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Driving sustainable Nora cultural tourism with the BCG economic model: The role of key factors and integration

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Abstract

This study investigates tourism behavior and patterns, analyzes the causal relationships of the local economy, and develops a causal relationship model of Nora indigenous cultural tourism in Phatthalung Province, Thailand. The sample consists of 1,093 tourists visiting the province. Data were analyzed using structural equation modeling (SEM) with the Integrated Generalized Structured Component Analysis (IGSCA) method. The findings reveal that most tourists are female, aged 36−45 years, traveling with family/relatives for relaxation. They are satisfied with studying the local way of life but dissatisfied with traffic problems. The SEM results indicate that the model is consistent with the empirical data at an acceptable level. Knowledge and perception about Nora performing arts (KAP) have a high level of direct positive influence on interest and participation in Nora cultural tourism activities (IPA). Local community participation (CPP) has a direct positive influence on the roles of stakeholders in tourism development (SRD), and tourist satisfaction (SQI) has a direct positive influence on the application of the BCG economic model to Nora cultural tourism. The results provide guidelines for the sustainable development and promotion of Nora cultural tourism in Phatthalung Province according to the BCG economic concept, focusing on creating knowledge, understanding, and participation of local communities, and generating satisfaction for tourists. These efforts will lead to income generation, income distribution to communities, and the preservation and continuation of local arts and culture.

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Introduction

The tourism industry has long been recognized as a pivotal driver of economic growth and development in Thailand, generating substantial revenue and value-added for the nation (Ministry of Tourism and Sports, 2022). Amidst the rapidly evolving global landscape and the emergence of unprecedented challenges, the paradigm of tourism development has undergone a profound shift, necessitating a greater emphasis on the principles of sustainability, which encompass the delicate balance between economic, social, and environmental dimensions (United Nations World Tourism Organization [UNWTO], 2021). Within this context, cultural tourism has garnered significant attention due to its immense potential to create value-added and facilitate equitable income distribution to local communities through the valorization and creative enhancement of cultural capital and indigenous knowledge systems (Ahmad et al., 2022; Pencarelli, 2020).

Phatthalung Province, situated in the southern region of Thailand, boasts a rich tapestry of artistic and cultural heritage, with the Nora performance art standing as a quintessential embodiment of its local identity (Phatthalung Provincial Cultural Office, 2021; Thanapitak et al., 2024). However, the preservation and transmission of this invaluable cultural asset are confronted with multifaceted challenges stemming from the pervasive forces of globalization and the rapid transformations in the socio-cultural landscape (Esichaikul & Chansawang, 2022). Consequently, the development of Nora cultural tourism in Phatthalung Province assumes paramount importance in fostering motivation and establishing robust mechanisms for safeguarding, perpetuating, and enhancing this precious cultural heritage (Ma et al.,2024; Qiu et al., 2022) This study advances the theoretical alignment of BCG with cultural tourism by distinguishing it from conventional sustainability models, such as the triple bottom line, which often prioritize broad ecological goals over cultural preservation. BCG uniquely integrates resource efficiency and cultural valorization, offering a framework tailored to regions like Phatthalung with rich biodiversity and heritage. However, its application in tourism remains underexplored globally, necessitating empirical investigation into tourist behavior, economic linkages, and stakeholder dynamics (Boonwanno et al., 2024).

The Bio-Circular-Green Economy (BCG) paradigm, encompassing bioeconomy, circularity, and green principles, offers a robust framework for Nora cultural tourism development in Phatthalung Province by integrating economic innovation with cultural preservation and environmental sustainability. Unlike ecotourism, which primarily emphasizes ecological outcomes, or community-based tourism, which focuses on social benefits, BCG uniquely leverages bio-based resources and circular processes to enhance cultural heritage valorization while fostering sustainable growth (Ellen MacArthur Foundation, 2013; UNWTO, 2021). This approach positions the study as a novel contribution to sustainable tourism literature.

This approach leverages the region's inherent strengths and potential, encompassing its rich biodiversity, vibrant cultural traditions, and indigenous knowledge systems, and synergistically integrates them with cutting-edge knowledge and innovative technologies to generate value and create new economic opportunities. (MHESI, 2021) The successful implementation of the BCG model has the potential to catalyze equitable income distribution, stimulate employment generation, and fortify the grassroots economy.

