Strategic mapping of sustainable business excellence in creative industries: integrating PLS-SEM and PCA biplot analysis

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Abstract

Creative industries in emerging economies face persistent environmental uncertainty that challenges sustainable business excellence. This study examines how environmental uncertainty, organizational agility, creativity, innovation, and Sustainable Collaborative People Value in Tourism Marketing (SCPVTM), a novel concept introduced in this study, relate to sustainable business excellence in the sasirangan cloth and purun craft industries of South Kalimantan, Indonesia. An explanatory quantitative technique was employed to collect data from 200 valid respondents using structured in-person interviews. The construct dimensionality was assessed using principal component analysis (PCA), and the hypothesis was tested using partial least squares structural equation modeling (PLS-SEM). The results show that environmental uncertainty significantly enhances creativity, innovation, and SCPVTM, while creativity and innovation significantly improve sustainable business excellence. Creativity and innovation also mediate the effects of environmental uncertainty on sustainable business excellence. Organizational agility significantly enhances creativity but does not moderate the uncertainty–creativity relationship. SCPVTM has no significant direct effect on sustainable business excellence, indicating that collaborative tourism marketing may require a more developed regional tourism ecosystem to generate measurable business outcomes. PCA reveals an integrated empirical dimension linking uncertainty, innovation, creativity, and sustainable business excellence. Overall, innovation emerges as the primary pathway for transforming environmental challenges into sustainable business outcomes.

Keywords: *agility, business excellence, creativity, environmental uncertainty, innovation, sustainability*.

Introduction

While tourism investment realization increased by 35.8% in 2021, Indonesia's creative economy produced USD 5,181 million in exports, a 27.31% rise over the previous year (Permanasari et al., 2022). These figures demonstrate how important the creative sector is to the nation's economic expansion. However, behind this development trajectory, the climate facing the creative industries is becoming more competitive and disruptive. In the volatile, unpredictable, complex, and ambiguous (VUCA) era, businesses need to develop adaptable strategies, flexible business models, and sustainable organizational orientations (Al-Sudany et al., 2024; Ames et al., 2025). For creative entrepreneurs in South Kalimantan, particularly producers of sasirangan cloth and purun crafts, this challenge is acute. They operate under persistent environmental unpredictability while facing limited human capital, restricted financial resources, and production systems that remain structurally misaligned with dynamic market demands. Achieving sustainable business excellence under these conditions requires a set of interconnected organizational capabilities, yet how

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these capabilities jointly function in tourism embedded craft industries remains insufficiently understood.

Environmental uncertainty, defined as the degree of unpredictability in external conditions, including market competition, customer demand and technological change, is increasingly recognized as a critical antecedent of organizational adaptation. Research demonstrates that uncertainty can stimulate creativity by compelling firms to generate novel responses to unfamiliar competitive pressures (Radomska et al., 2026; Suralaga et al., 2021). Uncertainty can similarly drive innovation, as firms facing volatile demand and rapid technological cycles are pressured to invest in new product development and strategic renewal (Han et al., 2023; Xu et al., 2024). However, when adaptive capabilities are inadequate, increasing levels of unpredictability can also limit innovative activity (Deng et al., 2022). This tension between uncertainty as a stimulus and as a constraint on creative and innovative outcomes has not been adequately resolved in SME contexts. The conditions under which uncertainty generates productive rather than inhibiting effects on creativity and innovation therefore require further empirical clarification. Moreover, beyond its direct effects, environmental uncertainty may increase the need for interorganizational collaboration in tourism marketing contexts, as firms facing market volatility require external partnerships to share market intelligence, coordinate resources, and jointly develop responses to demand instability (Eslami & Melander, 2019; Qu & Yang, 2015; Tang & Wang, 2015).

Organizational agility has emerged as a prominent meta capability through which firms translate environmental pressure into adaptive outcomes. Agile organizations make decisions rapidly, maintain flexible administrative structures, and cultivate learning environments that support creative ideation and innovative behavior (Magdy & Elmakkawy, 2024; Godwin & Sorbarikor, 2022). Theoretically, agility may both moderate the effect of environmental uncertainty on creativity amplifying creative responses when adaptive capacity is high and function as a direct driver of creativity by enabling faster identification of and response to market signals (Darvishmotevali et al., 2020; Bushairi et al., 2024a; Jun et al., 2024). These dual roles of agility, moderating and direct, have rarely been tested simultaneously, and the conditions under which each mechanism operates in resource constrained creative industries remain insufficiently specified. In parallel, creativity constitutes an ideational foundation for sustainable differentiation (Saleh & Brem, 2023; Adegbile et al., 2024), while innovation operationalizes creative ideas into new products, processes, and technologies that can strengthen sustainable performance (Agoraki et al., 2024; Lima et al., 2023; Loučanová et al., 2023). Crucially, creativity and innovation are not merely independent predictors of sustainable business excellence. Creativity is theorized to mediate the agility to sustainability relationship, while innovation is theorized to mediate the uncertainty to sustainability relationship (Golgeci et al., 2021; Newman, 2005). These mediation mechanisms have not been simultaneously tested empirically in craft based creative industries, leaving a critical gap between theory and evidence.

Collaborative value creation among tourism stakeholders also shapes sustainable business excellence in tourism related creative sectors. Tourism stakeholders, including destination managers, operators, local communities, tourists, and government agencies, can work together to produce economic, social, cultural, and environmental value when

sustainability oriented cooperation is incorporated into marketing tactics (Fobbe, 2020; Bjärstig, 2017; Larsson & Larsson, 2020; Maziliauske, 2024). This study introduces Sustainable Collaborative People Value in Tourism Marketing (SCPVTM) as a novel theoretical construct that synthesizes collaboration theory (Zahoor et al., 2023), sustainability theory (Rahman et al., 2022), and the tourism marketing mix (Goi, 2009; Islam, 2020) to capture sustainability oriented collaborative value creation in craft based creative industries. Building on dynamic capabilities theory (Teece, 2007), the framework assumes that firms facing environmental turbulence develop sensing, seizing, and reconfiguring capabilities that enable sustainable competitive performance. Within this framework, environmental uncertainty activates organizational capabilities, including creativity, innovation, and collaborative value creation through SCPVTM, which in turn contribute to sustainable business excellence. Agility functions as a meta capability that shapes how uncertainty is sensed and converted into creative and innovative outputs. Drawing on this framework, eight hypotheses are proposed:

H1: Organizational agility moderates the effect of environmental uncertainty on creativity.
H2: Environmental uncertainty significantly influences creativity.
H3: Agility significantly influences creativity.
H4: Environmental uncertainty significantly influences innovation.
H5: Environmental uncertainty significantly influences SCPVTM.
H6: Creativity significantly influences sustainable business excellence.
H7: Innovation significantly influences sustainable business excellence.
H8: SCPVTM significantly influences sustainable business excellence.

