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INSIGNIFICANT BUT ESSENTIAL: THE CRITICAL ROLE OF NON-SIGNIFICANT VARIABLES THROUGH NECESSITY LOGIC IN SPORT EVENT TOURISM CONTEXT

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Abstract

This study explores the application of Single Necessary Condition Analysis (NCA) alongside traditional regression-based techniques, such as Structural Equation Modeling (SEM), to provide a comprehensive understanding of consumer behavior in sport and tourism settings. Traditional methods, including SEM, often rely on additive logic, which predicts outcomes using multiple variables that can compensate for each other. While useful, this approach may offer an incomplete picture of complex consumer phenomena. In contrast, necessity logic, exemplified by NCA, identifies conditions that must be present for an outcome to occur. This study applies NCA to evaluate the essential factors influencing intentions to visit sport events in Bangkok, Thailand, specifically focusing on attitudes, subjective norms, and perceived behavioral control as necessary conditions. The findings indicate that if these conditions are not met, the intention to visit a sport event typically will not occur. By integrating both necessity and additive logics, this study reveals that all variables in the Theory of Planned Behavior (TPB) are indispensable for forming an intention to visit a sport event. The analysis shows that attitudes, subjective norms, and perceived behavioral control are necessary conditions, even though subjective norms and perceived behavioral control may not appear significant in traditional SEM tests. The study underscores the importance of considering multiple causal perspectives—deterministic, probabilistic, and typicality—to achieve a holistic understanding of consumer intentions. This dual approach ensures that significant variables are not overlooked, providing robust support for the TPB in the context of sport event marketing. Future research should continue to incorporate complementary perspectives to enhance the accuracy and depth of consumer behavior analysis in various settings.

Keywords: Single Necessary Condition Analysis, Necessity Logic, Sport Tourism and Marketing, Theory of Planned Behavior

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INTRODUCTION

The use of regression-based techniques, such as structural equation modeling (SEM), is one of the mainstream methods for studying consumer insights in marketing literature (Sarstedt et al., 2022). Similarly, in sport and recreation marketing management, numerous past studies have employed these techniques. For example, in the sport management context, Trail and McCullough (2020) developed and evaluated a model for assessing sport sustainability campaigns among participants of a 10-mile running event using SEM. In the tourism context, Rasmidatta (2023) employed SEM to assess the impact of atmosphere, perceived value, service quality, and satisfaction on tourists' word-of-mouth recommendations and revisit intentions in Khung Bang Kachao, Thailand. Such knowledge discovery methods fall under the category of additive logic analysis (sometimes referred to as sufficiency logic) (Hauff et al., 2021). As Hauff et al. (2021) put it, additive logic emphasizes predicting outcomes using multiple variables. Adding variables to the system often explains more of the outcome's variance. Some variables may have less explanatory power, while others may have greater explanatory power. Therefore, in this type of analysis, the variables in the system can compensate for each other as long as the predictive capability of the outcome is acceptable. This type of analysis is popular in theory explanation because it can be viewed as X produces Y.

However, understanding consumer phenomena is complex. The perspective of X produces Y, while useful, provides an incomplete picture. Incorporating the perspective of 'no Y without X' can help researchers and practitioners identify and manage conditions more accurately. Necessity logic involves reasoning that predicts the outcome will not occur when a certain variable is absent or when the variable does not meet a certain threshold (J. Dul, 2016). For instance, Meeprom et al. (2023) enhanced sufficiency logic by incorporating necessity logic through the integration of single NCA (Necessary Condition Analysis) to identify the factors and components influencing food choice behavior. In the context of sport management, Satitsamitpong et al. (2024) utilized NCA based on fuzzy-set Qualitative Comparative Analysis (fsQCA) to elucidate the factors influencing spectator engagement in e-sports events. This application extends into consumer literature, where Sathatip (2024) employed single NCA following model verification based on SEM to assess whether variables derived from the Norm Activation Model were indispensable, both in terms of in-degree and in-kind, for generating intentions to reduce waste and minimize disposable packaging. Therefore, incorporating this perspective into traditional data analysis can enhance our understanding of consumers in the sport and tourism industries (Fakfare, Rittichainuwat, et al., 2024; Wattanacharoensil et al., 2023). This study is designed to present and call for the application of a statistical technique that uses necessity logic, known as single NCA, to enhance consumer insights in the sport and tourism business.