Nonetheless, the operationalization of the BCG concept in the realm of cultural tourism development remains an underexplored area, with limited empirical evidence and research studies, particularly in the domains of tourist behavior and preferences, the intricate linkages between tourism and local economic development, and the comprehensive assessment of regional potential and readiness (Boonwanno et al., 2024). Moreover, the cultivation of stakeholder engagement and the fostering of multi-sectoral collaboration are identified as critical determinants in driving sustainable tourism development. In light of the aforementioned considerations, this research endeavor employs the innovative Integrated Generalized Structured Component Analysis (IGSCA) methodology, a state-of-the-art analytical framework, to elucidate the causal relationships underpinning Nora local cultural tourism in Phatthalung Province. The IGSCA approach offers a myriad of methodological advantages, including the flexibility and diversity of analyzable models, the robustness to non-normally distributed data, and the ability to yield reliable results with relatively small sample sizes, rendering it a potent tool for unraveling the complexities of research data (Hwang et al., 2020; Pinijvarasin et al., 2025). The application of the IGSCA technique in this study aims to contribute to the advancement of academic knowledge by generating novel insights into the intricate causal dynamics of cultural tourism, which can subsequently inform the formulation of effective and sustainable policies and strategies for cultural tourism development. The primary objectives of this research are fourfold: 1) to investigate the behavioral patterns and tourism preferences of Nora local cultural tourists in Phatthalung Province; 2) to analyze the causal relationships between Nora performance patterns and local economic development in Tha Khae community, Mueang District, Phatthalung Province; 3) to construct a causal relationship model of Nora local cultural tourism in Phatthalung Province utilizing the IGSCA

methodology; and 4) to evaluate the relative importance and performance of factors influencing Nora cultural tourism within the BCG economic framework. The findings of this study are expected to yield significant academic and policy implications for the sustainable development of Nora cultural tourism in Phatthalung Province, fostering long-term equilibrium and resilience. The insights generated from this research have the potential to contribute to the strengthening of the grassroots economy, facilitating equitable income distribution to local communities, nurturing a sense of pride in local identity and cultural heritage, and ensuring the sustainable conservation and transmission of the nation's invaluable artistic and cultural legacy for generations to come.

Literature Review

The BCG model diverges from traditional sustainability frameworks by emphasizing resource recycling and cultural capital as economic drivers (MHESI, 2021; National Science and Technology Development Agency, 2021). Unlike the triple bottom line, which broadly addresses profit, people, and planet, BCG integrates bio-economic principles with circular systems, making it suitable for cultural tourism reliant on indigenous knowledge (Nugroho & Numata, 2022). Globally, studies on sustainable tourism (e.g., Richards, 2018) highlight knowledge and perception (KAP) as catalysts for participation (IPA), while community involvement (CPP) strengthens stakeholder roles (SRD) (Salazar, 2012).

1. Knowledge and Perception (KAP) of Nora Performance Art.

Knowledge and perception of Nora performance art play a crucial role in stimulating interest and participation in Nora cultural tourism activities (Interest and Participation, IPA). (Nugroho & Numata, 2022). Hypothesis 1a posits that KAP exerts a direct positive influence on IPA, which aligns with the findings of Richards (2018), who demonstrated that the perception and understanding of the cultural value of performing arts can significantly enhance individuals' interest and engagement in cultural activities. (Kim et al., 2021). Furthermore, hypothesis 1b postulates that KAP has a direct positive impact on the roles of stakeholders in tourism development (Stakeholder Roles in Development, SRD). Possessing accurate knowledge and perception of Nora is essential in fostering stakeholders' recognition of the importance of preserving and promoting this performing art. This notion is corroborated by the research of Salazar (2012) and Gössling et al. (2021) which highlighted the role of cultural knowledge and perception in generating stakeholder participation and responsibility in the development of cultural tourism.

2. Interest and Participation in Nora Cultural Tourism Activities (IPA)

Interest and participation in Nora cultural tourism activities are crucial factors influencing the application of the Bio-Circular-Green Economy (BCG) model components. Hypothesis 3 posits that IPA exerts a direct positive influence on the implementation of BCG, which aligns with the findings of Gössling et al. (2021), who demonstrated that tourist participation in sustainable tourism activities can significantly enhance the opportunities for resource efficiency and environmental friendliness.

3. Application of the BCG Model Components to Nora Cultural Tourism (BCG)

The BCG model is a development approach that emphasizes resource efficiency, resource recycling, and environmental conservation (National Science and Technology Development Agency, 2021). Empirical studies, such as Khan et al. (2021), demonstrate the efficacy of sustainability models in tourism contexts globally, providing a comparative basis for BCG's application. Similarly, UNWTO (2021) underscores the integration of circular economy principles in cultural tourism as a pathway to resilience, enhancing the global relevance of this study beyond regional frameworks. The application of BCG in Nora cultural tourism can contribute to the sustainability of tourism. Hypothesis 4 postulates that the roles of stakeholders in tourism development (SRD) have a direct positive impact on the implementation of BCG. Studies by Falcone (2019) and Khan et al. (2021), Suriyankietkaew (2022), have highlighted the importance of stakeholder roles in policy-making and tourism promotion for the effective application of the BCG concept.

