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Socio-Cultural and Educational Dimensions of MSME Transformation in the Digital Era: The Role of Innovative Entrepreneurship Learning

Enik Rahayu [1], Edi Noersasongko [2*], Sih Darmi Astuti [3], Tito Aditya Perdana [4]

[1] *Department of Management, Dian Nuswantoro University,* INDONESIA
[2] *Department of Management, Dian Nuswantoro University,* INDONESIA
[3] *Department of Management, Dian Nuswantoro University,* INDONESIA
[4] *Department of Management, Dian Nuswantoro University,* INDONESIA

***Corresponding Author:** p42202300019@mhs.dinus.ac.id

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ABSTRACT

This study examines the socio-cultural and educational dimensions of Micro, Small, and Medium Enterprise (MSME) transformation in Central Java, Indonesia. Focusing on the batik industry as a cultural and economic symbol, the research explores how Innovative Entrepreneurship Learning (IEL) fosters Digital Entrepreneurship Behavior (DEB) through creativity, knowledge sharing, and cultural adaptation. Using a quantitative approach involving 240 MSME owners and managers, the study reveals that entrepreneurship education, creativity, and knowledge sharing significantly influence IEL and DEB. More than an economic shift, digital transformation among MSMEs represents a cultural evolution where traditional values intersect with technological innovation. IEL emerges as a key mediator that bridges learning, innovation, and cultural sustainability. The findings highlight the importance of culturally responsive and inclusive entrepreneurship education in strengthening digital resilience, empowering women entrepreneurs, and promoting sustainable community development. This research contributes to interdisciplinary discussions on entrepreneurship, local wisdom, and socio-digital adaptation, offering insights into how education and culture can drive inclusive growth in Indonesia's creative economy.

Keywords: Cultural Adaptation, Digital Transformation, Innovative Entrepreneurship Learning, MSMEs; Entrepreneurship Education, Socio-Economic Development

INTRODUCTION

Amid the ongoing digital revolution and rapid technological advancements, Micro, Small, and Medium Enterprises (MSMEs) are increasingly challenged to remain competitive through innovation and adaptability. In Indonesia, the batik industry, renowned for its strong cultural heritage and significant economic contribution, faces increasing pressure to evolve in response to changing consumer behavior, the widespread use of digital platforms, and the growing demand for innovation-based creative products. For MSMEs in Central Java, Indonesia, a major production hub, the need to foster Digital Entrepreneurship Behavior (DEB) is becoming increasingly urgent.

Digital entrepreneurial behavior goes beyond simply adopting digital tools; it encompasses a mindset characterized by proactive, innovative, and opportunity-seeking attitudes, integrated with the strategic use of digital technologies to create value across business functions (Nambisan 2017) . The effectiveness of DEBs depends heavily not only on access to technology but also on the development of human resources capable of learning, adapting, and innovating in a dynamic environment. This underscores the crucial role of Innovative Entrepreneurship Learning (IEL), a process that cultivates entrepreneurial capabilities through formal education, experiential activities, reflective practice, and digital immersion (Secundo, Rippa, and Meoli 2020) .

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From a human resource development perspective, fostering digital entrepreneurial behavior requires an integrated pedagogical strategy. The literature identifies three main antecedents to the formation of DEB: Entrepreneurship Education, Creativity, and Knowledge Sharing. First, entrepreneurship education has been consistently shown to increase entrepreneurial intentions, especially when integrating digital literacy and experiential learning methods (Fayolle, A., & Gailly 2015 ; Ratumbuysang 2017) . These programs empower students to identify market opportunities, manage risks, and develop innovative solutions by leveraging technology (Ratten 2016) .

Second, creativity is crucial for innovation, especially in traditional cultural industries transitioning to the digital space. In digital entrepreneurship, creativity goes beyond aesthetics and encompasses divergent thinking, problem-solving, and adaptability to fluctuating market demands (Fillis, I., & Rentschler 2006 ; Jones et al. 2017) .

Third, knowledge sharing supports collaborative learning and innovation by facilitating the dissemination of tacit and explicit knowledge among individuals and networks. In MSME ecosystems, especially fragmented and informal ones like the batik sector, knowledge sharing serves as a key mechanism for organizational learning and adaptation (Su et al. 2021) ; (Donate 2022) .

