

Increasing the Competitiveness of The Tanjung Bumi Hand Writen Batik in the Digital Era

Zaeni Miftah^{1*}, Indah Purnama Sari², Fezan Nabawi³

¹) Physics Education, Faculty of Mathematics and Natural Sciences, Indraprasta PGRI University, Indonesia

²) Retail Management, Faculty of Educational Sciences and Social Sciences, Indraprasta PGRI University, Indonesia

³) Information Systems, Faculty of Engineering & Computer Science, Nahdlatul Ulama Indonesia University, Indonesia

*Corresponding Author

Email: zaenimiftah02@gmail.com

Abstract

The purpose of this study is to analyze the influence of digitalization strategies and product innovation on increasing the competitiveness of Tanjung Bumi Hand-Written Batik. The approach used is quantitative, data collected from 30 craftsmen and traders of Tanjung Bumi hand-drawn batik in Madura and analyzed using multiple linear regression through SPSS 23.0. The uniqueness of this study lies in the use of primary data in the form of physical evidence of the use of Chinese ceramic jars more than a century old in the dyeing process of Tanjung Bumi gentongan batik and several pieces of ancient gentongan batik more than a century old. The results show that product innovation has a positive and significant effect on competitiveness ($p = 0.00$ with a t-count value = 4.491), driven by the integration of traditional motifs into contemporary designs. However, the digitalization strategy does not show a significant effect on competitiveness ($p = 0.155$ with a t-count value = 1.464). Simultaneously, both variables have a significant effect on increasing competitiveness ($p = 0.00$ with a F-count value = 36.781). This finding reveals the "digital paradox" in the creative industry that is extreme slow-fashion, where the main selling point is not in digital presence but rather lies in physical authenticity and history (provenance). This study strengthens the Resource-Based View, concluded that for high-level cultural heritage creative industries, history and culture-based innovation is more decisive for competitiveness than conventional digital transformation.

Keywords: *Digitalization Paradox, Product Innovation, Heritage Management*

INTRODUCTION

Culture-based creative industries face a significant paradox amidst globalization. While appreciation for authentic products is growing, the survival of traditional craftspeople is threatened by the standardization of mass industry (Lian & Xie, 2024). Among Indonesia's most vulnerable and striking cultural heritages is the Tanjung Bumi hand-drawn batik from Madura. One of the techniques used to create Tanjung Bumi hand-drawn batik is the gentongan technique, which requires months of soaking the cloth in a special jar. This batik, known as Gentongan batik, features aggressively detailed motifs yet is deeply philosophical and even mystical. Thus, this batik is not merely a textile commodity, but rather a representation of profound sociocultural identity.

The uniqueness of this production technique is a fundamental aspect that distinguishes Tanjung Bumi hand-drawn batik from other batik artists from other regions in Indonesia. This dyeing technique, using a jar, is known as the Gentongan technique. In this process, the fabric is soaked in a special ceramic jar for a very long period of time, often lasting six months to a year. This lengthy process allows for a depth of color unmatched by modern synthetic dyes, given that the dyes used in the gentongan technique are natural.

What is very interesting about this research is supported by the findings of primary data in the form of ceramic jar artifacts from China that are more than one hundred years old (see Figure 1), some of which are still used in the batik production process. This research also succeeded in obtaining original images of batik gentongan cloth that is more than a century old,

of course the condition of the cloth has begun to weather due to age (see Figure 2). Nevertheless, the beauty of the motifs and colors can still be seen and felt. The existence of these historical artifacts is not just a tool and production result, but material evidence of a persistent culture and transoceanic trade relations in the past, aestheticized in a piece of very beautiful cloth. The integration of tangible historical value with intangible motifs creates a natural competitive advantage that should generate high economic value. The major challenge faced today is how this strong historical narrative and proof of authenticity can be transformed into a digital format (Bessiere, 2013) to be able to resonate with the global market that demands transparency of provenance.