4. Conservation, Preservation, and Participation of Local Communities (CPP)

Conservation, preservation, and participation of local communities are crucial factors in the development of cultural tourism. Hypothesis 2a posits that CPP exerts a direct positive influence on IPA, which is supported by the study of Hjalager (2020), who found that communities with active roles in cultural conservation and preservation can attract more tourists to engage and participate in activities. Hypothesis 2b postulates that CPP has a direct positive impact on SRD. The research by Khan et al. (2021) demonstrates that communities involved in cultural conservation and preservation possess the ability to effectively promote and develop tourism.

5. Tourist Satisfaction, Perceived Quality, and Behavioral Intention (SQI)

Tourist satisfaction, perceived quality, and behavioral intention are significant factors influencing the application of

the BCG model components. Hypothesis 5 posits that SQI exerts a direct positive influence on the implementation of BCG. The study by (Kim et al., 2021). revealed that tourist satisfaction and perceived quality can enhance their interest in supporting sustainable tourism practices.

6. Stakeholder Roles in Tourism Development (SRD)

The roles of stakeholders in tourism development are pivotal factors in the application of the BCG model components. Hypothesis 4 posits that SRD exerts a direct positive influence on the implementation of BCG. The studies by Suriyankietkaew (2022) confirm that stakeholder roles in policy-making and tourism promotion are essential for the effective application of the BCG concept (Figure 1).

Figure 1 illustrates the conceptual framework of this study, which presents the hypothesized causal relationships among six latent variables. Knowledge and Perception of Nora Performance Art (KAP) and Conservation, Preservation, and Participation of Local Communities (CPP) serve as exogenous variables, influencing Interest and Participation in Nora Cultural Tourism Activities (IPA) and Stakeholder Roles in Development (SRD). Both IPA and SRD, together with Tourist Satisfaction, Perceived Quality, and Behavioral Intention (SQI), are hypothesized to influence the Application of the BCG Economy Model Components (BCG) as the primary outcome variable, as shown in Figure 1.

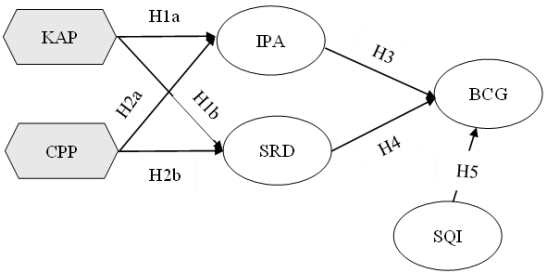


Figure 1 Conceptual framework of Nora cultural tourism with the BCG economic model

Methodology

Population and Sample

The study sampled 1,093 Thai tourists across four districts in Phatthalung Province (Mueang Phatthalung, Khuan Khanun, Pak Phayun, Si Banphot) using stratified cluster sampling. Sites were selected based on their prominence as Nora cultural hubs, ensuring relevance to the research focus.

The population was stratified proportionally across four principal districts Mueang Phatthalung, Khuan Khanun, Pak Phayun, and Si Banphot selected due to their prominence as Nora cultural hubs, hosting the majority of performance sites and historical significance as documented by Phatthalung Provincial Cultural Office (2021). Other districts were excluded due to their limited Nora cultural presence or logistical constraints, ensuring the sample's representativeness of the province's cultural tourism landscape. Within each district, Nora cultural sites were designated as primary sampling units for the cluster sampling process. Subsequently, simple random sampling was employed to select tourists from each cluster, resulting in a comprehensive sample size of 1,093 individuals. The sample was meticulously designed to ensure representativeness and optimal distribution, thus rendering it appropriate for Structural Equation Modeling (SEM). SEM, a robust parametric statistical method, requires adherence to several preliminary assumptions, including data normality, a minimum sample size of 10−20 times the number of parameters, and multivariate normality. (Manosuthi et al., 2021). These stringent methodological standards significantly bolster the credibility and validity of the analytical outcomes.

