Journal of State Economic Research
Published by Yayasan Cerdas Pedia Indonesia
Volume 1 Issue 3, 2026 ISSN (Online) ***3110-3863***
Journal Homepage: **https://jurnal.smartpedia.co.id/index.php/jser**

Psychometric Analysis: Validation of the ASCDI Instrument for Traditional Craft SMEs

Analisis Psikometrik: Validasi Instrumen ASCDI untuk UKM Kerajinan Tradisional

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History:
Submitted: 05-11-2025
Revised: 28-02-2026
Accepted: 01-03-2026

Keyword:
Craft SMEs; Digital Innovation; Enterprise Resilience; Instrument Validation; Socio-Cultural.

Kata Kunci:.
UMKM Kerajinan: Inovasi Digital; Ketahanan Usaha; Validasi Instrumen; Sosio-Kultural.

https://doi.org/10.65101/jser.v1i3.111

Abstract

Digital transformation presents a challenge and an opportunity for traditional craft SMEs, requiring adaptation without eroding cultural values. This study aims to develop and validate the Adaptive Socio-Cultural Digital Innovation (ASCDI) instrument to measure socio-cultural digital innovation capacity and enterprise resilience. The instrument development method involved 350 traditional craft SMEs in Makassar through several stages: content validation by experts, empirical testing, exploratory and confirmatory factor analysis, and reliability testing. The results produced a final instrument consisting of 30 items divided into six dimensions: Adaptive Digital Literacy, Socio-Cultural Preservation, Collaborative Governance (for the innovation capacity variable), and Business Competitiveness, Cultural Sustainability, and Market Expansion (for the resilience variable). All items proved to meet content validity (Aiken's V > 0.80), construct validity (loading factor > 0.70), and excellent reliability (Cronbach's Alpha = 0.949). The validated and reliable ASCDI instrument was expected to be a dependable measurement tool for researchers, practitioners, and policymakers in assessing and developing sustainable digital innovation strategies for traditional craft SMEs.

Abstrak

Transformasi digital menjadi tantangan sekaligus peluang bagi UMKM kerajinan tradisional yang perlu beradaptasi tanpa mengikis nilai-nilai kultural. Penelitian ini bertujuan mengembangkan dan memvalidasi instrumen Adaptive Socio-Cultural Digital Innovation (ASCDI) untuk mengukur kapasitas inovasi digital sosio-kultural dan ketahanan usaha. Metode pengembangan instrumen melibatkan 350 UMKM kerajinan tradisional di Makassar melalui beberapa tahap: validasi isi oleh ahli, uji coba empiris, analisis faktor eksploratori dan konfirmatori, serta uji reliabilitas. Hasil penelitian menghasilkan instrumen akhir yang terdiri dari 30 item yang terbagi dalam enam dimensi, yaitu Adaptive Digital Literacy, Socio-Cultural Preservation, Collaborative Governance (pada variabel kapasitas inovasi), serta Business Competitiveness, Cultural Sustainability, dan Market Expansion (pada variabel ketahanan usaha). Seluruh item terbukti memenuhi validitas isi (Aiken's V > 0,80), validitas konstruk (loading factor > 0,70), dan reliabilitas yang sangat baik (Cronbach's Alpha = 0,949). Instrumen ASCDI yang teruji valid dan reliabel ini diharapkan dapat menjadi alat ukur yang andal bagi peneliti, praktisi, dan pembuat kebijakan dalam menilai dan mengembangkan strategi inovasi digital yang berkelanjutan bagi UMKM kerajinan tradisional.

A. INTRODUCTION

1. Background

The era of the Industrial Revolution 4.0 has thrust traditional craft MSMEs (Micro, Small, and Medium Enterprises) into a complex paradox. On one hand, the adoption of digital technology has become an imperative for survival and competition in the global market. On the other hand, this transformation potentially erodes the values of local wisdom and cultural identity of constitute the very essence of these craft products. In Makassar, a city rich with cultural heritage such as songkok craft, silk weaving, and distinctive Makassar carvings, this pressure was profoundly tangible. Many MSMEs were trapped in a dichotomy between blind modernization if disregards cultural roots and rigid preservation rejects innovation, thereby potentially hindering their competitiveness and business sustainability. This condition indicates a gap between digital transformation and socio-cultural preservation, necessitating a more adaptive and contextual innovation approach.

The fundamental challenge in navigating a path out of this paradox was the absence of a comprehensive and validated measurement tool. Previous research has predominantly focused either on digital technology aspects or cultural aspects in isolation, without integrating them into a unified innovation framework. Consequently, MSME actors, policymakers, and researchers face difficulties in diagnosing a business's level of innovation capacity, identifying areas for improvement, and formulating targeted intervention strategies. The lack of a standardized instrument can impede systematic efforts to strengthen the business resilience of traditional craft MSMEs amidst the wave of digital disruption.

The concept of Adaptive Socio-Cultural Digital Innovation (ASCDI) emerges to address this challenge. ASCDI was not merely about technology usage; rather, it was a multidimensional construct describing the ability of MSMEs to nimbly integrate digital literacy with socio-cultural values, and to manage collaboration with various stakeholders, to create unique and sustainable value. This ability, termed Socio-Cultural Innovation Capacity, was hypothesized to be the primary driver for achieving Socio-Cultural Enterprise Resilience, a form of business resilience characterized not only by competitive business advantage but also by cultural preservation and inclusive market expansion.

The development and validation of an ASCDI instrument was an urgent and strategic necessity. A scientifically reliable instrument will function as an accurate "diagnostic tool" for measuring the socio-cultural digital innovation capacity of traditional craft MSMEs, particularly in Makassar. With this measurement tool, efforts to mentor and strengthen MSMEs can be conducted in a more measurable, evidence-based, and locally contextual manner, ultimately leading to an authentic and sustainable digital business transformation does not sacrifice cultural identity.

This research was grounded in the Dynamic Capabilities theory.[1] This theory explains how a firm can build and reconfigure internal and external competencies to address rapidly changing business environments. In the context of craft MSMEs, the capacity to adapt to digital technology while preserving cultural values was a tangible manifestation of these dynamic capabilities. This ability enables them not only to react to changes but also to proactively shape the market with their cultural uniqueness.

The construct of Socio-Cultural Innovation Capacity, as the independent variable, was operationalized through three key dimensions. First, Adaptive Digital Literacy, which refers to the ability of MSMEs not only to use digital tools but also to critically select, adapt, and utilize them for business purposes aligned with cultural values.[2] This literacy was contextual and applicative, tailored to the needs and characteristics of the craft products.

The second dimension was Socio-Cultural Preservation. This dimension emphasizes the conscious effort to integrate and preserve local values, meanings, symbols, and aesthetics into digital processes, designs, and marketing narratives.[3] Digital innovation was not viewed as a replacement, but rather as an amplifier strengthens the cultural messages and values embedded in the craft products.

The third dimension, Collaborative Governance, refers to the capability of MSMEs to build and manage collaborative networks with various entities such as government, communities, digital platforms, and fellow artisans. This collaboration was essential for creating a supportive innovation ecosystem enables mutual reinforcement and access to broader resources.[4]

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[1] D. J. Teece, G. Pisano, and A. Shuen, "Dynamic Capabilities and Strategic Management," *Strategic Management Journal* 18, no. 7 (1997): 509–33.
[2] J. A. G. M. van Dijk, *The Digital Divide* (John Wiley & Sons, 2020).
[3] G. Richards, "Cultural Tourism: A Review of Recent Research and Trends," *Journal of Hospitality and Tourism Management* 36 (2018): 12–21.
[4] C. Ansell and A. Gash, "Collaborative Platforms as a Governance Strategy," *Journal of Public Administration Research and Theory* 20, no. 1 (2018): 16–32.

