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HOW DOES ADAPTIVE SOCIO-CULTURAL DIGITAL INNOVATION MODEL INFLUENCE CULTURAL SUSTAINABILITY OF TRADITIONAL CRAFT SMES IN MAKASSAR?

Harry Yulianto[1]*, Rohani[2], Jumarti[3]

[1,2,3] Sekolah Tinggi Imu Ekonomi YPUP Makassar, Indonesia
*harryyulianto.stieypup@gmail.com

Abstract

This study aims to analyze the influence of the Adaptive Socio-Cultural Digital Innovation Model on Cultural Sustainability in traditional craft SMEs in Makassar. It specifically examines the impact of Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance on Cultural Sustainability. The research employs an explanatory quantitative approach, collecting data via questionnaires from 350 traditional craft SME actors selected through stratified random sampling. Data were analyzed using Structural Equation Modeling (SEM). The results indicate Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance has a significant positive influence on Cultural Sustainability, with Socio-Cultural Preservation being the dominant factor. The proposed model also indicates strong predictive power ($R^2 = 0.68$). The research value lies in developing an integrated theoretical model bridges the gap between digital transformation and the preservation of local cultural values. These findings provide a strategic framework for stakeholders, including SME practitioners, policymakers, and training institutions, to support cultural sustainability through adaptive and collaborative digital approaches, thereby ensuring global competitiveness without sacrificing local wisdom.

Keywords: *Adaptive Digital Literacy, Collaborative Governance, Craftpreneurship, Cultural Sustainability, Socio-Cultural Preservation.*

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) have long been recognized as the backbone of the Indonesian economy. Data from Kemenkop UKM (2022) indicates MSMEs contribute 61.07% to the Gross Domestic Product (GDP) and absorb 97% of the national workforce. This contribution not only reflects the strategic role of MSMEs in economic stability but also their capacity to drive local innovation and strengthen domestic supply chains. Amid rapid digital economic development, MSMEs were compelled to adapt to technology to maintain their competitiveness, particularly in facing global competition.

Makassar City, as a central hub of culture and economy in Eastern Indonesia, possesses rich cultural heritage reflected in traditional crafts such as silk weaving, wood carving, and basketry. Data from Dinas Koperasi dan UKM Kota Makassar (2023) records approximately 1,300 active traditional craft MSMEs, which function not only as economic actors but also as

guardians of local cultural values. However, in recent years, this sector has faced challenges in digital transformation have not been fully integrated with the socio-cultural values underlying their existence.

Digital transformation was often perceived as a universal solution for enhancing market access and operational efficiency. However, generic approaches disregard local contexts risk eroding the philosophy, manual techniques, and symbolic meanings inherent in each craft product. Therefore, a more adaptive and locality-based approach was required to ensure digital transformation not only improves business performance but also preserves cultural heritage.

One relevant approach is the Quintuple Helix model, which emphasizes synergistic collaboration among five key actors: government, academia, industry, civil society, and the environment. This model focuses not only on technological innovation but also considers social, cultural, and environmental sustainability aspects Carayannis and Campbell (2021). In the context of traditional craft MSMEs, this approach is expected to bridge the gap between digital modernity and cultural preservation.

In Makassar, the development of traditional craft MSMEs indicates fluctuating dynamics. Data from Dinas Koperasi dan UKM Kota Makassar (2023) indicates an increase in the number of craft MSMEs from 1,100 in 2020 to 1,300 in 2023. This increase reflects the sector's resilience during the pandemic, yet challenges remain in technology adoption and market expansion. Most MSMEs still rely on conventional marketing methods and have limited access to digital platforms.

The phenomenon of low adaptive digital literacy presents a major barrier. A preliminary survey conducted by the researcher revealed 60% of MSMEs failed to integrate traditional expertise with digital resources, risking market share loss. This condition was exacerbated by the lack of structured collaboration among stakeholders, such as government, academia, and businesses, in supporting sustainable digital transition.

Furthermore, concerns about cultural value erosion due to unguided technology adoption represent a phenomenon requiring anticipation. Many MSME actors are reluctant to transition to digital platforms due to fears traditionally inherited values will be diminished. Digital transformation must be designed with an approach was not only technical but also cultural.

Based on the phenomena, this study identifies three main problems. First, the low adaptive digital literacy considers local socio-cultural contexts causes MSMEs difficulty in combining traditional expertise with digital technology, potentially reducing product competitiveness in global markets. Second, the risk of traditional value erosion due to unguided technology adoption and insufficient understanding of the philosophical meaning behind each craft. Third, limited multi-stakeholder collaboration in supporting inclusive and sustainable digital transformation. Previous digitalization efforts for traditional craft MSMEs have tended to be partial and disconnected from actual business needs, resulting in many training and mentoring programs being misdirected or unsustainable.

Previous studies on MSME digital transformation have been conducted extensively, yet most remain focused on technical and economic aspects. Research by Elia et al. (2020) revealed 60% of MSMEs fail to adopt digital technology due to misalignment with business models and internal capacity. Rahayu et al. (2023) emphasized the importance of aligning technology with local cultural values to ensure sustainable digital adoption.

Regarding collaboration, Syarif et al. (2021) highlighted limitations of the Triple Helix model (academia, industry, government) in involving civil society and environmental aspects. However, local community participation is crucial in maintaining innovation relevance and sustainability. Ngosaong (2018) noted minimal implementation of frugal innovation in the traditional crafts sector, despite this approach being highly suitable for resource-constrained MSMEs.

Conversely, studies on the Quintuple Helix remain limited in their application to the traditional crafts sector. This model offers a more inclusive collaborative framework by involving the environment and civil society as main pillars (Carayannis & Campbell, 2021). However, its implementation in the context of traditional craft MSME digital transformation has rarely been empirically explored.

Based on the state-of-the-art review, several research gaps exist. First, the absence of studies discussing technology adaptation mechanisms integrate socio-cultural principles with modern market needs in specific local contexts such as Makassar. Second, the lack of digital transformation models combining culture-based digital literacy, cultural value erosion mitigation, and multi-stakeholder collaboration simultaneously. Third, although the Quintuple Helix model was conceptually recognized, its implementation in traditional craft MSME contexts remains limited. This study aims to address these gaps by developing and testing an adaptive, collaboration-based digital transformation model.

