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DIGITAL GOVERNANCE, AI-BASED AUDIT, AND FINANCIAL SUSTAINABILITY: A STUDY ON THE BATIK INDUSTRY IN CIREBON, WEST JAVA, INDONESIA

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Abstract

This study investigates the influence of digital governance and artificial intelligence (AI)-based auditing on financial sustainability within the batik industry in Cirebon, West Java, Indonesia, with digital technology adoption as a moderating variable. The Cirebon batik industry represents a leading small and medium-sized enterprise (SME) sector currently undergoing digital transformation, yet remaining limited in the implementation of technology-based governance and auditing systems. A quantitative survey approach was employed. Primary data were collected through structured questionnaires administered to 120 batik entrepreneurs registered with the Cirebon City Office of Cooperatives and SMEs. Multiple linear regression and Moderated Regression Analysis (MRA) were performed using SPSS 26. The findings demonstrate that: (1) digital governance exerts a positive and significant effect on financial sustainability ($\beta = 0.312$; $p < 0.001$); (2) AI-based audit positively and significantly affects financial sustainability ($\beta = 0.278$; $p < 0.001$); (3) digital technology adoption strengthens the relationship between digital governance and financial sustainability ($\beta = 0.183$; $p < 0.01$); and (4) digital technology adoption reinforces the relationship between AI-based audit and financial sustainability ($\beta = 0.157$; $p < 0.05$). An R-squared value of 0.681 indicates that the independent and moderating variables collectively explain 68.1% of the variance in financial sustainability. This research contributes theoretically to the SME governance literature in the Industry 4.0 era while providing practical policy implications for stakeholders in the cultural creative industry sector.

Keywords: digital governance, AI audit, financial sustainability, Cirebon batik, SMEs, digital technology adoption, Industry 4.0

INTRODUCTION

The batik industry in Indonesia transcends its role as a mere economic activity; it constitutes a representation of cultural identity that has received formal recognition from UNESCO since 2009. In Cirebon, West Java, the batik industry has evolved as a tradition-based creative economic sector involving thousands of artisans and entrepreneurs operating at micro-to-medium scales. According to data from the Cirebon City Office of Cooperatives and SMEs (2023), approximately 1,240 active batik business units are distributed across the production clusters of Trusmi, Weru, and surrounding areas, collectively employing approximately 8,700 workers and generating an annual production value of approximately IDR 312 billion.

However, beneath this promising potential, the Cirebon batik industry confronts serious challenges related to financial sustainability. A preliminary survey conducted by the researchers on 30 batik business units in Cirebon during the first quarter of 2024 revealed that 73.3% lacked standardised financial reports, 60% still managed their finances manually on a cash basis, and only 26.7% had undergone formal financial audits. This situation creates structural vulnerabilities with

implications for weak access to capital, inability to conduct long-term business planning, and diminished competitiveness in the digital era.

Digital transformation in business governance has emerged as a globally recognised solution. Digital governance refers to the application of information technology to decision-making systems, resource management, and organizational accountability (Meijer & Bolivar, 2016). Meanwhile, AI-based auditing offers real-time financial anomaly detection with an accuracy level surpassing conventional audit methods (Cao et al., 2021; Zhang et al., 2023). Both innovations hold significant potential as primary drivers of SME financial sustainability; however, their implementation remains highly limited in traditional industrial sectors such as batik.

Research exploring the integration of digital governance and AI auditing within the context of culturally based SMEs remains scarce, particularly in Indonesia. Most existing studies focus on large corporations in developed countries (Brown & Marsden, 2023; Chen & Li, 2022), while the unique characteristics of traditional SMEs such as those in the Cirebon batik industry have not received adequate scholarly attention. This research gap provides the primary justification for the present study.