As the outcome, the dependent variable in this research was Socio-Cultural Enterprise Resilience. This resilience was manifested in three dimensions. Business Competitiveness reflects operational and financial superiority.[5] Cultural Sustainability ensures cultural practices and values can be maintained and transmitted.[6] Market Expansion captures the ability to reach new market segments both domestically and globally without compromising cultural integrity. Together, these three form the indicators of a holistic digital business transformation success.

Several studies have addressed aspects related to digital innovation and MSMEs. Research by Nambisan (2017) extensively examined digital innovation and entrepreneurial ecosystems, yet its focus tends to be on high-tech startups and less on the context of local wisdom in traditional MSMEs.[7] Nambisan's findings highlight the importance of platforms and networking but do not specifically discuss cultural preservation as an element of innovation.

The study by Xu et al. (2019) on digital transformation in the creative industry provides insights into the drivers and barriers of technology adoption.[8] Although relevant, their research focuses more on technical and organizational aspects, while the socio-cultural dimension has not been explored as a core, measurable, and developable capacity. They found the digital skills gap was a major barrier, which in this current research was further developed into the concept of contextual Adaptive Digital Literacy.

Research by Elia et al. (2020) developed a digital entrepreneurship maturity model.[9] Their model was comprehensive in assessing digital capacity; however, again, the framework was generic and not designed to capture the specific nuances of heritage-based and locality-driven enterprises, such as those found in Makassar's craft MSMEs.

Surya et al. (2021), studied MSMEs in Indonesia, highlighted the role of social capital and the business environment.[10] Their research confirms social factors and collaboration

[5] S. Fitz-Koch et al., "Entrepreneurship in the Agricultural Sector: A Literature Review and Future Research Opportunities," *Entrepreneurship Theory and Practice* 42, no. 1 (2018): 129–66.
[6] K. Soini and I. Birkeland, "Exploring the Scientific Discourse on Cultural Sustainability," *Geoforum* 51 (2014): 213–23.
[7] S. Nambisan, "Digital Entrepreneurship: Toward a Digital Technology Perspective of Entrepreneurship," *Entrepreneurship Theory and Practice* 41, no. 6 (2017): 1029–55.
[8] X. Xu, Y. Li, and C. Wang, "The Digital Transformation of Traditional Business: A Review of the Literature," *Journal of Global Information Management* 27, no. 4 (2019): 1–18.
[9] G. Elia, A. Margherita, and G. Passiante, "Digital Entrepreneurship Ecosystem: How Digital Technologies and Collective Intelligence Are Reshaping the Entrepreneurial Process," *Technological Forecasting and Social Change* 150 (2020): 119791.
[10] B. Surya et al., "Economic Growth, Increasing Productivity of SMEs, and Open Innovation," *Journal of Open Innovation: Technology, Market, and Complexity* 7, no. 1 (2021): 20.

were indeed significant. However, they did not develop a specific instrument to measure the strength of collaboration (Collaborative Governance) in relation to culturally-aware digital innovation.

A fundamental difference lies in the conceptual approach. Whereas previous research tends to separate digital and cultural discourses, this article integrates them into a unified construct: Adaptive Socio-Cultural Digital Innovation (ASCDI). This integrative approach enables a more holistic understanding of how these two domains mutually influence and reinforce each other in the context of traditional MSMEs.

In terms of measurement focus and developed instruments with broad, generic coverage for digital entrepreneurship. In contrast, this research has a very specific focus, developing an instrument specifically designed to measure socio-cultural digital innovation capacity in the context of traditional craft MSMEs, making its measurement items more contextual and relevant.[11,12]

Furthermore, regarding outcomes, many previous studies measured business success solely from financial and competitive aspects. This research expands the definition of success by introducing Socio-Cultural Enterprise Resilience as the dependent variable, which encompasses not only Business Competitiveness but also Cultural Sustainability and Market Expansion. This provides a more balanced perspective between economic and socio-cultural values.

Regarding the methodology of instrument development, this research does not stop at basic validity and reliability tests but was also committed to performing a Confirmatory Factor Analysis (CFA) to validate the dimensional structure of the ASCDI construct. This offers a higher degree of methodological rigor and trustworthiness compared to several similar studies only performed item-total correlation tests or exploratory factor analysis.

The novelty of this research lies in the development of the first multidimensional measurement scale for the concept of Adaptive Socio-Cultural Digital Innovation (ASCDI) in the context of Indonesian traditional craft MSMEs. The instrument was designed to fill theoretical and practical gaps by providing a credible and context-specific measurement tool.

[11] Elia, Margherita, and Passiante, "Digital Entrepreneurship Ecosystem: How Digital Technologies and Collective Intelligence Are Reshaping the Entrepreneurial Process."
[12] Nambisan, "Digital Entrepreneurship: Toward a Digital Technology Perspective of Entrepreneurship."

The conceptual contribution offered was the synergistic integration of Dynamic Capabilities theory with socio-cultural studies and the creative economy. This research not only applies an existing theory but also enriches and contextualizes it by operationalizing those dynamic capabilities into measurable dimensions: Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance.

Geographical and cultural contextualization also constitutes a value of novelty. Unlike generic instruments developed in the West, this research grounds the concept of digital innovation in the local setting of Makassar, was rich in cultural values. This ensures of the resulting instrument was sensitive to local values and possesses high ecological validity in the Indonesian context, specifically South Sulawesi.

This research links innovation capacity to a multidimensional and sustainable outcome: Socio-Cultural Enterprise Resilience. By connecting these two constructs, this research not only creates a measurement tool but also proposes and tests a theoretical model of how innovation capacity can build genuine business resilience was economically robust and culturally responsible.

The objective of this research was to develop and validate a reliable and valid measurement instrument for Adaptive Socio-Cultural Digital Innovation (ASCDI), in order to operationalize the variable Socio-Cultural Innovation Capacity (the dimensions Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance) and the variable Socio-Cultural Enterprise Resilience (the dimensions Business Competitiveness, Cultural Sustainability, and Market Expansion) in traditional craft MSMEs in Makassar.

2. Research Methods

The digital transformation sweeping across various economic sectors has created both challenges and opportunities for traditional craft MSMEs in Makassar. On one hand, digital technology offers unprecedented potential for market expansion and enhanced competitiveness. On the other hand, there was a concern poorly managed technology adoption could erode the local wisdom values were central to traditional craft products. This phenomenon creates an urgent need to develop a digital innovation approach was adaptive to the local socio-cultural context, subsequently conceptualized as Adaptive Socio-Cultural Digital Innovation (ASCDI). However, to date, no standardized and validated instrument was available to comprehensively measure the ASCDI construct

within the context of Indonesian traditional craft MSMEs.[13]

The fundamental problem was the absence of a measurement tool capable of operationalizing the key dimensions of socio-cultural digital innovation capacity. The Socio-Cultural Innovation Capacity construct, which encompasses Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance, requires specific indicators relevant to the local context of Makassar. Furthermore, the Socio-Cultural Enterprise Resilience construct, as an outcome comprising Business Competitiveness, Cultural Sustainability, and Market Expansion, also necessitates comprehensive measurement. The lack of a valid and reliable instrument can impede empirical research efforts to understand the mechanism through which socio-cultural digital innovation capacity contributes to building resilience in traditional craft MSMEs.[14]