Research Instruments

The research instruments employed in this study consist of quantitative tools, which are divided into two sections. Section 1 comprises questions pertaining to the basic personal information of the sample group. Section 2 is a questionnaire that explores the opinions and perceptions of the participants regarding the research topics, derived from the literature review of studies conducted by Ekeocha et al. (2021) Hjalager (2020) Khan et al. (2021) Gössling et al. (2021) Kim et al., (2021) World Travel & Tourism Council (2020) and Nugroho & Numata (2022). The questionnaire encompasses six components: 1) Knowledge and perception of Nora performance art; 2) Interest and participation in Nora cultural tourism activities; 3) Application of the Bio-Circular-Green (BCG) Economy model components to Nora cultural tourism; 4) Conservation, preservation, and participation of local communities; 5) Tourist satisfaction, perceived quality, and behavioral intention; and 6) Stakeholder roles in tourism development. Items were validated with an Index of Item-Objective Congruence (IOC) ranging from 0.60 to 1.00. Low IOC scores prompted item revision to ensure alignment with objectives. The development of the research instruments followed these steps: 1) Studying the principles of questionnaire construction in alignment with the research framework; and 2) Reviewing relevant literature, including books, documents,

articles, and research papers, to formulate the questionnaire items. Subsequently, the Index of Item-Objective Congruence (IOC) was assessed, with the results ranging from 0.06 to 1.00. Items with IOC scores below 0.5 were retained only if deemed theoretically critical by expert reviewers during pre-testing, with revisions applied to enhance congruence. For instance, items related to cultural perception were preserved despite lower scores due to their alignment with the study's conceptual framework, ensuring content validity. Conducting item discrimination analysis for the checklist items was done using standard deviation, and for the rating scale items using correlation coefficient. The reliability of the rating scale items was evaluated using Cronbach's alpha. The item discrimination analysis yielded test results between 0.867 and 0.939, while the Corrected Item-Total Correlation values ranged from 0.356 to 0.705.

Data Analysis

IGSCA was chosen over traditional SEM methods (e.g., CB-SEM) due to its robustness with non-normal data and smaller samples, reducing bias in composite models (Hwang et al., 2020). Fit indices (GFI ≥ 0.93, SRMR < 0.08) assessed model adequacy, with AVE (> 0.5), Cronbach's alpha (> 0.6), and VIF (< 5) validating measurement reliability. Additionally, the Heterotrait-Monotrait Ratio of Correlations (HTMT) was assessed to evaluate discriminant validity. The HTMT value should be less than 0.86 (Henseler et al., 2015) and is considered acceptable if it is below 0.90. Furthermore, the Variance Inflation Factor (VIF) was evaluated, with values below 5 indicating acceptability (Hair et al., 2020).To examine the causal relationships using structural equation modeling, the Integrated Generalized Structured Component Analysis (IGSCA) framework was employed. This approach allows for the investigation of causal relationships among latent variables and reduces bias from the factor-based measurement model. The IGSCA method is particularly suitable for parameter estimation as it comprehensively integrates data and does not require specifying the data distribution (Hwang et al., 2023).

Results

Validation of the Measurement Model

The validation of the measurement model was conducted through the analysis of convergent validity and discriminant validity, utilizing Cronbach's alpha coefficient and DG-rho values, as shown in Table 1 (Benitez et al., 2020; Hair et al., 2020). All reliability indicators exceeded the minimum thresholds proposed by scholars (AVE > .5; α > .6; ρ > .7) (Hair et al., 2020; Manosuthi et al., 2021), clearly demonstrating the validity of the measurement model (Table 1).

Table 1 Reliability, validity, HTMT, and VIF values for the components and factors in the study

Total sample				Total sample (n = 1093)			
Construct	AVE	α	ρ	HTMT	Estimate	95%CI(L)	95%CI(U)
KAP (Component)	.714	.867	.909	KAP ↔ CPP	.771	.584	.731
CPP (Component)	.705	.86	.905	KAP ↔ IPA	.843	.934	.982
IPA (factor)	.696	.896	.901	KAP ↔ SRD	.703	.648	.75
SRD (factor)	.863	.939	.949	KAP ↔ SQI	.795	.621	.747
SQI (factor)	.596	.870	.880	KAP ↔ BCG	.799	.745	.846
BCG (factor)	.643	.896	.900	CPP ↔ IPA	.655	.591	.706
				CPP ↔ SRD	.764	.599	.722
				CPP ↔ SQI	.844	.956	.996
				CPP ↔ BCG	.827	.782	.856
				IPA ↔ SRD	.71	.671	.756
				IPA ↔ SQI	.74	.577	.689
				IPA ↔ BCG	.843	.801	.877
				SRD ↔ SQI	.765	.722	.805
				SRD ↔ BCG	.718	.648	.768
				SQI ↔ BCG	.8	.752	.838
				VIF			
				KAP		1.497	
				CPP		1.497	
				IPA		1.999	
				SRD		2.635	
				SQI		2.214	

In terms of assessing discriminant validity, the Heterotrait-Monotrait Ratio of Correlations (HTMT) values presented in Table 1 fall within the acceptable range, being less than 0.86 according to the stringent criterion (Henseler et al., 2015) and below 0.90 based on the general criterion. As Rasoolimanesh (2022) points out, HTMT is suitable for evaluating the discriminant validity of latent variables in reflective models or models developed from factors, which is not the case for this model, which consists of composite variables. Therefore, as recommended by Rasoolimanesh et al. (2022), a comprehensive assessment of multicollinearity should be used to evaluate discriminant validity. From the factor analysis using the Variance Inflation Factor (VIF) values, it was found that all components had values below 5 (Table 1), indicating that there were no significant multicollinearity issues (Hair et al., 2020).

