

The Influence of Digital Literacy and Technology Readiness on Innovation Capability of MSMEs in Garut

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Abstract– The Indonesian economy relies heavily on contributions from Micro, Small, and Medium Enterprises, yet a substantial number of small businesses operating in Kabupaten Garut remain underutilized in adopting digital technology to stimulate innovative practices. The present work investigates how digital literacy together with technology readiness shape the innovation capability of small businesses in Garut. Adopting a quantitative explanatory design, primary information was gathered via a structured survey administered to 121 owners chosen through purposive selection. Hypothesis testing was conducted with Partial Least Squares Structural Equation Modeling through the SmartPLS 4 software. Empirical evidence shows that both predictors significantly affect innovation capability in a positive direction, although the impact of technology readiness emerged as more pronounced. Approximately 36.7 percent of the variance in innovation capability is captured by the model, accompanied by robust predictive ability. This research enriches scholarly discussions on digital transformation and provides practical guidance for strengthening the foundation of MSME innovation in regional contexts.

Keywords - Digital Literacy, Innovation Capability, MSMEs, SEM-PLS, Technology Readiness

I. INTRODUCTION

Within Indonesia's economic structure, small business actors occupy a foundational position. Official statistics consistently show that the small business sector accounts for more than sixty percent of national output and absorbs a sizable share of the workforce, making the sector a critical pillar for inclusive economic growth [1], [2]. This sectoral importance has grown sharper in the digital era, where global competitive pressures hinge on how skillfully firms weave digital tools into their everyday operational routines.

Garut Regency is a region with substantial MSME potential in West Java. Records from the Cooperatives and SMEs Office of Garut indicate that the number of MSMEs in the regency exceeded one hundred fifty thousand units, positioning Garut as one of the largest contributors of MSME population in West Java [3]. Such potential, however, has yet to be translated evenly into actual digital adoption. Field observations indicate that a meaningful share of small business actors in Garut still rely on conventional routines and engage only sparingly with online marketing, electronic payment, or evidence based managerial decisions.

Several preliminary studies argue that digital literacy is one of the determinants of MSME competitiveness in the post pandemic era. The construct of digital literacy encompasses a combined

repertoire of knowledge, capabilities, and dispositions necessary for using digital tools in an effective, secure, and ethically responsible manner across diverse operational settings [4], [5]. Beyond literacy, technology readiness also plays a central role because it captures the psychological propensity of individuals to embrace new technologies. This disposition is shaped by motivating elements such as optimism along with a leaning toward innovation, while at the same time being restrained by inhibiting elements such as discomfort and feelings of insecurity [6], [7].

Innovation capability is widely viewed as the bridge that connects internal organizational resources to superior business performance. The capability to innovate enables MSMEs to differentiate products, refine processes, expand market reach, and respond to changes in customer preferences [8], [9]. Nevertheless, empirical evidence regarding how digital literacy and technology readiness jointly shape innovation capability among MSMEs in regional contexts such as Garut remains limited, particularly in studies that combine both variables within a single quantitative model.

Based on this background, the present research aims to: (1) analyze the influence of digital literacy on the innovation capability of MSMEs in Garut, (2) analyze the influence of technology readiness on the innovation capability of MSMEs in Garut, and (3) examine the simultaneous influence of digital literacy



and technology readiness on innovation capability. The findings are expected to contribute theoretically to the literature on digital transformation of MSMEs and practically to local government policy, business associations, and MSME actors in designing programs that strengthen the foundation of digital readiness prior to the adoption of more advanced technologies such as data analytics and artificial intelligence.

II. LITERATURE REVIEW

Two complementary theoretical lenses underpin this research, namely the Resource-Based View (RBV) and the Dynamic Capabilities perspective. The RBV argues that firm level superiority arises from internal resources that meet the criteria of value, rarity, inimitability, and non substitutability, while the dynamic capabilities perspective extends this view by emphasizing an organization's ability to combine, develop, and reshape its internal competencies amid environmental turbulence [2]. Within this framework, digital literacy and technology readiness are conceptualized as intangible resources that support the formation of innovation capability.