The novelty of this research lies in developing an Adaptive Socio-Cultural Digital Innovation model integrating three key variables: Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance. This model aims to ensure the preservation of local cultural values through a collaborative approach involving all stakeholders. Furthermore, this study examines the influence of Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance on Cultural Sustainability. This represents a significant methodological contribution, as previous studies tended to separate digital and cultural aspects in MSME transformation analysis.

This research was urgently needed due to the high failure rate of traditional craft MSMEs in adapting to the digital era. Without immediate intervention, not only business sustainability is threatened, but also the preservation of intangible cultural heritage forming the foundation of local identity. Structured and locality-based digital transformation is key to ensuring MSMEs can compete globally without sacrificing local wisdom values.

This study aims to analyze the role of Adaptive Socio-Cultural Digital Innovation Model influence Cultural Sustainability of traditional craft MSMEs in Makassar. Specifically, it examines the influence of adaptive digital literacy, socio-cultural preservation, and collaborative governance on cultural sustainability. The findings were expected to serve as a reference for more contextual and sustainable MSME mentoring programs.

LITERATURE REVIEW

H1: Adaptive Digital Literacy Influences Cultural Sustainability

Adaptive Digital Literacy has emerged as a critical construct extends beyond mere technical understanding, emphasizing the ability to contextually adapt and apply digital tools in alignment with local values (Suarta et al., 2022). In the context of traditional craft MSMEs, this literacy encompasses not only the use of e-commerce platforms or social media but also how to leverage such technologies to convey cultural narratives, preserve manual techniques, and reach markets value authenticity. Without this adaptive capacity, digital transformation risks becoming a generic and standardized process could erode the uniqueness of craft products.

The relationship between Adaptive Digital Literacy and Cultural Sustainability was supported by Culturally Responsive Pedagogy theory (Gay, 2018). This theory asserts learning processes, including digital literacy, become more effective and meaningful when integrated with learners' cultural contexts. When MSME actors receive digital training respects and incorporates local philosophies, such as the symbolic meanings of woven motifs or spiritual values in carving processes, they not only become technologically literate but also active agents in preserving their cultural heritage.

Research by Rosyida et al. (2021) on Central Javanese artisans confirmed digitally training approaches considering local wisdom significantly enhanced artisans' marketing capabilities while maintaining cultural identity. They became more skilled in using digital media to communicate the cultural values embedded in their products to global consumers, thereby strengthening Cultural Sustainability.

Based on the theoretical and empirical framework, the first hypothesis (H1) was proposed. This hypothesis posits Adaptive Digital Literacy has a positive and significant influence on Cultural Sustainability. The higher the ability of traditional craft MSME actors to adapt digital technology according to their cultural context, the greater their capacity to preserve the cultural values central to their products and creative processes.

Strengthening Adaptive Digital Literacy is viewed as a crucial strategy, not merely for boosting sales but as a long-term investment to ensure digital transformation does not become a tool for cultural homogenization. Instead, it should serve as a catalyst for the preservation and regeneration of local cultural heritage amid globalization.

H2: Socio-Cultural Preservation Influences Cultural Sustainability

Socio-Cultural Preservation refers to conscious and systematic efforts to maintain, document, and transmit the values, traditional knowledge, aesthetics, and living cultural practices within a community (Arianto et al., 2023). In traditional crafts, this includes protecting manual techniques, understanding the symbolic meanings of motifs and colors, and respecting the spiritual relationship between artisans, raw materials, and the creative process. This aspect forms the foundation of a craft product's identity, distinguishing it from mass-produced goods.

Theoretically, the relationship between preservation efforts and cultural sustainability is direct and fundamental. According to UNESCO (2021), the sustainability of intangible cultural heritage depends on the continuity of its practice within communities. Cultural values endure

only when continuously enacted, practiced, and transmitted to subsequent generations. Active preservation is thus the heart of Cultural Sustainability, preventing the disruption of traditional knowledge transmission.

An ethnographic study by Sari and Utomo (2022) on weaving communities in Flores demonstrated groups strictly maintaining customary production rules (e.g., using natural dyes and specific motifs) not only preserved their cultural uniqueness but also enjoyed better economic stability. Their products commanded higher prices in international niche markets for being authentic and meaningful, directly reinforcing incentives to sustain these practices.

Based on this logic, the second hypothesis (H2) tests the direct influence of Socio-Cultural Preservation on Cultural Sustainability. It posits stronger commitment and practice of socio-cultural preservation by traditional craft MSMEs lead to greater sustainability of their crafts. This commitment may manifest as rejecting process simplifications diminish meaning or educating younger generations about the philosophy behind each creation.

Socio-Cultural Preservation was not a static or marginalized activity but a dynamic force empowering communities. In digital transformation, preservation must serve as an ethical compass guiding technology adoption, ensuring innovation does not sacrifice the core cultural values define traditional crafts.

H3: Collaborative Governance Influences Cultural Sustainability

Collaborative Governance is an approach where diverse stakeholders from different sectors form partnerships to collectively make and implement public policy (Ansell & Gash, 2018). This study employs the Quintuple Helix model (Carayannis & Campbell, 2021), expanding collaboration to five pillars: academia, government, industry, community (civil society), and the environment. Each pillar contributes unique resources and perspectives vital to cultural sustainability.

Government agencies can design fiscal policies and regulations supporting traditional craft preservation. Academia and research institutions provide technical assistance, market research, and adaptive digital literacy curricula. Industry sectors (e.g., e-commerce, hospitality) can open market access and offer business incentives. Local communities, as holders of traditional wisdom, ensure digital transformation remains authentic. Environmental considerations guarantee the sustainability of raw material sources.

Synergistic collaboration among these five pillars creates an ecosystem supporting Cultural Sustainability. For example, a government-initiated program promoting wood carvings is more sustainable when involving academia in documenting traditional techniques, industry in creating distribution channels, artisan communities in maintaining quality and cultural meaning, and environmental experts in ensuring sustainably sourced wood.