Beyond these relationships, this study theorizes that creativity and innovation serve as mediating mechanisms through which environmental uncertainty and agility contribute to sustainable business excellence. Dynamic capabilities theory (Teece, 2007) posits that environmental pressure does not necessarily generate sustainable outcomes directly but may instead activate intermediate organizational capabilities that translate sensing and seizing activities into tangible performance improvements. Specifically, environmental uncertainty stimulates creativity, which subsequently generates novel products, processes, and organizational responses that may strengthen sustainable business excellence (Saleh & Brem, 2023; Radomska et al., 2026). In parallel, environmental uncertainty drives innovation, while innovation, as the systematic operationalization of new ideas into marketable outputs, constitutes an important mechanism through which firms can strengthen sustainable performance under uncertain conditions (Han et al., 2023; Newman, 2005). Agility, meanwhile, directly strengthens creativity, allowing creativity to channel the adaptive capacity generated by agility into sustainable business outcomes (Golgeci et al., 2021; Bushairi et al., 2023). Although theoretically sound, these mediation pathways have not been concurrently and empirically validated in craft based creative sectors. Consequently, three additional mediation hypotheses are proposed:

H9: Creativity mediates the association between environmental uncertainty and sustainable business excellence.
H10: Innovation mediates the association between environmental uncertainty and sustainable business excellence
H11: Creativity mediates the relationship between agility and sustainable business excellence.

Despite the contributions of prior research on environmental uncertainty, agility, creativity, innovation, and sustainability, three specific gaps remain that this study directly addresses. First, no empirical research has been done on how the six constructs environmental uncertainty, agility, creativity, innovation, SCPVTM, and sustainable business excellence work together in tourism embedded craft sectors in emerging nations. Second, the simultaneous mediating roles of creativity and innovation as mechanisms connecting environmental antecedents to sustainable business excellence have not been empirically verified in this context, leaving the theoretically proposed mediation pathways of Golgeci et al. (2021) and Newman (2005) without direct empirical support in craft based creative industry settings. Third, to the best of our knowledge, SCPVTM as a construct synthesizing sustainability, collaboration, and tourism marketing has not previously been empirically examined in strategic management or tourism marketing research, representing a substantive theoretical contribution. The novelty of this study therefore resides in three contributions: the introduction and empirical testing of SCPVTM as a theoretically grounded construct; the simultaneous empirical examination of creativity and innovation as mediators between environmental antecedents and sustainable business excellence; and the application of a dual PLS-SEM and exploratory PCA analytical strategy that examines both directional structural relationships and the underlying empirical dimensionality of the construct set. Accordingly, this study aims to examine how environmental uncertainty, organizational agility, creativity, innovation, and SCPVTM jointly shape sustainable business excellence among sasirangan cloth and purun craft producers in South Kalimantan, Indonesia.

Methods

To examine the structural relationships among six latent constructs within culturally embedded creative industry contexts, this study employed a quantitative explanatory research design. Registered sasirangan cloth and purun craft enterprises operating in South Kalimantan, Indonesia, particularly in Banjarmasin, Banjarbaru, and Cempaka District, constituted the target population. The study population consisted of about 450 registered businesses, according to population registration data from the South Kalimantan Regional Office of Industry and Trade. The primary owners or operational managers who possessed direct knowledge of business operations and decision making were the respondents, and the enterprise served as the unit of analysis. The major owner or operational manager of the company, direct involvement in business decision making, and at least a year of operational experience were prerequisites for eligibility. Cases failing to meet the eligibility criteria or containing substantial missing data were excluded from the final sample.

Instead of using a traditional margin of error method, sample adequacy was assessed using an a priori statistical power analysis. The analysis was conducted using a linear multiple regression framework with three predictors - the maximum number of predictors directed toward any single endogenous construct in the structural model - a significance level of 0.05, statistical power of 0.90, and a medium estimated effect size ($f^2 = 0.15$). Specifically, Creativity was predicted by Environmental Uncertainty, Organizational Agility, and their interaction term; whereas Sustainable Business Excellence was predicted by Creativity, Innovation, and SCPVTM. The minimum sample size needed under these conditions was roughly 99 observations. The study obtained 200 valid responses, exceeding

the minimum requirement and providing adequate statistical power for estimating the proposed structural relationships. To preserve the geographic distribution of businesses throughout the research region, respondents were chosen by proportional random selection stratified by district. Table 1 displays the construct measurements.

Table 1. Constructs Measurement

Construct	Items	Measurement Focus	Source
Environmental Uncertainty	6	Market; technological; and competitive unpredictability	Ganbold & Matsui (2017)
Organizational Agility	4	Rapid response; flexible decision making; and adaptive capacity	Kumkale (2022)
Creativity	4	Idea generation; originality; and creative organizational climate	Saleh and Brem (2023)
Innovation	5	Product; process; and strategic innovation	Agoraki et al. (2024)
SCPVTM	3	Collaborative sustainability oriented value transformation	Zahoor et al. (2023); Rahman et al. (2022); Goi (2009)
Sustainable Business Excellence	4	Leadership; strategic orientation; customer focus; and sustainable business performance	Bushairi et al. (2022)

Trained enumerators performed structured in-person interviews with respondents at their places of work to gather primary data. The interview based approach facilitated accurate interpretation of the measurement items, particularly given the diversity of educational and business backgrounds among creative industry actors. Completed questionnaires were screened for eligibility, completeness, and consistency before being included in the final dataset. The resulting dataset comprised 200 valid observations.

PLS-SEM with SmartPLS was used for data analysis since the study aimed to create a predictive structural model with many latent dimensions and interactions including mediation and moderation effects. The measurement model was assessed using the loading factor, Cronbach's alpha, composite reliability, average variance extracted (AVE), and discriminant validity using the Fornell-Larcker criterion (Henseler et al., 2015). The structural model was evaluated using standardized path coefficients, coefficient of determination (R^2), adjusted R^2, effect sizes (f^2), goodness of fit and predictive relevance (Q^2). Hypotheses were tested using a nonparametric bootstrapping technique with 5,000 subsamples. Statistical significance was assessed using path coefficients, t-values, confidence intervals, and p-values. Mediation hypotheses were evaluated through the significance and confidence intervals of indirect effects, whereas the moderation hypothesis was examined using the interaction impact of Organizational Agility and Environmental Uncertainty on Creativity. Predictive performance was additionally evaluated using PLSpredict following Shmueli et al. (2019).

As a complementary analytical procedure, Principal Component Analysis (PCA) was conducted on standardized construct-level composite scores to examine the empirical dimensionality of the six theoretically specified constructs. Construct-level standardized scores were used rather than item-level indicators because the purpose of the PCA was not

to substitute for confirmatory measurement modeling, but to assess whether theoretically distinct constructs exhibit a discernible pattern of empirical convergence at the latent-variable level. Component retention decisions employed both the Kaiser criterion (eigenvalue > 1) and parallel analysis (Horn, 1965) as a more conservative benchmark. The Varimax-rotated three-component solution was retained for descriptive interpretation only; the parallel-analysis result was treated as the primary retention criterion. The PCA was intended to provide supplementary evidence regarding whether the empirical patterns among the construct level scores were broadly consistent with the theoretically specified six construct structure. PCA was not used as a substitute for the PLS-SEM measurement model assessment; rather, it served as an additional robustness oriented analysis. Mahalanobis distance was also examined at an alpha level of .001 as a sensitivity assessment for potential multivariate outliers. Observations identified through this procedure were evaluated in conjunction with substantive and data quality considerations rather than being automatically removed solely on the basis of statistical extremity.