Digital literacy can be understood as a coherent bundle of competencies allowing individuals to retrieve, appraise, produce, and disseminate information through digital media in ways that are both effective and ethical [5]. In the MSME context, digital literacy includes the ability to utilize productivity applications, social media platforms for marketing, electronic payment systems, and online business management tools. Recent studies indicate that digital literacy contributes significantly to business transformation by expanding the cognitive frame of MSME owners, accelerating learning processes, and improving the quality of strategic decisions [1], [5]. Digital literacy and digital capability are often portrayed as two complementary forces that drive MSME performance in Indonesia [1].

Technology readiness is a psychological construct originally proposed in [6] and later refined into the TRI 2.0 instrument [7]. The construct comprises four dimensions, namely optimism and innovativeness as motivators, and discomfort and insecurity as inhibitors. A subsequent meta analysis [6] reconfirmed that technology readiness functions as a robust antecedent of technology usage across

various contexts, including consumer behavior, employee behavior, and small business adoption. For MSME owners, a high level of technology readiness reflects an open mindset toward new tools and a lower resistance to the disruption that accompanies digital change.

Innovation capability denotes the organizational capacity to repeatedly turn knowledge and ideation into novel offerings, workflows, marketing tactics, and managerial routines that produce value [8]. Following the Oslo Manual taxonomy, four principal innovation categories are recognized, covering product, process, marketing, and organizational dimensions [9]. In the MSME context, innovation capability is critical because the limited scale of operations forces firms to rely on agility, creativity, and rapid experimentation rather than large research and development budgets. Antecedents of innovation capability in SMEs commonly include human capital, learning orientation, and access to external knowledge channels [9].

The effect of digital literacy on innovation capability. Digital literacy equips MSME owners with the cognitive tools to identify market opportunities, scan competitor moves, and evaluate consumer feedback in real time. Owners who are digitally literate are more likely to recombine information from multiple sources, experiment with new digital channels, and adapt their offerings accordingly. Empirical evidence from Indonesian MSMEs supports the positive linkage between digital literacy and innovation outcomes [1], [4]. Based on this argument, the first hypothesis is formulated as follows.

H1 : Digital literacy has a positive and significant influence on the innovation capability of MSMEs in Garut.

The effect of technology readiness on innovation capability. MSME owners with high optimism and innovativeness perceive technology as a means to enhance productivity and to create new value, while owners burdened by discomfort and insecurity tend to delay adoption and resist change. The capability to innovate is therefore strongly influenced by the underlying readiness of the actor to engage with new technological possibilities [6], [7], [10]. In an emerging market context, several studies confirm that technology readiness is a meaningful antecedent of



digital adoption and subsequent innovation behavior [11], [12], [10]. Therefore, the second hypothesis is formulated as follows.

H2 : Technology readiness has a positive and significant influence on the innovation capability of MSMEs in Garut.

Simultaneous effect. When digital literacy and technology readiness operate together, MSME owners possess both the skill base and the mindset to convert digital opportunities into concrete innovation outputs. The interaction of competence and willingness is considered crucial in resource constrained environments such as regional MSMEs in Indonesia [13], [14]. Hence, the third hypothesis is proposed as follows.

H3 : Digital literacy and technology readiness simultaneously have a significant influence on the innovation capability of MSMEs in Garut.

III. RESEARCH METHODS

This research adopts a quantitative explanatory design to test the causal links among digital literacy, technology readiness, and innovation capability within small businesses in Kabupaten Garut. The unit of analysis is the individual MSME owner or principal manager. The target population covers all active MSMEs in Garut Regency, totaling approximately one hundred fifty thousand units [15]. Purposive sampling was applied with three inclusion criteria: (1) the business has operated for at least one year, (2) the owner has used at least one digital platform, and (3) the respondent is the principal decision maker. A final sample of 121 respondents was obtained, satisfying the ten times rule for PLS-SEM [16].