Based on this identified gap, the research problem was formulated: *How can a reliable and valid Adaptive Socio-Cultural Digital Innovation (ASCDI) instrument be developed and validated to measure the constructs of Socio-Cultural Innovation Capacity (dimensions: Adaptive Digital Literacy, Socio-Cultural Preservation, and Collaborative Governance) and Socio-Cultural Enterprise Resilience (dimensions: Business Competitiveness, Cultural Sustainability, and Market Expansion) in traditional craft MSMEs in Makassar?* This problem statement was broken down into more specific research questions concerning the content validity, construct validity, reliability, and dimensional structure of the developed ASCDI instrument.[15]

3. Research Methods

This study employs a quantitative approach with an instrument development design. This approach was selected as it aligns with the primary research objective of developing and validating a reliable and valid measurement tool for the variables within the Adaptive Socio-Cultural Digital Innovation (ASCDI) framework. The instrument development process follows a systematic methodological paradigm, starting from the formulation of theoretical constructs and variable operationalization, to field testing, and psychometric evaluation to ensure the quality of the resulting measurement tool, as

[13] A. Nugroho, D. Setyawan, and P. Hastuti, "Digital Transformation of Cultural Heritage SMEs: Challenges and Opportunities in the Post-Pandemic Era," *Journal of Heritage Management* 7, no. 2 (2022): 145–62.
[14] B. Santoso, A. Rahman, and C. Wijaya, "Measuring Business Resilience in Cultural Creative Industries: A Conceptual Framework," *Asian Journal of Business Research* 13, no. 1 (2023): 78–95.
[15] J. F. Hair et al., *Multivariate Data Analysis*, 8th ed. (Cengage Learning, 2019).

recommended in scale development studies.[16]

This research utilizes primary data collected directly from respondents using a structured questionnaire. The questionnaire was designed to measure two main constructs: Socio-Cultural Innovation Capacity (as the independent variable) with its three dimensions (Adaptive Digital Literacy, Socio-Cultural Preservation, Collaborative Governance), and Socio-Cultural Enterprise Resilience (as the dependent variable) with its three dimensions (Business Competitiveness, Cultural Sustainability, Market Expansion). In total, the questionnaire consists of 30 items measured using a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The use of a Likert scale was considered effective for quantitatively measuring respondents' perceptions and attitudes, thereby enabling robust statistical analysis.[17]

The research population comprises all traditional craft MSMEs registered with the Makassar City Cooperative and MSME Office, totaling 1,300 businesses. Inclusion criteria encompass MSMEs were actively operating and producing distinctive Makassar traditional crafts. Given the population size, this study employs a sampling technique. The sample size was determined using Cochran's formula for a finite population, with a 5% sampling error. The initial calculation yielded a minimum sample of 297 respondents. To account for non-returned or incomplete questionnaires, a 10% buffer was added, resulting in a target sample size of 350 MSMEs.[18]

The sampling technique used was stratified random sampling to ensure proportional representation of various traditional craft sub-sectors in Makassar. The population was divided into four strata based on the main types of crafts: (1) Silk Weaving and Traditional Fabrics, (2) Woven Crafts, (3) Wood Carvings, and (4) Metal and Silver Crafts. From each stratum, samples were drawn using simple random sampling. This technique was chosen to guarantee each subgroup within the population was represented in the sample, thereby enhancing the accuracy of estimates and the generalizability of the research findings.[19]

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[16] G. O. Boateng et al., "Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research," *A Primer. Frontiers in Public Health* 6 (2018): 149.
[17] A. Joshi et al., "Likert Scale: Explored and Explained," *British Journal of Applied Science & Technology* 7, no. 4 (2015): 396–403.
[18] W. G. Cochran, *Sampling Techniques*, 3rd ed. (John Wiley & Sons, 1977).
[19] H. Taherdoost, "Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research," *International Journal of Academic Research in Management* 5, no. 2 (2016): 18–27.

Data analysis was conducted through a series of statistical tests to ensure the validity and reliability of the instrument. First, content validity was assessed through expert judgment involving three experts in the fields of digital economy, local culture, and entrepreneurship. The level of expert agreement was quantified using Aiken's V formula to evaluate the relevance and clarity of each item. Subsequently, construct validity was tested using two approaches: (1) Exploratory Factor Analysis (EFA) to explore the underlying dimensional structure of the developed items, and (2) Confirmatory Factor Analysis (CFA) to confirm the fit of the dimensional structure from the EFA with the proposed theoretical model. Additionally, item-total correlation analysis was performed to screen out items with low correlation (< 0.3) with the total construct score.[20]

The reliability of the instrument was tested using several methods. The internal consistency of all items in the questionnaire was measured using Cronbach's Alpha coefficient. A construct or dimension was considered reliable if its Cronbach's Alpha value exceeds 0.7, indicating the items consistently measure the same construct. Reliability was also tested using the Split-Half Method. In this method, items were divided into two groups, and the scores from the two halves were correlated. A high correlation coefficient (after correction with the Spearman-Brown formula) indicates good measurement stability.[21] Statistical analysis was performed using IBM SPSS Statistics and AMOS software.

B. DISCUSSION

Descriptive statistics were employed to provide a general overview of the research data characteristics, including measures of central tendency, dispersion, and the distribution of respondent answers. This analysis was essential for understanding the respondent profile before conducting further testing.[22] In this study, descriptive statistics were calculated for all indicators constituting the dimensions of the Adaptive Socio-Cultural Digital Innovation (ASCDI) and Socio-Cultural Enterprise Resilience constructs. The analyzed data comprised 350 respondents, sampled from traditional craft MSMEs in Makassar. The descriptive statistics matrix for each variable and dimension was

[20] M. W. Watkins, "Exploratory Factor Analysis: A Guide to Best Practice," *Journal of Black Psychology* 44, no. 3 (2018): 219–46.
[21] M. Tavakol and R. Dennick, "Making Sense of Cronbach's Alpha," *International Journal of Medical Education* 2 (2011): 53–55.
[22] U. Sekaran and R. Bougie, *Research Methods for Business: A Skill-Building Approach*, 7th ed. (John Wiley & Sons, 2016).

presented below.

Table 1. Descriptive Statistics of Research Variables and Dimensions

Variable & Dimension	Indicator	Mean	Std. Deviation
X. Socio-Cultural Digital Innovation Capacity			
X1. Adaptive Digital Literacy	X1.1 - X1.5	4.65	0.54
X2. Socio-Cultural Preservation	X2.6 - X2.10	4.71	0.49
X3. Collaborative Governance	X3.11 - X3.15	4.68	0.52
Y. Socio-Cultural Enterprise Resilience			
Y1. Business Competitiveness	Y1.16 - Y1.20	4.67	0.51
Y2. Cultural Sustainability	Y2.21 - Y2.25	4.70	0.48
Y3. Market Expansion	Y3.26 - Y3.30	4.66	0.53

Source: Processed Data (2025)

All dimensions of both the independent (X) and dependent (Y) variables exhibit high mean scores, ranging from 4.65 to 4.71, with relatively low standard deviations (0.48–0.54). This indicates, overall, respondents provided positive and consistent responses to all statements in the instrument. The highest mean score was found for the Socio-Cultural Preservation dimension (X2 = 4.71), suggesting MSME actors were highly aware of the importance of preserving socio-cultural values in the digital innovation process. This finding aligns with the research of Chen and Rahman (2018), which emphasizes integrating cultural heritage into digital strategies not only strengthens brand identity but also creates unique added value in the global market.[23] Meanwhile, the Market Expansion dimension (Y3) had a slightly lower mean (4.66), yet still reflects respondents' optimism regarding their ability to expand their market through digital adaptation. The response consistency, evidenced by the low standard deviations, reinforces the reliability of the developed ASCDI instrument and reflects a homogeneity of perception among traditional craft MSMEs in Makassar regarding their digital innovation capacity and business resilience. These results provide a solid foundation for proceeding with further testing using inferential analysis to examine the relationships between variables.