Result and Discussions

This study assessed six reflective latent constructs: environmental uncertainty, agility, innovation, creativity, SCPVTM, and sustainable business excellence. Convergent validity was assessed by examining indicator loadings, which were required to exceed 0.70 and be statistically significant at $p < 0.05$ (Hair et al., 2019). Convergent validity, discriminant validity, and reliability testing with SmartPLS were used to evaluate the measurement model. Discriminant validity was assessed using the average variance extracted (AVE), which had to be higher than 0.50 and surpass the AVE values of other constructs (Hair et al., 2019).

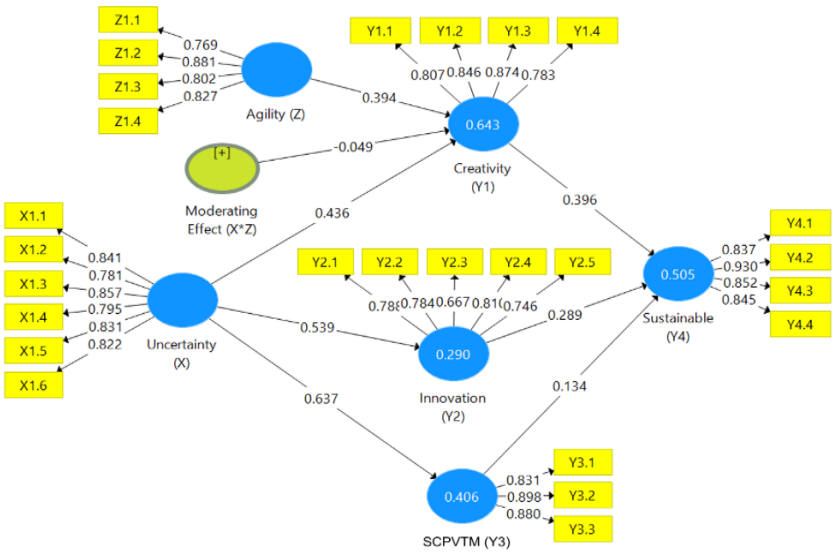

Figure 1. Measurement Model

All constructs exhibit satisfactory measurement quality, according to the validity and reliability assessment results shown in Table 2. The indicator loadings consistently exceed the recommended threshold of 0.70, confirming adequate indicator reliability and convergent validity. Furthermore, the Average Variance Extracted (AVE) values, which range from 0.579 to 0.757 and are above the basic threshold of 0.50, show that each

construct accounts for a considerable portion of the variance in its related indicators. Furthermore, internal consistency reliability is confirmed, with Composite Reliability values between 0.872 and 0.926 and Cronbach's Alpha values between 0.817 and 0.904, all exceeding the recommended thresholds.

Overall, the measurement model demonstrates adequate convergent validity and internal consistency across all constructs, including environmental uncertainty, agility, creativity, innovation, SCPVTM, and sustainable business excellence. These results show that the measuring model is appropriate and provide a sound basis for assessing the structural relationships and testing the proposed hypotheses.

Table 2. Validity and Reliability Test

Variable	Loading Factor	Cronbach's alpha	Composite reliability	AVE
Agility (Z)	0.769	0.841	0.892	0.674
	0.881			
	0.802			
	0.827			
Creativity (Y1)	0.805	0.847	0.897	0.686
	0.846			
	0.875			
	0.784			
Innovation (Y2)	0.788	0.817	0.872	0.579
	0.784			
	0.767			
	0.810			
	0.746			
SCPVTM (Y3)	0.831	0.839	0.903	0.757
	0.898			
	0.880			
Sustainable B.E.(Y4)	0.837	0.889	0.923	0.751
	0.930			
	0.852			
	0.845			
Uncertainty (X)	0.841	0.904	0.926	0.675
	0.781			
	0.857			
	0.795			
	0.831			
	0.822			

The Fornell–Larcker criterion, which is displayed in Table 3, validates the discriminant validity of the measurement model. The square root of the Average Variance Extracted (AVE) for each construct is displayed in the diagonal values, and it is always greater than its correlations with the other constructs. Specifically, the square root of AVE values are 0.821, 0.828, 0.761, 0.870, 0.867, and 0.822 for Agility, Creativity, Innovation, SCPVTM, Sustainable Business Excellence, and Environmental Uncertainty. Each diagonal value is larger than the equivalent inter construct correlations, indicating that each construct has greater variation with its own indicators than with other constructs. Overall, by demonstrating that the constructs are empirically distinct and measure conceptually distinct events, these findings

bolster the measurement model's robustness for more structural analysis and hypothesis testing.

Table 3. Discriminant Validity (Fornell–Larcker Criterion)

	Agility (Z)	Creativity (Y1)	Innovation (Y2)	SCPVTM (Y3)	Sustainable (Y4)	Uncertainty (X)
Agility (Z)	(0.821)					
Creativity (Y1)	0.276	(0.828)				
Innovation (Y2)	-0.056	0.125	(0.761)			
SCPVTM (Y3)	-0.010	0.142	0.084	(0.870)		
Sustainable (Y4)	0.106	0.285	0.406	0.097	(0.867)	
Uncertainty (X)	-0.010	0.333	0.331	0.469	0.194	(0.822)

Note. Agility (Z) serves as both a direct predictor of Creativity and as a moderating variable in the interaction term (X × Z → Y1). It is labeled Z throughout to reflect its primary structural role in the model

Table 4. Model Fit Indices

Fit Index	Value
SRMR	0.054 (Good fit)
GoF	0.579 (Strong)
Average Q^2 Predictive Relevance	0.505 (Strong)
Average Effect Size (f^2)	0.282 (moderate to substantial effect)
Average R^2	0.459 (Moderate)
Average R^2 adjusted	0.454 (Moderate)

The model quality and predictive assessment presented in Table 4 indicate that the proposed structural model demonstrates satisfactory explanatory and predictive performance. Model fit was assessed using the standardized root mean square residual (SRMR), which represents the most widely accepted fit criterion for PLS-SEM (Henseler et al., 2015). The SRMR value of 0.054 for the estimated model falls below the 0.08 threshold, indicating a good overall model fit. the low SRMR value indicates a good level of approximate model fit, reflecting a relatively small discrepancy between the observed and model-implied correlations. The Goodness of Fit (GoF) value of 0.579 further supports the overall quality of the proposed model, substantially exceeding the 0.36 benchmark for a strong level of model quality. Likewise, the Average Q^2 Predictive Relevance of 0.505 substantially exceeds the 0.35 threshold, demonstrating strong predictive relevance and indicating that the model possesses strong predictive relevancefor the endogenous constructs.