Measurement Model Assessment

Confirmatory factor analysis (CFA) was employed to evaluate the measurement model, which comprises six variables. The researcher conducted the CFA following the recommendations of Manosuthi et al. (2021) for IGSCA, assessing convergent and discriminant validity using the criteria of factor loadings greater than 0.7, AVE values exceeding 0.5, and HTMT values below 0.85 as indicators of validity. All observed variables exhibited statistically significant factor loadings (p-value < .01), highlighting the importance of these variables to the factors influencing the issues under investigation. The factor loadings ranged from 0.86 to 0.939 (Table 1).

Structural Model Analysis

The results of the Structural Equation Modeling (SEM) analysis reveal that the structural model accounts for 79.9 percent of the variance in the variables, while the constrained measurement model explains an impressive 97.9 percent of the variance, which is considered exceptionally high based on the criteria proposed by Lu et al. (2022). To determine the goodness of fit between the model and the empirical data, two key indices were examined, the Goodness of Fit Index (GFI) and the Standardized Root Mean Square Residual (SRMR). According to the established thresholds, a GFI value greater than or equal to 0.93 and an SRMR value below 0.08 indicate an acceptable level of congruence between the model and the observed data.

The analysis of the goodness-of-fit indices yielded the following results: FIT = 0.776, GFI = 0.979, FITs = 0.351, FITm = 0.878, and SRMR = 0.078 (Figure 2). These values demonstrate a satisfactory fit between the model and the empirical data (Lu et al., 2022), as stated by Kaewkhav et al. (2023). Weak path coefficients (e.g., SRD→BCG, β = 0.009, p > .05) suggest limited stakeholder impact, possibly due to coordination gaps or resource constraints. Non-significant indirect effects via SRD (e.g., KAP→SRD→BCG, β = 0.004) indicate that stakeholder roles do not substantially mediate BCG application, necessitating further exploration of practical barriers. Structural Equation Modeling (SEM) analysis in the study titled "Causal Relationship Model of the BCG Economy for Nora Cultural Tourism in Phatthalung Province" employed the Bootstrap sampling technique with 100 samples drawn from the actual sample of 95 observations. The results indicated that the model exhibited an acceptable level of congruence with the empirical data, as evidenced by the following goodness-of-fit indices: relative chi-square (CMIN/DF) = 0.878, Goodness of Fit Index (GFI) = 0.979, and Standardized Root Mean Square Residual (SRMR) = 0.078.Chi-square difference test between the unconstrained and constrained models (CMIN/DF Difference) yielded a value of 0.04, which was statistically significant at the 0.0001 level (p < 0.05). This finding supports the discriminant validity of the developed model. Furthermore, the Confirmatory Factor Analysis (CFA) revealed that the measurement model possessed convergent validity, with factor loadings of all latent variables surpassing the threshold of 0.50, ranging from 0.548 to 0.869, and demonstrating statistical significance at the 0.001 level (p < 0.05).

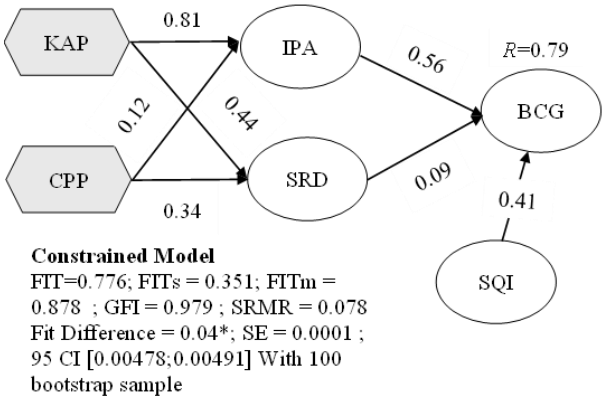


Figure 2 Structural Equation Modeling (SEM) analysis in the study titled Causal Relationship Model of the BCG Economy for Nora Cultural Tourism

Note: (Knowledge and Perception) KAP; (Interest and Participation) IPA; (Bio-Circular-Green Economy) BCG; (Conservation, Preservation, Participation) CPP; (Satisfaction, Quality, Intention) SQI; (Stakeholder Roles in Development) SRD

In addition to the aforementioned findings, the Structural Equation Modeling (SEM) results elucidate the relationships and influences among the latent variables, which can be expounded as follows. Exogenous Latent Variables

1.1 The latent variable Conservation, Preservation, Participation (CPP) exerts a direct positive influence on Interest and Participation in Nora Cultural Tourism Activities (IPA) with a path coefficient of 0.127. Moreover, CPP exhibits a direct positive effect on Stakeholder Roles in Development (SRD) with a path coefficient of 0.348.