Primary data were collected through a structured questionnaire using a five point Likert scale. Digital literacy was operationalized through five dimensions of the DigComp framework, namely information and data literacy, communication and collaboration, content creation, safety, and problem solving [17]. Technology readiness was measured along four dimensions of the TRI 2.0 instrument, namely optimism, innovativeness, discomfort, and insecurity [18], with discomfort and insecurity items reverse coded prior to analysis. Innovation capability was captured through four Oslo Manual dimensions: product, process, marketing, and organizational innovation [9]. Data analysis was performed using SmartPLS 4 in two stages. The outer model was

evaluated through convergent validity (outer loadings and AVE), internal consistency (Cronbach alpha and composite reliability), and discriminant validity (Fornell-Larcker and HTMT) [13]. The inner model was assessed through R^2 , f^2 , $Q^2_{predict}$ via PLSpredict [18], and path significance through bootstrap resampling with 5000 iterations [18].

IV. RESULT AND DISCUSSION

Field data were collected from 121 individuals serving as owners or principal managers of small businesses scattered across various parts of Garut Regency. The respondent demographic profile broadly mirrors the prevailing composition of the regional small business population. Table 1 presents the complete profile of respondents.

Table 1. Respondent Profile (n = 121)

Characteristic	Category	n	%
Gender	Female	67	55.4
	Male	54	44.6
Age	Below 25 years	15	12.4
	25 to 35 years	28	23.1
	36 to 45 years	29	24.0
	46 to 55 years	29	24.0
	Above 55 years	20	16.5
Education	SD/SMP	32	26.4
	SMA/SMK	53	43.8
	Diploma (D1/D2/D3)	13	10.7
	Bachelor (S1)	23	19.0
Business Sector	Culinary	41	33.9
	Handicraft	24	19.8
	Fashion/Garment	20	16.5
	Trading	14	11.6
	Agriculture/Livestock	11	9.1
	Services	9	7.4
Business Age	Others	2	1.7
	Below 4 years	46	38.0
	4 to 6 years	25	20.7
	7 to 10 years	25	20.7
Number of Employees	Above 10 years	25	20.7
	Up to 4 persons	86	71.1
	5 to 19 persons	24	19.8
	20 to 99 persons	8	6.6
Monthly Revenue	100 or more persons	3	2.5
	Below Rp 5 million	27	22.3
	Rp 5 to 25 million	58	47.9
	Rp 25 to 100 million	28	23.1
	Rp 100 to 500 million	7	5.8



Characteristic	Category	n	%
Gender	Above Rp 500 million	1	0.8
	Female	67	55.4
	Male	54	44.6

Source: Primary data processed (2026)

Women slightly outnumber men in the sample at 55.4 percent. Owners aged 36 to 55 years collectively make up 48.0 percent, while those completing senior high or vocational schooling reach 43.8 percent. Culinary, handicraft, and fashion segments together absorb around 70.2 percent of the respondents. These three sectors align with the well known economic identity of Garut Regency, which has historically been associated with food specialties, leather and textile crafts, and garment manufacturing. The data also confirm that the MSME population in Garut is dominated by micro scale enterprises, as 71.1 percent of respondents employ between one and four workers and 47.9 percent generate monthly revenue between Rp 5 million and Rp 25 million.

The measurement model was evaluated through convergent validity, internal consistency reliability, and discriminant validity. In the initial estimation, several indicators exhibited outer loadings below the recommended threshold of 0.70. Following the iterative purification procedure [16], fourteen items were sequentially removed because their outer loadings did not meet the required threshold and their removal contributed to an increase in the average variance extracted. The removed items were DL3, DL6, DL9, DL10, DL13, TR1, TR3, TR11, TR13, TR15, TR16, IC2, IC11, and IC12. The final measurement model retained 29 indicators across the three constructs, comprising 10 indicators for Digital Literacy, 10 indicators for Technology Readiness, and 9 indicators for Innovation Capability.