Figure 1. Ancient Chinese Jar
Source: Researcher's data source (2025)



Figure 2. Ancient Gentongan Batik
Source: Researcher's data source (2025)

Unfortunately, this uniqueness does not automatically guarantee economic resilience in the digital age. In fact, the economic life of hand-drawn batik artisans is still far from a prosperous standard of living. Several factors, such as limited market penetration, a still conventional supply chain, and weak digital literacy among artisans, create significant barriers to competing with modern textile products. Without transformation, this heritage is suspected to be trapped in cultural nostalgia that lacks competitive value in a global market now driven by algorithms and e-commerce.

In fact, there have been many studies that have analyzed hand-drawn batik as one of Indonesia's cultural riches, but previous studies have focused on preserving motifs or historical aspects of batik (Sari, 2022) (Sari & Miftah, 2021). The literature that discusses how the integration of product innovation and digitalization strategies can specifically increase competitive advantage in geographically isolated traditional craftsman clusters is still very limited (Friel, 2020) (Jakob & Thomas, 2017). Therefore, scientific studies or research to formulate a strategic model that not only digitizes marketing, but also innovates products without losing their sacred value is something urgent.

This study aims to analyze the competitiveness of Tanjung Bumi Hand-Written Batik through two main pillars: a digital marketing system strategy and product innovation based on contemporary market needs. Using a quantitative approach, this study provides theoretical contributions to creative industry strategy management and practical contributions for stakeholders in designing digital transformation policies for cultural heritage-based MSMEs. This study is not only useful for Indonesia, but also for other countries with historical and cultural similarities.

The main theoretical basis of this research is the Resource-Based View (RBV) theory developed by Barney (1991). According to this theory, a company can achieve sustainable competitive advantage if it has resources that meet the VRIO criteria: Valuable, Rare, Inimitable,

and Non-substitutable/Organized (Barney, 1991) . In the context of this research, the company is interpreted as a cluster of Tanjung Bumi batik artisans. To be able to explain VRIO in the context of Tanjung Bumi batik, the Inimitable criterion can be explained by strategic resources such as the use of century-old Chinese ceramic jars, dyeing techniques that take months and very distinctive coastal batik motifs depicting the natural coastal environment. This historical authenticity and the long and complicated dyeing process create a barrier to entry for mass production, because the historical value and quality of natural colors cannot be replicated instantly by machines.

The meso theory in this study uses the dynamic capabilities theory developed by Teece et al. (1997). According to this theory, organizations must have the ability to build, integrate, and restructure internal and external competencies to face a rapidly changing environment (Gutt et al., 2019) . Especially in the digital era, physical resources such as jars and cloth alone are not enough. Hand drawn batik artisans need dynamic capabilities to adapt and undergo digital transformation. Digitalization here is holistic, viewed not only as a marketing tool but also as a mechanism for communicating the provenance and storytelling of cultural artifacts to a global audience through digital platforms. The RBV theory and the dynamic capabilities theory are not mutually exclusive. The RBV provides the resources (jars, gentongan techniques, and typical coastal batik motifs), while dynamic capabilities are how to use these resources in the digital era.

The theory of Product Innovation and cultural branding is a theory adopted at the application level. The essence of tradition must be maintained when creative industry companies innovate products. Innovation should be able to adapt utility to modern lifestyles. Furthermore, the cultural branding strategy developed by Holt (2004) strengthens the innovation theory by optimizing the function of the brand, namely not simply selling function, but also selling the myth and identity of a unique regional culture (Giliberto & Labadi, 2022). For example, by using the original image of an ancient jar as a symbol, the branding strategy implemented transforms Tanjung Bumi's hand-drawn batik into a cultural investment object, rather than simply a hand drawn batik product. While some experts argue that digitalization can degrade the sacred value of culture, this study argues otherwise, using a Cultural Branding approach.

Digitalization is not just about using hardware. In the context of craft MSMEs, such as hand-drawn batik, digitalization is the adoption of a system. According to the TAM theory developed by Davis (1989), two factors influence the effectiveness of digitalization: Perceived Usefulness and Perceived Ease of Use (Vial, 2019). In this study, the digitalization strategy of Tanjung Bumi batik is viewed through the lens of the Digital Maturity Model (Quach et al., 2022) not just about social media, but also about authentic photographs as a form of product transparency. The main goal of this strategy is to reduce the information asymmetry between Madurese batik artisans and global batik collectors.

