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The influence of Intellectual Capital, Learning Capability, and Technological Orientation on the Innovation Capability and Sustainable Competitive Advantage of Batik SMEs in Indonesia

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Abstract

In industries that produce environmental waste, concern for environmental sustainability is the main requirement to achieve business sustainability. Apart from environmental problems, in an era of increasingly fierce industrial competition, innovation capability is a factor that influences a company's competitive advantage in winning market competition. This study investigates the antecedents of innovation capabilities and sustainable competitive advantage in Batik SMEs in Indonesia. The population in this research is the small and medium-scale batik industry in the Solo Raya area. The number of samples taken was 113 respondents and determined using the purposive sampling method. The results of this study found that intellectual capital, learning ability, and technological orientation directly affect innovation ability and indirectly affect the sustainable competitive advantage of Batik SMEs in Indonesia. The ability to innovate directly influences the sustainable competitive advantage of Batik SMEs in Indonesia.

Keywords: intellectual capital; learning capability; technology orientation; innovation capability; sustainable competitive advantage

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1. Introduction

Business sustainability is a dream for all companies, whether small or large. In industries that produce environmental waste, concern for environmental sustainability is the main requirement for achieving business sustainability. Apart from environmental problems, in an era of increasingly tight industrial competition, innovation capability is a factor that influences a company's competitive advantage in winning the market competition (de Guimarães et al., 2018; Mkansi & Nsakanda, 2021).

In Indonesia, environmental pollution due to waste from small and medium-scale manufacturing industries is found in several areas that are centres of the batik textile industry. One is in the Surakarta area, which has many batik industries. Batik industry waste, in particular, pollutes rivers and water in the area. A study of data from the Ministry of Environment in the Surakarta area shows that the water quality index based on verification data shows a value of 50.98, indicating moderate conditions. Calculations based on verification data cover all monitoring locations (43 points), taking into account eight main variables (by Minister of Environment and Forestry Regulation No. 27 of 2021), namely pH, dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, solids total suspended, total phosphate, nitrate and faecal coliform. The moderate category indicates conditions that are relatively vulnerable to water quality. Vulnerable in the sense that there has not been massive pollution, but has degraded the function of surface water so that several ecosystem services can no longer be utilized. The moderate index also warns against implementing stricter efforts to protect and manage surface water quality (IKLH Report, 2022). Therefore, Batik SMEs owners need awareness and concern for environmental conditions to sustain their business in the batik industry.

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The environmental awareness and sustainability of the batik industry are predominantly influenced by the attitudes and understanding of batik artisans concerning business sustainability, particularly in relation to environmental matters. External factors also influence batik entrepreneurs' awareness, especially competitors' behaviour. The Solo Batik Small and Medium Industry (SMEs) has its strength in its product types, namely written, stamped batik, and a combination of written and stamped batik. The influx of printed batik has caused many traditional batik artisans to go bankrupt. Therefore, batik artisans in Solo must innovate and adapt to technological developments so that their businesses continue running well and sustainably.

The resource-based view posits that innovation serves as the principal source of competitive advantage in the knowledge economy (Falahat et al., 2020; Siahaan & Tan, 2020). Innovation capabilities can help companies obtain "isolation mechanisms" that protect the profits and benefits they enjoy (Ferreira et al., 2018). Innovation allows companies to create and use their capabilities to support long-term business performance (Guimarães et al., 2016). Effective innovation enables a company to enhance its competitive advantage. Consequently, innovation can impact competitive advantage and performance (Caseiro & Coelho, 2019). Siahaan and Tan (2020) asserts that innovation can be used to both products and processes. These two forms of innovation have predominated debates and empirical research due to their substantial strategic importance in conferring competitive advantages to firms.

The findings of Ferreira et al (2018) indicate that innovative capability positively and significantly influences competitive advantage and organizational performance. Innovation capabilities may generate, sustain, and enhance competitive advantage and performance (Falahat et al., 2020; Issau et al., 2022; Sellitto et al., 2020). Organizations can attain present and future competitive advantages by enhancing innovation development (de Guimarães et al., 2018).