Amid the ongoing digital revolution, the transformation of MSMEs in Indonesia represents not only an economic adjustment but also a socio-cultural transition. Digitalization has reshaped how business owners learn, interact, and preserve cultural values through new forms of entrepreneurship. In Central Java, the batik industry deeply rooted in Indonesian cultural identity illustrates how traditional craftsmanship is reinterpreted through digital innovation and creative marketing.

This intersection of culture and technology demands a holistic understanding of entrepreneurial learning as both a managerial and social process. Beyond skill acquisition, entrepreneurship education functions as a cultural mechanism for transmitting values of creativity, collaboration, and adaptability in a rapidly changing society.

However, many MSMEs still struggle to integrate digital competencies into their business models, partly due to limited access to structured learning programs that combine technological literacy with cultural sustainability. Therefore, this study investigates how Innovative Entrepreneurship Learning (IEL) can enhance Digital Entrepreneurship Behavior (DEB) among MSME owners in Central Java by promoting creativity, knowledge sharing, and socio-cultural resilience.

By situating MSME transformation within the broader framework of education, local culture, and digital adaptation, this research contributes to the interdisciplinary discourse on economic development, cultural sustainability, and social innovation in the digital era.

LITERATURE REVIEW

Entrepreneurship Education (EE)

Entrepreneurship education refers to a structured learning process designed to equip individuals with the knowledge, skills, and mindsets necessary to recognize opportunities and create value. In the era of digital transformation, the scope of Entrepreneurship Education has expanded. Entrepreneurship education is no longer limited to teaching business planning or basic management, but now encompasses digital literacy, innovative thinking, and experiential learning approaches.

Research by (Fayolle, A., & Gailly 2015) shows that Integrated Learning has a significant and sustained impact on individual entrepreneurial attitudes and intentions. When learners are exposed to a supportive environment that allows for real-world practice, learning outcomes tend to persist over time. Furthermore, (Fayolle, A., & Gailly 2015) , through a systematic review found that problem-based learning and technology-integrated curricula improve students' entrepreneurial readiness.

For MSMEs, such as batik artisans, innovative entrepreneurship education is crucial in the transition from traditional patterns to a digital business ecosystem. In this context, innovative entrepreneurship education is not merely theoretical but also a driving force enabling adaptive digital entrepreneurship practices.

especially in MSMEs embedded in cultural industries like batik, entrepreneurship education not only improves managerial capacity but also functions as a social mechanism for preserving and adapting cultural knowledge.

Creativity (C)

Creativity is a core competency in entrepreneurship. It enables individuals to see opportunities from unconventional perspectives and develop innovative solutions. In the context of digital entrepreneurship, creativity extends beyond product aesthetics to include business model innovation, content creation, and digital storytelling.

Amabile (1998) emphasized that creativity thrives in environments that support autonomy, challenge, and resource availability. Meanwhile, Fillis, I., & Rentschler (2006) and Noersasongko (2022) highlight creativity as a

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key differentiator in the world of creative entrepreneurship. For MSMEs utilizing digital platforms such as social media and online marketplaces, creativity is a strategic tool for building appeal, retaining customers, and expanding their market reach. Creativity is no longer a complementary skill, but a fundamental asset in digital entrepreneurship.

For batik MSMEs, creativity is expressed through digital designs, motif innovation, and the fusion of tradition with modern digital aesthetics, showing how creative learning supports both business growth and cultural continuity.

Knowledge Sharing (KS)

Knowledge sharing refers to the exchange of information, experiences, or skills between individuals or groups. In small organizations such as MSMEs, knowledge sharing plays a crucial role in fostering innovation and collective learning (Ingsih et al. 2024) . Through the exchange of ideas and best practices, entrepreneurs can adapt more quickly to change, particularly in the context of digitalization.

Gao et al. (2020) found that knowledge sharing is positively correlated with innovation and company performance. Obrenovic (2022) also found that a strong knowledge-sharing culture enhances collaboration among business actors and reduces the learning curve in adopting new technologies. For batik MSMEs, knowledge sharing can foster community-based digital practices such as collaborative learning about digital marketing, e-commerce, or social media content management.

In the cultural MSME sector, knowledge sharing enables community learning and helps artisans adapt traditional craftsmanship to digital platforms.

Innovative Entrepreneurship Learning (IEL)

Innovative Entrepreneurship Learning is a dynamic process that integrates formal education, hands-on practice, and reflective thinking to enhance entrepreneurial capacity. This approach emphasizes learning from successes and failures to generate relevant and sustainable innovations.