Joseph Schumpeter defined innovation as creative destruction as a driver of economic growth. In the context of hand-drawn batik, the most relevant theory is Incremental Innovation (Fletcher, 2010). Product innovation doesn't change the sacred woven fabric technique, but rather updates several aspects, such as design and standardization. Ancient batik motifs need to be adapted to contemporary fashion pieces. And, if artisans currently lack standardized raw material sizes for the dyeing process, standardization is necessary. The goal of this innovation is to bridge the interests of heritage preservation and market relevance.

The theory used to measure the Competitiveness Increase variable is the Competitive Advantage theory developed by Michael Porter. According to Porter, competitiveness does not depend solely on the abundance of natural resources, but rather on the ability to create added value in the form of uniqueness that differentiates it from competitors. There are three indicators to measure the competitiveness of Tanjung Bumi hand-drawn batik: differentiation, price leadership, and niche market. The unique soaking process using Chinese jars that are more than 100 years old and cannot be replaced (produced) by modern technology (printing machines) is a

very strong differentiation element. Distribution cost efficiency through direct-to-consumer through digital platforms will lead to cost leadership. In addition, this hand-drawn batik craft will be able to target the premium market of art collectors who appreciate historical value.

The theoretical framework formed is $Y = f(X1, X2)$, where Competitiveness Improvement (Y) is a function of the effectiveness of Digitalization Strategy (X1) and Product Innovation (X2). The robust argument in this study is that Digitalization Strategy acts as a multiplier effect for Product Innovation. Without digitalization, innovation in Tanjung Bumi hand drawn batik will remain geographically isolated, and conversely, without product innovation, digitalization will only market obsolete products that are no longer relevant to the current market. Therefore, the synergy between digitalization strategy and product innovation will create a Competitive Advantage based on provenance and modernity. The existence of Chinese jar properties that are more than a century old used in the production process of hand-drawn batik gentongan, will be one of the specific concepts of heritage based competitive Advantage, where the past is believed to be an asset in the future.

This research is not merely local but has global resonance and fills a gap unaddressed by global researchers. Globally, the traditional textile industry has been transforming into a digital ecosystem in various countries with rich cultural heritage. For example, in India, the handicrafts sector is undergoing a digital transformation with a focus on blockchain integration to ensure product authenticity and supply chain transparency (Shafi et al., 2022). Meanwhile, traditional textiles in Japan, such as Nishijin-ori, are being revitalized through a Hybrid Innovation Strategy. This strategy maximizes the use of digital technology to visualize historical product data, thereby increasing their perceived value among global consumers.

Compared to this global phenomenon, Tanjung Bumi Hand-Drawn Batik faces similar challenges despite its unique position. This unique position is that while many traditional textile industries in Europe and East Asia have shifted entirely to digital standardization for efficiency, Tanjung Bumi Batik still maintains the traditional soaking process in ancient Chinese jars. This demonstrates the existence of an international niche market that seeks authentic imperfections and a deep cultural historical narrative despite the global trend toward automation. This phenomenon represents an untapped potential within Indonesia's digitalization strategy.

This research attempts to fill several critical gaps in various literature on MSME digitalization that has developed rapidly, for example, (Sagala & Öri, 2024), (Giliberto & Labadi, 2022), (Ge et al., 2022) including:

1. The gap between tradition and technology, where most studies focus on how manual processes can be replaced by technology. Not much research has examined how digitalization actually serves to strengthen very slow/time-consuming manual processes (such as the gentongan technique), rather than replace them. Digitalization serves as a reconciliation that reconciles tradition and technology and serves to create uniqueness, thus becoming a competitive advantage.
2. Visual evidence and provenance, where the existing literature is still very limited in exploring the role of historical material evidence (such as the use of 100-year-old gentong artifacts) as strategic digital content for building brand trust in the international market, especially in markets skeptical of the rise of imitation products. This study has unique data in the form of physical evidence of Chinese gentongs and ancient gentongan batik cloth from Tanjung Bumi, which are over a century old. The researchers managed to obtain this data from the heirs of ancient gentongan batik on Madura Island, Indonesia.
3. The specific context of extreme slow-fashion, where product innovation models generally focus only on accelerating production. This study fills the gap by offering a unique product innovation model, characterized by extreme slow-fashion. This uniqueness actually adds to the selling value, which lies in the long production time. To educate the market about this unique product innovation, MSMEs need the help of appropriate digitalization strategies.