Table 2 reports the outer loadings, Cronbach alpha, composite reliability (rho_c), and AVE values of the final measurement model. All retained indicators show outer loadings above 0.78, well exceeding the 0.70 threshold. The internal consistency reliability of the three constructs is excellent with Cronbach alpha and composite reliability values exceeding 0.95. The AVE values of all constructs exceed 0.70, well above the 0.50 cutoff, confirming convergent validity

Table 2. Outer Loadings, Reliability, and Convergent Validity

Construct	Item	Outer Loading	Cronbach α	rho_c	CR (rho_c)	AVE					
Digital Literacy	DL1	0.833	0.953	0.956	0.959	0.703					
	DL2	0.848									
	DL4	0.850									
	DL5	0.793									
	DL7	0.855									
	DL8	0.814									
	DL11	0.818									
	DL12	0.860									
	DL14	0.863									
	DL15	0.848									
	Technology Readiness	TR2					0.785	0.953	0.955	0.959	0.701
		TR4					0.834				
		TR5					0.881				
		TR6					0.837				
TR7		0.841									
TR8		0.851									
TR9		0.824									
TR10		0.887									
TR12		0.827									
TR14		0.802									
Innovation Capability	IC1	0.821	0.953	0.955	0.960	0.725					
	IC3	0.881									
	IC4	0.821									
	IC5	0.881									
	IC6	0.863									
	IC7	0.840									
	IC8	0.880									
	IC9	0.857									
	IC10	0.818									

Source: SmartPLS 4 output processed (2026)

Discriminant validity was assessed through the HTMT criterion [13] and the Fornell-Larcker criterion. Table 3 presents both results. Every HTMT entry rests well beneath the conservative 0.85 cutoff, signalling that the three constructs operate as



empirically separable entities. The Fornell-Larcker view echoes the same conclusion because the square root of each construct's AVE outstrips the inter-construct correlations along the corresponding row and column.

Table 3. Discriminant Validity (HTMT and Fornell-Larcker)

Criterion	Construct	Digital Literacy	Innovation Capability	Technology Readiness
HTMT	Digital Literacy			
	Innovation Capability	0.475		
Fornell-Larcker	Digital Literacy	0.838		
	Innovation Capability	0.461	0.852	
	Technology Readiness	0.436	0.555	0.837

Source: SmartPLS 4 output processed (2026)

The structural model was evaluated through the coefficient of determination (R squared), effect size (f squared), and predictive relevance (Q squared predict) following the procedures recommended in [13] and [18], table 4 summarizes the results.

Table 4. Structural Model Evaluation

Metric	Value	Interpretation
R ² (Innovation Capability)	0.367	Moderate explanatory power
Q ² _predict (Innovation Capability)	0.333	Strong predictive relevance
f ² Digital Literacy → IC	0.094	Small effect
f ² Technology Readiness → IC	0.244	Medium effect

Source: SmartPLS 4 output processed (2026)

An R squared of 0.367 conveys that digital literacy and technology readiness, taken together, account for roughly 36.7 percent of the variance observed in innovation capability. This value falls in the moderate range and is appropriate for behavioral and organizational research in emerging markets [13]. The effect size analysis confirms that technology readiness produces a medium effect on innovation capability (f² = 0.244) while digital literacy contributes a small but meaningful effect (f² = 0.094). The predictive relevance test using PLSpredict yields a Q squared predict value of 0.333, which exceeds the 0.25 benchmark and indicates strong predictive power. Furthermore, the comparison between PLS-

SEM root mean squared error and the linear model benchmark reveals that all nine indicators of innovation capability have lower PLS-SEM RMSE values than the linear model alternatives, which establishes that the model possesses strong predictive validity [18].

Hypothesis Testing

Hypothesis testing was conducted through bootstrapping with 5000 subsamples in SmartPLS 4. Table 5 reports the path coefficients, t statistics, and p values for the three hypotheses. The results indicate that all three hypotheses are supported.