According to Rippa and Secundo (2019), Innovative digital entrepreneurship learning effectively fosters students' entrepreneurial intentions, especially when designed within a technology-based framework. This aligns with experiential learning theory (Kolb 1984) , which states that competencies develop through a cycle of experience, reflection, conceptualization, and experimentation. For MSMEs, IEL facilitates direct learning from the market, such as testing new marketing strategies, evaluating results, and refining approaches based on customer feedback.

IEL also functions as a cultural bridge, helping entrepreneurs maintain local identity while adapting to global digital dynamics.

Digital Entrepreneurship Behavior (DEB)

Digital Entrepreneurial Behavior encompasses proactive, innovative, and opportunity-oriented actions through the use of digital technology. This behavior goes beyond simply using digital tools; it also encompasses the application of a digital, adaptive mindset and the ability to create technology-based value propositions.

Nambisan (2017) describes DEB as a new form of entrepreneurship that combines business strategy with digital technology. MSMEs exhibiting DEB tend to be quicker at adopting e-commerce platforms, understanding social media algorithms, and providing online customer service (Rahayu, Noersasongko, and Astuti 2024) . Factors such as entrepreneurship education, creativity, and knowledge sharing are key drivers in the development of DEB.

(Hofstede 1980) (2001) underscores that cultural dimensions such as collectivism and uncertainty avoidance shape entrepreneurial decision-making, suggesting that DEB in Indonesia's MSMEs is rooted in both technological capability and social values.

RESEARCH METHODOLOGY

Research Approach and Design

This study uses a quantitative approach with a survey method as the main data collection strategy. The quantitative method was chosen to test the statistical and objective relationship between independent and dependent variables. The research design is explanatory, which aims to examine the effect of Entrepreneurship Education, Creativity, Knowledge Sharing, and Innovative Entrepreneurship Learning on Digital Entrepreneurship Behavior among batik MSME (Micro, Small, and Medium Enterprises) owners and managers in Central Java, Indonesia. This design is in line with the work of (Hair Jr., JF, Matthews, LM, Matthews, RL, & Sarstedt 2017) , which emphasizes the suitability of an explanatory design in testing hypotheses with latent constructs, especially when using Structural Equation Modeling (SEM).

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Population and Sampling

The target population consisted of owners and managers of batik MSMEs operating in Central Java Province. Purposive sampling was based on the following inclusion criteria: (1) Being the owner or main manager of a batik MSME; (2) Having run a business for at least two years; (3) Having attended training, workshops, or entrepreneurship education programs. Of the 300 questionnaires distributed, 240 respondents were selected after validity screening, with a response rate of 80%. This sample size exceeds the minimum requirements for SEM-PLS analysis as recommended by (Hair, JF, Black, WC, Babin, BJ, & Anderson 2010) , thus ensuring robust path coefficient estimates and model fit.

Data Collection Technique

Data were collected through online and offline surveys to accommodate the limited digital access of some respondents. (1) Distributed through Google Forms and social media platforms targeting digitally literate MSMEs. (2) Face-to-face distribution in batik production centers such as Pekalongan, Solo, and Klaten.

A 7-point Likert scale (1 = strongly disagree, 7 = strongly agree) was used in the structured questionnaire. Measurement items were adapted and validated from previous studies, ensuring the theoretical basis and reliability of the constructs: (1) Entrepreneurship Education (EE) (Fayolle, A., & Gailly 2015) ; (Edwards-Schachter et al. 2015) ; (2) Creativity (C) (Zhang 2016) ; (Fillis, I., & Rentschler 2006) ; (3) Knowledge Sharing (KS) (Olan 2022) ; (Gao et al. 2020) ; (4) Innovative Entrepreneurial Learning (IEL) (Kolb 1984) ; (Secundo, Rippa, and Cerchione 2020) ; (5) Digital Entrepreneurial Behavior (DEB) (Nambisan 2020) . A pilot test was conducted on 30 MSME participants to evaluate the validity and reliability of the instrument before the full survey.

Data Analysis Techniques

Data analysis used Partial Least Squares Structural Equation Modeling (Min et al. 2020) with SmartPLS version 3.0. PLS-SEM was chosen because of its ability to handle complex models and smaller sample sizes, as supported by (Chien-Chi et al. 2020) and (Hawthorne 2019) .