Therefore, by closing this gap, this research not only contributes to the development of digital marketing management theory but also seeks to offer a new paradigm in heritage tech synergy, where digital technology also functions as a custodian of historical purity, not simply a sales platform.

RESEARCH METHODS

This research approach is quantitative with an explanatory design. Explanatory research aims to explain the status of the variables under study and the relationships between them through hypothesis testing (Hair et al., 2019). The explanatory approach was selected because the research aims to explain causal relationships and test hypotheses regarding the influence of product innovation (X1) and digitalization strategy (X2) on the enhancement of competitiveness (Y) among Madura hand-drawn batik industry players. Through this approach, numerical data obtained from respondents will be statistically analyzed to measure the magnitude of the contribution and the level of significance of these variables. The study population was the Tanjung Bumi batik ecosystem in Madura, Indonesia. The sampling technique used purposive sampling, with respondents being artisans or traders directly involved in batik production.

The total sample size was 30 respondents. This is relatively small, but in the context of a niche and highly traditional craft industry, this sample size is representative enough and meets the minimum requirements for parametric statistical analysis (Central Limit Theorem) (Hair et al., 2019), thus providing an in-depth overview of the behavior of the Tanjung Bumi traditional batik industry.

This study used primary data collected through questionnaires. Each item in the questionnaire was measured using a 5-point Likert scale, ranging from “Strongly Disagree” to “Strongly Agree”. To deepen the data, researchers also conducted field observations and direct documentation of historical artifacts, including Chinese jars and ancient gentongan batik cloth dating back more than a century, to validate respondents' answers regarding product innovation.

Data analysis was conducted in stages using SPSS 23.0 for Windows statistical software. The analysis stages were divided into three main phases:

1. Instrument Testing. Instrument testing was conducted initially before further analysis. Data were tested using a Validity Test (Pearson Correlation) to ensure each statement item was on target, and a Reliability Test (Cronbach's Alpha) to ensure the questionnaire's internal consistency.
2. Classical Assumption Test. This test was conducted to ensure the resulting regression model was a Best Linear Unbiased Estimator (BLUE). Several classical assumption tests were performed, including: the Normality Test (Kolmogorov-Smirnov) to examine data distribution, the Multicollinearity Test (VIF and Tolerance) to ensure there was no correlation between independent variables, and the Heteroscedasticity Test (Glejser Test) to check for equality of residual variances.

Multiple Linear Regression Analysis. This analysis was used to examine the direction and magnitude of the influence of the variables Digitalization Strategy (X1) and Product Innovation (X2) on Competitiveness (Y). The resulting regression equation was retested using the Goodness of Fit Test of the regression model including the F Test (simultaneous significance), t Test (partial significance), and the Coefficient of Determination (R^2) to measure the extent to which the model is able to explain variations in the competitiveness variable. The hypotheses tested were: 1) It is suspected that digitalization strategy has a significant effect on competitiveness; 2) It is suspected that product innovation has a significant effect on

competitiveness; and 3) It is suspected that digitalization strategy and product innovation simultaneously have a significant effect on competitiveness.

RESULTS AND DISCUSSION

Result

Based on data processing using SPSS 23.0, the regression model meets all classical assumptions: the data is normally distributed, free from multicollinearity, and there is no heteroscedasticity. Based on the probability plot normality test, the points or data are located near or follow the diagonal line, indicating a normally distributed residual value. The tolerance value for the Digitalization Strategy (X1) and Product Innovation (X2) variables is $0.437 > 0.10$, and the VIF value for both independent variables is $2.286 < 10.00$, thus concluding that there is no multicollinearity in the regression model.