1.2 The latent variable Knowledge and Perception of Nora Performance Art (KAP) wields a direct positive influence on Interest and Participation in Nora Cultural Tourism Activities (IPA) with a path coefficient of 0.819. Furthermore, KAP demonstrates a direct positive effect on Stakeholder Roles in Development (SRD) with a path coefficient of 0.445. Additionally, KAP exerts an indirect influence through the Application of the Bio-Circular-Green (BCG) Economy Model Components with a path coefficient of 0.466. (Endogenous Latent Variables).

2.1 Interest and Participation in Nora Cultural Tourism Activities (IPA) is influenced by CPP and KAP, and in turn, affects other endogenous latent variables. Specifically, IPA exerts a direct positive influence on the Application of the Bio-Circular-Green (BCG) Economy Model Components to Nora Cultural Tourism (BCG) with path coefficients of 0.07 and 0.466, respectively. Conservation, Preservation, and Participation of Local Communities (CPP) is influenced by IPA and transmits its influence to Stakeholder Roles in Development (SRD) with a path coefficient of 0.548. SRD receives both direct influence from IPA with a path coefficient of 0.127 and indirect influence through CPP with a path coefficient of 0.05. Moreover, Tourist Satisfaction, Perceived Quality, and Behavioral Intention (SQI) exhibit a direct positive effect on the Application of the BCG Economy Model Components to Nora Cultural Tourism (BCG) with a path coefficient of 0.417. In summary, the developed causal model effectively elucidates the influential causal relationships of the BCG Economy for Nora Cultural Tourism in Phatthalung Province, demonstrating acceptable levels of convergent validity, discriminant validity, and reliability. Furthermore, the analysis reveals that IPA serves as a crucial mediating latent variable, linking the factors of Knowledge and Perception (KAP) and the Application of the BCG Model with the factors of Conservation, Preservation, and Participation by the Community (CPP) and Stakeholder Roles in Development (SRD), ultimately leading to Tourist Satisfaction, Quality Perception, and Behavioral Intention (SQI). Notably, the relationships and influences among these variables are consistently positive in nature.

The results of the Structural Equation Modeling (SEM) analysis, as presented in Table 2 reveal the path coefficients among the latent variables in the causal model of the application of the Bio-Circular-Green (BCG) Economy components within the context of Nora cultural tourism development. Notably, the weak and non-significant path from SRD to BCG ($\beta = 0.009$, $p > .05$) suggests that stakeholder roles, as currently structured, exert minimal influence on BCG implementation. This may reflect inadequate coordination among stakeholders, such as limited government support or private sector engagement, consistent with Rasoolimanesh et al. (2022), who highlight gaps in multi-stakeholder collaboration as a barrier to sustainable tourism development. The relationships between all latent variables in the model are statistically significant at the 95 percent confidence interval, reflecting the significant positive influence of the antecedent variables on the consequent variables in this causal model.

Table 2 Parameters for the analysis of the causal relationship model of the BCG economy for Nora cultural tourism in Phatthalung Province

Constrained model		
Relationship	*β*	95% CI
Direct effect		
KAP→IPA	.819	[.783;.86]
CPP→IPA	.127	[.078;.179]
KAP→SRD	.445	[.389;.503]
CPP→SRD	.348	[.277;.407]
IPA→BCG	.569	[.498;.633]
SRD→BCG	.009	[-.07;.095]
SQI→BCG	.417	[.365;.509]
Indirect effect		
KAP→IPA→BCG	.466	[.408;.518]
KAP→SRD→BCG	.004	[-.031;.042]
CPP→IPA→BCG	.072	[.063;.080]
CPP→ SRD→BCG	-.024	[-.024;.033]
Fit indices		
FIT		.776
FITs		.351
FITm		.878
GFI		.979
SRMR		.078

Note: $p < .05$*

When examining the direct effects, it is observed that the variable Knowledge and Perception of Nora Performance Art (KAP) exerts the strongest direct influence on the variable Application of the BCG Economy Model Components (BCG), with an effect size of 0.819, followed by the variable Conservation, Preservation, and Participation of Local Communities (CPP), which yields a direct effect of 0.127. Meanwhile, the variables Interest and Participation in Nora

Cultural Tourism Activities (IPA), Tourist Satisfaction, Perceived Quality, and Behavioral Intention (SQI), and Stakeholder Roles in Development (SRD) also demonstrate moderate to relatively high direct effects on the BCG variable.