External Model Evaluation (Measurement Model)

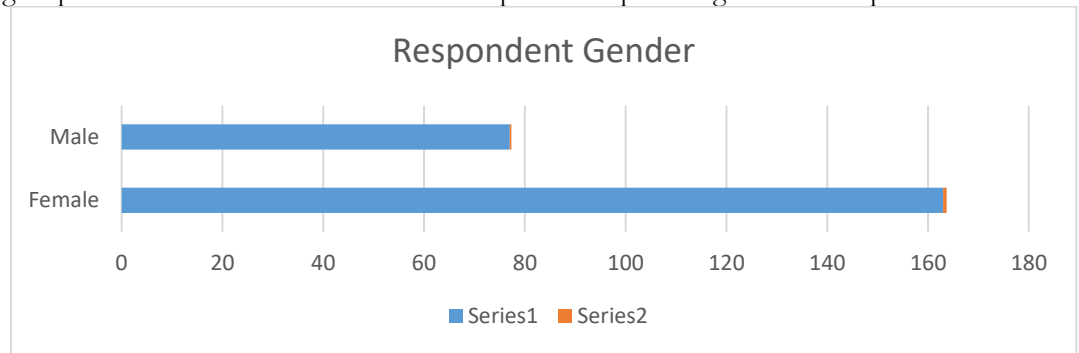
1. Convergent Validity Average Variance Extracted (AVE) > 0.50
2. Discriminant Validity of Heterotrait-Monotrait Ratio (HTMT) < 0.90
3. Reliability Construct Cronbach's Alpha and Composite Reliability (CR) > 0.70

Internal Model Evaluation (Structural Model)

R^2 (Coefficient of Determination) Assesses the explanatory power of independent variables on DEB. Q^2 (Predictive Relevance) Using the blindfolding method to assess the predictive ability of the model. Path Coefficient and Bootstrapping Significance Testing with 5,000 re-samples to test the statistical significance of the hypothesis.

Respondent Profile

Based on gender distribution, the majority of respondents were women, comprising 68% of the total participants. This highlights the crucial role of women in the industry, not only as artisans but also as business owners and decision-makers in micro, small, and medium enterprises (MSMEs). The dominance of women in this sector reflects a cultural heritage where batik skills are often passed down from generation to generation, and the increasing empowerment of women in creative entrepreneurship and digital business practices.



Graph 1. Gender of Respondents

In terms of business duration, most companies have been operating for between 2–5 years (62.9%), placing them in a critical stage for developing digital and innovative capabilities.

Table 1. Distribution of Age and Education Level of Entrepreneurs and Characteristics of Digital Entrepreneurial Behavior

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Age Group	Level of education	Percentage (%)	Characteristics of Digital Entrepreneurship Behavior
< 30 years	High School, Diploma	25%	Highly innovative, quick to adopt digital tools, open to new motifs and colors, but with relatively limited business experience
30–40 years	High School, Diploma, Bachelor's Degree	35%	Balance between innovation and business experience, proactive in adopting digital marketing, able to combine tradition with modern trends
41–50 years	Diploma, Bachelor	20%	Strong business experience and established customer base, selective in adopting new technologies, more focus on maintaining product quality and customer trust
> 50 years	High School, Undergraduate	20%	Deep craft expertise, limited digital adoption, preference for traditional marketing, reliance on networks and loyal customers

Source: Primary Data Processed by Researchers (2025)

Based on Table 1, the majority of entrepreneurs are in the 30–40 age group (35%), with educational backgrounds ranging from high school to bachelor's degree. This group demonstrates a balance between innovation and business experience, demonstrating a proactive tendency to adopt digital marketing while maintaining traditional elements.

The <30 age group (25%) is dominated by high school and diploma graduates. They are highly innovative, quick to adopt digital technology, and open to exploring new motifs and colors, despite their relatively limited business experience.

Meanwhile, entrepreneurs aged 41–50 (20%) generally hold a diploma or bachelor's degree, have strong business experience and an established customer base. They tend to be selective in adopting new technologies, with a greater focus on product quality and customer trust.

The age group over 50 (20%) mostly has educational qualifications ranging from high school to bachelor's degree. They rely on in-depth craft expertise but show relatively low adoption of digital technology. This group prefers traditional marketing strategies and leverages a network of loyal customers they have built over the years .