Table 1. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Colinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	2.824	2.088		1.352	.188		
Digitalization_strategy (X1)	.181	.124	.221	1.464	.155	.437	2.286
Product_innovation (X2)	.646	.144	.677	4.491	.000	.437	2.286

a. Dependent Variable: Increasing_competitiveness (Y)

Based on the results of the multiple linear regression analysis, the resulting multiple linear regression equation is $Y = 2.824 + 0.181X_1 + 0.646X_2$. This equation shows that the Product Innovation (X2) variable dominates the increase in competitiveness. Furthermore, there are contrasting findings between the independent variables. Partially, Product Innovation (X2) shows a significant influence on Competitiveness (Y) ($0.00 < 0.05$) with a t-count value = 4.491. Meanwhile, the Digitalization Strategy variable (X1) surprisingly does not show a significant influence ($0.155 > 0.05$) with a t-count value = 1.464. Thus, the first hypothesis (H1) is rejected, while the second hypothesis (H2) is accepted.

However, simultaneously the significance value of the variable is below 0.05 ($0.00 < 0.05$) with an F-count value = 36.781, which means hypothesis 3 is accepted.

Table 2. Anova

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	216.136	2	108.068	36.781	.000 ^b
Residual	79.330	27	2.938		
Total	295.467	29			

a. Dependent Variable: Increasing_competitiveness (Y)

b. Predictors: (Constant), Product_innovation (X2), Digitalization_strategy (X1)

The high value of the Coefficient of Determination (R^2) (0.732) indicates that the independent variables in this model make a major contribution to increasing the competitiveness of craftsmen.

Table 3. Model Summary

Model	R	R Squares	Adjusted R Squares	Std. Error of the Estimate
1	.855a	.732	.712	1.714

a. Predictors: (Constant), Product_innovation (X2), Digitalization_strategy (X1)

b. Dependent Variable: Increasing_competitiveness (Y)

Discussion

The research finding that digitalization strategies have no effect on increasing the competitiveness of Tanjung Bumi batik tulis reveals a profound sociocultural reality. This can be explained through several critical arguments, such as: 1) For consumers of Gentongan batik tulis, the main selling point lies not in the ease of digital access or the marketing platform used, but rather in the physical evidence and sensory experience felt. The existence of Chinese jars and ancient gentongan batik cloths that are more than a century old create a narrative of "scarcity" so strong that conventional digital marketing methods are unable to add significant value when compared to the uniqueness and authenticity of the product itself. 2) It is possible that the main market segment of Tanjung Bumi batik tulis, especially Gentongan batik, are elite collectors who rely more on word-of-mouth or direct visits to batik galleries than social media algorithms. Moreover, when viewed from the price side, a piece of batik tulis cloth is quite expensive, even for gentongan batik cloth can reach Rp. 15.000.000 per piece measuring approximately 2.5 meters. Therefore, in this case, digitalization has only touched the surface level and has not been able to effectively communicate the sacred value of this very long process. 3) Generally, digitalization theory often talks about the acceleration of transactions, however, Tanjung Bumi hand-drawn batik falls into the extreme slow-fashion category. This insignificance indicates a misalignment between digital technology and traditional production rhythms that take a very long time. The theory of global digitalization may require adjustments when applied to indigenous communities or very traditional artisan communities. The findings of this study also prove that Tanjung Bumi hand-drawn batik is a product that is digitally resistant in a positive sense, namely its value is so high both economically and socio-culturally that it is not affected by digital trends that are only momentary. Digitalization for hand-drawn batik crafts should not be for selling, but for documenting the history and philosophy of hand-drawn batik itself.

In this study, product innovation was the primary determinant of increased competitiveness, in contrast to digitalization. The key lies in the craftsmen's success in modifying ancient motifs into products relevant to modern market tastes without compromising the original techniques. Furthermore, the craftsmen's openness to suggestions for contemporary motifs from modern consumers was also a determining factor. This confirms that for high-end craft products, the substance of the product is far more important than its distribution channels.