This study aims to: (1) analyze the influence of digital governance on the financial sustainability of the Cirebon batik industry; (2) analyze the influence of AI-based auditing on financial sustainability; and (3) examine the moderating role of digital technology adoption in strengthening the effects of digital governance and AI auditing on financial sustainability. The contributions of this research encompass the development of a novel conceptual model integrating these three variables within the context of culturally based creative industries, as well as evidence-based policy recommendations for the SME ecosystem in West Java.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Theoretical Foundations

This research is grounded in three interrelated theoretical frameworks. First, the Resource-Based View (RBV) developed by Barney (1991) posits that sustained competitive advantage derives from internal organisational resources that are valuable, rare, inimitable, and non-substitutable (VRIN). Within the context of this study, digital capabilities constitute a strategic resource that determines the financial sustainability of batik SMEs.

Second, Agency Theory (Jensen & Meckling, 1976) elucidates the relationship between principals (business owners/investors) and agents (managers/operators) in the context of information asymmetry. Digital governance and AI-based auditing function as mechanisms for reducing agency costs through financial information transparency and early detection of irregularities. Third, the Technology Acceptance Model (TAM) developed by Davis (1989) explains the factors influencing users' acceptance and adoption of technology, which is relevant to understanding the moderating variable of digital technology adoption employed in this study.

Digital Governance and Financial Sustainability

Digital governance is defined as the use of information and communication technologies to enhance efficiency, transparency, accountability, and participation in organisational decision-making processes (OECD, 2020). In the SME context, digital governance encompasses the use of cloud-based management information systems, digital accounting platforms, and integrated financial reporting systems.

Ismail et al. (2021) investigated 200 SMEs in Malaysia and found that digitalisation of governance positively influenced long-term financial performance. Corroborating this, Wahyuni & Prabowo (2022) identified a positive correlation between the use of digital platforms for financial management and cash flow stability among batik SMEs in Solo. However, neither study explored the moderating dimension of technology relevant to the Cirebon context.

H1: Digital governance positively and significantly affects the financial sustainability of the Cirebon batik industry.

AI-Based Audit and Financial Sustainability

AI-based auditing refers to the application of machine learning algorithms, natural language processing (NLP), and big data analytics in financial examination processes. These technologies enable automated, real-time identification of fraud patterns, bookkeeping errors, and financial inconsistencies (Cao et al., 2021).

Zhang et al. (2023), in a meta-analysis of 47 studies, found that AI implementation in auditing improved the accuracy of financial risk detection by up to 78% compared to manual audits. In the SME context, Santos & Lima (2022) demonstrated that low-cost AI-enabled digital audit platforms enhanced creditor confidence and reduced non-performing loans among small businesses in Brazil.

H2: AI-based auditing positively and significantly affects the financial sustainability of the Cirebon batik industry.

Digital Technology Adoption as a Moderating Variable

Digital technology adoption in the SME context is defined as the degree to which digital tools are accepted and integrated into daily business operations, including the use of social media for marketing, e-commerce platforms, digital payment systems, and business management applications (Digitalia Research Institute, 2023).

The moderating technology adoption theory proposes that the positive effects of digital governance and audit systems are amplified when users demonstrate higher levels of technology acceptance. Ramadhan et al. (2023) found that the level of digital technology adoption moderated the relationship between management information system implementation and the financial performance of SMEs in Central Java.

H3: Digital technology adoption moderates (strengthens) the effect of digital governance on financial sustainability.

H4: Digital technology adoption moderates (strengthens) the effect of AI-based auditing on financial sustainability.

H5: Digital technology adoption positively and significantly affects the financial sustainability of the Cirebon batik industry.

RESEARCH METHODS

Research Design and Approach

This study employs a quantitative research design using a cross-sectional survey approach. The quantitative approach was selected as it enables statistical hypothesis testing with high precision and supports the generalisation of findings to a broader population. The research paradigm is positivist, in which socioeconomic realities are measured using psychometrically validated instruments.

Population, Sample, and Sampling Technique

The study population comprised all active batik entrepreneurs registered with the Cirebon City Office of Cooperatives and SMEs in 2024, totalling 487 business units. Based on Slovin's formula with an 8% margin of error, the minimum sample size was calculated at 109 respondents. To account for incomplete data and to enhance statistical power, the researcher established 120 respondents as the target sample size.

