1417–1437. https://doi.org/10.1007/s10639-021-10624-x

Fechtelpeter, C., Kuehn, A., Dumitrescu, R., & Ebbesmeyer, P. (2017). Integrated technology transfer concept for fostering innovation in SMEs. *26th Int. Assoc. Manag. Technol. Conf. IAMOT*, 1028–1048.

Firmansyah, D. (2022a). Kinerja Kewirausahaan: Literasi Ekonomi, Literasi Digital dan Peran Mediasi Inovasi. *Formosa Journal of Applied Sciences*, *1*(5), 745–762. https://doi.org/10.55927/fjas.v1i5.1288

Firmansyah, D. (2022b). Teknik Pengambilan Sampel Umum dalam Metodologi Penelitian: Literature Review. *Jurnal Ilmiah Pendidikan Holistik (JIPH)*, *1*(2), 85–114. https://doi.org/10.55927/jiph.v1i2.937

Firmansyah, D., Mulyadi, H., & Susetyo, D. P. (2023). Penentuan Harga Jual: Harga Pokok Produksi dan Ekspektasi Laba. *JKBM (JURNAL KONSEP BISNIS DAN MANAJEMEN)*, *9*(2), 202–215. https://doi.org/10.31289/jkbm.v9i2.8808

Firmansyah, D., Rifa'i, A. A., & Suryana, A. (2022). Human Resources: Skills and Entrepreneurship in Industry 4.0. *Formosa Journal of Applied Sciences*, *1*(6), 1221–1240. https://doi.org/10.55927/fjas.v1i6.1899

Firmansyah, D., Rifa'i, A. A., Suryana, A., & Suwarna, A. I. (2021). Self Identity Management UMKM Dalam Cyberspace: Perspectif Pasca Transformasi

Digital UMKM Di Kawasan Destinasi Wisata Geopark Cileutuh. *J-ABDI: Jurnal Pengabdian Kepada Masyarakat*, *1*(6), 1075–1084.

Firmansyah, D., & Saepuloh, D. (2022). Daya Saing: Literasi Digital dan Transformasi Digital. *Journal of Finance and Business Digital*, *1*(3), 237–250. https://doi.org/10.55927/jfbd.v1i3.1348

Firmansyah, D., Suryana, A., & Rifa'i, A. A. (2022). PMD (Pelatihan Media Digital) Sektor Usaha Mikro dan Kecil Handycraft Bambu Di KAA Sukabumi Guna Meningkatkan Pemasaran Online Berbasis Marketplace Di Era Ekonomi Digital. *J-ABDI: Jurnal Pengabdian Kepada Masyarakat*, *1*(10), 2805–2816.

Firmansyah, D., Suryana, A., Rifa'i, A. A., Suherman, A., & Susetyo, D. P. (2022). Hexa Helix: Kolaborasi Quadruple Helix Dan Quintuple Helix Innovation Sebagai Solusi Untuk Pemulihan Ekonomi Pasca Covid-19. *EKUITAS (Jurnal Ekonomi Dan Keuangan)*, *6*(4), 476–499. https://doi.org/10.24034/j25485024.y2022.v6.i4.4602

Firmansyah, D., Wahdiniwaty, R., & Budiarti, I. (2023). Entrepreneurial Performance Model: A Business Perspective in the Digital Economy Era. *Jurnal Bisnis, Manajemen, Dan Ekonomi*, *4*(2), 125–150. https://doi.org/10.47747/jbme.v4i2.110

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50. https://doi.org/10.1177/002224378101800104

Franke, G., & Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: a comparison of four procedures. *Internet Research*, *29*(3), 430–447. https://doi.org/10.1108/IntR-12-2017-0515

Garengo, P., Biazzo, S., & Bititci, U. S. (2005). Performance measurement systems in SMEs: A review for a research agenda. *International Journal of Management Reviews*, *7*(1), 25–47. https://doi.org/10.1111/j.1468-2370.2005.00105.x