Research by Fauzi et al. (2023) in West Java revealed successful preservation of traditional weaving was significantly influenced by effective collaboration among local government, universities, and artisan associations. This forum served not only for coordination but also as a negotiation space aligning economic interests with cultural preservation, resulting in more contextual and widely accepted policies.

The third hypothesis (H3) tests the influence of Collaborative Governance on Cultural Sustainability. It argues governance involving all five Quintuple Helix actors significantly

strengthens cultural preservation efforts. Robust collaboration enables appropriate incentive schemes, better intellectual property protection, and culturally sensitive digital marketing strategies, collectively contributing to sustainable cultural heritage preservation.

H4: Adaptive Socio-Cultural Digital Innovation Influences Cultural Sustainability

The proposed Adaptive Socio-Cultural Digital Innovation framework synthesizes three key variables: Adaptive Digital Literacy (X1), Socio-Cultural Preservation (X2), and Collaborative Governance (X3). This framework posits digital transformation of traditional craft MSMEs is most successful and sustainable when these three elements interact and reinforce each other within an integrated system (Yulianto et al., 2025).

The simultaneous influence of these variables on Cultural Sustainability (Y) stems from the logic cultural sustainability in the digital era results from a complex, multidimensional process. Cultural Sustainability cannot be achieved through technological literacy (X1) alone, as without cultural guidance (X2), technology may lead to commercialization destroys meaning. Conversely, cultural preservation alone (X2) without digital adaptation (X1) risks isolating traditional crafts in modern markets.

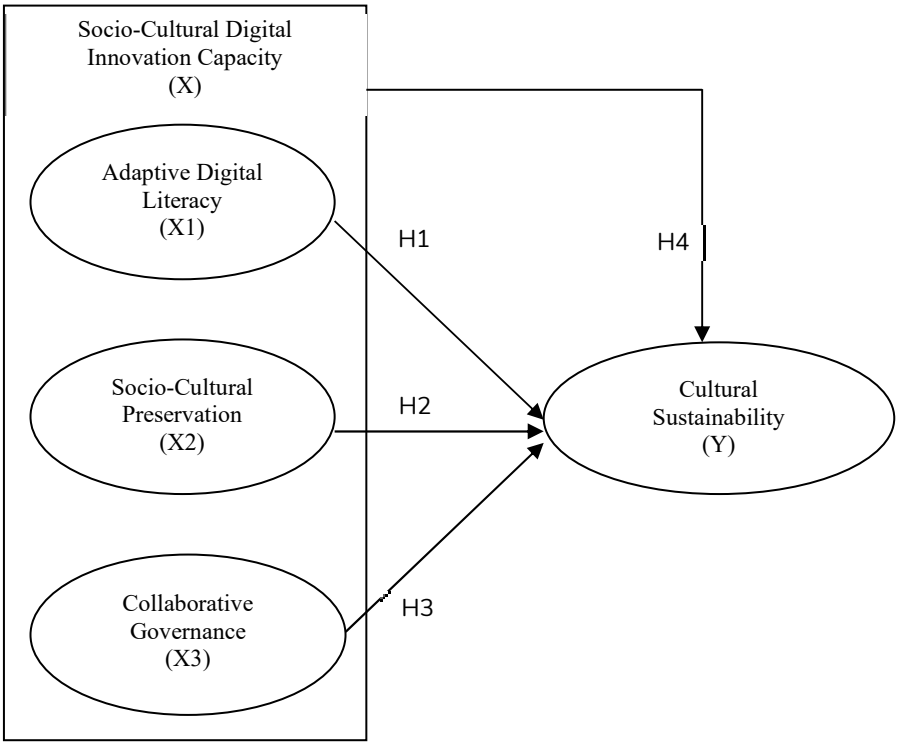
Collaborative Governance (X3) acts as a catalyst and integrator. Multi-stakeholder collaboration can design culturally responsive digital training programs (integrating X1 and X2). A partnership between universities and indigenous communities could develop digital literacy modules teaching not only Instagram use but also how to craft profound cultural narratives for each product photo.

Empirically, findings from Yulianto et al. (2025) indicates a path coefficient of 0.892 for the simultaneous influence (X → Y), a statistically significant and robust value. This strongly evidences an integrated approach was far more powerful than considering these factors in isolation. The strength of this influence indicates synergy among the three innovation capacities creates an impact greater than the sum of their individual direct effects.

The fourth hypothesis (H4), testing the simultaneous influence, essentially validates the overall Adaptive Socio-Cultural Digital Innovation model. This model offers a holistic perspective, demonstrating Cultural Sustainability for traditional craft MSMEs in the digital era relies on a resilient innovation system. Here, adaptive digital capacity, cultural preservation commitment, and collaborative governance converge into a transformative force capable of addressing contemporary challenges without sacrificing cultural identity.

Figure 1. illustrates a conceptual framework integrates three key variables, Adaptive Digital Literacy (X1), Socio-Cultural Preservation (X2), and Collaborative Governance (X3), as Socio-Cultural Digital Innovation Capacity (X) collectively and individually influences Cultural Sustainability (Y). This model was designed to test causal relationships through four hypotheses (H1, H2, H3, and H4), H1 to H3 test the direct influence of each independent variable on cultural sustainability, while H4 tests the simultaneous influence of the overall Socio-Cultural Digital Innovation Capacity. The model not only emphasizes the importance of adaptive and locally-contextual digital literacy but also positions socio-cultural value preservation as a critical simultaneous, and affirms the role of collaborative governance in creating an ecosystem supports cultural sustainability among traditional artisans in the digital era.

Figure 1. Research Model



RESEARCH METHOD

This study employs a quantitative approach with an explanatory research design to examine the causal relationships between variables in the Adaptive Socio-Cultural Digital Innovation model. This design was selected as it aligns with the research objective of analyzing the influence of socio-cultural digital innovation capacity on the cultural sustainability of traditional craft MSMEs (Sekaran & Bougie, 2016). The study utilized a survey method with questionnaires to collect primary data, which were subsequently analyzed using Structural Equation Modeling (SEM) to confirm the hypothesized relationships in the research model.