Regarding the indirect effects, the KAP variable transmits the strongest influence through the IPA variable to the BCG variable, with an effect size of 0.466, while CPP conveys its influence through IPA at a level of only 0.072. Notably, the variables KAP and CPP exhibit negligible indirect effects on BCG through the SRD variable, indicating that these variables do not have significant indirect impacts on BCG via SRD.

The study concludes that knowledge, interest, and participation of stakeholders directly influence the application of the BCG model in Nora cultural tourism. The implementation of BCG is also indirectly affected by stakeholders' knowledge and perception, mainly through their interest and participation, while stakeholder roles have a limited indirect impact. To successfully apply the BCG model and ensure sustainable Nora cultural tourism development, it is crucial to focus on strategies that promote knowledge, cultivate interest, and facilitate multi-stakeholder participation.

Figure 3 presents the Importance-Performance Analysis (IPA) grid, which classifies the six study factors into four quadrants based on their mean importance score ($\bar{X}$ = 4.32) and mean performance score ($\bar{X}$ = 4.26). Factors with high importance and high performance fall in the Keep Up the Good Work quadrant, while those with high importance but low performance are placed in the Concentrate Here quadrant, indicating priority areas for improvement. Factors with low importance despite high performance are categorized as Possible Overkill, and those with both low importance and low performance are classified as Low Priority, as shown in Figure 3.

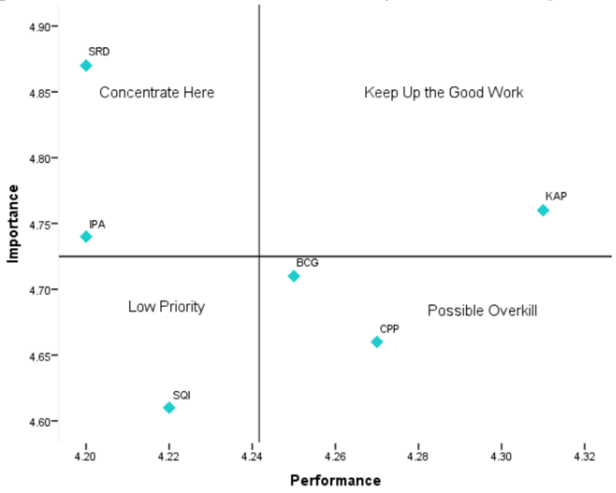


Figure 3 Importance-performance analysis grid

This study employed rigorous statistical tests to evaluate the importance levels of the variables under investigation. The analysis revealed that the six factors, namely, Stakeholder Roles in Development (SRD), Satisfaction, Quality, and Intention (SQI), Interest and Participation in Nora Cultural Tourism Activities (IPA), Conservation, Preservation, and Participation of Local Communities (CPP), Application of the Bio-Circular-Green (BCG) Economy Model Components to Nora Cultural Tourism (BCG), and Knowledge and Perception of Nora Performance Art (KAP), exhibited statistically significant differences at the 0.05 level (p-value < 0.05), necessitating a comprehensive and nuanced analysis utilizing the Importance-Performance Analysis (IPA) framework.

The IPA revealed four distinct quadrants based on importance ($\bar{X}$ = 4.32) and performance ($\bar{X}$ = 4.26) levels. 1. Keep Up the Good Work; KAP and BCG factors showed high importance and performance, highlighting their crucial role in cultural tourism. 2. Possible Overkill Despite good performance; the CPP factor was not perceived as highly important, contrasting with Manosuthi et al. (2021). This may be due to over-allocation of resources or respondents' perceptions. 3. Low Priority; The IPA factor had low importance and performance, contradicting Nguyen et al. (2021). Respondents may not prioritize participation in Nora cultural tourism activities or view current performance as adequate. 4. Concentrate Here; SRD and SQI factors had high importance but low performance, emphasizing the need for improvement in stakeholder management and tourist satisfaction to enhance Nora cultural tourism's attractiveness and align with sustainable tourism development principles.

Hypothesis Testing Results

All hypotheses were supported (p < .05), revealing the intricate relationships among key factors in Nora cultural tourism. KAP strongly influenced IPA (β = 0.819) and SRD (β = 0.127), while CPP positively affected both IPA (β = 0.348) and SRD (β = 0.445). IPA (β = 0.569), SRD (β = 0.098), and SQI (β = 0.417) had positive impacts on the application of the BCG model to Nora cultural tourism. These findings underscore the critical roles of knowledge, conservation, participation, stakeholder involvement, and tourist satisfaction in driving sustainable Nora cultural tourism development under the innovative BCG framework.