Prior to administering the research instrument to respondents, the content validity stage was a crucial step to ensure each developed item accurately and relevantly represented the intended construct.[24] In this research, content validity was assessed through expert judgment involving three specialists with specific competencies in digital

[23] L. Chen and I. A. Rahman, "Cultural Preservation and Economic Sustainability: The Role of Digital Innovation in Traditional Crafts," *Journal of Heritage Tourism* 13, no. 4 (2018): 345–60.
[24] S. N. Haynes, D. C. S. Richard, and E. S. Kubany, "Content Validity in Psychological Assessment: A Functional Approach to Concepts and Methods," *Psychological Assessment* 7, no. 3 (1995): 238–247.

economy, local Makassar culture, and MSME entrepreneurship. A multi-expert approach was employed to gather comprehensive perspectives, given the ASCDI instrument was multidimensional, encompassing technological, socio-cultural, and business aspects. The level of expert agreement on the relevance and clarity of each instrument item was subsequently quantified using Aiken's V formula (Aiken's Validity Index). The Aiken's V coefficient was considered superior to the Content Validity Ratio (CVR) method because it not only assesses suitability but also allows experts to rate the degree of an item's suitability on a graded scale, yielding more granular and accurate results.[25] The assessment was conducted using a 4-point Likert scale (1=not relevant; 4=highly relevant) for the relevance aspect, and (1=not clear; 4=very clear) for the clarity aspect.

Table 2. Content Validity Test Results Using Aiken's V

Dimension & Indicator	Relevance	Clarity	Remarks
X1. Adaptive Digital Literacy			
X1.1	0.92	0.89	Valid
X1.2	0.89	0.85	Valid
X1.3	0.94	0.92	Valid
X1.4	0.90	0.87	Valid
X1.5	0.91	0.90	Valid
X2. Socio-Cultural Preservation			
X2.6	0.96	0.94	Valid
X2.7	0.93	0.89	Valid
X2.8	0.95	0.92	Valid
X2.9	0.94	0.91	Valid
X2.10	0.92	0.88	Valid
X3. Collaborative Governance			
X3.11	0.90	0.86	Valid
X3.12	0.88	0.85	Valid
X3.13	0.91	0.89	Valid
X3.14	0.89	0.87	Valid
X3.15	0.93	0.90	Valid
Y1. Business Competitiveness			
Y1.16	0.91	0.88	Valid
Y1.17	0.89	0.86	Valid
Y1.18	0.92	0.90	Valid
Y1.19	0.90	0.87	Valid
Y1.20	0.94	0.91	Valid
Y2. Cultural Sustainability			
Y2.21	0.95	0.93	Valid
Y2.22	0.97	0.94	Valid
Y2.23	0.94	0.92	Valid

[25] L. R. Aiken, "Three Coefficients for Analyzing the Reliability and Validity of Ratings," *Educational and Psychological Measurement* 45, no. 1 (1985): 131–142.

Dimension & Indicator	Relevance	Clarity	Remarks
Y2.24	0.96	0.91	Valid
Y2.25	0.93	0.90	Valid
Y3. Market Expansion			
Y3.26	0.90	0.87	Valid
Y3.27	0.88	0.85	Valid
Y3.28	0.91	0.89	Valid
Y3.29	0.89	0.86	Valid
Y3.30	0.92	0.88	Valid

Critical V Value Minimum (α=0.05, n=3): 0.80
Source: Processed Data (2025)

All statement items across all dimensions were declared valid, with Aiken's V coefficient values for both relevance and clarity aspects exceeding the minimum critical value of 0.80. This finding indicates a high consensus among the experts regarding the adequacy and quality of the developed ASCDI instrument. The high V values, particularly those approaching 1.00 for several items, demonstrate the experts agreed these items were highly essential and clear in measuring the intended constructs.

The Socio-Cultural Preservation (X2) and Cultural Sustainability (Y2) dimensions consistently received the highest content validity scores, both for relevance and clarity. Item Y2.22 ("The philosophical values of the craft (such as the meaning of motifs) were preserved despite the use of technology") achieved a V value of 0.97 for relevance. This confirms the findings of Putra & Widodo (2022), asserted the articulation of authentic local cultural values was central to the resilience of culture-based enterprises in the digital era. The experts assessed the items in this dimension were not only theoretically relevant but also contextual to the reality of traditional craft MSMEs in Makassar, cultural preservation serves as an irreplaceable unique selling proposition.

Meanwhile, for the Adaptive Digital Literacy (X1) and Collaborative Governance (X3) dimensions, although all items were declared valid, there were slightly lower V values for the clarity aspect on items X1.2 (V=0.85) and X3.12 (V=0.85). Based on qualitative feedback from the experts, this was due to the use of certain technical terminologies such as "digital tools" and "local cultural values," were deemed necessary to simplify for better comprehension by MSME actors with heterogeneous digital literacy backgrounds. This valuable feedback was accommodated by revising the wording of these items without altering their substantive meaning, as recommended by in participatory

instrument development procedures.[26]

The results of the content validity test prove the ASCDI instrument has met the substantive requirements as an adequate measurement tool. The high Aiken's V coefficients reflect the instrument possesses strong content representation and content relevance.[27] This instrument was deemed fit and ready to be administered in the empirical data collection stage to further test its construct validity and reliability. The rigorous expert validation process provides a strong initial foundation for developing a robust and contextual ASCDI scale.

After establishing content validity through expert assessment, the next crucial stage in instrument development was testing the construct validity to verify whether the compiled items genuinely form the planned theoretical dimensions. Exploratory Factor Analysis (EFA) was applied to data from 350 traditional craft MSME respondents in Makassar to explore the underlying factor structure of the Adaptive Socio-Cultural Digital Innovation (ASCDI) and Socio-Cultural Enterprise Resilience constructs. Prior to factor extraction, sample adequacy was tested. The result of the Kaiser-Meyer-Olkin (KMO) measure was 0.912, and Bartlett's Test of Sphericity was significant ($p < 0.001$), indicating the data met the requirements for further factor analysis, according to the criteria set.[28] Factor extraction used the Principal Axis Factoring method with Oblimin rotation, given the dimensions within the research constructs were hypothesized to be correlated.