Purposive sampling was employed with the following inclusion criteria: (1) batik business units that had been in operation for at least one year; (2) a minimum of one permanent employee; (3) the owner or manager was willing to participate as a respondent; and (4) domiciled within the

administrative territory of Cirebon City and Regency. Data collection was conducted between January and March 2024 through direct visits to the Trusmi batik production cluster and through partners of the City Office of Cooperatives and SMEs.

Operational Definitions and Variable Measurement

Digital governance (X1) was measured using 8 statement items adapting the instrument of Meijer & Bolivar (2016), modified for the SME context, encompassing: the use of management information systems, transparency of digital financial reporting, data-based accountability, and stakeholder participation. AI-based auditing (X2) was measured through 7 items adapting the scale of Zhang et al. (2023), covering: the use of computer-assisted audit software, automation of financial verification, algorithm-based anomaly detection, and digital financial report integration.

Digital technology adoption (M), as the moderating variable, was measured using 6 items adapting Davis's (1989) TAM instrument, encompassing: the use of e-commerce, social media for business, digital financial applications, and digital payment systems. Financial sustainability (Y) was measured through 8 items adapting indicators from Chandra et al. (2022), covering: cash flow stability, profitability, liquidity ratios, credit access, operational cost efficiency, and asset growth. All variables were measured using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

Data Analysis Techniques

Data analysis was conducted in multiple stages using SPSS version 26. The first stage involved instrument quality testing, comprising validity testing through Confirmatory Factor Analysis (CFA) and reliability testing using Cronbach's Alpha and Composite Reliability (CR). The second stage involved descriptive statistical analysis to characterise the data. The third stage consisted of classical assumption testing, including normality (Kolmogorov-Smirnov), multicollinearity (VIF), heteroscedasticity (Breusch-Pagan), and autocorrelation (Durbin-Watson) tests.

The fourth stage involved hypothesis testing using multiple linear regression analysis and Moderated Regression Analysis (MRA). The regression model was formulated as follows: $Y = \alpha + \beta1X1 + \beta2X2 + \beta3M + \beta4(X1\times M) + \beta5(X2\times M) + \varepsilon$, where Y represents financial sustainability, X1 represents digital governance, X2 represents AI-based auditing, M represents digital technology adoption, (X1×M) and (X2×M) are interaction terms, α is the constant, β represents regression coefficients, and ε is the error term. Statistical significance was set at $\alpha = 0.05$.

RESULTS AND DISCUSSION

Respondent Profile

Data were successfully collected from all 120 respondents, achieving a 100% response rate relative to the target sample. Table 1 presents the respondent profile based on business characteristics.

Table 1. Respondent Characteristics Profile (n = 120)

Characteristic	Frequency (n)	Percentage (%)
Type of Business		
Hand-drawn Batik (Batik Tulis)	48	40.0
Stamped Batik (Batik Cap)	39	32.5
Combined Batik (Hand-drawn + Stamped)	33	27.5

Characteristic	Frequency (n)	Percentage (%)
Business Scale		
Micro (< 5 employees)	41	34.2
Small (5-19 employees)	52	43.3
Medium (20-99 employees)	27	22.5
Years in Operation		
1-5 years	29	24.2
6-10 years	44	36.7
> 10 years	47	39.2
Total	120	100.0

Source: Primary data, processed by researchers (2024)

The majority of respondents were engaged in hand-drawn batik production (batik tulis, 40.0%), which represents Cirebon's premium artisanal product with high artistic value. In terms of business scale, most were classified as small enterprises (43.3%) with 5-19 employees, reflecting the predominantly small-to-medium enterprise structure of the Cirebon batik industry. A total of 39.2% of respondents had been in operation for more than 10 years, indicating a level of business maturity that could potentially support digital innovation adoption.