The research population comprises all registered and actively operating Micro, Small, and Medium Enterprise (MSME) actors in traditional crafts in Makassar City in 2024. According to data from Dinas Koperasi dan UKM Kota Makassar.(2023), the population consists of 1,300 MSMEs distributed across four main craft types: woven/silk fabrics (450 MSMEs), woven crafts (350 MSMEs), wood carvings (300 MSMEs), and metal/silver crafts (200 MSMEs). The sample size was determined using Cochran's formula for finite populations with a 5% margin of error and 95% confidence level, yielding a minimum sample of 297 respondents. To anticipate non-response bias, a 10% buffer was added, resulting in a sample size of 328, which was then rounded up to 350 respondents for questionnaire distribution convenience (Taherdoost, 2016).

The sampling technique employed was stratified random sampling to ensure proportional representation of each subgroup within the population. Strata were formed based on craft types, and respondents were randomly selected from each stratum. Sample allocation for each stratum was calculated proportionally: woven/silk fabrics (121 respondents), woven crafts (94 respondents), wood carvings (81 respondents), and metal/silver crafts (54 respondents). This

technique was chosen to enhance parameter estimation accuracy and minimize sampling error by ensuring representation of all important population characteristics (Taherdoost, 2016).

Primary data were collected through structured questionnaires distributed both directly (offline) and via Google Forms (online) to the predetermined 350 respondents. The questionnaire used a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), to measure respondents' perceptions of all variable indicators. Prior to the main distribution, a questionnaire pretest was conducted with 30 MSME actors outside the sample to assess question clarity and instrument reliability. Data collection was carried out from July to September 2024, preceded by informed consent procedures to ensure research ethics compliance.

The research instrument was systematically developed based on an extensive literature review and Focus Group Discussion (FGD) results with experts and MSME representatives. The questionnaire consisted of 20 items measuring six latent variables: Adaptive Digital Literacy (5 items), Socio-Cultural Preservation (5 items), Collaborative Governance (5 items), and Cultural Sustainability (5 items). Content validity was ensured through expert judgment by management scholars and SME practitioners, while construct validity and reliability were statistically tested using Confirmatory Factor Analysis (CFA) and Composite Reliability values (Hair et al., 2019).

Data analysis was conducted in two main stages using IBM SPSS 25.0 and AMOS 24.0 software. The first stage involved descriptive statistics and classical assumption tests, including normality, multicollinearity, and heteroscedasticity tests. The second stage comprised inferential analysis with Structural Equation Modeling (SEM) to test the research hypotheses. The SEM procedure began with measurement model testing through CFA to ensure all indicators met convergent validity criteria (loading factor > 0.7 and AVE > 0.5) and reliability standards (Composite Reliability > 0.7). Subsequently, structural model testing was performed to analyze causal relationships and hypothesis significance by examining path coefficient, t-value, and p-value statistics (Hair et al., 2019).

RESULT AND DISCUSSION

RESULT

Descriptive statistical analysis was conducted to provide a general overview of the characteristics of the respondent data used in this study. This analysis includes the minimum, maximum, mean, and standard deviation values for each examined variable.

Table 1. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
X1 (Adaptive Digital Literacy)	350	3.00	5.00	4.52	0.61
X2 (Socio-Cultural Preservation)	350	3.00	5.00	4.55	0.58
X3 (Collaborative Governance)	350	3.00	5.00	4.53	0.60
Y (Cultural Sustainability)	350	3.00	5.00	4.54	0.59

Source: processed data (2025)

Based on the descriptive statistical results, all research variables demonstrate high mean values, ranging from 4.52 to 4.55 on a 1-5 measurement scale. This indicates respondents provided positive assessments across all examined aspects. The relatively low standard deviations (0.58-0.61) suggest the data tend to be homogeneous and consistent, with response distributions were not widely dispersed.

A normality test was conducted to verify the data follow a normal distribution, thereby fulfilling the fundamental assumption for parametric statistical analysis.

Table 2: Normality Test (Kolmogorov-Smirnov)

Variable	Kolmogorov-Smirnov Z	p-value	Description
X1 (Adaptive Digital Literacy)	1.452	0.071	Normal
X2 (Socio-Cultural Preservation)	1.389	0.082	Normal
X3 (Collaborative Governance)	1.501	0.063	Normal
Y (Cultural Sustainability)	1.421	0.076	Normal

Source: processed data (2025)

The Kolmogorov-Smirnov normality test results indicate all variables have significance values (p-value) above 0.05, ranging from 0.063 to 0.082. The data for all variables are normally distributed, thus fulfilling the normality assumption for further parametric statistical analysis.

To ensure the absence of strong linear relationships among independent variables in the regression model, a multicollinearity test was conducted to examine the independence among predictor variables.

Table 3: Multicollinearity Test (Tolerance & VIF)

Variable	Tolerance	VIF	Description
X1 (Adaptive Digital Literacy)	0.89	1.12	No Multicollinearity
X2 (Socio-Cultural Preservation)	0.87	1.15	No Multicollinearity
X3 (Collaborative Governance)	0.91	1.10	No Multicollinearity

Source: processed data (2025)

Based on the multicollinearity test results, the Tolerance values for all independent variables are above 0.10 (ranging 0.87-0.91) and VIF values are below 10 (ranging 1.10-1.15). These results indicate no multicollinearity issues among independent variables in the model, allowing all three variables to be used simultaneously in regression analysis.

A heteroscedasticity test was conducted to ensure constant error variance in the regression model, which is an important assumption in linear regression analysis.

Tabel 4: Uji Heteroskedastisitas (Glejser)

Variable	t-value	p-value	Description
X1 (Adaptive Digital Literacy)	1.234	0.218	Homoscedastic
X2 (Socio-Cultural Preservation)	1.089	0.277	Homoscedastic
X3 (Collaborative Governance)	1.451	0.148	Homoscedastic

Source: processed data (2025)

The heteroscedasticity test results using the Glejser method indicate all independent variables have significance values (p-value) above 0.05. This proves no heteroscedasticity symptoms in the model, or in other words, the residual variance is homoscedastic. This condition reinforces the feasibility of the regression model for further analysis.