The model also exhibits moderate explanatory power, as reflected in the Average R^2 of 0.459 and Average R^2 adjusted of 0.454. These values indicate that the model explains a meaningful proportion of variance in the endogenous constructs, with the adjusted value remaining relatively stable after accounting for model complexity. Furthermore, the Average Effect Size (f^2) of 0.282 indicates a meaningful overall effect of the structural relationships, suggesting that the predictors collectively contribute substantively to the endogenous constructs. Taken together, these results provide evidence that the proposed model demonstrates strong overall model quality and predictive relevance, together with moderate explanatory power and meaningful effect magnitude, supporting its adequacy for evaluating the hypothesized structural relationships.

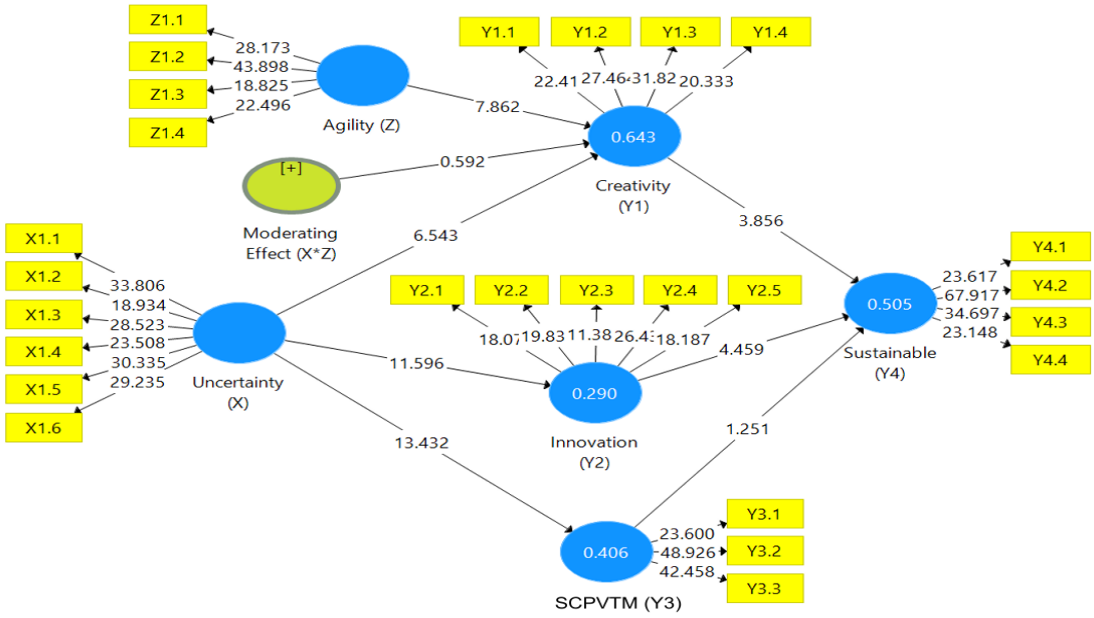

Figure 2. Measurement Model with Bootstrapping Algorithm

Table 5. Hypothesis Testing Results

Hypothesis	Path	Path Coefficient (β)	P values	Result
H1	Z × X -> Y1	0.018	0.758	Rejected
H2	X -> Y1	0.473	<0.001	Accepted
H3	Z -> Y1	0.422	<0.001	Accepted
H4	X -> Y2	0.539	<0.001	Accepted
H5	X -> Y3	0.637	<0.001	Accepted
H6	Y1 -> Y4	0.396	<0.001	Accepted
H7	Y2 -> Y4	0.289	<0.001	Accepted
H8	Y3 -> Y4	0.134	0.188	Rejected
H9	X -> Y1 -> Y4	0.234	0.001	Accepted
H10	X -> Y2 -> Y4	0.428	<0.001	Accepted
H11	Z -> Y1 -> Y4	0.167	0.001	Accepted

The hypothesis testing results presented in Table 5 provide substantial empirical support for the proposed structural model, with nine of the eleven hypotheses supported. The direct effects indicate that Environmental Uncertainty has a positive and significant effect on Creativity ($\beta = 0.473, p < 0.001$), supporting H2, while Agility also positively influences Creativity ($\beta = 0.422, p < 0.001$), supporting H3. These findings indicate that both Environmental Uncertainty and Agility are important antecedents of Creativity, with Environmental Uncertainty exerting a slightly stronger effect. Furthermore, Environmental Uncertainty demonstrates strong positive effects on Innovation ($\beta = 0.539, p < 0.001$) and SCPVTM ($\beta = 0.637, p < 0.001$), supporting H4 and H5, respectively. These results position Environmental Uncertainty as a central antecedent in the model, particularly in explaining variations in Innovation and SCPVTM.

Regarding Sustainable Business Excellence, Creativity has a positive and significant effect on Sustainable Business Excellence ($\beta = 0.396, p < 0.001$), supporting H6.

Innovation also exhibits a positive and significant effect ($\beta = 0.289, p < 0.001$), supporting H7. Although the coefficient of Creativity is larger than that of Innovation in the direct relationship with Sustainable Business Excellence, Innovation demonstrates a more prominent role as an indirect transmission mechanism, as evidenced by the mediation results. In contrast, SCPVTM has a positive but statistically non-significant effect on Sustainable Business Excellence ($\beta = 0.134, p = 0.188$), leading to the rejection of H8. This finding suggests that the increase in SCPVTM generated by Environmental Uncertainty does not automatically translate into higher Sustainable Business Excellence through a direct pathway. The contribution of SCPVTM may therefore depend on additional organizational or contextual mechanisms that are not captured by the direct relationship examined in this model.

The mediation analysis provides further evidence that Creativity and Innovation function as significant mechanisms through which Environmental Uncertainty and Agility influence Sustainable Business Excellence. The indirect effect of Environmental Uncertainty on Sustainable Business Excellence through Creativity is positive and significant ($\beta = 0.234, p = 0.001$), supporting H9. The corresponding indirect effect through Innovation is also positive and significant and substantially stronger ($\beta = 0.428, p < 0.001$), supporting H10. The larger coefficient for the Innovation pathway indicates that Innovation represents the more influential mediating mechanism linking Environmental Uncertainty to Sustainable Business Excellence. In addition, Agility has a positive and significant indirect effect on Sustainable Business Excellence through Creativity ($\beta = 0.167, p = 0.001$), supporting H11. Collectively, these findings demonstrate that the effects of Environmental Uncertainty and Agility on Sustainable Business Excellence are transmitted through specific intermediate mechanisms, with Innovation emerging as the stronger mediating pathway for Environmental Uncertainty.

In contrast, the proposed moderating effect of Agility on the relationship between Environmental Uncertainty and Creativity is not supported ($\beta = 0.018, p = 0.758$), leading to the rejection of H1. The near-zero and non-significant interaction effect indicates that Agility does not significantly alter the strength of the relationship between Environmental Uncertainty and Creativity. Overall, the findings identify Environmental Uncertainty as a central antecedent in the proposed model, given its significant effects on Creativity, Innovation, and SCPVTM and its significant indirect effects on Sustainable Business Excellence through Creativity and Innovation. At the outcome level, Creativity demonstrates the stronger direct effect on Sustainable Business Excellence, whereas Innovation emerges as the more influential mediating mechanism. Meanwhile, the non-significant moderation and SCPVTM-to-Sustainable Business Excellence relationship highlight important boundary conditions in the model. These findings indicate that the pathways from environmental conditions to Sustainable Business Excellence are selective and operate primarily through creativity and innovation rather than uniformly through all proposed mechanisms.