Basic Concept of Necessity Logic and Its Benefits

Figure 1 Four Possible Area of the Combination of X and Y

Y			
	Y = 1	area A	area B
	Y = 0	area C	area D
		X = 0	X = 1
		X	

The regions in Figure 1 represent all possible outcomes of a simple relationship between X and Y. The core idea of necessity logic is that whenever we observe the outcome (Y), X must

also be present. Conversely, whenever the outcome is not observed (~Y), X must be absent (~X). In other words, we can view this necessity relationship as X is a superset of Y.

In necessity logic, regions B, C, and D correspond to this concept. The significant implication of this discrete example is that we can easily detect that region A violates the necessity theories. Necessity theories emphasize predicting phenomena where the outcome cannot occur without the predictor variable (region C). In other words, if X is absent, Y will not be observed. Therefore, another implication is that X acts as a constraint or bottleneck preventing the occurrence of Y (J. Dul, 2016). This perspective is particularly useful because it complements traditional views, such as sufficient or additive logics, which are commonly used in sport and recreation marketing literature. For example, in sport marketing and sport tourism, understanding necessity logic can help identify critical factors (constraints) that must be present for certain outcomes to occur. For example, in sport tourism, Manosuthi et al. (2024) extended the traditional analysis by evaluating the necessity of all predictors influencing decisions to visit green destinations through the application of both single NCA and fsQCA. For constraint analysis, Fakfare, Manosuthi, Lee, Promsivapallop, et al. (2024) employed single NCA with a bottleneck approach to evaluate the extent to which necessary conditions influence tourists' intentions to conserve water, reduce waste, and protect ecology.

Additive logic, also known as sufficient logic, represents a traditional perspective on the relationship between independent and dependent variables (Hauff et al., 2021). In additive logic, the focus is on how a combination of concepts contributes to the overall outcome, either increasing or decreasing it on average. If this combination is not effective, we then examine how different concepts can compensate for each other to produce the desired outcome (Bokrantz & Dul, 2023). Moreover, the addition of predictor variables, as long as they do not introduce excessive collinearity with existing predictors, could enhance the explanatory power regarding the dependent variable (e.g., Manosuthi et al., 2021). In pure additive logic, theories are often tested by integrating predictor variables derived from related theories into a conceptual framework to explain the variance in the dependent variable. This approach is favored for its ability to provide a comprehensive understanding of the factors influencing the dependent variable and to enhance the predictive accuracy of the model. However, we argue that an analysis from the perspective of additive logic has significant limitations which can lead to confusion. Following additive logic, when no significant relationship is found between the predictor and the outcome variables, it is concluded that this predictor is unimportant or unnecessary for the outcome. While this conclusion aligns with additive logic—where changes in the independent variable have no effect on the dependent variable—it overlooks the perspective of necessity logic.

Necessity logic posits that if a predictor variable is a necessary condition for the outcome, the outcome will always occur when the predictor is present (J. Dul, 2016). Unfortunately, several pieces of literature in sport and tourism management often neglect this perspective. A predictor that is not significant in additive logic might still be crucial according to necessity logic (Fakfare, Manosuthi, Lee, Han, et al., 2024; Fakfare, Manosuthi, Lee, Lee, et al., 2024; Fakfare, Manosuthi, Lee, Promsivapallop, et al., 2024; Wattanacharoensil et al., 2024). Hence, concluding that a predictor is unimportant based on additive logic alone could be incorrect, as the predictor might be indispensable for the outcome to occur, when incorporating necessity logic into consideration. This gap highlights the importance of considering both additive and necessity logic in research. By integrating both perspectives, we argue that researchers can avoid erroneous conclusions and better understand the complex dynamics between variables.

In recent years, tourism research has increasingly focused on integrating necessity logic and additive logic (or sufficient logic) in research analyses. Researchers are now combining these perspectives to analyze and interpret data through comprehensive summary tables. For

example, Fakfare, Manosuthi, Lee, Promsivapallop, et al. (2024) summarize their findings by presenting a table that illustrates cases of sufficiency ("if X then Y") and necessity ("if not X then not Y"). The table enumerates all variables examined through both additive and necessity logics, aligning with the causal perspectives outlined by Dul (2024). This integrated approach allows for a more nuanced understanding of the relationships between variables, providing deeper insights and more robust conclusions. This shift signifies a recognition of the limitations inherent in relying solely on one logical perspective and highlights the benefits of a more holistic approach to data analysis. By incorporating both necessity and additive logic, researchers can more accurately identify critical factors and the conditions that influence tourism outcomes.