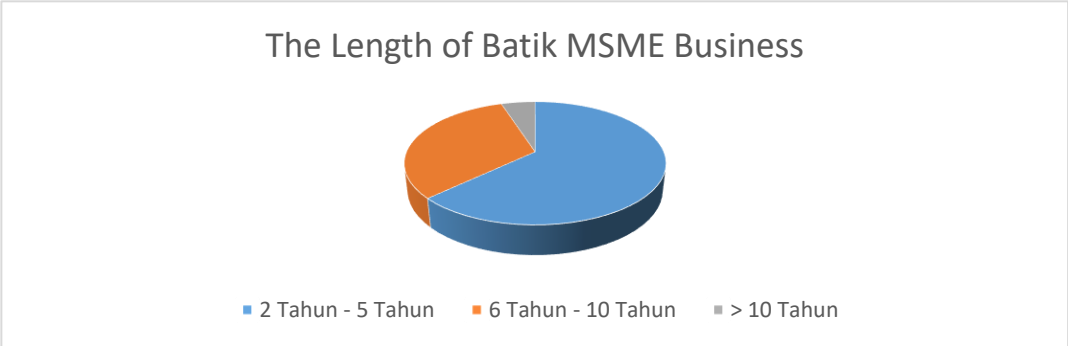

Figure 1. Business Duration

Table 2. Distribution of Platforms/Technologies Used by MSMEs

Platform / Technology	Number of Respondents (People)	Percentage (%)
Instagram	207	86.3%
Facebook	199	82.9%
TikTok	192	80.0%
Shopee	159	66.3%
Tokopedia	125	52.1%
Own Website	74	30.8%
Another	103	42.9%

Source: Primary Data Processed by Researchers (2025)

Table 2 shows the distribution of platforms and technologies used by MSMEs. The majority of respondents reported using Instagram, with 86.3% of business owners leveraging the platform for promotional and sales activities. Facebook followed closely behind at 82.9%, demonstrating its continued relevance in customer engagement. TikTok, a rapidly growing platform for visual marketing, was used by 80% of respondents, reflecting the shift toward short-form video content in digital entrepreneurship. E-commerce platforms were also widely adopted, with 66.3% of respondents utilizing Shopee and 52.1% using Tokopedia to reach a wider consumer market. Despite the rise of social media and marketplace platforms, only 30.8% of MSMEs operated their own

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websites, indicating limited independent digital infrastructure. Furthermore, 42.9% of respondents reported using other digital tools such as WhatsApp Business and Google My Business to support customer engagement and business operations. These findings demonstrate high levels of digital platform utilization among MSMEs, highlighting their adaptability and the growing importance of digital entrepreneurship in the creative economy.

RESULTS AND DISCUSSION

Evaluation of Measurement Model (Outer Model)

Convergent validity evaluates whether indicators accurately reflect their intended constructs. Two main criteria are used: External loadings > 0.70 and Average Variance Extraction (AVE) > 0.50.

Table 3. External load > 0.70

	C	DEB	EE	IEL	KS
C1	0.780				
C2	0.747				
C3	0.754				
C4	0.784				
DEB1		0.828			
DEB2		0.766			
DEB3		0.799			
DEB4		0.602			
DEB5		0.808			
EE1			0.782		
EE2			0.761		
EE3			0.755		
EE4			0.744		
EE5			0.756		
IEL1				0.749	
IEL2				0.726	
IEL3				0.768	
IEL4				0.742	
IEL5				0.766	
KS1					0.727
KS2					0.733
KS3					0.727
KS4					0.800
KS5					0.705

Convergent Validity Test Results

Based on the outer loading results, all indicators in constructs C, DEB, EE, IEL, and KS generally have values above 0.70 so they can be said to be valid based on convergent validity.

Construction C (C1–C4)

The external loading values ranged from 0.747 to 0.784. All indicators met the convergent validity criteria (>0.70), indicating that these indicators adequately represent construct C.

Building DEB (DEB1–DEB5)

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Most of the external loading values are above 0.70, ranging from 0.766 to 0.828, except for DEB4 with a value of 0.602. Although DEB4 is below the threshold of 0.70, the value can still be maintained if the construct's AVE meets the criteria of >0.50 and its indicators are considered theoretically important.

EE Construction (EE1–EE5)

All indicators have external loading values between 0.744 and 0.782, which indicates good consistency and contribution to the EE construct.

Building IEL (IEL1–IEL5)

The external loading values ranged from 0.726 to 0.768. All indicators met the criteria >0.70, indicating convergent validity.