Table 5. Hypothesis Testing Results

Hypothesis	Path	β	t-Statistic	p-Value	Decision
H1	Digital Literacy → Innovation Capability	0.271	3.110	0.002	Supported
H2	Technology Readiness → Innovation Capability	0.437	5.683	0.000	Supported
H3	Innovation Capability (R ² = 0.367)	n/a	5.540	0.000	Supported

Source: SmartPLS 4 output processed (2026)

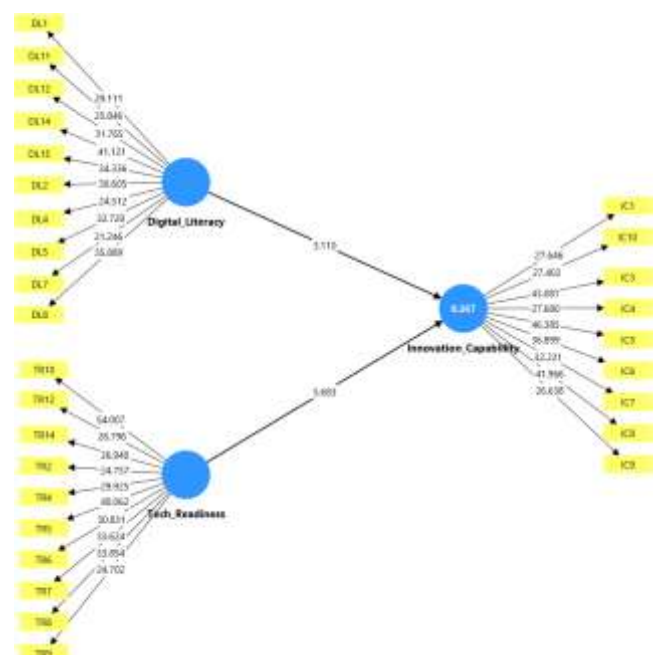


Figure 1 Structural Model with t-Statistics from Bootstrapping (5000 subsamples)*Source : Researchers (2026)***Discussion**

H1 proposed that digital literacy has a positive and significant influence on innovation capability. The path coefficient was 0.271 with a t statistic of 3.110 and a p value of 0.002, supporting H1. The result indicates that MSME owners with stronger digital literacy are more capable of identifying market opportunities, recombining information from multiple digital sources, and translating insights into innovative product, process, or marketing initiatives. This finding aligns with prior empirical evidence showing that digital literacy serves as a primary antecedent of innovation outcomes among Indonesian MSMEs [1], [5].

H2 proposed that technology readiness has a positive and significant influence on innovation capability. The path coefficient was 0.437 with a t statistic of 5.683 and a p value below 0.001, supporting H2 with stronger evidence than H1. MSME owners who are optimistic and innovative about technology and who experience less discomfort and insecurity tend to demonstrate higher levels of innovation capability. This finding is consistent with meta analytic evidence and empirical findings that position technology readiness as an important psychological driver of digital transformation outcomes in SMEs [10], [19].

H3 proposed that digital literacy and technology readiness simultaneously influence innovation capability. The simultaneous effect is reflected in the R squared of 0.367 with a t statistic of 5.540 and a p value below 0.001, supporting H3. The finding confirms that competence (digital literacy) and willingness (technology readiness) jointly explain a substantial portion of innovation capability variance among regional MSMEs.

Taken together, the empirical findings reveal that technology readiness exerts a stronger influence on innovation capability than digital literacy. This pattern carries an important interpretive implication. Even MSME owners who possess relevant digital skills may not translate them into innovation activities unless they hold a fundamentally open and optimistic stance toward technology. Conversely, owners with low optimism or high discomfort tend to underutilize their digital competencies, dampening their innovation output. The result therefore supports the proposition that psychological readiness operates as a critical activation condition for digital skills to

materialize into innovation outcomes. The R^2 of 0.367 also implies that approximately 63 percent of the variance in innovation capability is influenced by factors outside the model, which is expected because innovation outcomes are shaped by multifaceted antecedents that include entrepreneurial orientation, financial access, market dynamics, and external collaboration networks.