Hair, J.F, Hult, G. T. ., Ringle, C. ., & Sarstedt, M. (2017). A Primer on Partial Least Squares Structural Equation Modeling, PLS-SEM. *Sage. Thousand Oaks, CA.*

Hair, Joe F, Ringle, C. M., & Sarstedt, M. (2011). PLSSEM: Indeed a Silver Bullet Journal of Marketing Theory and Practice, 19 (2) pages 139-152, doi: 10.2753. *MTP1069-6679190202.* https://doi.org/10.2753/ MTP1069-6679190202. Hair, J. F., Ringle, C. M., & Sar

Hair, Joseph F, Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Hair, Joseph F, Sarstedt, M., Pieper, T. M., & Ringle, C. M. (2012). The use of partial least squares structural equation modeling in strategic management

research: a review of past practices and recommendations for future applications. *Long Range Planning*, *45*(5–6), 320–340. https://doi.org/10.1016/j.lrp.2012.09.008

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: updated guidelines. *Industrial Management & Data Systems*, *116*(1), 2–20. https://doi.org/10.1108/IMDS-09-2015-0382

Herrera, M. E. B. (2015). Creating competitive advantage by institutionalizing corporate social innovation. *Journal of Business Research*, *68*(7), 1468–1474. https://doi.org/10.1016/j.jbusres.2015.01.036

Hibberts, M., Burke Johnson, R., & Hudson, K. (2012). *Common Survey Sampling Techniques BT - Handbook of Survey Methodology for the Social Sciences* (L. Gideon (ed.); pp. 53–74). Springer New York. https://doi.org/10.1007/978-1-4614-3876-2_5

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, *3*(4), 424.

Huang, C.-H. (2021). Using PLS-SEM model to explore the influencing factors of learning satisfaction in blended learning. *Education Sciences*, *11*(5), 249. https://doi.org/10.3390/educsci11050249

Jeansson, J., & Bredmar, K. (2019). Digital transformation of SMEs: Capturing complexity. *32nd Bled EConference: Humanizing Technology for a Sustainable Society, Bled, Slovenia, June 16-19, 2019*, 523–541.

Kane, G. C., Palmer, D., & Phillips, A. N. (2017). *Achieving digital maturity*. MIT Sloan Management Review.

Kemenkeu RI. (2022). *PIP Dukung Penguatan Kontribusi UMKM terhadap Ekonomi Indonesia*. Kementerian Keuangan Republik Indonesia, Ditjen Pembendaharaan BLU Pusat Investasi Pemerintah.

Kock, N. (2017). WarpPLS user manual: Version 6.0. *ScriptWarp Systems: Laredo, TX, USA*, *141*, 47–60.

Krumsvik, A. H. (2015). Newspaper Ownership And The Prioritization Of Digital Competences. *Digital Journalism*, *3*(5), 777–790. https://doi.org/10.1080/21670811.2014.941234

Lachowicz, M. J., Preacher, K. J., & Kelley, K. (2018). A novel measure of effect size for mediation analysis. *Psychological Methods*, *23*(2), 244. https://doi.org/10.1037/met0000165

Liu, C., Constantinides, P. P., & Li, Y. (2014). Research and development in drug innovation: reflections from the 2013 bioeconomy conference in China, lessons learned and future perspectives. *Acta Pharmaceutica Sinica B*, *4*(2),

112–119. https://doi.org/10.1016/j.apsb.2014.01.002

Liu, Z.-J., Tretyakova, N., Fedorov, V., & Kharakhordina, M. (2020). Digital literacy and digital didactics as the basis for new learning models development. *International Journal of Emerging Technologies in Learning (IJET)*, *15*(14), 4–18. https://doi.org/10.3991/ijet.v15i14.14669