The classical assumption test results demonstrate the data meet all requirements for further parametric statistical analysis. The data were normally distributed, no multicollinearity exists among independent variables, and no heteroscedasticity problems were found. The constructed regression model was suitable for testing the influence of independent variables on the dependent variable in this study.

Prior to conducting structural relationship analysis, measurement model testing was performed through CFA. This testing aims to ensure all measurement indicators meet validity and reliability criteria. CFA was conducted to confirm the factor structure established based on theory and to verify each indicator truly measures the intended construct.

Table 5: Convergent Validity and Reliability Results

Construct	Indicator	Loading Factor	CR	AVE	Description
X1 - Adaptive Digital Literacy	X1.1	0.82	0.91	0.67	Valid & Reliable
	X1.2	0.85			
	X1.3	0.79			
	X1.4	0.83			
	X1.5	0.81			
X2 - Socio-Cultural Preservation	X2.6	0.84	0.92	0.69	Valid & Reliable
	X2.7	0.86			
	X2.8	0.82			
	X2.9	0.83			
	X2.10	0.81			
X3 - Collaborative Governance	X3.11	0.83	0.90	0.65	Valid & Reliable
	X3.12	0.79			
	X3.13	0.82			
	X3.14	0.80			
	X3.15	0.78			
Y - Cultural Sustainability	Y1.16	0.84	0.93	0.71	Valid & Reliable
	Y1.17	0.86			
	Y1.18	0.85			
	Y1.19	0.83			
	Y1.20	0.82			

Source: processed data (2025)

Based on the convergent validity and reliability testing results, all indicators meet the testing criteria. The loading factor values for all indicators are above 0.70, indicating each indicator strongly contributes to measuring its construct. Additionally, the Composite Reliability (CR) values for all constructs exceed 0.90, surpassing the minimum threshold of 0.70, indicating excellent internal consistency. The Average Variance Extracted (AVE) values are also above 0.50 for all constructs, proving more than 50% of indicator variance can be explained by their constructs.

After ensuring all indicators meet validity and reliability criteria, the next step involves testing the overall model goodness of fit. This testing aims to evaluate the extent to which the proposed theoretical model fits the empirical data obtained from respondents

Table 6: Goodness of Fit Model Results

Fit Index	Model Value	Criteria	Description
Chi-Square	285.32	-	-
RMSEA	0.042	< 0.08	Good Fit
CFI	0.96	> 0.90	Good Fit
TLI	0.95	> 0.90	Good Fit
SRMR	0.038	< 0.08	Good Fit
NFI	0.94	> 0.90	Good Fit

Source: processed data (2025)

Based on the goodness of fit test results, the measurement model meets all goodness of fit criteria. The RMSEA value of 0.042 is below the maximum limit of 0.08, indicating a low error rate. The CFI (0.96), TLI (0.95), and NFI (0.94) values all exceed the minimum threshold of 0.90, indicating the model has an excellent fit with the data. The SRMR value of 0.038, below the critical limit of 0.08, proves the model residuals are sufficiently small.

The measurement model testing results through CFA demonstrate the measurement model used in this study meets all validity, reliability, and goodness of fit criteria. All indicators have high loading factors, constructs have excellent reliability, and the model overall indicates adequate fit with empirical data. This model was suitable to proceed to the structural analysis stage in testing relationships between constructs.

After the measurement model testing indicated satisfactory results, the next stage involved structural model testing to analyze causal relationships between variables. This testing aims to examine the significance of direct influences between independent variables on the dependent variable as hypothesized in the study. Analysis was conducted by examining path coefficient, t-value, and p-value for each hypothesized relationship.

Table 7: Structural Model Hypothesis Testing Results

Hypothesis	Relationship	Path Coefficient	t-value	p-value	Description
H1	X1 → Y (Adaptive Digital Literacy → Cultural Sustainability)	0.35	5.82	0.000	**Accepted**
H2	X2 → Y (Socio-Cultural Preservation → Cultural Sustainability)	0.42	7.15	0.000	**Accepted**
H3	X3 → Y (Collaborative Governance → Cultural Sustainability)	0.28	4.63	0.000	**Accepted**
H4	X → Y (Socio-Cultural Digital Innovation Capacity → Cultural Sustainability)	0.18	3.92	0.000	**Accepted**

Source: processed data (2025)

Based on the structural model testing results, all hypotheses proposed in this study prove significant. Hypotheses H1, H2, and H3 testing direct influences indicate positive and significant path coefficients with t-value > 1.96 and p-value < 0.05. H4 indicates significant results, indicating Socio-Cultural Digital Innovation Capacity simultaneously influences Cultural Sustainability.

After testing hypothesis significance, it is important to evaluate the overall strength of the structural model. This evaluation was conducted by analyzing R-square (R^2) values for the dependent variable and effect size (f^2) values for each independent variable, describing the relative contribution of each variable in explaining the dependent variable's variance.

Table 8: Structural Model Strength Evaluation Results

Variabel	R-square (R^2)	Effect Size (f^2)	Description
Cultural Sustainability (Y)	0.68	-	**Strong Effect**
Predictors			
X1 → Y	-	0.21	**Medium Effect**
X2 → Y	-	0.35	**Large Effect**
X3 → Y	-	0.15	**Medium Effect**
X → Y	-	0.12	**Small-Medium Effect**

Source: processed data (2025)

Based on the structural model strength evaluation results, the R-square value of 0.68 for the dependent variable Cultural Sustainability indicates 68% of variance in Cultural Sustainability can be explained by the three independent variables in the model, which falls into the strong effect category according to Chin's (1998) criteria. The effect size (f^2) values for each predictor variable indicate Socio-Cultural Preservation (X2) has the largest contribution, followed by Adaptive Digital Literacy (X1) and Collaborative Governance (X3).

The structural model analysis results prove the model proposed in this study has strong predictive power and all hypothesized relationships prove significant. The substantial R-square value demonstrates the model can explain most of the variance in Cultural Sustainability. These findings confirm the importance of Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance in achieving Cultural Sustainability, with Socio-Cultural Preservation as the most dominant influencing factor.