Innovation at Tanjung Bumi is incremental, not radical, and could undermine tradition. This incremental product innovation has proven to be a crucial factor in increasing the competitiveness of Tanjung Bumi's hand drawn batik. The use of technology (innovation) is only applied to various efforts to improve quality management and diversify designs, while the core batik process remains manual by hand, and the dyeing process continues using traditional immersion techniques.

This integration between the past (traditional hand drawn batik culture, 19th-century gentong) and the present (contemporary and modern designs) creates strong product differentiation in accordance with Porter's Diamond Model. This results in the resulting product not simply being a beautifully patterned piece of cloth, but rather a manifestation of a cultural investment object. The successful testing of this hypothesis confirms that innovation doesn't have to mean abandoning traditional roots. Instead, the strength of innovation in traditional creative industries lies in the ability to maintain originality amidst global standardization.

This research produces a unique theoretical synthesis on the relationship between tradition and modernity. Theoretically, it is found that the competitive advantage of Tanjung Bumi hand-drawn batik is not linear to digital penetration, but rather Product-Centric, while reconstructing the application of the Resource-Based View (RBV). While digitalization is generally considered a new strategic resource, in the context of Tanjung Bumi hand drawn batik, especially Gentongan batik, the most valuable and inimitable resources remain the traditional

batik method, century old Chinese jars, preserved ancient motifs, and the long production time process. This synthesis shows that in the high-end heritage industry, the value of a product actually increases when it does not keep up with the digital pace. What is very interesting is the concern that excessive digitalization efforts will actually degrade the value of exclusivity and sacredness that are the foundation of this product's competitiveness.

This research also proves that there is a convergence between product innovation and historical preservation (Ceschel et al., 2026). Innovations that prove significant are not those that change the essence, but rather those that reinvent that history for contemporary aesthetic relevance. This creates a heritage-driven innovation model, where the past (through 100-year-old earthenware artifacts, traditional batik methods, and ancient motifs) becomes the primary fuel for future design.

The rejection of the digitalization hypothesis actually provides a new contribution to the dynamic capabilities theory, where the dynamic capabilities of Tanjung Bumi artisans lie not in their fluency in managing the marketplace, but in their steadfastness in maintaining The art of slowness amidst the digital acceleration. Competitiveness arises from the paradox that Tanjung Bumi's hand drawn batik will win the global competition not because it keeps up with the digital pace, but because it offers a value that cannot be accelerated by any technology. The slow fashion paradox (Jung & Jin, 2014) provides a critical perspective on the phenomenon of digitalization, which is usually considered always profitable. We believe we have successfully identified the limits of digitalization in cultural heritage based commodities.

The final synthesis of this research confirms that the best strategy for creative industries based on traditional culture is not digital first, but rather authenticity first, digital second. Digitalization should be positioned as a window to view history, not as the primary engine driving economic value. Economic value remains deeply rooted in the craftsmanship and diligence that transcends digital time, the use of ancient Chinese Gentong artifacts in the production process, and the modification of ancient batik motifs into modern styles.

The findings of this study provide a new perspective that enriches the existing literature. The results, which demonstrate the significant influence of Product Innovation on competitiveness, align with studies (Abdullah et al., 2024) and (Hervas-Oliver et al., 2021) which state that in traditional industries, the ability to undertake incremental innovation without losing cultural identity is a key determinant of global market success. The use of a 100-year-old Chinese barrel in this study provides empirical evidence supporting the heritage based innovation theory, where historical assets serve as anchors for non replicable innovation (VRIO resources). However, the insignificance of Digitalization Strategy in this study creates an interesting academic debate with the general theory of MSME digitalization. This finding contradicts research (Williams, 2017) which states that digitalization is the primary driver of market access. On the contrary, the results of this study support the argument that in the luxury craft or slow fashion segments, excessive digitalization can actually reduce the perception of exclusivity (Zhao, 2023) . This insignificance also validates the concept of digital resistance in products with high sacred value, as previously discussed in a study of traditional Japanese textiles (Zuo, 2022). Thus, the results of this study reinforce the theoretical position that the effectiveness of digitalization is contingent; it depends on the type of product and the depth of its accompanying historical value. Primary data in the form of ancient jar artifacts from Tanjung Bumi proves that for collectors, physical provenance is far more valuable than digital presence.