Marković, D., Janaćković, G., Simeunović, N., & Lalić, B. (2020). Identifying and ranking novel indicators of MSMEs innovation potential. *Technology Analysis & Strategic Management*, *32*(5), 529–541. https://doi.org/10.1080/09537325.2019.1675871

Mcmullan, R. W. E., & Kenworthy, T. P. (2016). *Creativity and entrepreneurial performance* (1st ed.). Springer. https://doi.org/10.1007/978-3-319-04726-3

Morze, N. V, & Strutynska, O. V. (2021). Digital transformation in society: key aspects for model development. *Journal of Physics: Conference Series*, *1946*(1), 12021. https://doi.org/10.1088/1742-6596/1946/1/012021

Narzary, S. (2022). *Anthony Larsson and Robin Teigland (Eds.), The Digital Transformation of Labor: Automation, The Gig Economy, and Welfare*. SAGE Publications Sage India: New Delhi, India. https://doi.org/10.1177/26314541211064724

Negroponte, N. (1995). Being Digital ', Vintage Books. New York. *165*.

Ogbeibu, S., Jabbour, C. J. C., Gaskin, J., Senadjki, A., & Hughes, M. (2021). Leveraging STARA competencies and green creativity to boost green organisational innovative evidence: A praxis for sustainable development. *Business Strategy and the Environment*, *30*(5), 2421–2440. https://doi.org/10.1002/bse.2754

Oluwakemi, O. T. (2019). Digital literacy and entrepreneurial returns among small business owners in Lagos State, Nigeria. *Education & Science Journal of Policy Review and Curriculum Development*, *9*(2), 1–11.

Porter, M. E., Ketels, C., & Delgado, M. (2008). The microeconomic foundations of prosperity: findings from the business competitiveness index. *The Global Competitiveness Report*, *2008*, 51–81.

Reis, J., Amorim, M., Melão, N., & Matos, P. (2018). *Digital Transformation: A Literature Review and Guidelines for Future Research BT - Trends and Advances in Information Systems and Technologies* (Á. Rocha, H. Adeli, L. P. Reis, & S. Costanzo (eds.); pp. 411–421). Springer International Publishing.

Saepuloh, D., Firmansyah, D., Susetyo, D. P., & Suryana, A. (2022). Quadruple Helix Collaboration Concept As An Economic Recovery Solution After COVID-19. *Economica*, *10*(2), 1–14. https://doi.org/10.22202/economica.2022.v10.i2.4636

Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. *How to Choose a Sampling Technique for Research (April 10, 2016)*.

Wahdiniwaty, R., Firmansyah, D., Dede, Suryana, A., & Rifa'i, A. A. (2022). The Concept of Quadruple Helix Collaboration and Quintuple Helix Innovation as Solutions for Post Covid 19 Economic Recovery. *MIX JURNAL ILMIAH MANAJEMEN*, *12*(3), 418–442. https://doi.org/10.22441/jurnal_mix.2022.v12i3.005

Wahdiniwaty, R., Firmansyah, D., Suryana, A., Dede, D., & Rifa'i, A. A. (2022). Mystery in Marketing Management Products Post COVID-19 as a Model of Survival Strategy Towards the Awakening of Micro Small and Medium Enterprises (MSMEs) in the Digital Economy Era. *Khazanah Sosial*, *4*(1), 187–210. https://doi.org/10.15575/ks.v4i1.17397

Westerman, G., Bonnet, D., & McAfee, A. (2014). The nine elements of digital transformation. *MIT Sloan Management Review*, *55*(3), 1–6.

Zaoui, F., & Souissi, N. (2020). Roadmap for digital transformation: A literature review. *Procedia Computer Science*, *175*, 621–628. https://doi.org/10.1016/j.procs.2020.07.090

Zhang, X., Xu, Y., & Ma, L. (2022). Research on successful factors and influencing mechanism of the digital transformation in SMEs. *Sustainability*, *14*(5), 2549. https://doi.org/10.3390/su14052549