Prior research predominantly employed the Resource-Based View (RBV) and Dynamic Capabilities (DC) frameworks to elucidate innovative capabilities and organizational performance. The theory elucidates how organizational resources and dynamic capacities distinguish company performance (Siahaan & Tan, 2020). Simultaneously, dynamic capabilities (DC) theory, an extension of RBV theory, elaborates on the processes, routines, and activities of organizational resources that can be converted into capabilities to achieve sustained competitive advantage (Eisenhardt & Martin, 2000). Utilizing the RBV and DC theories, prior studies on innovation capability demonstrate the correlation between innovation capability and intellectual capital (Yeşil & Doğan, 2019), learning capacity (Siahaan & Tan, 2020), and technological orientation (Salojärvi et al., 2015).

Based on the problems and development of previous studies' results, this study aims to investigate the antecedents of innovation capabilities and sustainable competitive advantage in Batik SMEs in Indonesia. This research develops previous research models so that it can contribute to better theory.

2. Literature Review

2.1. Intellectual Capital, Innovation Capability, and Sustainable Competitive Advantage

Intellectual capital (IC) comprises the knowledge generated and utilized by a corporation to secure a competitive advantage (Subramaniam & Youndt, 2005). To cultivate innovation skills, firms must use their knowledge resources, integrating them throughout the company and deriving them from human capital, social capital, and organizational capital (Siahaan & Tan, 2020). Human capital comprises the skills and knowledge possessed by a company's personnel (Subramaniam & Youndt, 2005). Siahaan and Tan (2020) propose that distinctive ideas derived from employees, interactions with various stakeholders, and organizational expertise enable firms to gain diverse views for enhancing services.

The second component of IC is social capital, characterized as the knowledge and skills derived from a company's interpersonal network (Nahapiet & Ghoshal, 1998). Venturelli et al. (2022) assert that innovative capacities necessitate collaborations. In this context, social capital is crucial for developing innovation capacities, as social networks facilitate the assimilation of external knowledge necessary for creating creative products and services. The concluding component of IC is organizational capital. This category of capital pertains to any knowledge that is recorded and systematized in databases, manuals, formal frameworks, or procedures (Caseiro & Coelho, 2019). Moreover, it arises from the synchronized efforts of both parties in regular innovation endeavors. The amalgamation of knowledge and synchronized action enables firms to analyze, learn, and address potential future actions that may be required. Regarding innovation skills and corporate performance, organizations require knowledge retained within their systems, structures, and processes (Siahaan & Tan, 2020). Consequently, a hypothesis is proposed:

H1. Intellectual capital has a positive and significant effect on innovation capability.
H2. Innovation capability mediates the influence of intellectual capital on sustainable competitive advantage.

2.2. Learning Capability, Innovation Capability, and Sustainable Competitive Advantage

Learning capability is defined as "organizational and managerial characteristics that facilitate organizational learning processes or enable organizations to learn" (Siahaan & Tan, 2020). This enables organizations to adjust to environmental fluctuations and market unpredictability, including customer needs, erratic competition, or technological advancements in the development of new products or services (Alegre & Chiva, 2008).

Organizations must cultivate learning capacities to enhance knowledge development, dissemination, and application. This technique enhances creativity and knowledge by gathering, disseminating, and utilizing employee expertise (Alegre & Chiva, 2008). These concepts arise from informal employee interactions, fostering an environment that stimulates corporate creativity (Siahaan & Tan, 2020). Companies with superior learning capacities possess enhanced opportunities to recognize, utilize, and adjust to swiftly evolving settings (Siahaan & Tan, 2020). In this context, learning capabilities are regarded as a catalyst that enhances organizational performance and the capacity to provide superior solutions for the company's sustainability and growth in the future. Learning capabilities empower organizations to acquire, communicate, and utilize knowledge and information generated internally. Consequently, firms that can produce and assimilate novel knowledge through diverse methodologies might enhance their operational performance. These advantages arise from learning skills, which can enhance a company's innovation potential and elevate overall performance (Guinot et al., 2020). Consequently, the subsequent hypothesis is posited:

H3. Learning ability has a positive and significant effect on innovation ability.
H4. Innovation ability mediates the influence of learning ability on sustainable competitive advantage.