Building KS (KS1–KS5)

The external loading values ranged from 0.705 to 0.800. All indicators were above the minimum threshold of 0.70, indicating adequate strength in reflecting the KS construct.

Overall, almost all indicators met the external loading criteria (>0.70), indicating that all constructs have good convergent validity. Only one indicator (DEB4) was slightly below the threshold, but it was still tenable with adequate theoretical justification and AVE value.

All constructs exceeded the minimum threshold (AVE > 0.50), confirming strong convergent validity.

Discriminant Validity is assessed through:

1. Each indicator has the highest load on its respective construction.
2. The square root of AVE for each construct is greater than the inter-construct correlation.
3. All HTMT values < 0.90.

These results confirm good discriminant validity, indicating distinct constructs.

Table 4. Reliability Test

Build	Cronbach's Alpha	ROAD	Composite Reliability	Interpretation
Creativity (C)	0.766	0.587	0.851	Reliable
Digital Entrepreneurship Behavior (DEB)	0.819	0.585	0.875	Reliable
Entrepreneurship Education (EE)	0.817	0.577	0.872	Reliable
Innovative Entrepreneurship Learning (IEL)	0.806	0.563	0.865	Reliable
Knowledge Sharing (KS)	0.791	0.546	0.857	Reliable

All values exceed 0.70, indicating strong internal consistency.

Structural Model Evaluation (Deep Model)

Multicollinearity Test (VIF)
All VIF values < 5, indicating no multicollinearity between predictors.

Table 5. Hypothesis Testing (Direct Effect)

Track	Coefficient	T Statistics	P value	Interpretation
Creativity and Innovative Entrepreneurship Learning	0.378	6,385	0.000	Important
Entrepreneurship Education and Digital Entrepreneurial Behaviour	0.132	2,149	0.032	Important
Entrepreneurship Education and Innovative Entrepreneurship Learning	0.219	3,483	0.001	Important
Innovative Entrepreneurship Learning and Digital Entrepreneurial Behaviour	0.378	5,978	0.000	Important
Knowledge Sharing and Digital Entrepreneurial Behaviour	0.413	7,047	0.000	Important
Knowledge Sharing and Innovative Entrepreneurship Learning	0.332	5,472	0.000	Important

All relationships are statistically significant ($p < 0.05$), which confirms that Creativity, Entrepreneurship Education, and Knowledge Sharing significantly influence Innovative Entrepreneurship Learning and Digital Entrepreneurship Behavior.

Table 6. Mediation Analysis (Indirect Effect through IEL)

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Mediation Path	Coefficient	T Statistics	P value	Interpretation
Creativity – Innovative Entrepreneurship Learning – Digital Entrepreneurial Behaviour	0.143	4,265	0.000	Important
Entrepreneurship Education – Innovative Entrepreneurship Learning – Digital Entrepreneurial Behaviour	0.083	2,944	0.003	Important
Knowledge Sharing – Innovative Entrepreneurship Learning – Digital Entrepreneurial Behaviour	0.126	4.102	0.000	Important

Innovative Entrepreneurship Learning significantly mediates the relationship between Creativity, Entrepreneurship Education, and Knowledge Sharing with Digital Entrepreneurial Behavior. This confirms the vital role of learning transformation in digital entrepreneurship development, which supports experiential learning theory.

Table 7. Effect Size (f^2)

Connection	f^2 value	Effect Size
Creativity and Innovative Entrepreneurship Learning	0.185	Currently
Innovative Entrepreneurship Learning and Digital Entrepreneurial Behaviour	0.177	Currently
Knowledge Sharing and Digital Entrepreneurial Behaviour	0.231	Currently
Knowledge Sharing and Innovative Entrepreneurship Learning	0.150	Currently
Entrepreneurship Education and Digital Entrepreneurial Behaviour	0.028	Small
Entrepreneurship Education and Innovative Entrepreneurship Learning	0.076	Small

Knowledge Sharing and Innovative Entrepreneurship Learning showed the highest impact on Digital Entrepreneurship Behavior.

Model Fit and Predictive Validity

Table 8. R^2 and Q^2 values

Build	R^2	Q^2	Interpretation
DEB	0.707	0.404	Strong and relevant
IEL	0.693	0.377	Strong and relevant

Both constructs showed high explanatory power and predictive relevance ($R^2 > 0.67$; $Q^2 > 0.35$).