The construct correlation matrix displayed in Table 6 indicates that the relationships between the research constructs are generally weak to moderate, with correlation coefficients ranging from −0.104 to 0.466. The strongest association is seen between Innovation and Sustainable Business Excellence (r = 0.466), followed by Uncertainty and Innovation (r = 0.351), Uncertainty and Creativity (r = 0.339), and Creativity and

Sustainable Business Excellence (r = 0.327). The correlations between Agility and SCPVTM, which vary from weak negative to weak positive connections, are among the few remaining correlations. Crucially, none of the interconstruct correlations approach a level indicative of excessive construct overlap between the constructs. This pattern offers preliminary evidence of construct differentiation within the suggested model by indicating that the constructs capture sufficiently separate aspects while retaining theoretically significant relationships.

Table 6. Construct Correlation Matrix

Construct	Uncertainty	Agility	Creativity	Innovation	SCPVTM	SBE
Uncertainty	1.000	−0.104	0.339	0.351	0.269	0.278
Agility	−0.104	1.000	0.216	−0.045	−0.050	0.054
Creativity	0.339	0.216	1.000	0.178	0.025	0.327
Innovation	0.351	−0.045	0.178	1.000	0.053	0.466
SCPVTM	0.269	−0.050	0.025	0.053	1.000	0.055
SBE	0.278	0.054	0.327	0.466	0.055	1.000

Note. SBE = Sustainable Business Excellence.

Table 7 presents further evidence of data suitability for factor-based evaluation, reporting Bartlett's test of sphericity and construct-level KMO values. The overall KMO value of 0.591 indicates marginal but acceptable sampling adequacy for exploratory assessment, even though Bartlett's test of sphericity is statistically significant (χ^2 = 148.719, df = 15, p <.001), indicating that the correlation matrix is not an identity matrix and that significant relationships exist among the observed measures.

Table 7. Sampling Adequacy and Bartlett's Test

Statistic	Value
Overall KMO	0.591
KMO — Uncertainty	0.599
KMO — Agility	0.405
KMO — Creativity	0.573
KMO — Innovation	0.615
KMO — SCPVTM	0.504
KMO — Sustainable Business Excellence	0.642
Bartlett's χ^2	148.719
df	15
p-value	< .001

At the construct level, the KMO values range from 0.405 for Agility to 0.642 for Sustainable Business Excellence, indicating variation in sampling adequacy across constructs, with most constructs demonstrating acceptable levels for exploratory evaluation. Although the KMO value for Agility is relatively low, the significant Bartlett's test and the overall KMO provide sufficient preliminary evidence that the correlation structure contains systematic relationships suitable for further multivariate assessment. When considered collectively, the correlation and sampling adequacy results indicate that the Agility construct should receive special consideration when evaluating measurement quality and construct validity, while also supporting the dataset's suitability for further assessment of the measurement and structural models.

Table 8. Eigenvalues, Explained Variance, and Cumulative Explained Variance

PC	Eigenvalue	Explained Variance (%)	Cumulative Variance (%)	Kaiser (>1)
1	2.027	33.62	33.62	Yes
2	1.212	20.10	53.72	Yes
3	1.008	16.72	70.44	Yes
4	0.761	12.62	83.07	No
5	0.579	9.60	92.67	No
6	0.442	7.33	100.00	No

The initial PCA produced six components presented in Table 8. PC1 had an eigenvalue of 2.027 and explained 33.62% of the total variance. PC2 had an eigenvalue of 1.212, accounting for an additional 20.10%, while PC3 had an eigenvalue of 1.008 and explained a further 16.72%, yielding cumulative explained variance of 70.44% across the first three components. Based on the conventional Kaiser criterion (eigenvalue > 1), three components would initially be retained. However, the eigenvalue of PC3 was only marginally above the threshold (1.008), indicating tentative retention.

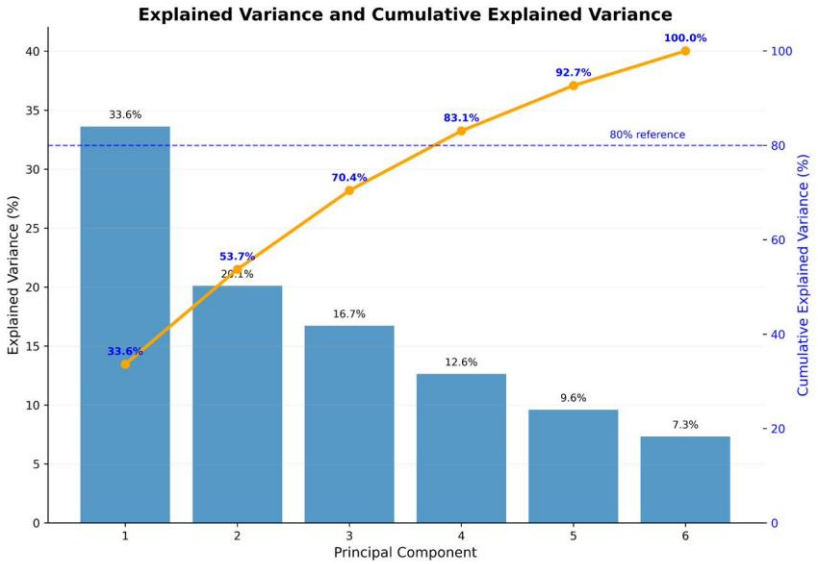

Figure 3. Displays The Explained Variance and Cumulative Explained Variance

Figure 3. Explained Variance and Cumulative Explained Variance by Principal Component. The bar representing PC1 (33.6%) is substantially taller than those for subsequent components, confirming the dominance of the first empirical dimension. The 80% cumulative threshold is not crossed until PC4.

Table 9. Parallel Analysis — Observed and Random Eigenvalues

Component	Observed Eigenvalue	Random Mean Eigenvalue	Random 95th Percentile	Retained
PC1	2.027	1.279	1.414	Yes
PC2	1.212	1.142	1.249	No
PC3	1.008	1.035	1.129	No
PC4	0.761	0.942	1.029	No
PC5	0.579	0.853	0.940	No
PC6	0.442	0.751	0.838	No

Note. Retention decision based on observed eigenvalue > 95th percentile random eigenvalue (Horn,

1965).