This study contributes to the digital transformation literature in three ways. First, the findings provide empirical support for the Resource-Based View and Dynamic Capabilities perspectives in the MSME context. Digital literacy and technology readiness, both intangible cognitive psychological resources, are confirmed as significant antecedents of innovation capability. The findings extend prior work [8], [17] by demonstrating that microfoundational variables remain relevant at the regional MSME level in emerging economies.

Second, the study reaffirms the role of technology readiness as a robust psychological antecedent of innovation behavior. The stronger effect of technology readiness compared with digital literacy supports the meta analytic conclusion that motivators such as optimism and innovativeness, together with inhibitors such as discomfort and insecurity, capture a critical psychological dimension that operates alongside actual digital skills [10].

Third, the study establishes an empirical groundwork for future research on advanced technology adoption among MSMEs. The confirmation that digital literacy and technology readiness drive innovation capability provides a stepping stone for subsequent investigations into the adoption of more sophisticated technologies, including data analytics and artificial intelligence, in resource constrained MSME settings. This positions the present research as a foundational input for future studies on the AI readiness of regional MSMEs.

For MSME owners in Garut, the findings emphasize the importance of cultivating both digital skills and a positive technological mindset. Skill acquisition alone is insufficient if not accompanied by genuine openness toward technology. MSME owners are therefore encouraged to engage in continuous learning programs that combine technical training with exposure to success stories of peers who have transformed their businesses through technology.

For local government agencies such as the Dinas Koperasi dan UKM Kabupaten Garut, the findings provide directional guidance for program design. Training initiatives should not be limited to teaching



specific digital tools, but should also address the psychological barriers that hinder technology adoption, including the fear of complexity, distrust of digital transactions, and the perception that technology is reserved for younger or more educated individuals. Awareness campaigns, mentorship programs, and peer learning communities can address these barriers more effectively than purely technical workshops.

For business associations and MSME communities, the findings highlight the value of collaborative learning environments. Communities that connect MSME owners with peers and experts can serve as informal channels for building both skills and positive attitudes toward technology. Such communities also create a supportive social context in which experimentation with innovation becomes more accessible and less risky for individual entrepreneurs.

V. CONCLUSION AND SUGGESTION

Based on data from 121 MSME respondents in Kabupaten Garut analyzed through SEM-PLS, this study concludes that digital literacy and technology readiness both exert a positive and significant influence on innovation capability, with technology readiness producing the stronger effect. The two antecedents jointly explain 36.7 percent of the variance in innovation capability and the model demonstrates strong predictive relevance with a $Q^2_{predict}$ value of 0.333. The contribution of this study lies in confirming the joint role of competence (digital literacy) and willingness (technology readiness) as drivers of regional MSME innovation, while offering an empirical foundation for subsequent research on the adoption of more advanced technologies such as artificial intelligence.

Three concrete suggestions are offered. First, MSME training programs in Garut should integrate technical digital skill modules with psychological readiness interventions that explicitly target optimism, openness to innovation, and the reduction of technology discomfort and insecurity, since the effect of technology readiness is empirically stronger than digital literacy alone. Second, future research is encouraged to extend the model by incorporating entrepreneurial orientation, financial access, and external collaboration networks as additional antecedents, and by testing moderating roles of government support and digital infrastructure quality.

Third, the present model should be replicated in studies on AI readiness and AI adoption among

MSMEs, treating digital literacy and technology readiness as foundational antecedents, to advance the roadmap from basic digital transformation toward intelligent technology adoption. Limitations include the single regional setting (Garut), the cross sectional design, and reliance on self reported data, which can be addressed in future work through longitudinal multi region designs and triangulation with secondary performance data.

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