CONCLUSION

This study concludes that the competitiveness of Tanjung Bumi Hand-Written Batik in the digital era is not determined by the massive use of technology platforms, but rather by the strength of product authenticity rooted in history. Empirical findings indicate that Product Innovation based on cultural heritage has a significant influence on increasing competitiveness. The success of the artisans in transforming ancient motifs born from the traditional process of soaking in Chinese jars that is more than a century old into contemporary designs is the main driver of their economic value. Conversely, Digitalization Strategy was found to have no significant direct influence on competitiveness in the context of this research sample. This phenomenon reveals a theoretical anomaly that for products with extreme sacredness and historical value (extreme slow-fashion), the presence of digital is not able to replace or add value instantly if not accompanied by market education about in-depth historical narratives.

Theoretically, this study broadens the Resource-Based View (RBV) by emphasizing that the traditional batik process using historical artifacts (ancient jars) is a strategic asset that cannot be substituted by digital technology. This study also offers a new perspective in innovation management literature that in the creative industry of hand-drawn batik, the best innovation is one that is able to maintain the integrity of tradition amidst the onslaught of modernity. Practically, this study provides input for policymakers and hand-drawn batik artisans to avoid being trapped in superficial digitalization. The main focus must remain on preserving traditional batik techniques, including the gentongan technique, and protecting existing historical artifacts. Digitalization should be directed at the functions of digital archiving and storytelling to build global consumer trust in product authenticity.

The limitations of this study lie in its limited sample size within a single geographic cluster and its focus on standard quantitative instruments. However, this research makes a unique contribution by using primary data in the form of physical evidence of ancient jars and batik cloth, which are absolute differentiators in the international market. This research confirms that in the future, the competitiveness of traditional, culture-based industries will depend heavily on the ability of industry players to align the speed of digital technology with the serenity and diligence of past traditions.

ACKNOWLEDGEMENTS

Thank you to the Directorate of Research and Community Service, Directorate General of Research and Development, Ministry of Higher Education, Science, and Technology (Kemdiktisaintek) for the funding support for the 2025 Regular Fundamental Research program entitled “Holistic Digitalization Development of the Tanjung Bumi Hand-drawn Batik Creative Economy for Accelerating Sustainable Development in the Coastal Region of Madura Island”

REFERENCES

- Abdullah, I., Al-Shorman, M., Ibrahim, M., Omar, M. H., & Ariff, A. F. (2024). PRODUCT INNOVATION, MARKETING INNOVATION AND BUSINESS PERFORMANCE RELATIONSHIP OF MALAYSIAN PRODUCT INDUSTRIES: MEDIATING EFFECT OF DESIGN MANAGEMENT. *New Design Ideas*, 8(1), 116–136. <https://doi.org/10.62476/ndi81116>
- Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. In *Journal of Management* (Vol. 17, Number 1).