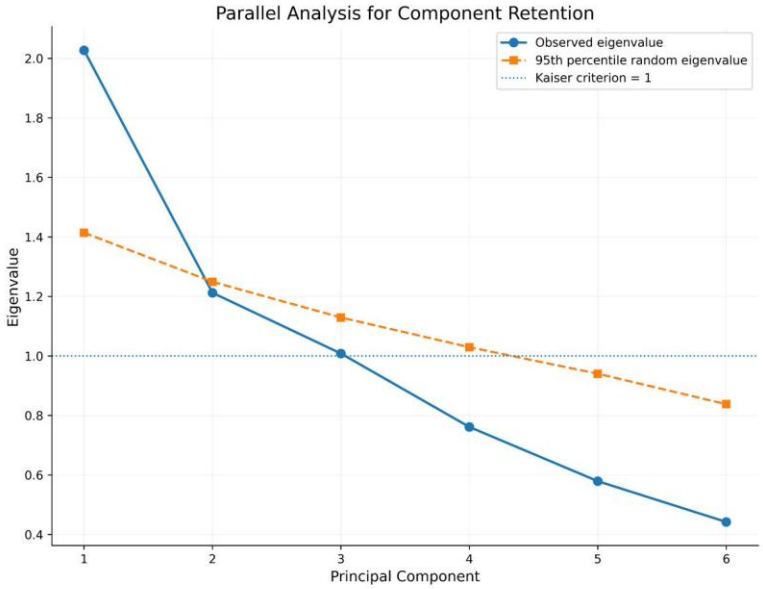

Figure 4. Parallel Analysis for Component Retention.

Parallel analysis (Horn, 1965) was used as a more conservative retention criterion to ascertain the number of empirically supported components. Only PC1 exceeded its corresponding random benchmark (observed eigenvalue = 2.027 vs. random 95th percentile = 1.414). PC2 did not exceed the random threshold (observed = 1.212 vs. random = 1.249). PC3 showed an even clearer failure (observed = 1.008 vs. random = 1.129). Accordingly, parallel analysis supported the retention of one dominant component.

Table 10. Principal Component Loading Matrix and Communalities

Construct	PC1	PC2	PC3	Communality
Uncertainty	0.721	−0.301	0.201	0.650
Agility	0.052	0.795	0.397	0.793
Creativity	0.619	0.439	0.247	0.637
Innovation	0.707	−0.092	−0.423	0.688
SCPVTM	0.279	−0.514	0.697	0.829
Sustainable Business Excellence	0.738	0.153	−0.289	0.652

Note. Communalities reflect the three component Kaiser solution. SBE = Sustainable Business Excellence.

PC1 was characterized by strong positive loadings from Sustainable Business Excellence (0.738), Uncertainty (0.721), Innovation (0.707), and Creativity (0.619). Agility exhibited a near zero loading on PC1 (0.052), while SCPVTM showed only a moderate loading (0.279). PC2 was strongly dominated by Agility (0.795), followed by Creativity (0.439), while SCPVTM (−0.514) and Uncertainty (−0.301) displayed negative loadings. PC3 was dominated by SCPVTM (0.697) with moderate positive loading from Agility (0.397).

Table 11. Varimax-Rotated Component Loadings (Three Component Solution)

Construct	RC1	RC2	RC3
Uncertainty	0.556	−0.002	0.584
Agility	−0.109	0.878	−0.103

Construct	RC1	RC2	RC3
Creativity	0.459	0.625	0.187
Innovation	0.819	−0.132	−0.005
SCPVTM	−0.061	−0.035	0.908
Sustainable Business Excellence	0.793	0.147	−0.023

Note. RC1 = Innovation–Sustainability configuration; RC2 = Agility–Creativity configuration; RC3 = SCPVTM oriented configuration. Retention of RC2 and RC3 is not supported by parallel analysis.

For descriptive purposes, Varimax rotation was applied to the three Kaiser retained components, yielding three interpretable configurations: an innovation–sustainability configuration (RC1: Innovation = 0.819, SBE = 0.793), an agility–creativity configuration (RC2: Agility = 0.878, Creativity = 0.625), and an SCPVTM oriented configuration (RC3: SCPVTM = 0.908). These labels are descriptive and exploratory; they should not be interpreted as confirmed independent latent dimensions because the parallel analysis criterion did not support the retention of RC2 and RC3.

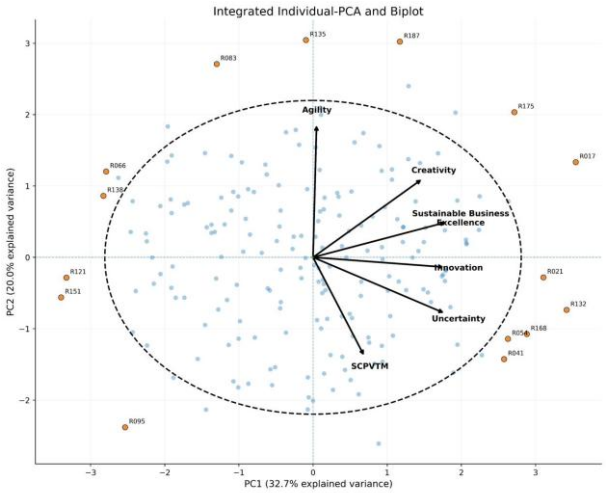

Figure 5. Integrated Individual-PCA Biplot.

The integrated individual-PCA biplot provides complementary visual evidence of the relationships among the six constructs and the distribution of individual observations across the principal component space. Innovation and Sustainable Business Excellence display vectors with strong rightward alignment (positive PC1), consistent with their high unrotated loadings. Uncertainty also projects toward the positive PC1 region. Creativity occupies an intermediate position, reflecting meaningful contributions to both PC1 (0.619) and PC2 (0.439). Agility is oriented almost entirely upward along the positive PC2 axis, while SCPVTM projects toward the lower half of the biplot space. The distribution of individual observations indicates respondent level heterogeneity without pronounced clustering. The biplot provides descriptive visual support for the loading matrix findings without introducing interpretive claims beyond those warranted by the numerical results.

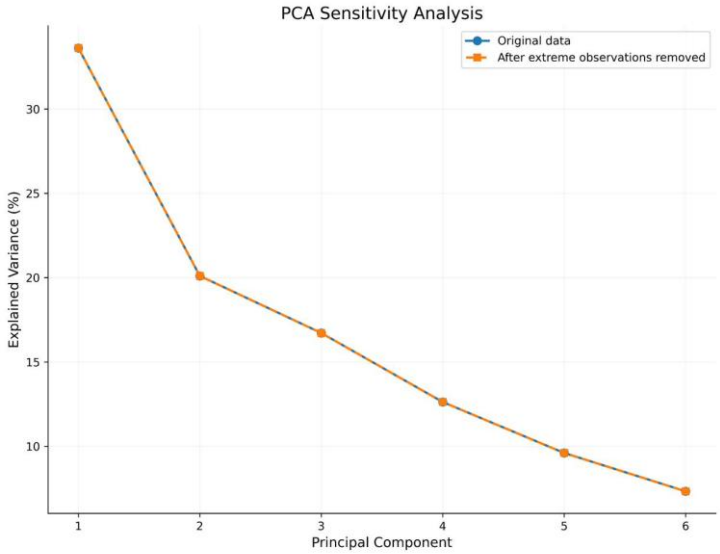

Figure 6. PCA Sensitivity Analysis

Table 12. Sensitivity Analysis — Original vs. Sensitivity PCA

Component	Original Eigenvalue	Sensitivity Eigenvalue	Original Var. (%)	Sensitivity Var. (%)	Loading Correlation
PC1	2.027	2.027	33.62	33.62	1.00
PC2	1.212	1.212	20.10	20.10	1.00
PC3	1.008	1.008	16.72	16.72	1.00
PC4	0.761	0.761	12.62	12.62	1.00
PC5	0.579	0.579	9.60	9.60	1.00
PC6	0.442	0.442	7.33	7.33	1.00