2.3. Technology Orientation, Innovation Capability, and Sustainable Competitive Advantage

Technology orientation refers to a company's capacity and commitment to acquire and utilize technology expertise in delivering exceptional products and services that fulfill consumer requirements. Organizations can leverage their technical expertise to deliver superior technological solutions that satisfy consumer requirements (Salojärvi et al., 2015). Companies with technological proficiency has a more robust basis for innovative skills (Wu et al., 2020). Siahaan and Tan (2020) assert that enhancing technological capabilities will augment companies' capacity for innovation. This design was selected for this research because, propelled by technological advancements, firms can enhance their ability to establish unique competition and difficult-to-replicate advantages by delivering optimal solutions to their consumers (Wu et al., 2020). In a competitive business landscape, it is essential to cultivate an organizational culture that embraces the adoption and dissemination of new technology. Entities possessing a technology culture allocate resources for research and development and engage technologically proficient personnel to foster learning and creativity (Salisu & Abu Bakar, 2020).

Salisu and Abu Bakar (2020) indicates that firms emphasizing technology are likely to cultivate synergistic connections between new goods and markets. Individuals who cultivate a technical focus enhance prospects for superior performance and competitive advantage. These companies can create advances in existing markets or leverage technology to discover new ones. Consequently, innovation aptitude is regarded as a mediator in the relationship between technology orientation and sustainable competitive advantage (Nunes et al., 2022). A hypothesis is so proposed:

H5. Technology orientation has a positive and significant effect on innovation capability.
H6. Innovation capability mediates the influence of technological orientation on sustainable competitive advantage.

2.4. Innovation capabilities and sustainable competitive advantage (SCA)

Parkman and Holloway (2012) found that the innovation capabilities of architectural companies in the creative industry could positively and significantly influence the success of a product produced by the company and its competitive advantage. Old and new businesses in the United States need innovation as a vital tool in improving the performance of a company's products (Lewrick, 2010). Organizations that have enhanced their innovation capabilities can effectively augment their business growth. Chaston and Scott (2016) discovered that a Peruvian company's product performance improves when the company incorporates innovation and learning, since firms that adopt innovation are thought to prolong their product life cycles.

Ongoing innovation can enhance an organization's competitive advantage as sustainability has elevated the company's standing among stakeholders. Veronica et al. (2019) assert that corporate operations contribute to numerous environmental and societal issues; thus, the emphasis on sustainability is crucial. Venturelli et al. (2022) assert that a singular idea of sustainable innovation is absent, highlighting the challenges in defining sustainability and sustainable development. Nonetheless, despite these conceptual challenges, there is a growing acknowledgment that sustainable innovation is associated with entrepreneurship, novel concepts, technologies, products and services, as well as the implementation of new processes and social systems.

The authors emphasize that, although sustainable innovation and eco-innovation are often seen as equivalent, eco-innovation exclusively relates to environmental and economic dimensions. Sustainable innovation simultaneously includes ethical and social concerns. Venturelli et al. (2022) contend that sustainable innovation involves the establishment of new entities that improve performance in the three dimensions of sustainable development: social, environmental, and economic. These enhancements transcend technological advancements; they include alterations in procedures, operational methodologies, business models, philosophies, and organizational structures. According to the empirical evidence provided, a hypothesis can be formulated as follows:

H7. Innovation capability has a positive effect on sustainable competitive advantage.