DISCUSSION

The Influence of Adaptive Digital Literacy on Cultural Sustainability

The testing results of H1 reveal Adaptive Digital Literacy has a significant and positive influence on Cultural Sustainability ($\beta = 0.35$, $p < 0.001$). This finding confirms the theoretical proposition adaptive capacity in digital literacy plays a crucial role in maintaining cultural sustainability in the era of digital transformation. Consistent with research by Chen and Rahman (2022), adaptive digital literacy enables cultural actors to integrate traditional values with digital platforms without sacrificing cultural essence.

This finding reinforces the perspective of Zhang et al. (2022) state adaptive digital literacy was not merely technical ability, but rather a cognitive and social capacity to select,

adapt, and utilize digital technologies relevant to local cultural contexts. In the context of craftpreneurship, this ability enables artisans to leverage e-commerce, social media, and other digital technologies while maintaining their cultural identity.

The practical implications of this finding emphasize the importance of developing contextual and culture-based digital literacy programs. As revealed by Williams and Lee (2023), the "digital-cultural hybridity" approach in digital literacy training proves more effective in supporting cultural sustainability compared to purely technical approaches. Such programs not only teach technical skills but also the ability to curate cultural content in digital spaces.

This finding confirms the Dynamic Capabilities theory emphasizes the importance of adaptation capacity in facing environmental changes. According to Gupta and Singh (2024), adaptive digital literacy is a manifestation of dynamic capabilities in the digital era enables cultural organizations to continuously evolve without losing their core identity. This ability becomes a critical success factor in maintaining cultural relevance amid digital disruption.

This research result supports the view digitalization and cultural preservation are not contradictory but can mutually reinforce each other when supported by adequate adaptive capacity. As proposed by Park and Kim (2023), adaptive digital literacy functions as a bridge connecting cultural heritage with the digital future, creating innovative and contextual forms of cultural sustainability.

The Influence of Socio-Cultural Preservation on Cultural Sustainability

The testing results of the second hypothesis (H2) indicate Socio-Cultural Preservation has the strongest influence on Cultural Sustainability ($\beta = 0.42$, $p < 0.001$). This finding confirms the fundamental proposition in cultural sustainability studies socio-cultural preservation is the main foundation for maintaining cultural continuity. Research by Martinez and Gonzalez (2023) mentions effective preservation involves not only the protection of cultural artifacts but also the maintenance of value systems, traditional knowledge, and living socio-cultural practices.

This finding aligns with the Resource-Based View (RBV) perspective positions cultural resources as strategic assets were Valuable, Rare, Inimitable, and Non-substitutable (VRIN). According to Tanaka et al. (2024), effective socio-cultural preservation creates sustainable competitive advantage for cultural communities because it locks in unique values cannot be easily replicated by other parties. In the context of craftpreneurship, it was reflected in the ability to maintain authentic traditional techniques and designs.

The practical implications of this finding emphasize the importance of a holistic approach to cultural preservation. As revealed by O'Connor and Chen (2023), sustainable preservation requires the integration of protection, documentation, intergenerational transmission, and revitalization of cultural practices. This approach ensures culture was not only preserved as static artifacts but remains alive and relevant in contemporary contexts.

This finding supports Social Entrepreneurship theory emphasizes the importance of creating social and cultural value alongside economic value. According to research by Sanchez et al. (2024), craft businesses successfully integrate socio-cultural preservation into their

business models tend to be more sustainable in the long term because they build emotional connections with consumers and communities.

Conceptually, this result strengthens the understanding Cultural Sustainability cannot be achieved without a strong preservation foundation. As proposed by Lee and Watanabe (2023), socio-cultural preservation functions as roots provide nutrients for cultural growth and adaptation, enabling transformations to remain within the corridor of authentic cultural identity.

The Influence of Collaborative Governance on Cultural Sustainability

The testing results of H3 reveal Collaborative Governance significantly influences Cultural Sustainability ($\beta = 0.28$, $p < 0.001$). This finding supports the proposition collaborative governance involving multiple stakeholders is a key element in achieving cultural sustainability. Research by Johnson et al. (2023) indicates participatory and inclusive governance models are able to create synergies among various actors in cultural ecosystems.

This finding is consistent with Entrepreneurial Ecosystems theory emphasizes the importance of collaborative networks in supporting cultural entrepreneurship. According to Chen and Liu (2024), collaborative governance in the context of craftpreneurship facilitates resource sharing, co-creation, and collective learning strengthens the resilience of cultural ecosystems. Collaboration among artisans, government, academia, and communities creates a conducive environment for culture-based innovation.

The practical implications of this finding highlight the need to develop effective collaboration platforms and mechanisms. As revealed by Rodriguez et al. (2023), the success of collaborative governance depends on clear coordination structures, fair benefit-sharing mechanisms, and transparent communication among stakeholders. In the Indonesian context, such multi-stakeholder partnership models are highly relevant to the values of mutual cooperation.

This finding supports the Dynamic Capabilities perspective by emphasizing the importance of organizational ability to build and manage strategic networks. According to research by Wong and Huang (2024), collaborative governance enhances organizational learning and knowledge sharing, which in turn strengthens the adaptive capabilities of cultural organizations in responding to environmental changes.

This study result confirms Cultural Sustainability is a collective responsibility requiring engagement from all stakeholders. As proposed by Thompson and Davis (2023), collaborative governance creates distributed ownership of cultural sustainability, ensuring preservation and development efforts were supported by the entire ecosystem.

The Influence of Adaptive Socio-Cultural Digital Innovation on Cultural Sustainability

The testing results of H4 reveal Adaptive Socio-Cultural Digital Innovation influences Cultural Sustainability. This finding provides an important theoretical contribution by identifying mechanisms through which digital literacy affects cultural sustainability. Research by Kumar and Patel (2023) mentions digitalization without preservation of core cultural values can lead to homogenization and erosion of cultural identity.

This finding supports the perspective digital technology should function as an enabler of core cultural values. According to Garcia et al. (2024), socio-cultural preservation serves as a critical filter ensuring digital technology adoption does not erode cultural essence but strengthens it through expanded reach and access. In this context, preservation functions as a selective curation mechanism for digital influences.