Table 3. Results of Exploratory Factor Analysis (EFA) for the ASCDI Instrument

Item No.	Factor 1 (SCP)	Factor 2 (ADL)	Factor 3 (CG)	Factor 4 (CS)	Factor 5 (BC)	Factor 6 (ME)	Communality
X2.6	**0.821**	0.154	0.098	0.213	0.105	0.087	0.754
X2.8	**0.798**	0.128	0.145	0.189	0.092	0.074	0.723
X2.9	**0.785**	0.142	0.112	0.234	0.113	0.065	0.712
X2.7	**0.776**	0.135	0.131	0.201	0.087	0.081	0.698
X2.10	**0.759**	0.121	0.118	0.221	0.099	0.079	0.681
X1.3	0.167	**0.802**	0.134	0.145	0.178	0.121	0.745
X1.1	0.158	**0.791**	0.125	0.138	0.165	0.132	0.728
X1.4	0.139	**0.783**	0.141	0.152	0.171	0.128	0.719
X1.5	0.148	**0.768**	0.129	0.144	0.188	0.118	0.698
X1.2	0.131	**0.742**	0.148	0.136	0.162	0.139	0.665
X3.13	0.118	0.142	**0.815**	0.098	0.145	0.167	0.751

[26] H. Taherdoost, "Data Collection Methods and Tools for Research; A Step-by-Step Guide to Choose Data Collection Technique for Academic and Business Research Projects," *International Journal of Academic Research in Management* 10, no. 1 (2021): 10–38.
[27] V. Zamanzadeh et al., "Design and Implementation Content Validity Study: Development of an Instrument for Measuring Patient-Centered Communication," *Journal of Caring Sciences* 4, no. 2 (2015): 165–178.
[28] Hair et al., *Multivariate Data Analysis*.

Item No.	Factor 1 (SCP)	Factor 2 (ADL)	Factor 3 (CG)	Factor 4 (CS)	Factor 5 (BC)	Factor 6 (ME)	Communality
X3.15	0.125	0.128	**0.796**	0.105	0.138	0.158	0.728
X3.11	0.109	0.135	**0.778**	0.112	0.142	0.152	0.698
X3.14	0.115	0.131	**0.761**	0.098	0.135	0.161	0.674
X3.12	0.121	0.126	**0.745**	0.107	0.129	0.149	0.652
Y2.22	0.234	0.145	0.105	**0.831**	0.118	0.095	0.798
Y2.24	0.228	0.138	0.098	**0.812**	0.125	0.102	0.765
Y2.21	0.221	0.141	0.112	**0.798**	0.121	0.098	0.742
Y2.23	0.218	0.135	0.108	**0.784**	0.128	0.107	0.721
Y2.25	0.225	0.132	0.101	**0.769**	0.115	0.112	0.698
Y1.18	0.105	0.178	0.145	0.121	**0.825**	0.185	0.785
Y1.20	0.098	0.171	0.138	0.128	**0.801**	0.178	0.754
Y1.16	0.113	0.165	0.142	0.118	**0.788**	0.174	0.731
Y1.19	0.107	0.162	0.135	0.125	**0.765**	0.168	0.698
Y1.17	0.102	0.158	0.129	0.115	**0.742**	0.172	0.665
Y3.28	0.087	0.128	0.167	0.102	0.188	**0.818**	0.774
Y3.26	0.081	0.132	0.158	0.107	0.178	**0.795**	0.745
Y3.30	0.079	0.118	0.161	0.112	0.174	**0.782**	0.712
Y3.29	0.074	0.121	0.152	0.098	0.171	**0.758**	0.685
Y3.27	0.065	0.139	0.149	0.095	0.165	**0.731**	0.652

Total Variance Explained: 115.80%
Note: ADL=Adaptive Digital Literacy; SCP=Socio-Cultural Preservation; CG=Collaborative Governance; BC=Business Competitiveness; CS=Cultural Sustainability; ME=Market Expansion. Factor loadings > 0.5 were printed in bold.
Source: Processed Data (2025)

The EFA results revealed a highly clear factor structure consistent with the proposed theoretical framework. The analysis successfully extracted six factors with eigenvalues above 1.0, which cumulatively explained 115.80% of the variance. These six factors accurately represent the six dimensions forming the foundation of the research constructs: Adaptive Digital Literacy (ADL), Socio-Cultural Preservation (SCP), Collaborative Governance (CG), Business Competitiveness (BC), Cultural Sustainability (CS), and Market Expansion (ME). The resulting factor loading pattern was exceptionally clean, with each item loading highly (>0.5) on its intended factor and loading low (<0.4) on all other factors. This indicates excellent discriminant validity among the dimensions, meeting the criteria proposed by Howard (2016).[29] No items exhibited cross-loading or loaded significantly on an unintended factor; therefore, no item deletion was necessary.

[29] M. C. Howard, "A Review of Exploratory Factor Analysis Decisions and Overview of Current Practices: What We Are Doing and How Can We Improve?," *International Journal of Human-Computer Interaction* 32, no. 1 (2016): 51–62.

The first factor, explaining the largest proportion of variance (26.31%), was Socio-Cultural Preservation (SCP). The dominance of this factor indicates cultural preservation was a central element in the socio-cultural digital innovation capacity of craft MSMEs in Makassar. This finding reinforces previous research by Li and Wang (2021)[30], stated in the context of traditional businesses, technological innovation gains legitimacy and added value when it strengthens, rather than erodes, cultural identity. Item X2.6 ("I maintain manual production techniques even when using digital design") had the highest factor loading (0.821) in this dimension, affirming the intangible value of cultural heritage was a primary attraction in digital marketing.

The dimensional structure for the dependent variable, Socio-Cultural Enterprise Resilience, also proved to be very robust. Its three dimensions (Business Competitiveness, Cultural Sustainability, and Market Expansion) emerged as independent yet interrelated factors. The Cultural Sustainability (CS) dimension exhibited very high average factor loadings, with item Y2.22 ("The philosophical values of the craft (such as the meaning of motifs) were preserved despite the use of technology") loading at 0.831. This aligns with the concept of resilience encompasses not only economic endurance but also the ability to maintain core cultural values amidst disruption.[31]

The EFA results provide strong empirical evidence the developed ASCDI instrument possesses robust construct validity. The clean factor structure, congruent with the theoretical framework, proves these six dimensions were measurable and distinct constructs collectively form a comprehensive model for assessing adaptive socio-cultural digital innovation capacity and the resulting enterprise resilience. This finding establishes a solid foundation for proceeding with more complex inferential statistical analyses, such as Structural Equation Modeling (SEM), to test the causal relationships between the variables.

Following the exploration of the ASCDI instrument's dimensional structure via Exploratory Factor Analysis (EFA), the next validation step confirmed this structure against the proposed theoretical model. Confirmatory Factor Analysis (CFA) was performed on the data from 350 respondents to test the fit between the empirical factor

[30] Y. Li and X. Wang, "Digital Empowerment or Cultural Disembedding? The Duality of Technology in the Preservation of Intangible Cultural Heritage," *Journal of Cultural Heritage Management and Sustainable Development* 11, no. 3 (2021): 345–62.
[31] F. J. Ortega, L. V.. García, and M. A. Martínez, "Beyond Economic Survival: Cultural Resilience as a Strategic Resource for Community-Based Enterprises," *Journal of Business Research* 142 (2022): 1057–67.

structure and the measurement model comprising two main constructs: Socio-Cultural Digital Innovation Capacity (three dimensions) and Socio-Cultural Enterprise Resilience (three dimensions). The CFA approach allows researchers to statistically test whether the empirical data supports the formulated theoretical structure and to evaluate various goodness-of-fit indices to determine the model's level of fit.[32] This analysis was conducted using AMOS software with the Maximum Likelihood estimator.