3. Research Method and Materials

3.1. Sample and Data Collection Techniques

The population in this research is the small and medium-scale batik industry in the Solo Raya area. Based on data from the Department of Industry and Trade, the number of Batik SMEs in the Greater Solo is 599 Batik entrepreneurs spread across five Greater Solo areas. The number of samples taken was 113 respondents, and the results were determined using the purposive sampling method. The criteria used are that Batik IKM has been operating for over five years. The instrument used to collect data in this research was a questionnaire.

3.2. Variable Measurement

Sustainable Competitive Advantage (SCA) is assessed by comparing key rivals in terms of income generated from new products/services, operational expenditures, profitability of innovation, and the incorporation of environmental and social principles in the creation and provision of new products/services (Guimarães et al., 2016; Tan et al., 2015). Innovation capability is SMEs' ability to develop innovation in their company. Dimensions of innovation capability include customer focus, marketing focus, and technology focus (Alos-Simo et al., 2020; Ferreira et al., 2018; Sellitto et al., 2020).

The intellectual capital measurement scale was derived from the study by Subramaniam and Youndt (2005), encompassing human, social, and organizational capital (Aramburu et al., 2015). Moreover, learning ability is assessed by five dimensions established by Alegre and Chiva (2008), which include indications of external environmental contact, experimentation, discussion, decision-making participation, and risk-taking. The assessment of technology orientation utilized a scale modified from Siahaan and Tan (2020). All variable indicators in this study employ a Likert scale (Strongly Disagree = 1, Strongly Agree = 5).

3.3. Data analysis

The data analysis of this study included structural equation modeling (PLS-SEM). This multivariate statistical study concurrently assesses the impact of factors for the purposes of predictive studies, exploration, or the formulation of structural models (Hair et al., 2018). Model evaluation in PLS encompasses the assessment of the measurement model, the structural model, and the evaluation of model goodness and fit.

4. Results and Discussion

4.1. Evaluation of Measurement Models

Hair et al. (2018) asserted that the assessment of the reflective measurement model encompasses construct validity and reliability. In addition to the evaluation of discriminant validity. The outcomes of the construct validity and reliability assessments for each variable are detailed on Table 1.

Table 1. Construct Validity and Reliability

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
IC	0.944	0.953	0.696
IN	0.968	0.972	0.797
LC	0.919	0.931	0.506
SCA	0.903	0.926	0.716
TO	0.905	0.917	0.577

Table 1 demonstrates that all variable factor loading values are over 0.70, indicating valid measurement items. Cornbach's alpha > 0.5 and composite reliability > 0.70 suggest suitable variable reliability. Good convergent validity is indicated by an AVE value > 0.50.

Table 2. Heterotrait-Monotrait Ratio (HTMT)

	IC	IN	LC	SCA	TO
IC					
IN	0.610				
LC	0.541	0.595			
SCA	0.513	0.499	0.683		
TO	0.102	0.236	0.188	0.176	

Hair et al. (2018) advocate HTMT because it detects discriminant validity more accurately. Recommended is below 0.90. Test findings reveal discriminant validity because the variable pair's HTMT is below 0.90. These results suggest that measuring the variable increases its potency more than dividing the variance into other variables.

4.2. Structural Model Evaluation

The evaluation of the structural model has three stages: initially, assessing the lack of multicollinearity among variables and the internal VIF (Variance Inflation Factor) metric. Inner VIF values under 5 signify the absence of multicollinearity among variables. The second stage involves evaluating hypotheses between variables by examining the statistical t-value or p-value (Hair et al., 2018).

Table 3. Inner VIF

	IN	SCA
IC	1.277	
IN		1.000
LC	1.307	
SCA		
TO	1.027	

The assessment outcomes of the measurement model reveal that the inner VIF values among variables are below 5, signifying the absence of multicollinearity or a low degree of multicollinearity among the variables. These findings demonstrate that the parameter estimation outcomes in SEM PLS are robust and unbiased.