Note. Sensitivity analysis applied Mahalanobis criterion at α = .001. Loading correlations reflect the Pearson correlation between original and sensitivity loading vectors across all constructs per component

A sensitivity analysis was conducted to determine whether the PCA structure was disproportionately influenced by multivariate extreme observations. Mahalanobis distance was computed for each observation and evaluated against a conservative significance criterion of α = .001. No statistically defined multivariate extreme observations were identified. The three largest observed Mahalanobis distances were 15.883, 15.788, and 12.640; none met the critical threshold for classification as a multivariate outlier. Because no observations met the exclusion criterion, the sensitivity PCA produced results identical to the original solution. The loading correlations between the original and sensitivity solutions were 1.00 across all six principal components, confirming complete structural robustness.

The empirical findings consistently identify environmental uncertainty as a central antecedent in the proposed model, exerting significant positive influences on creativity, innovation, and SCPVTM. This pattern is theoretically consistent with dynamic capabilities theory (Teece, 2007), which conceptualizes environmental turbulence as a condition that requires organizations to continuously sense changes, seize emerging opportunities, and reconfigure available resources. Rather than functioning solely as a constraint, environmental uncertainty in South Kalimantan's craft industries appears to act as a

productive stimulus that encourages firms to generate creative responses, develop new products and strategies, and strengthen collaborative relationships with tourism stakeholders. This interpretation is consistent with Han et al. (2023) and Xu et al. (2024), who demonstrate positive relationships between environmental uncertainty and innovation in emerging economy SME contexts, as well as Radomska et al. (2026) and Suralaga et al. (2021), who show that environmental pressures can stimulate innovative outcomes when firms possess sufficient flexibility to respond to changing conditions.

The particularly strong relationship between environmental uncertainty and innovation highlights the strategic importance of innovation as an adaptive response to market volatility in craft-based industries. In South Kalimantan, changing consumer preferences, competition, and market opportunities beyond the local region may encourage producers to continuously modify product designs, materials, production approaches, and marketing strategies. Demand for distinctive sasirangan and purun products, particularly those emphasizing local identity and environmentally oriented characteristics, may further encourage firms to differentiate their offerings through innovation. The finding therefore suggests that uncertainty does not necessarily suppress entrepreneurial activity in resource-constrained creative industries. Instead, when firms perceive environmental change as an opportunity rather than solely as a threat, uncertainty may stimulate the search for new market solutions and adaptive product strategies.

The significant relationship between environmental uncertainty and SCPVTM provides a complementary perspective by extending the consequences of environmental pressure beyond internal organizational adaptation. Firms facing volatile markets may increasingly depend on relationships with tourism actors, government agencies, communities, distributors, and other stakeholders to obtain market information, access promotional channels, and collectively create value. This interpretation extends prior research on interorganizational collaboration (Eslami & Melander, 2019; Qu & Yang, 2015) by suggesting that uncertainty can stimulate not only internal innovation but also external collaborative responses within tourism marketing. However, the subsequent absence of a significant direct relationship between SCPVTM and sustainable business excellence indicates that the existence of collaborative orientation alone may not be sufficient to generate superior business outcomes. Collaboration appears to constitute a potential resource whose value depends on the surrounding ecosystem and the firm's ability to convert collaborative relationships into commercially relevant outcomes.

The mediation findings provide a more important theoretical insight into how environmental conditions are translated into sustainable business outcomes. Creativity and innovation emerge as the principal transmission mechanisms through which environmental uncertainty and organizational agility contribute to sustainable business excellence. This pattern supports the broader logic of dynamic capabilities theory, in which environmental sensing must be followed by organizational responses that transform changing conditions into new products, processes, and strategic actions. It also extends the arguments of Golgeci et al. (2021), who emphasize creativity as a mechanism connecting agility with sustainability-related outcomes, and Newman (2005), who conceptualizes innovation as an important mechanism through which uncertainty can be transformed into developmental outcomes. By demonstrating these mechanisms simultaneously within a craft-based creative industry context, the present study extends existing evidence beyond the more

commonly examined manufacturing, hospitality, and general SME settings.

Importantly, the mediation pattern reveals a distinction between creativity as a direct contributor to sustainable business excellence and innovation as a stronger transmission mechanism. Creativity provides the cognitive and ideational foundation for generating novel possibilities, whereas innovation involves the implementation and commercialization of those possibilities. The stronger innovation-mediated pathway therefore suggests that sustainable business value is generated not merely by producing new ideas but by transforming those ideas into products, processes, strategies, or market solutions that can be implemented and sustained. This interpretation is particularly relevant to craft-based industries, where creative capacity may be relatively abundant because production is closely connected to cultural knowledge, traditional design, and artisanal skills, while systematic innovation implementation may remain more challenging. The descriptive findings, which indicate comparatively higher levels of creativity than innovation, reinforce this interpretation. The gap between creative ideation and innovation implementation consequently represents an important intervention point for strengthening sustainable business excellence in the sector.

The findings concerning organizational agility further refine this interpretation. Consistent with Magdy and Elmakkawy (2024), Bushairi et al. (2024b), and Jun et al. (2024), organizational agility is positively associated with creativity, confirming that the ability to respond rapidly to changing conditions can create an organizational environment conducive to creative activity. However, agility does not significantly alter the relationship between environmental uncertainty and creativity. This result differs from Darvishmotevali et al. (2020), who identified a significant moderating role of agility in the hospitality sector. The divergence may reflect differences in organizational structure, resource availability, technological intensity, and managerial sophistication across contexts. In the predominantly small-scale craft businesses examined here, agility may operate primarily as an internal capability that directly facilitates creative responses rather than as a contingency mechanism that changes how environmental uncertainty affects creativity. Limited technology adoption, relatively informal managerial systems, and constrained resources may reduce the capacity of firms to deploy agility as a higher-order buffering or amplifying mechanism. Thus, the findings distinguish between agility as a capability that directly enables creativity and agility as a contextual condition that reshapes the effect of environmental uncertainty.

The non-significant direct relationship between SCPVTM and sustainable business excellence represents another theoretically meaningful boundary condition. SCPVTM was introduced in this study as a novel construct integrating collaboration theory (Zahoor et al., 2023), sustainability perspectives (Rahman et al., 2022), and tourism marketing principles (Goi, 2009; Islam, 2020). Its lack of a direct effect should not be interpreted as evidence against the conceptual relevance of the construct. Rather, it suggests that collaborative value creation may require an enabling ecosystem before it can be translated into measurable business outcomes. The relatively low descriptive level of SCPVTM among the sampled firms provides contextual support for this interpretation, indicating that collaborative tourism marketing may not yet be sufficiently developed to generate substantial commercial benefits.