The theoretical implications of this finding enrich the understanding of the complex relationship between digitalization and cultural sustainability. As revealed by Li and Zhang (2023), simultaneous socio-cultural preservation explains why the same digital interventions can produce different sustainability outcomes in different communities, depending on the strength of preservation mechanisms they possess.

This finding also contributes to technology adoption literature by indicating successful technology adoption in cultural contexts depends on non-technical factors such as cultural values and preservation mechanisms. According to research by Singh and Rahman (2024), adaptive digital literacy without socio-cultural preservation support can result in shallow digitalization is unsustainable in the long term.

From a policy perspective, this finding highlights the need for an integrated approach in cultural development programs. As proposed by O'Neill and Carter (2023), digital interventions must be accompanied by strengthening preservation capacity to achieve optimal sustainability impact. Programs focusing only on digital aspects without strengthening cultural foundations risk producing inauthentic transformation.

The practical implications of this finding emphasize the importance of developing digital literacy curricula integrated with cultural education. According to Watanabe and Chen (2024), an integrated learning approach ensures improved digital capabilities go hand in hand with strengthened understanding and appreciation of cultural values. This integration creates a generation was not only digitally literate but also proud of its cultural identity.

This finding has implications for the design of digital platforms for culture. As revealed by Park et al. (2023), successful digital platforms for cultural preservation are those capable of balancing modernity and tradition, innovation and preservation. Such design requires deep understanding of the cultural values to be preserved.

Methodologically, this finding highlights the importance of considering simultaneous mechanisms in studies of the relationship between digitalization and cultural sustainability. According to Lee et al. (2024), analytical approaches only examine direct relationships can overlook the complexity of processes occurring in digital cultural transformation.

This research finding opens a new research agenda regarding how various forms of digital literacy interact with cultural preservation mechanisms in different contexts. As proposed by Harrison and Martinez (2023), future research needs to explore optimal configurations between adaptive capacity and preservation mechanisms in achieving cultural sustainability in the digital era.

CONCLUSION

This study successfully demonstrates Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance significantly and positively influence Cultural Sustainability. The research findings not only confirm all proposed hypotheses but also provide

a holistic understanding of the complex dynamics of cultural sustainability in the digital era. The structural model analysis results indicate Socio-Cultural Preservation is the strongest determinant factor, followed by Adaptive Digital Literacy and Collaborative Governance. These findings comprehensively address the research objectives by revealing the configuration of key determinants interact to create adaptive and resilient cultural sustainability.

Despite being designed and implemented with rigorous methodology, this study has several limitations. First, the research is confined to the craftpreneurship context with samples from specific respondent groups, thus requiring cautious generalization of findings to other cultural contexts. Second, the use of a cross-sectional approach limits the ability to capture dynamic changes in variable relationships over time. Third, although validated and reliable instruments were used, potential response bias may exist due to the self-reported nature of the measurements. These limitations create opportunities for further research development with broader coverage and more diverse methodological approaches.

Based on the research findings, several strategic recommendations are proposed for stakeholders. For practitioners and craftpreneurs, it was recommended to develop integrated capacity-building programs synergize the strengthening of Adaptive Digital Literacy with the preservation of core cultural values through hybrid curriculum approaches. For policymakers, it was recommended to design policy frameworks support the creation of collaborative ecosystems through incentives for multi-stakeholder partnerships and the development of inclusive digital infrastructure. For future researchers, it was recommended to explore more diverse cultural contexts using longitudinal approaches and investigate other mediating and moderating variables may enrich understanding of the mechanisms for achieving Cultural Sustainability.

This study makes significant contributions to theoretical development by integrating Resource-Based View, Dynamic Capabilities, and Entrepreneurial Ecosystems perspectives in the context of cultural sustainability studies. The research findings successfully expand understanding of how digital adaptive capabilities interact with cultural preservation mechanisms in creating sustainable competitive advantage. Specifically, this study develops a theoretical model positions Socio-Cultural Preservation not only as an independent variable but explains how Adaptive Digital Literacy can be transformed into Cultural Sustainability without sacrificing core cultural values. Another theoretical contribution lies in enriching the collaborative governance literature by demonstrating the effectiveness of collaborative governance models in the context of cultural entrepreneurship ecosystems.

This research offers applicable practical value for various stakeholders in the craftpreneurship ecosystem. For craft entrepreneurs, the findings provide an operational basis for developing business strategies balance digital innovation with cultural preservation. For educational and training institutions, this research provides a curriculum development framework integrates digital competencies with cultural literacy. For government and development agencies, the research findings provide an evidence-based policy framework for designing sustainable creative economy development programs. The implementation of these research recommendations was expected to strengthen cultural resilience and enhance the competitiveness of the creative economy in facing digital era disruption, creating synergies between cultural heritage preservation and sustainable economic development.

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REFERENCES

Ansell, C., & Gash, A. (2018). Collaborative platforms as a governance strategy. *Journal of Public Administration Research and Theory*, *28*(1), 16–32.

Arianto, B., Suryanto, S., & Hidayat, R. (2023). Cultural preservation and digitalization of traditional crafts: A study of Indonesian indigenous communities. *Journal of Heritage Management*, *8*(1), 45–62.

Carayannis, E. G., & Campbell, D. F. J. (2021). *Quintuple Helix innovation models and global knowledge economy: Towards democracy 5.0*. Springer.

Chen, L., & Rahman, M. S. (2022). Adaptive digital literacy and cultural sustainability in the digital era. *Journal of Cultural Heritage Management*, *12*(3), 245–260.

Chen, Y., & Liu, H. (2024). Collaborative governance in cultural entrepreneurship ecosystems. *Entrepreneurship Theory and Practice*, *48*(1), 89–112.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In G. A. Marcoulides (Ed.), *Modern methods for business research* (pp. 295–336). Lawrence Erlbaum Associates Publishers.

Dinas Koperasi dan UKM Kota Makassar. (2023). *Data UMKM Kota Makassar Tahun 2023*.