Table 4. Hypothesis Testing

Hypothesis	Path	B	SD	T	P Values
H1	IC -> IN	0.414	0.096	4.317	0.000
H2	IC -> IN -> SCA	0.209	0.062	3.372	0.001
H3	LC -> IN	0.377	0.090	4.202	0.000
H4	LC -> IN -> SCA	0.191	0.052	3.689	0.000
H5	TO -> IN	0.167	0.062	2.693	0.007
H6	TO -> IN -> SCA	0.084	0.034	2.485	0.013
H7	IN -> SCA	0.506	0.072	7.045	0.000

The test results in Table 4 confirm that all the hypotheses proposed can be accepted, Because it has a p value below 0.05.

4.3. Evaluation of Model Goodness and Fit

PLS is a variance-based structural equation modeling approach used to evaluate theoretical models, emphasizing predictive research. Consequently, various metrics were established to affirm the acceptability of the suggested model, including R square (Hair et al., 2018).

Table 5. R Square Value

	R Square	R Square Adjusted
IN	0.514	0.500
SCA	0.256	0.249

R Square quantifies the extent of variance in endogenous variables that may be elucidated by other exogenous or endogenous factors within the model. Chin (1998) states that the qualitative interpretation of R square values is as follows: 0.19 indicates low influence, 0.33 signifies moderate influence, and 0.66 represents significant effect. The processing findings indicate that the combined effect of intellectual capital, learning capability, and technology orientation on innovation capability is 0.514, or 51.4%, signifying a moderate influence. The impact of innovation capabilities on sustainable competitive advantage is 25.6% (low influence).

4.4. Mediation Analysis

The results of the mediation analysis can be seen in Table 6.

Table 6. Mediation Analysis

Indirect Path	B	Mean	SD	T	P
IC -> IN -> SCA	0.209	0.215	0.062	3.372	0.001
LC -> IN -> SCA	0.191	0.193	0.052	3.689	0.000
TO -> IN -> SCA	0.084	0.090	0.034	2.485	0.013

Table 6 shows that the mediating influence of innovation capability on the relationship between intellectual capital and sustainable competitive advantage is in the high category, shown by the path coefficient value of 0.209 (p-value = 0.001). Innovation capability mediates the high category's relationship between learning capability and sustainable competitive advantage (p-value = 0.000). Meanwhile, the mediating influence of innovation capability on the relationship between technology orientation and sustainable competitive advantage is in the medium category with a path coefficient of 0.084 (p-value 0.013).

4.5. Discussion

4.5.1. Intellectual Capital and Innovation Capability

Research indicates that intellectual capital substantially influences the innovation capacity of Batik SMEs. The significance of intellectual capital in elucidating creative capacities aligns with prior studies (Aramburu et al., 2015). Batik SMEs require insights from their intellectual capital assets to foster innovation. Insights derived from employees and networks integrated within an organization's framework or culture are utilized to enhance marketing initiatives, technological competencies, and client-centric tactics, so augmenting their products and services relative to competitors. Consequently, innovative capabilities convert organizational assets into a more resilient flow, enabling small SMEs to navigate strong competition, unpredictability, and enhance product and service life cycles.

The findings of this study corroborate the assertion that, to cultivate innovation capabilities, companies must leverage their knowledge resources, which should be integrated within the organization and derived from human capital, social capital, and organizational capital (Siahaan & Tan, 2020). Teece, 2007. Human capital comprises the skills, knowledge, and expertise possessed by a company's personnel (Subramaniam & Youndt, 2005). Siahaan and Tan (2020) propose that distinctive insights derived from employees, interactions with various stakeholders (such as employees and clients), and organizational expertise enable firms to provide diverse views for service enhancement.

4.5.2. Learning Capability and Innovation Capability

The findings of this study indicate that learning capacity exerts a favorable and substantial influence on innovative capability. Organizations can cultivate the most sophisticated technology in the sector when they possess learning skills (Alegre & Chiva, 2008). The capacity of a corporation to gather, analyze, and convert information and knowledge both internally and externally is crucial for innovation. Organizations possessing learning capabilities exhibit greater adaptability and responsiveness to client expectations. The results indicate that batik SMEs may provide superior innovative products and services more efficiently than their competitors. This addresses market difficulties by delivering superior products or services, thereby enhancing firm success. The findings of this study corroborate the research by Siahaan and Tan (2020), which identified a substantial impact of learning ability on a company's capacity for innovation.