SRMR = 0.061 (< 0.08) → Indicates good model fit

Goodness of Fit (GoF) = $\sqrt{(}$ AVE × R^2) = $\sqrt{(}$ 0.700 × 0.391) = 0.522 → Indicates strong model performance PLS Prediction Analysis confirmed that the model had lower RMSE and MAE than the linear model, indicating better prediction accuracy.

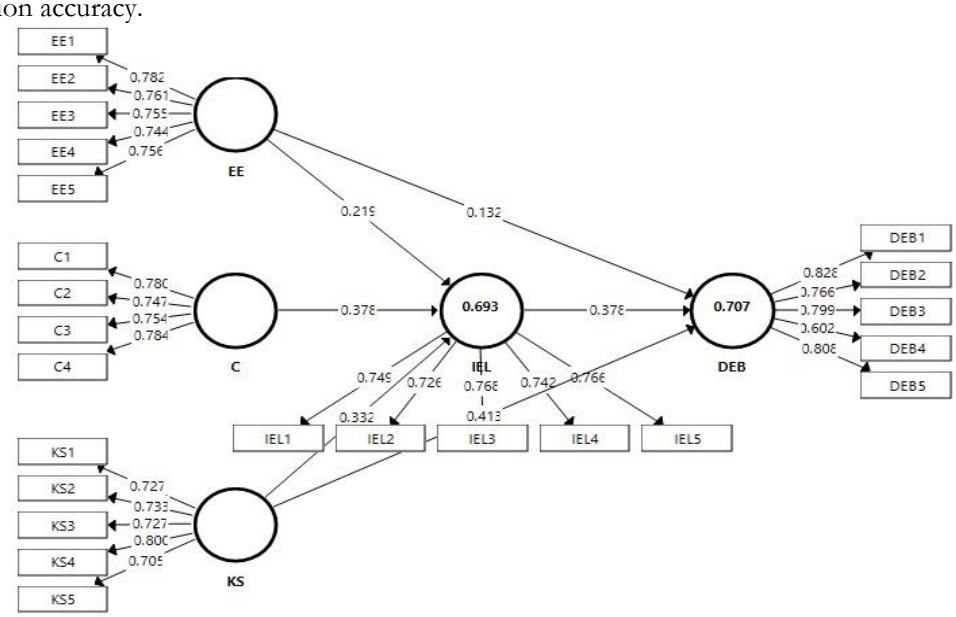

Figure 2. SmartPls Results

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DISCUSSION

The findings of this study reveal that Innovative Entrepreneurship Learning serves not only as an educational process but also as a cultural adaptation pathway for MSMEs navigating digital transformation. In the batik industry, digital tools have become platforms for both economic empowerment and cultural expression, enabling artisans to reinterpret traditional motifs, share creative processes online, and reach global audiences while maintaining local identity.

From a socio-cultural perspective, this transformation reflects how learning and innovation are embedded in community practices. Knowledge sharing among MSME actors fosters a collective learning ecosystem where digital literacy, cultural continuity, and entrepreneurship intersect. This aligns with the principles of social learning theory and experiential learning, emphasizing that knowledge is constructed through participation and reflection within cultural contexts.

Empirical Contributions and Variable Relationships

The empirical results of this study significantly contribute to broadening the understanding of the formation of Digital Entrepreneurial Behavior, particularly in the context of MSMEs transforming into a digital entrepreneurial ecosystem. This study primarily focuses on the influence of Entrepreneurship Education, Creativity, and Knowledge Sharing, mediated by Innovative Entrepreneurship Learning, on the development of DEB. Furthermore, the findings offer managerial insights into developing learning and innovation strategies for the creative MSME sector.

The Influence of Entrepreneurship Education on IEL and DEB

This study shows that Entrepreneurship Education has a significant impact on both IEL and DEB. However, the indirect pathway through IEL contributes more substantially than the direct effect on DEB. This finding emphasizes the importance of transforming entrepreneurship learning methods toward more innovative, contextual, and experience-based approaches.

Theoretically, this supports (Kolb 1984) Experiential Learning Theory, which emphasizes that knowledge is developed through direct experience that is processed reflectively. In the context of batik MSMEs, entrepreneurship education combined with practical activities such as digital business simulations, technology-based product development, and online marketing case analysis has proven more effective in shaping adaptive and innovative digital entrepreneurial behavior. From an educational management perspective, these findings suggest that MSME training institutions or facilitators should design project-based learning curricula that integrate technology, creativity, and local context as part of relevant entrepreneurship learning strategies.