One possible explanation lies in the structure and maturity of the regional tourism

ecosystem. Where tourism networks, institutional coordination, market infrastructure, and visitor flows remain limited, collaboration among individual businesses may generate social or relational value without immediately producing measurable improvements in business excellence. The predominance of domestic tourism may further constrain the market-expansion function that collaborative tourism marketing is expected to provide, particularly when craft producers already operate within established local and regional markets. From this perspective, SCPVTM may represent a latent strategic resource whose effectiveness depends on complementary ecosystem conditions rather than an independent determinant of sustainable business excellence.

This interpretation is consistent with research emphasizing that collaborative mechanisms in tourism are more likely to generate sustainable outcomes when supported by institutional arrangements, market infrastructure, and effective stakeholder coordination (Fobbe, 2020; Maziliauske, 2024; Larsson & Larsson, 2020). The findings therefore position SCPVTM as a potential contextual capability rather than a universally effective direct driver of sustainable business excellence. This distinction is particularly important for a newly developed construct because it suggests that its theoretical value may lie not only in its direct effect but also in explaining how firms respond collaboratively to environmental pressures under different ecosystem conditions. Future research should therefore examine SCPVTM across tourism ecosystems with different levels of maturity to determine whether its effectiveness varies according to institutional support, tourism intensity, market accessibility, and stakeholder integration.

Taken together, the findings suggest that sustainable business excellence in creative industries is produced through a differentiated transformation process rather than through the direct accumulation of individual capabilities. Environmental uncertainty acts as an important trigger, while agility, creativity, innovation, and collaborative value creation represent different organizational responses to that condition. The evidence indicates that these responses do not contribute equally or through identical mechanisms. Creativity is particularly important for generating and directly applying novel responses, whereas innovation appears more important for converting environmental challenges into sustainable business value. SCPVTM, by contrast, appears more dependent on the maturity of the surrounding tourism ecosystem, while agility functions primarily as a direct creative-enabling capability rather than as a moderator of environmental effects. This differentiated pattern extends the dynamic capabilities perspective by suggesting that the effectiveness of adaptive capabilities depends not only on their presence but also on the specific organizational and ecosystem mechanisms through which they are activated.

The multivariate evidence provides additional support for this interpretation. The parallel analysis results presented in Table 9, together with the component loading structures in Tables 10 and 11, reveal substantial shared empirical variation among the theoretically distinct constructs, particularly sustainable business excellence, environmental uncertainty, innovation, and creativity. The PCA biplot in Figure 5 complements these findings by showing a similar directional orientation among innovation, sustainable business excellence, and environmental uncertainty, while organizational agility occupies a more orthogonal position. Rather than indicating that these constructs are empirically identical, the pattern suggests that environmental conditions, adaptive responses, and sustainable outcomes may form interconnected dimensions of a broader

organizational transformation process.

This interpretation is broadly compatible with the integrated perspective of organizational transformation advanced by Teece (2007) and Doz and Kosonen (2010), which emphasizes the interdependence of adaptive, innovative, and creative capabilities in maintaining organizational performance under changing environmental conditions. The PCA evidence therefore provides exploratory support for viewing environmental uncertainty, creativity, innovation, and sustainable business excellence as interconnected elements within a broader strategic transformation process. Nevertheless, this interpretation should remain explicitly exploratory. Because the PCA was conducted at the construct-composite level rather than through item-level factor analysis or higher-order structural equation modeling, the results do not establish that these constructs constitute a single higher-order construct.

The stability of the observed structure, as illustrated in Figure 4 and supported by the sensitivity analysis in Table 12, further indicates that the empirical pattern is not readily attributable to atypical observations. The secondary Varimax configurations, including the agility-creativity and SCPVTM-oriented patterns, provide additional descriptive evidence of differentiated relationships within the broader structure. These configurations should nevertheless be interpreted cautiously because parallel analysis primarily informs component retention and does not independently establish construct dimensionality or statistical independence. Accordingly, the PCA findings should be viewed as complementary evidence rather than as a substitute for confirmatory higher-order modeling.

Overall, the integrated findings suggest that sustainable business excellence in South Kalimantan's creative industries depends on the transformation of environmental pressures into actionable organizational responses. The critical issue is therefore not whether firms experience uncertainty, possess agility, or engage in collaboration, but how these conditions are translated into creativity and, ultimately, implemented as innovation. This mechanism-oriented interpretation provides a stronger theoretical contribution than treating the constructs as independent predictors and highlights the importance of strengthening the transition from creative potential to innovation implementation. For resource-constrained creative industries, interventions aimed at developing innovation implementation capabilities, strengthening tourism ecosystem coordination, and improving firms' capacity to convert stakeholder relationships into market opportunities may therefore be more consequential than simply increasing individual organizational capabilities in isolation.

Conclusion

This study demonstrates that in creative industries operating under VUCA conditions, creativity and innovation constitute the key mechanisms through which environmental uncertainty and organizational agility translate into sustainable business excellence. Environmental uncertainty stimulates both creativity and innovation, which subsequently mediate its effects on sustainable business outcomes. In the context of the resource constrained craft industry, organizational agility does not significantly alter the impact of environmental uncertainty on creativity, but it does directly boost creativity and, via this mediating channel, contribute to sustainable business excellence. SCPVTM, the novel collaborative construct introduced in this study, does not directly enhance sustainable

business excellence under the present conditions. This finding may reflect a boundary condition associated with the underdeveloped regional tourism ecosystem rather than a theoretical limitation of the construct itself. Furthermore, the PCA demonstrates that environmental uncertainty, creativity, innovation, and sustainable business excellence create an interconnected strategic transformation system rather than being distinct organizational traits. This finding challenges conventional approaches that treat these constructs as strictly independent predictors and provides a basis for future research on higher-order construct modeling.

This study has several limitations. First, its cross sectional design limits causal inference regarding the temporal ordering of the relationships examined. Second, because the sample is restricted to two craft subsectors within a single Indonesian province, the findings cannot be extended to other creative industry segments, regions, or national settings. Third, SCPVTM has been validated only within this specific industry setting and therefore requires cross sectoral and cross national replication. Fourth, the PCA was conducted at the construct composite level and should not be considered a substitute for item level confirmatory factor analysis. To investigate how environmental uncertainty, creativity, and innovation change over time and support sustainable business outcomes, future research should employ longitudinal designs. Cross industry and cross national comparative studies could further assess whether the identified mediation pathways extend beyond craft based industries in emerging economy contexts. SCPVTM should also be examined in regions with more developed tourism ecosystems, such as Bali and Yogyakarta, to determine whether its non significant effect reflects a contextual boundary condition or indicates a need for further construct refinement. Future researchers could extend the research model by incorporating tourism ecosystem maturity as a moderating variable to examine whether and to what extent ecosystem maturity strengthens the relationship between SCPVTM and sustainable business excellence across different creative industry contexts. Finally, item level confirmatory factor analysis and covariance based structural equation modeling using larger samples could provide more rigorous evidence regarding whether a higher order strategic transformation construct offers a superior empirical representation of the six construct system identified through the PCA.

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