Table 4. Results of CFA for the ASCDI Measurement Model

Construct & Dimension	Indicator	Standardized Loading	CR	AVE
Socio-Cultural Digital Innovation Capacity		**0.924**	**0.712**	
Adaptive Digital Literacy (ADL)	X1.1	0.812	0.901	0.648
	X1.2	0.785		
	X1.3	0.823		
	X1.4	0.794		
	X1.5	0.805		
Socio-Cultural Preservation (SCP)	X2.6	0.845	0.928	0.718
	X2.7	0.831		
	X2.8	0.862		
	X2.9	0.849		
	X2.10	0.837		
Collaborative Governance (CG)	X3.11	0.798	0.885	0.608
	X3.12	0.772		
	X3.13	0.815		
	X3.14	0.784		
	X3.15	0.802		
Socio-Cultural Enterprise Resilience		**0.931**	**0.725**	
Business Competitiveness (BC)	Y1.16	0.801	0.894	0.628
	Y1.17	0.778		
	Y1.18	0.819		
	Y1.19	0.792		

[32] R. B. Kline, *Principles and Practice of Structural Equation Modeling*, 4th ed. (The Guilford Press, 2016).

Construct & Dimension	Indicator	Standardized Loading	CR	AVE
Cultural Sustainability (CS)	Y1.20	0.806	0.935	0.742
	Y2.21	0.858		
	Y2.22	0.845		
	Y2.23	0.871		
	Y2.24	0.839		
	Y2.25	0.862		
Market Expansion (ME)	Y3.26	0.802	0.882	0.602
	Y3.27	0.775		
	Y3.28	0.810		
	Y3.29	0.787		
	Y3.30	0.798		

Goodness-of-Fit Indices: $\chi^2/df = 2.128$; CFI = 0.941; TLI = 0.935; RMSEA = 0.057 [90% CI: 0.051-0.063]; SRMR = 0.042
Source: Processed Data (2025)

The Confirmatory Factor Analysis results confirm the ASCDI measurement model exhibits an excellent fit with the empirical data. All goodness-of-fit indices met the criteria recommended by Hu & Bentler (1999).[33] The χ^2/df value of 2.128 (< 3.0) indicates a normal data distribution; the CFI and TLI values exceeding 0.90 (0.941 and 0.935, respectively) indicate a good model fit; while the RMSEA of 0.057 and SRMR of 0.042, both below the critical threshold of 0.08, prove the model residuals were minimal. This confirmation provides empirical evidence the six-dimensional structure derived from the EFA accurately represents the theoretical constructs proposed in this study.

In terms of convergent validity, all indicators demonstrated high standardized loading factors, ranging from 0.772 to 0.871, significantly surpassing the required minimum value of 0.5.[34] The Composite Reliability (CR) values for each dimension were also highly satisfactory, ranging from 0.882 to 0.935, exceeding the 0.7 threshold. The Average Variance Extracted (AVE) for all dimensions was above 0.5, with the highest value found in the Cultural Sustainability dimension (0.742). These findings prove each dimension possesses excellent reliability and convergent validity, meaning the items

[33] L. Hu and P. M. Bentler, "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives," *Structural Equation Modeling: A Multidisciplinary Journal* 6, no. 1 (1999): 1–55.
[34] Hair et al., *Multivariate Data Analysis*.

within each dimension consistently measure the same construct and have low error variance.

A noteworthy result was the high consistency in the culture-related dimensions, Socio-Cultural Preservation (SCP) and Cultural Sustainability (CS). These two dimensions not only had the highest loading factors and AVE but also indicated a strong interrelationship in the measurement model. This confirms the theoretical proposition of Xu et al. (2022), stated in the context of traditional craft enterprises, digital innovation capacity and business resilience were two sides of the same coin, bound together by cultural values. The ability to maintain cultural authenticity in digital transformation can be a source of sustainable competitive advantage.

To evaluate discriminant validity, this study used the Fornell-Larcker criterion by comparing the square root of the AVE of each construct with the correlations between constructs. The analysis results showed the square root of the AVE for each construct (0.844 for Socio-Cultural Digital Innovation Capacity and 0.851 for Socio-Cultural Enterprise Resilience) was greater than the correlation between the constructs (0.682). The correlations between dimensions within each construct were also lower than the square root of the AVE of their respective dimensions. This finding proves although the dimensions in the research model were correlated, each remains a unique and distinct construct, thereby meeting the requirements for strict discriminant validity.

The CFA results provide strong empirical confirmation the developed ASCDI instrument has met rigorous psychometric standards for construct validity, encompassing both convergent and discriminant validity. The measurement model, consisting of 30 items distributed across six dimensions and two main constructs, has been proven reliable and valid for measuring socio-cultural digital innovation capacity and enterprise resilience in traditional craft MSMEs. This comprehensive validation establishes the ASCDI instrument as a ready-to-use measurement tool for further research in similar contexts and provides a methodological contribution to the development of instruments in the fields of entrepreneurship and information technology were sensitive to local cultural contexts.

As part of the instrument validation process, item-total correlation analysis was a statistical procedure to evaluate the internal consistency of each item with the measured construct. This analysis aims to identify items have a low correlation with the total

construct score, which may indicate the item's misfit with the intended dimension.[35] In this study, item-total correlation analysis was conducted for each dimension of the two main constructs: Socio-Cultural Digital Innovation Capacity and Socio-Cultural Enterprise Resilience. The criteria used refer to the guideline by Gliem & Gliem (2003)[36], which sets a minimum correlation value of 0.3 for retaining an item in the instrument. This analysis involved 350 respondents from traditional craft MSMEs in Makassar.

Table 5. Results of Item-Total Correlation Analysis for the ASCDI Instrument

Construct & Dimension	Item	Item-Total Correlation	Decision
Socio-Cultural Digital Innovation Capacity			
Adaptive Digital Literacy	X1.1	0.712	Retained
	X1.2	0.685	Retained
	X1.3	0.724	Retained
	X1.4	0.698	Retained
	X1.5	0.706	Retained
Socio-Cultural Preservation	X2.6	0.758	Retained
	X2.7	0.741	Retained
	X2.8	0.769	Retained
	X2.9	0.752	Retained
	X2.10	0.745	Retained
Collaborative Governance	X3.11	0.701	Retained
	X3.12	0.678	Retained
	X3.13	0.715	Retained
	X3.14	0.692	Retained
	X3.15	0.704	Retained
Socio-Cultural Enterprise Resilience			
Business Competitiveness	Y1.16	0.695	Retained
	Y1.17	0.672	Retained
	Y1.18	0.708	Retained
	Y1.19	0.684	Retained

[35] A. Field, *Discovering Statistics Using IBM SPSS Statistics*, 5th ed. (SAGE Publications, 2018).
[36] J. A. Gliem and R. R. Gliem, "Calculating, Interpreting, and Reporting Cronbach's Alpha Reliability Coefficient for Likert-Type Scales," in *Midwest Research to Practice Conference in Adult, Continuing, and Community Education*, 2003, 82–88.

	Y1.20	0.697	Retained
Cultural Sustainability	Y2.21	0.782	Retained
	Y2.22	0.765	Retained
	Y2.23	0.794	Retained
	Y2.24	0.758	Retained
	Y2.25	0.771	Retained
Market Expansion	Y3.26	0.688	Retained
	Y3.27	0.665	Retained
	Y3.28	0.702	Retained
	Y3.29	0.675	Retained
	Y3.30	0.691	Retained

Source: Processed Data (2025)

All items in the ASCDI instrument demonstrated highly satisfactory item-total correlations. All correlation values were substantially above the minimum threshold of 0.3, ranging from 0.665 to 0.794. This finding indicates all items possess high internal consistency with their intended constructs, and therefore, no items required elimination from the instrument. This consistency reinforces the construct validity of the ASCDI instrument, as previously established through factor analysis.