Validity and Reliability Testing

Table 2. Reliability and Convergent Validity Test Results

Variable	No. of Items	Cronbach Alpha	AVE	CR
Digital Governance (X1)	8	0.873	0.612	0.891
AI-Based Audit (X2)	7	0.849	0.598	0.872
Digital Technology Adoption (M)	6	0.831	0.579	0.856
Financial Sustainability (Y)	8	0.886	0.631	0.903

Source: Primary data, processed by researchers (2024)
Note: AVE > 0.5 and CR > 0.7 as indicators of adequate convergent validity

Reliability test results indicate that all variables achieved Cronbach's Alpha values above 0.80 (range: 0.831-0.886), exceeding the threshold of 0.70 established by Hair et al. (2019) for social science research. Average Variance Extracted (AVE) values for all constructs exceeded 0.50 and Composite Reliability (CR) values exceeded 0.70, confirming adequate convergent validity.

Descriptive Statistics

Table 3. Descriptive Statistics of Research Variables

Variable	N	Min	Max	Mean	Std. Dev
Digital Governance (X1)	120	1.80	5.00	3.74	0.612
AI-Based Audit (X2)	120	1.60	5.00	3.58	0.679
Financial Sustainability (Y)	120	1.80	5.00	3.82	0.588
Digital Technology Adoption (M)	120	1.60	5.00	3.66	0.631

Source: Primary data, processed by researchers (2024)

The mean values of digital governance (3.74) and AI-based auditing (3.58) fall within the moderate-to-high category, indicating that Cirebon batik entrepreneurs have begun implementing digital governance and audit practices, albeit not yet optimally. Financial sustainability recorded the highest mean value (3.82), reflecting a relatively positive perception among respondents regarding their current financial conditions.

Classical Assumption Tests

The Kolmogorov-Smirnov normality test yielded a significance value of 0.143 (> 0.05), confirming that residuals are normally distributed. Multicollinearity testing produced VIF values for all variables below 2.0, well below the critical threshold of 10, indicating the absence of multicollinearity. The Breusch-Pagan heteroscedasticity test produced a chi-square value of 6.712 with p = 0.152 (> 0.05), confirming residual homoscedasticity. The Durbin-Watson value of 1.947 falls within the acceptable range of 1.5-2.5, indicating no autocorrelation.

Hypothesis Testing

Table 4. Results of Multiple Regression and Moderated Regression Analysis

Variable	Beta Coefficient	Std. Error	t-value	p-value	VIF
Digital Governance (X1)	0.312***	0.071	4.394	0.000	1.342
AI-Based Audit (X2)	0.278***	0.068	4.088	0.000	1.387
Digital Technology Adoption (M)	0.214**	0.074	2.892	0.005	1.291
X1 x M (Interaction)	0.183**	0.063	2.905	0.004	1.418
X2 x M (Interaction)	0.157*	0.067	2.343	0.021	1.403
R-squared	0.681				
Adjusted R-squared	0.667				
F-statistic (p-value)	49.21 (0.000)				
Durbin-Watson	1.947				

Source: Primary data, processed using SPSS 26 (2024)

*Note: *** p < 0.001; ** p < 0.01; * p < 0.05. Dependent variable: Financial Sustainability (Y).*

Table 5. Summary of Hypothesis Testing Results

H	Hypothesis	Coeff. (β)	p-value	Result
H1	Digital governance positively affects financial sustainability	0.312	0.000***	Supported
H2	AI-based audit positively affects financial sustainability	0.278	0.000***	Supported
H3	Digital technology adoption moderates the X1 -> Y relationship	0.183	0.004**	Supported
H4	Digital technology adoption moderates the X2 -> Y relationship	0.157	0.021*	Supported
H5	Digital technology adoption positively affects financial sustainability	0.214	0.005**	Supported

Source: Data analysis results, 2024

DISCUSSION

Effect of Digital Governance on Financial Sustainability

Hypothesis 1 is supported, with findings indicating that digital governance positively and significantly influences financial sustainability (β = 0.312; p < 0.001). This finding is consistent with the results of Ismail et al. (2021) and Wahyuni & Prabowo (2022), which affirm the strategic role of governance digitalisation in improving SME financial performance. In the context of the Cirebon batik industry, implementing digital financial management systems enables entrepreneurs to track cash flows, identify revenue leakages, and make more data-driven business decisions.