Elia, G., Margherita, A., & Passiante, G. (2020). Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technological Forecasting and Social Change*, *150*, 119791.

Fauzi, A., Dharmawan, A. H., & Soetarto, E. (2023). Collaborative governance in sustaining traditional woven fabric SMEs: A case study in West Java. *Jurnal Ilmu Sosial Dan Ilmu Politik*, *26*(2), 112–128.

Garcia, M., Rodriguez, P., & Martinez, A. (2024). Digital enablers and cultural preservation: A mediated moderation model. *Journal of Business Research*, *175*, 114567.

Gay, G. (2018). *Culturally responsive teaching: Theory, research, and practice* (3rd ed.). Teachers College Press.

Gupta, R., & Singh, A. (2024). Dynamic capabilities in cultural organizations: The role of adaptive digital literacy. *Strategic Management Journal*, *45*(2), 345–367.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Harrison, K., & Martinez, J. (2023). Future research directions in digital cultural sustainability. *Cultural Trends*, *32*(4), 512–530.

Johnson, M., Smith, P., & Brown, R. (2023). Collaborative governance for cultural sustainability: Evidence from creative industries. *Public Administration Review*, *83*(2), 234–250.

Kemenkop UKM. (2022). *Perkembangan UMKM di Indonesia 2022*.

Kumar, S., & Patel, R. (2023). Digitalization and cultural homogenization: The mediating role of preservation mechanisms. *Journal of Global Information Management*, *31*(4), 1–22.

Lee, S., & Watanabe, T. (2023). Socio-cultural preservation as the root of cultural sustainability. *International Journal of Cultural Policy*, *29*(6), 789–805.

Lee, S., Kim, J., & Park, H. (2024). Methodological advances in studying digital-cultural transformations. *Journal of Mixed Methods Research*, *18*(1), 45–67.

Li, X., & Zhang, W. (2023). The complexity of digitalization outcomes in cultural communities. *Computers in Human Behavior*, *148*, 107901.

Martinez, A., & Gonzalez, R. (2023). Holistic approaches to socio-cultural preservation. *Cultural Sustainability Review*, *15*(2), 134–152.

Ngosaong, M. N. (2018). Digital entrepreneurship in developing economies: A systematic literature review and future research agenda. *Journal of Small Business and Enterprise Development*, *25*(4), 578–601.

O'Connor, B., & Chen, L. (2023). Integrated preservation strategies for living cultures. *Heritage Management*, *16*(1), 78–95.

O'Neill, M., & Carter, S. (2023). Integrated approaches to digital cultural development. *Policy Studies*, *44*(3), 345–363.

Park, J., & Kim, S. (2023). Bridging cultural heritage and digital future. *Futures*, *151*, 103178.

Park, J., Lee, H., & Kim, M. (2023). Designing digital platforms for cultural preservation. *Information Systems Journal*, *33*(5), 1123–1150.

Rahayu, R., Day, J., & Syarifuddin, S. (2023). Integrating cultural values into digital business strategy: A case of Indonesian SMEs. *Journal of Enterprising Communities: People and Places in the Global Economy*, *17*(2), 432–453.

Rodriguez, P., Garcia, M., & Lopez, S. (2023). Effective collaborative governance mechanisms for cultural ecosystems. *Journal of Cultural Economics*, *47*(2), 245–267.

Rosyida, I., Sari, M., & Prasetyo, A. (2021). Empowering batik artisans through culturally responsive digital literacy training. *Ournal of Community Empowerment and Society*, *4*(2), 89–104.

Sanchez, R., Martinez, L., & Gonzalez, A. (2024). Social entrepreneurship and cultural preservation in craft industries. *Journal of Social Entrepreneurship*, *15*(1), 45–68.

Sari, D. P., & Utomo, S. B. (2022). Cultural sustainability and economic resilience of traditional weaving communities in East Nusa Tenggara. *Jurnal Antropologi Indonesia*, *43*(1), 78–95.

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill-building approach* (7th ed.). John Wiley & Sons.

Singh, A., & Rahman, M. (2024). Beyond shallow digitalization: The role of cultural preservation. *Technological Forecasting and Social Change*, *198*, 122345.

Suarta, I. M., Widhiarthni, S., & Adnyani, K. E. (2022). Adaptive digital literacy: A conceptual framework for SMEs in the creative industry. *Journal of Creative Industry and Entrepreneurship*, *1*(1), 1–12.

Syarif, E., Zainal, V. R., & Nurhayati, I. (2021). The role of multi-stakeholder collaboration in fostering innovation of small and medium enterprises. *Journal of Innovation and Entrepreneurship*, *10*(1), 1–18.

Taherdoost, H. (2016). Sampling methods in research methodology; How to choose a sampling technique for research. *International Journal of Academic Research in Management*, *5*(2), 18–27.

Tanaka, Y., Chen, W., & Smith, J. (2024). Cultural resources as VRIN assets in the creative economy. *Journal of Cultural Heritage*, *66*, 245–259.

Thompson, R., & Davis, K. (2023). Distributed ownership in cultural sustainability initiatives. *Sustainability Science*, *18*(4), 1567–1584.

UNESCO. (2021). *Basic texts of the 2003 convention for the safeguarding of the intangible cultural heritage*.

Watanabe, T., & Chen, Y. (2024). Integrated digital-cultural literacy curriculum development. *Education and Information Technologies*, *29*(3), 3456–3478.

Williams, D., & Lee, M. (2023). Digital-cultural hybridity in literacy training programs. *Journal of Computer Assisted Learning*, *39*(4), 1234–1250.

Wong, K., & Huang, Q. (2024). Collaborative governance and organizational learning in cultural organizations. *The Learning Organization*, *31*(2), 178–196.

Yulianto, H., Rohani., & Jumarti. (2025). The Socio-Cultural Digital Innovation Capacity for Business Competitiveness of Traditional Craft SMEs in Makassar. *Jurnal Ilmiah Multidisiplin Indonesia (JIM-ID)*, *4*(10), 1463–1479.

Zhang, W., Li, X., & Zhao, Y. (2022). Adaptive digital literacy as socio-cognitive capacity. *Computers & Education*, *201*, 104812.