The Role of IEL as a Mediator in the Formation of DEB

Innovative Entrepreneurship Learning plays a significant mediating role in connecting EE, Creativity, and KS with DEB. IEL functions not only as a learning channel but also as a mechanism for transforming knowledge into concrete digital entrepreneurial actions.

Effective IEL is characterized by real-world problem-solving, technology integration to address challenges, cross-sector collaboration, and the stimulation of critical and creative thinking.

In MSME management practice, this can be implemented through interactive training, best-practice sharing forums, and strengthening networks among entrepreneurs. Thus, IEL serves as a bridge between theory and implementation, increasing the competitiveness of batik MSMEs through human resource development, technology adoption, and sustainable innovation

Socio-Cultural and Gender Dimensions

Moreover, the strong participation of women (68% of respondents) underscores how digital entrepreneurship contributes to gender empowerment and inclusive economic participation. Women entrepreneurs play a pivotal role in balancing cultural preservation and technological adoption, reshaping social structures within local communities.

In practical terms, the integration of innovative learning into entrepreneurship programs promotes socio-economic resilience, encourages cultural sustainability, and supports inclusive growth.

Therefore, policymakers and educators should design entrepreneurship education models that not only focus on profitability and efficiency but also honor local wisdom, gender inclusivity, and community collaboration.

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CONCLUSION

This study examined the influence of Entrepreneurship Education, Creativity, and Knowledge Sharing on Digital Entrepreneurial Behavior (DEB), with Innovative Entrepreneurship Learning (IEL) as a mediating variable. Conducted among batik MSMEs in Central Java, an iconic representation of Indonesia's creative and cultural industry, this research integrates economic, educational, and socio-cultural perspectives to explain how MSMEs adapt and transform within the digital ecosystem.

The findings reveal that Entrepreneurship Education significantly enhances DEB when implemented through innovative, contextual, and experiential learning approaches. Beyond managerial implications, entrepreneurship education also serves as a cultural transmission mechanism, embedding values of creativity, collaboration, and adaptability essential for navigating technological change. Creativity was found to be a key driver of entrepreneurial innovation, reinforcing the idea that digital entrepreneurship in cultural industries extends beyond aesthetics to involve problem-solving, experimentation, and the reinterpretation of traditional heritage through digital means. Meanwhile, Knowledge Sharing emerged as the most dominant factor influencing DEB both directly and through IEL, highlighting the importance of fostering a collaborative learning culture among MSMEs. Knowledge sharing strengthens community networks, facilitates collective innovation, and accelerates the integration of digital technology in creative business practices.

Innovative Entrepreneurship Learning plays a pivotal mediating role, serving as the bridge that connects education, creativity, and collaboration with digital entrepreneurial outcomes. In this sense, IEL is not merely a pedagogical model but a cultural and social learning process that aligns with Kolb's Experiential Learning Theory and Bandura's Social Learning Theory (1986). It promotes reflection, adaptability, and innovation, helping MSMEs balance digital transformation with cultural sustainability.

From a socio-cultural standpoint, the study underscores the role of women entrepreneurs, who constituted 68% of respondents, as agents of inclusive digital transformation. Their participation illustrates how digital entrepreneurship fosters gender empowerment and community resilience within Indonesia's creative economy.

The validated structural model demonstrates strong predictive power, suggesting that integrating learning innovation and cultural context provides a robust framework for strengthening MSME digital capability and competitiveness. The policy implications derived from this study emphasize the importance of developing culturally embedded entrepreneurship education that integrates local wisdom, creativity, and digital literacy, while fostering community-based learning ecosystems that encourage knowledge exchange and collaboration. Moreover, there is a growing need to support empowerment programs for women entrepreneurs and strengthen partnerships between academia, government, and MSMEs to institutionalize evidence-based entrepreneurship education rooted in the cultural context.

Future research is encouraged to expand the model by including variables such as digital self-efficacy, transformational leadership, and organizational culture, as well as adopting a longitudinal approach to observe the sustained impact of innovative learning on digital entrepreneurial performance and cultural adaptation.

In conclusion, the digital transformation of Indonesia's MSMEs, especially within cultural sectors like batik, represents more than an economic shift. It is a social learning journey where technology, education, and culture converge to shape a resilient, creative, and inclusive entrepreneurial future.

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