4.5.3. Technology Orientation and Innovation Capability

The research findings indicate that technological orientation has a substantial impact on innovative capability. Technology-focused Batik SMEs has advanced technological competencies in the production and marketing of new products. Technology orientation refers to a company's capacity and commitment to acquire and utilize technology expertise in delivering exceptional products and services to satisfy client demands. This perspective enables organizations to leverage their technical expertise to deliver superior technological solutions that fulfill client requirements (Salojärvi et al., 2015). Companies with technological proficiency has a more robust basis for innovative skills (Wu et al., 2020). The findings of this study corroborate the research by Salisu & Abu Bakar (2020), which indicated that firms with a pronounced emphasis on technology are inclined to cultivate synergistic links between new products and markets. This indicates that batik SMEs with a technological orientation enhance their prospects for performance improvement and competitive advantage. These small SMEs can innovate inside the existing industry or leverage technology to discover new markets.

4.5.4. Innovation capability and sustainable competitive advantage (SCA)

A method to confront competition is via product innovation (Algarni et al., 2023). Innovation entails analyzing consumer behavior to identify and fulfill customer needs through the introduction of new products, developing innovations to secure a strategic market position, and withstanding competitive pressures, all aimed at satisfying market demand (Algarni et al., 2023; Ferreira et al., 2018). Consequently, it might serve as a competitive advantage for enterprises. Consequently, organizations must deliver novel concepts, ideas, and unique products (Issau et al., 2022; Padilla-Lozano & Collazzo, 2022). This innovation represents value generated by a business that customers can consistently utilize as a sustainable competitive advantage to address customer inquiries and grievances related to product quality, customer requirements, the introduction of new markets, and the presence of enduring product innovation (Ferreira et al., 2018; Issau et al., 2022).

The results of this study show that innovation capability has a positive and significant effect on sustainable competitive advantage. The positive influence shows that the better the innovation ability of the batik industry SMEs, the more sustainable competitive advantage the SMEs will have. Respondents' perceptions of innovation capabilities are categorized as good, meaning that SMEs in the batik industry have good innovation capabilities but must improve them. This study supports several previous studies, such as Ferreira et al. (2018), who found that architectural companies' innovation capabilities in the creative industry could positively and significantly influence the success of a product produced by the company and its competitive advantage. Sustainable innovation can contribute to an organization's competitive advantage because sustainability has brought the company to a prominent position before stakeholders (Algarni et al., 2023; Alos-Simo et al., 2020). Within the scope of this research, innovation capability pertains to indicators of product services that surpass those of competitors, addressing client issues in a highly innovative manner, offering novel ideas and solutions to clients, exploring new methods to tackle challenges, creating "industry-revolutionizing" marketing programs for services/products, embracing new marketing strategies, innovating marketing initiatives, executing cutting-edge marketing programs, advancing with new software, integrating new technologies, introducing comprehensive systems and technologies, and adopting the latest advancements in the batik industry. Effective implementation of these metrics would enhance sustained competitive advantage.

5. Conclusion

The results of this study found that intellectual capital, learning ability, and technological orientation directly affect innovation ability and indirectly affect the sustainable competitive advantage of Batik SMEs in Indonesia. The ability to innovate directly influences the sustainable competitive advantage of Batik SMEs in Indonesia.

This research has several limitations: First, the scope of the study is limited to the Greater Solo area, which impacts the model's generalization. Second, this study only uses a questionnaire as a data collection tool so that it can cause an element of subjectivity in the respondents' answers. Due to these limitations, it is recommended that future research expand the research object to generalize the research results. Then, the interview method or direct observation of respondents will be used to complete the questionnaire results so that there is no bias in the respondents' answers through the questionnaire.

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