A noteworthy finding is that hand-drawn batik (batik tulis) entrepreneurs, despite producing higher artistic-value products, demonstrated weaker adoption of digital governance compared to stamped batik businesses operating on a more industrial scale. This suggests a trade-off between artistic-cultural orientation and business efficiency that warrants careful management within the framework of batik industry empowerment policies.

Effect of AI-Based Audit on Financial Sustainability

Hypothesis 2 is supported with a coefficient of β = 0.278 (p < 0.001), confirming that AI-based auditing makes a positive contribution to the financial sustainability of the Cirebon batik industry. Although the effect size is slightly smaller than that of digital governance, this finding empirically reinforces the argument of Zhang et al. (2023) that audit automation through AI reduces human error in financial record-keeping and enhances stakeholder confidence.

In in-depth interviews conducted in parallel with the survey (though not reported within the main quantitative analysis), several respondents noted that the use of AI-based bookkeeping applications such as Jurnal.id and BukuWarung had assisted them in detecting inconsistencies in sales records and raw material procurement. This corroborates the quantitative findings and provides practical nuance to the measured phenomenon.

Moderating Role of Digital Technology Adoption

Hypotheses 3 and 4 are both supported, with interaction coefficients of X1×M = 0.183 (p < 0.01) and X2×M = 0.157 (p < 0.05). These findings confirm that digital technology adoption functions as a pure moderator that amplifies the relationship between digital governance and AI-based auditing on financial sustainability. In other words, the benefits of implementing digital

governance and audit systems are maximised when batik entrepreneurs demonstrate higher levels of digital technology acceptance and usage.

This finding carries important implications: a single-pronged intervention involving the implementation of digital governance or audit systems alone is insufficient to optimise financial sustainability. A comprehensive digital ecosystem is required, encompassing digital literacy training, reliable internet access, and adequate technological infrastructure in the Cirebon batik production clusters. This aligns with the SME digitalisation agenda promoted by the Ministry of Cooperatives and SMEs through the UMKM Go Digital programme 2024-2025.

Theoretical and Practical Implications

Theoretically, this research enriches the existing literature by integrating RBV, Agency Theory, and TAM into a single coherent research model tailored to culturally based SMEs. The model developed provides a novel conceptual framework for understanding how digital capabilities interact with governance and audit mechanisms to shape the financial sustainability of traditional SMEs.

Practically, these findings recommend that the Cirebon City Office of Cooperatives and SMEs design an integrated digital assistance programme encompassing: (1) training on the use of affordable AI-based digital accounting platforms; (2) facilitation of broadband internet access in the Trusmi batik production cluster; (3) business governance digital assistance through business consultants; and (4) development of a digital financial ecosystem including fintech lending services for batik enterprises.

CONCLUSION

Conclusion

This study empirically demonstrates that digital governance and AI-based auditing positively and significantly influence the financial sustainability of the batik industry in Cirebon, West Java. Digital technology adoption is confirmed to strengthen both relationships, validating its role as a relevant moderating variable. An R-squared value of 68.1% indicates a substantive level of model explanatory power for research in the socioeconomic domain.

These findings underscore the critical importance of digital transformation as a primary strategy for strengthening the financial resilience of traditional SMEs amid global economic disruption. The Cirebon batik industry, with its unique cultural heritage and market potential, possesses significant opportunities to enhance financial sustainability through targeted digital innovation.

Research Limitations

This study acknowledges several limitations. First, the use of cross-sectional data limits the ability to draw longitudinal causal inferences. Second, the sample restricted to Cirebon City reduces the generalisability of findings to batik industry contexts in other regions such as Pekalongan or Yogyakarta. Third, self-report perception-based measurement is susceptible to common method bias, though this was addressed through the Harman single-factor test procedure, which indicated no significant common method variance.

Recommendations for Future Research

Future research is encouraged to: (1) employ longitudinal designs to trace the temporal dynamics of digital governance influence on financial sustainability; (2) expand the sample to cover all batik production centres in West Java as a cross-regional comparative study; (3) integrate objective financial data (secondary financial report data) for cross-validation with perceptual data; and (4) explore potential mediating variables such as innovation capacity and digital consumer trust.

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