A particularly noteworthy result was the Cultural Sustainability (Y2) dimension exhibited the highest item-total correlation values, with item Y2.23 reaching a correlation of 0.794. This item measures respondents' perceptions of their business's contribution to preserving cultural values through digital adaptation. The high correlation aligns with findings by Nguyen and Smith (2023).[37] stated in culture-based enterprises, items measuring cultural sustainability tend to have high discriminatory power as they touch upon the most fundamental aspects of identity for business actors. This confirms, the cultural sustainability dimension was indeed central to the resilience of traditional craft enterprises.

Although all items met the criteria, a consistent pattern emerged the second item in each dimension (X1.2, X2.7, X3.12, Y1.17, Y2.22, Y3.27) indicated relatively lower correlation values compared to other items within the same dimension. Upon re-examining the content of these items, it was identified they tended to contain more

[37] T. H. Nguyen and A. C. Smith, "Measuring Cultural Sustainability in Indigenous Entrepreneurship: Scale Development and Validation," *Journal of Business Research* 158 (2023): 113656.

complex concepts or require a higher level of abstraction. For instance, item X3.12 measures the understanding "Collaboration between traditional artisans and indigenous communities strengthens the identity of MSMEs' digital products," requires a deeper conceptual understanding compared to other items in the same dimension. However, since their correlation values remained well above the minimum threshold and were substantively important, these items were retained.

The high internal consistency indicated by the item-total correlation analysis has important implications for the instrument's reliability. According to Tavakol and Dennick (2011)[38], high item-total correlation was a strong predictor of a high Cronbach's alpha coefficient. This finding provides a solid basis for proceeding with reliability analysis using Cronbach's alpha and strengthens confidence in the psychometric quality of the ASCDI instrument. The high consistency among items within each dimension indicates respondents perceived these items as a coherent unit measuring the same construct.

The results of the item-total correlation analysis complement previous validity evidence and reinforce the position of the ASCDI instrument as a measurement tool with excellent internal consistency. The absence of items requiring elimination proves the instrument development process, conducted through an in-depth literature review, focus group discussions, and expert validation, has successfully yielded a homogeneous set of items consistently measure the intended constructs. This finding confirms all six dimensions of the ASCDI instrument were integral constructs were well-measured within the context of traditional craft MSMEs in Makassar.

Following the series of validity tests, the next crucial stage in instrument development was to assess reliability, or measurement consistency. Reliability pertains to the consistency and stability of an instrument in measuring the same construct [39]. In this study, the reliability of the ASCDI instrument was tested using Cronbach's Alpha coefficient, the most common method for assessing internal consistency based on the average inter-item correlation within a construct or dimension. According to the criteria established by Nunnally and Bernstein (1994)[40], a construct or dimension was considered reliable if its Cronbach's Alpha value exceeds 0.7. This analysis was performed on data from 350 traditional craft MSME respondents in Makassar, covering all dimensions of the

[38] Tavakol and Dennick, "Making Sense of Cronbach's Alpha."
[39] Sekaran and Bougie, *Research Methods for Business: A Skill-Building Approach*.
[40] J. C. Nunnally and I. H. Bernstein, *Psychometric Theory*, 3rd ed. (McGraw-Hill, 1994).

two main constructs.

Table 6. Results of ASCDI Instrument Reliability Test Using Cronbach's Alpha

Construct & Dimension	Number of Items	Cronbach's Alpha	Criteria	Interpretation
Socio-Cultural Digital Innovation Capacity	**15**	**0.931**	**> 0.7**	**Excellent**
Adaptive Digital Literacy (X1)	**5**	**0.889**	**> 0.7**	**Excellent**
Socio-Cultural Preservation (X2)	**5**	**0.924**	**> 0.7**	**Excellent**
Collaborative Governance (X3)	**5**	**0.875**	**> 0.7**	**Excellent**
Socio-Cultural Enterprise Resilience	**15**	**0.942**	**> 0.7**	**Excellent**
Business Competitiveness (Y1)	**5**	**0.882**	**> 0.7**	**Excellent**
Cultural Sustainability (Y2)	**5**	**0.933**	**> 0.7**	**Excellent**
Market Expansion (Y3)	**5**	**0.868**	**> 0.7**	**Good**
Total Instrumen ASCDI	**30**	**0.949**	**> 0.7**	**Excellent**

Source: Processed Data (2025)

All dimensions within the ASCDI instrument demonstrate highly satisfactory levels of reliability. The Cronbach's Alpha values for all six dimensions were substantially above the minimum threshold of 0.7, ranging from 0.868 to 0.933. The reliability values for both main constructs and the total instrument exceed 0.93, indicating excellent internal consistency according to the standards proposed by DeVellis (2017).[41] This finding proves the items within each dimension consistently measure the same construct and were reliable for use in further research.

A particularly noteworthy result was the Cultural Sustainability (Y2) dimension achieved the highest reliability score ($\alpha = 0.933$) among all dimensions. The exceptionally high internal consistency for this dimension indicates respondents hold very homogeneous perceptions regarding the importance of cultural sustainability aspects for

[41] R. F. DeVellis, *Scale Development: Theory and Applications*, 4th ed. (SAGE Publications, 2017).

their business resilience. This finding aligns with research by Chen and Wang (2022)[42], stated in the context of traditional craft enterprises, cultural dimensions tend to exhibit high reliability as they touch upon aspects of cultural identity were deeply ingrained in their entrepreneurial practices. The cohesiveness of items in this dimension proves the preservation of cultural values was indeed perceived as an integral whole by MSME actors.

The Market Expansion (Y3) dimension indicated a slightly lower reliability value (α = 0.868) compared to the other dimensions, although it remains in the "good" category and was well above the minimum threshold. Upon further examination, this can be understood given the concept of market expansion in a digital context encompasses a wider variety of strategies, ranging from social media marketing to cross-platform commerce, which may be perceived slightly differently by individual respondents. Nevertheless, the still-high alpha value indicates the instrument successfully captures the essence of digital market expansion as a multidimensional yet coherent construct.

The high reliability values for the main constructs, Socio-Cultural Digital Innovation Capacity (α = 0.931) and Socio-Cultural Enterprise Resilience (α = 0.942), carry important theoretical implications. According to Hair et al. (2019)[43], construct reliability exceeds 0.9, it not only demonstrates excellent internal consistency but also indicates the construct was measured with high precision. This finding strengthens the proposition of adaptive socio-cultural digital innovation capacity and enterprise resilience were constructs can be reliably operationalized and measured within the context of traditional craft MSMEs.

The reliability test results complement the previous psychometric evidence and confirm the developed ASCDI instrument has met stringent reliability standards. The high internal consistency across all dimensions ensures the measurements will yield stable and trustworthy scores. Achieving a Cronbach's Alpha of 0.949 for the total instrument was a strong indicator the ASCDI was a robust measurement tool ready for use in subsequent research related to digital innovation and business resilience within specific socio-cultural contexts.

As a complement to the Cronbach's Alpha reliability test, this study also applied the Split-Half Method to assess the internal consistency of the ASCDI instrument from a

[42] L. Chen and Y. Wang, "Cultural Embeddedness and Measurement Reliability in Indigenous Entrepreneurship Research," *Journal of Business Research* 139 (2022): 232–43.
[43] Hair et al., *Multivariate Data Analysis*.

different perspective. This method divides all items within a construct into two equivalent groups, then calculates the correlation between the total scores of these two halves.[44] The obtained correlation coefficient was then corrected using the Spearman-Brown formula to estimate the reliability of the full instrument, assuming the two halves were equivalent and measure the same construct. This approach provides additional evidence regarding measurement stability, particularly for instruments with an even and relatively large number of items, such as the ASCDI.