- Bessiere, J. (2013). *Heritagi*. <http://journalauthors.tandf.co.uk/preparation/permission.asp>.
- Ceschel, F., Marchegiani, L., Bartoli, C., Gerardi, M. L., & Boccardelli, P. (2026). Head in the clouds, feet on the ground: navigating paradoxes in the twin transitions. *Management Decision*, 64(13), 361–383. <https://doi.org/10.1108/MD-01-2025-0157>
- Fletcher, K. (2010). Slow Fashion: An Invitation for Systems Change. *Fashion Practice*, 2(2), 259–265. <https://doi.org/10.2752/175693810x12774625387594>
- Friel, M. (2020). Crafts in the contemporary creative economy. *Aisthesis (Italy)*, 13(1), 83–90. <https://doi.org/10.13128/Aisthesis-11599>
- Ge, B., De Massis, A., & Kotlar, J. (2022). Mining the Past: History Scripting Strategies and Competitive Advantage in a Family Business. *Entrepreneurship: Theory and Practice*, 46(1), 223–251. <https://doi.org/10.1177/104225872111046547>
- Giliberto, F., & Labadi, S. (2022). Harnessing cultural heritage for sustainable development: an analysis of three internationally funded projects in MENA Countries. *International Journal of Heritage Studies*, 28(2), 133–146. <https://doi.org/10.1080/13527258.2021.1950026>
- Gutt, D., Neumann, J., Zimmermann, S., Kundisch, D., & Chen, J. (2019). Design of review systems – A strategic instrument to shape online reviewing behavior and economic outcomes. In *Journal of Strategic Information Systems* (Vol. 28, Number 2, pp. 104–117). Elsevier B.V. <https://doi.org/10.1016/j.jsis.2019.01.004>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *MULTIVARIATE DATA ANALYSIS EIGHTH EDITION*. www.cengage.com/highered
- Hervas-Oliver, J. L., di Maria, E., & Bettiol, M. (2021). Guest editorial. In *Competitiveness Review* (Vol. 31, Number 1, pp. 1–11). Emerald Group Holdings Ltd. <https://doi.org/10.1108/CR-01-2021-164>
- Jakob, D., & Thomas, N. J. (2017). Firing up craft capital: the renaissance of craft and craft policy in the United Kingdom. *International Journal of Cultural Policy*, 23(4), 495–511. <https://doi.org/10.1080/10286632.2015.1068765>
- Jung, S., & Jin, B. (2014). A theoretical investigation of slow fashion: Sustainable future of the apparel industry. *International Journal of Consumer Studies*, 38(5), 510–519. <https://doi.org/10.1111/ijcs.12127>
- Lian, Y., & Xie, J. (2024). The Evolution of Digital Cultural Heritage Research: Identifying Key Trends, Hotspots, and Challenges through Bibliometric Analysis. *Sustainability (Switzerland)*, 16(16). <https://doi.org/10.3390/su16167125>
- Quach, S., Thaichon, P., Martin, K. D., Weaven, S., & Palmatier, R. W. (2022). Digital technologies: tensions in privacy and data. *Journal of the Academy of Marketing Science*, 50(6), 1299–1323. <https://doi.org/10.1007/s11747-022-00845-y>
- Sagala, G. H., & Őri, D. (2024). Toward SMEs digital transformation success: a systematic literature review. *Information Systems and E-Business Management*, 22(4), 667–719. <https://doi.org/10.1007/s10257-024-00682-2>
- Sari, I. P. (2022). Batik Tulis Tanjung Bumi: Ciri Khas dan Potensi. *Dinamika Kerajinan Dan Batik : Majalah Ilmiah*, 39(2 Desember), 159–168. <https://doi.org/10.22322/dkb.v39i2.7086.g6092>
- Sari, I. P., & Miftah, Z. (2021). *Exploratory Research on the Myth of Batik Gentongan in Tanjung Bumi*. 512(Icoflex 2019), 36–39. <https://doi.org/10.2991/assehr.k.201230.007>
- Shafi, M., Szopik-Depczyńska, K., Cheba, K., Ciliberto, C., Depczyński, R., & Ioppolo, G. (2022). INNOVATION IN TRADITIONAL HANDICRAFT COMPANIES TOWARDS SUSTAINABLE DEVELOPMENT. A SYSTEMATIC LITERATURE REVIEW. *Technological and Economic Development of Economy*, 28(6), 1589–1621. <https://doi.org/10.3846/tede.2022.17085>
- Vial, G. (2019). *JOURNAL OF STRATEGIC INFORMATION SYSTEMS REVIEW Manuscript title: Understanding digital transformation: A review and a research agenda.*

- Williams, A. (2017). LUXURY AND ULTRA-PREMIUM SPIRITS: ENHANCING THE EXPERIENCE THROUGH STORY TELLING. In *Journal of International Marketing Strategy* (Vol. 5, Number 1).
- Zhao, Y. (2023). From Tradition to Technology: Exploring the Evolution of Luxury Retailing and the Digital Frontier. In *Business, Economics and Management EDMS* (Vol. 2023).
- Zuo, L. (2022). The Formation and Development of Japanese Craftsmanship. *Journal of Asian Research*, 6(4), p25. <https://doi.org/10.22158/jar.v6n4p25>