Discussion

This study aimed to analyze a Structural Equation Model (SEM) by applying the Bio-Circular-Green Economy (BCG) concept in the development of Nora cultural tourism. The causal analysis results highlight the significant relationships among various latent variables in the model, particularly the factors influencing the application of the BCG model in the context of sustainable cultural tourism.

The findings reveal that Knowledge and Perception of Nora Performance Art (KAP) has the strongest direct influence on the application of the BCG model, aligning with Kim et al.'s (2021) study confirming the importance of imparting knowledge and fostering awareness of cultural heritage conservation among stakeholders to promote participation and effective implementation of sustainable tourism concepts. Raising awareness about the value and significance of Nora art and culture forms a crucial foundation for the balanced and sustainable application of BCG principles in cultural tourism development. This is linked to Interest and Participation in Nora Cultural Tourism Activities (IPA), which directly influences the application of the BCG model, consistent with Khan et al.'s (2021) findings that community awareness and participation directly impact the success of tourism development based on the green economy. Encouraging genuine interest and active involvement from all sectors leads to the acceptance and concrete implementation of sustainable development approaches.

Moreover, Conservation, Preservation, and Participation of Local Communities (CPP) positively influence the application of the BCG model both directly and indirectly, reflecting the necessity of fostering community participation to raise awareness about maintaining a balance between economic growth, community well-being, and environmental conservation. Emphasize the importance of building collaborative networks, sharing benefits, and promoting community roles in integrating the circular economy concept into sustainable tourism management. While the BCG model promises sustainability, its application in Nora cultural tourism faces challenges such as funding constraints for green infrastructure, potential community resistance to commercialization, and risks of cultural commodification. Addressing these requires targeted investments, public-private partnerships, and community-led oversight to balance economic growth with cultural authenticity. Empowering communities lays the foundation for long-term sustainability. Although Stakeholder Roles in Development (SRD) have a relatively limited indirect impact on the application of the BCG model, reforming the multi-stakeholder participation system and developing a transparent and fair working framework remain essential. SRD's weak influence highlights practical barriers funding shortages, policy ambiguity, or resistance requiring clearer operationalization, such as defined responsibilities in funding allocation or promotional campaigns. Rasoolimanesh et al. (2022) stress the need to reform the multi-stakeholder participation system to address gaps in implementing sustainable tourism development approaches, highlighting the importance of developing and promoting knowledge, cultivating interest, and fostering participation from all sectors, particularly strengthening local communities. These factors are crucial for the successful application of the BCG model in Nora cultural tourism development and achieving long-term sustainability.

The findings of this study are consistent with other research related to the application of the BCG concept in sustainable development. For instance, research by Nugroho and Numata (2022) supports the use of the BCG model in the Asia-Pacific region, emphasizing the promotion of sustainability and inclusive growth. This aligns with the World Bank study (2024), which underscores the importance of natural resource management and empowering local communities to reduce poverty and enhance shared prosperity. Furthermore, the Asian Development research demonstrates the support for circular economy development in Thailand through the use of technology and innovation to increase resource efficiency. Nugroho and Numata (2022) and Ueasangkomsate et al. (2025) highlight the importance of the BCG model for sustainable tourism development, resource efficiency, and waste reduction. Ueasangkomsate et al. (2025) also emphasize the role of community knowledge and participation in sustainable tourism development. These findings align with the present study, which underscores the significance of knowledge, interest, and multi-stakeholder participation in applying the BCG model for sustainable Nora cultural tourism development (Nugroho & Numata, 2022; Ueasangkomsate et al., 2025).

Conclusion and Recommendation

This research validates a causal model linking KAP, CPP, IPA, and SQI to BCG-driven Nora tourism sustainability. To enhance implementation: (1) Policy Support: Establish funding mechanisms (e.g., cultural grants) and incentives for green tourism practices; (2) Stakeholder Collaboration: Define SRD roles via multi-sectoral frameworks, addressing coordination gaps; (3) Community Engagement: Launch pilot programs in Phatthalung to test BCG strategies, supported by qualitative studies on community perceptions; (4) Tourist Experience:

Improve infrastructure (e.g., traffic management) to boost SQI. Future research should explore BCG's scalability across cultural tourism contexts and barriers to stakeholder engagement, ensuring Phatthalung's Nora heritage thrives sustainably.

Conflict of Interest

The author declares that there is no conflict of interest.

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