Table 7. Results of Reliability Test Using the Split-Half Method

Construct & Dimension	Number of Items	Correlation between Halves	Spearman-Brown Coefficient	Criteria	Interpretation
Socio-Cultural Digital Innovation Capacity	**15**	**0.863**	**0.926**	**> 0.7**	**Excellent**
Adaptive Digital Literacy (X1)	**5**	**0.812**	**0.896**	**> 0.7**	**Excellent**
Socio-Cultural Preservation (X2)	**5**	**0.845**	**0.916**	**> 0.7**	**Excellent**
Collaborative Governance (X3)	**5**	**0.798**	**0.887**	**> 0.7**	**Excellent**
Socio-Cultural Enterprise Resilience	**15**	**0.879**	**0.935**	**> 0.7**	**Excellent**
Business Competitiveness (Y1)	**5**	**0.805**	**0.892**	**> 0.7**	**Excellent**
Cultural Sustainability (Y2)	**5**	**0.868**	**0.929**	**> 0.7**	**Excellent**
Market Expansion (Y3)	**5**	**0.784**	**0.879**	**> 0.7**	**Good**
Total Instrumen ASCDI	**30**	**0.875**	**0.933**	**> 0.7**	**Excellent**

Source: Processed Data (2025)

The ASCDI instrument demonstrates exceptionally high reliability when tested with the Split-Half Method. The Spearman-Brown Coefficient values for all dimensions, main constructs, and the total instrument were substantially above the minimum threshold of 0.7, ranging from 0.879 to 0.935. This finding was consistent with the previous Cronbach's

[44] R. Eisinga, M. Te Grotenhuis, and B. Pelzer, "The Reliability of a Two-Item Scale: Pearson, Cronbach, or Spearman-Brown?," *International Journal of Public Health* 58, no. 4 (2013): 637–42.

Alpha results and further solidifies the position of the ASCDI as an instrument with excellent internal consistency. The high correlation coefficients between the two halves (0.784-0.879) indicate both item groups measure the same aspects of the intended construct.

A particularly significant result was the Socio-Cultural Enterprise Resilience construct achieved the highest Spearman-Brown Coefficient (0.935), slightly exceeding of the Socio-Cultural Digital Innovation Capacity construct (0.926). It indicates the measurement of socio-cultural enterprise resilience in the ASCDI instrument possesses excellent stability. This finding aligns with research by Gupta and Singh (2022)[45], stated business resilience constructs measured through multiple dimensions tend to exhibit high split-half reliability when their items were designed to comprehensively capture various manifestations of resilience.

The Cultural Sustainability (Y2) dimension recorded the best performance with a Spearman-Brown Coefficient of 0.929. This high consistency reinforces the proposition the cultural dimension was the most stable and measurable core of the traditional craft enterprise resilience construct. Conversely, the Market Expansion (Y3) dimension indicated a relatively lower value (0.879), albeit still in the "good" category. This pattern was consistent with the previous Cronbach's Alpha results and further confirms the concept of market expansion entails greater complexity and variation in interpretation among respondents.

The high Spearman-Brown Coefficient for the total instrument (0.933) carries important methodological implications. According to Streiner (2003)[46], when the split-half method yields a reliability coefficient above 0.9, it not only demonstrates excellent internal consistency but also indicates the instrument possesses high homogeneity, meaning all items contribute consistently to measuring the same construct. This finding strengthens the construct validity of the ASCDI and provides additional assurance this instrument will yield stable and trustworthy measurements.

The reliability test results using the Split-Half Method complement the previous psychometric evidence and confirm the ASCDI instrument meets stringent reliability standards from multiple perspectives. The consistency of results between the Cronbach's

[45] P. Gupta and S. Singh, "Measuring Entrepreneurial Resilience in Traditional Craft Sectors: A Split-Half Reliability Approach," *Journal of Small Business Management* 60, no. 3 (2022): 589–611.
[46] D. L. Streiner, "Starting at the Beginning: An Introduction to Coefficient Alpha and Internal Consistency," *Journal of Personality Assessment* 80, no. 1 (2003): 99–103.

Alpha and Split-Half methods creates a strong convergence of evidence regarding the instrument's psychometric quality. Achieving a Spearman-Brown Coefficient of 0.933 for the total instrument, which aligns with the previous Cronbach's Alpha value (0.949), provides high confidence the ASCDI was a robust, stable measurement tool ready for use in various subsequent research contexts.

C. CONCLUSIONS

Based on a series of comprehensive psychometric analyses, this study has successfully developed and validated a reliable and valid Adaptive Socio-Cultural Digital Innovation (ASCDI) instrument for measuring socio-cultural digital innovation capacity and enterprise resilience in traditional craft MSMEs in Makassar. The 30-item instrument has been proven to meet all standards of content validity through expert judgment with Aiken's V coefficients > 0.80, construct validity through Exploratory and Confirmatory Factor Analyses revealing a six-dimensional structure consistent with the theoretical framework, and excellent reliability with a Cronbach's Alpha value of 0.949 and a Spearman-Brown Coefficient of 0.933. These findings comprehensively address the research problem and objectives by demonstrating the ASCDI construct can be empirically operationalized in the context of traditional craft MSMEs, thereby filling a literature gap concerning the measurement of digital innovation was sensitive to socio-cultural dimensions.[47]

Despite meeting rigorous psychometric standards, this research has several limitations. First, data collection was confined to traditional craft MSMEs in the Makassar region; therefore, generalizing the findings to other geographical contexts and business types should be done cautiously. Second, although it underwent a stringent expert validation process, the instrument has not been tested for more comprehensive response biases, such as method bias or social desirability bias. Third, this study was cross-sectional and thus cannot assess the measurement stability over an extended period. These limitations present opportunities for further research development, particularly in the contexts of cross-cultural and longitudinal validation.

Several recommendations can be proposed for future research and practice. For subsequent studies, it was advisable to conduct cross-cultural validation of the ASCDI

[47] H. Yulianto, Rohani., and Jumarti., "The Socio-Cultural Digital Innovation Capacity for Business Competitiveness of Traditional Craft SMEs in Makassar," *Jurnal Ilmiah Multidisiplin Indonesia (JIM-ID)* 4, no. 10 (2025): 1463–79.

instrument with traditional craft MSMEs in other regions of Indonesia and to test the causal relationship between socio-cultural digital innovation capacity and enterprise resilience using a Structural Equation Modeling approach. For practitioners and policymakers, the ASCDI instrument can be adopted as a diagnostic tool to assess the readiness of traditional craft MSMEs for digital transformation and serve as a basis for formulating more targeted and contextualized mentoring programs.

This research carries significant theoretical and practical implications. Theoretically, the findings contribute to the development of socio-technical systems theory in the context of traditional entrepreneurship by introducing a measurable and valid ASCDI construct. The successful validation of the six core dimensions reinforces the proposition of digital innovation and enterprise resilience in the traditional craft context were multidimensional phenomena must be understood holistically. Practically, the ASCDI instrument, with its proven reliability and validity, provides a dependable tool for MSME actors, business mentors, and policymakers to evaluate and develop digital innovation strategies were not only technologically sound but also culturally sustainable, thereby strengthening business resilience in the era of digital disruption.

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