Testing a Single Necessary Condition Analysis (NCA)

Testing a hypothesis using single NCA differs significantly from testing hypotheses using additive or sufficient logics (Dul, 2024). The core of using a single NCA to contribute to theory development lies in the principle of falsification (Hauff et al., 2021). That is, NCA examines whether the relationship between X and Y follows a pattern of type A (see Figure 1).

This concept allows researchers to conduct both informal and formal tests. Informal testing can be easily performed by visually inspecting a scatter plot to check for the presence of data in area A. However, Dul et al. (2020) developed an NCA package in R programing to perform formal significance testing (Dul, 2018). Three critical components are required to draw conclusions about a necessary condition analysis hypothesis: Scatter Plots with Ceiling Lines, NCA Parameters and Their Effect Sizes (in kind), and Bottleneck Tables (in degree) (J. Dul, 2016; J. Dul, 2016; Dul et al., 2020; Hauff et al., 2021). Decision-making criteria include theoretical justification, the magnitude of the effect size, and the p-value (Hauff et al., 2021).

THEORETICAL BACKGROUND

Applications of NCA as a Complementary Approach in Sport and Recreation Marketing

In the field of marketing research, understanding consumer insights is crucial for marketers when designing strategies aimed at influencing consumer purchase decisions. Various theories provide frameworks for analyzing consumer behavior, such as the Theory of Reasoned Action (TRA), the Motivation-Opportunity-Ability (MOA) Model, and the Behavioral Economics Model (BEM). TRA focuses on the relationship between attitudes, subjective norms, and behavioral intentions. It posits that an individual's intention to perform a behavior is the primary predictor of that behavior. While TRA is valuable, it assumes that individuals have full control over their actions and does not account for factors beyond intentionality. MOA emphasizes the role of motivation, opportunity, and ability in influencing consumer behavior (Hauff et al., 2021). It is useful for understanding how these factors interact to affect decision-making, but may lack specificity in predicting behavioral intentions. BEM integrates psychological insights into economic decision-making, focusing on biases, heuristics, and irrational behaviors (Ho et al., 2006). While it provides a detailed look into consumer irrationalities, it may be less structured for predicting specific behavioral intentions. However, one of the most extensively utilized theories in tourism and sport literature is the Theory of Planned Behavior (TPB) (Manosuthi et al., 2020).

The Theory of Planned Behavior (TPB) extends the TRA by incorporating the concept of perceived behavioral control, which addresses the limitations of TRA by accounting for factors beyond individual intentions. TPB offers a more comprehensive framework for understanding consumer behavior by integrating three key components: attitudes, subjective norms and perceived behavioral control. By including perceived behavioral control, which

accounts for the ease or difficulty of performing the behavior, the TPB considers both internal capabilities and external constraints. By addressing both volitional (attitudes and subjective norms) and non-volitional (perceived behavioral control) factors, TPB provides a thorough understanding of the multiple dimensions influencing consumer decisions (Meng et al., 2020). This makes it particularly valuable for developing targeted marketing strategies that can effectively address the various aspects of consumer decision-making, such as enhancing positive attitudes, leveraging social norms, and overcoming perceived barriers. For instance, in sport event marketing, the TPB can guide strategies to improve fan engagement by shaping positive attitudes towards an event, harnessing social influence from key stakeholders, and addressing logistical or financial constraints that may affect attendance (Han et al., 2017). This holistic approach allows marketers to design more nuanced and effective campaigns that resonate with consumer motivations and constraints, ultimately improving marketing outcomes. This study employs the TPB as the primary theoretical framework to demonstrate how single NCA can complement traditional sufficiency logic in the sport event context.

Data

This study employed an online survey approach to collect data from January to March 2024. The web-based survey was developed collaboratively by the research team and representatives of GN Research, an online research consulting firm in Thailand. After finalizing the survey through agreed-upon amendments, it was distributed to panels in the GN Research company's database. Screening questions ensured that only participants who had attended sport events within the past 24 months were included, targeting individuals with relevant experience. Respondents who answered 'yes' to the screening questions proceeded with the survey. Incomplete and unengaged responses were inspected and removed, along with any extreme outliers. Consequently, 457 valid responses were obtained for further statistical analysis.

The survey results indicated a balanced gender ratio, with 51.3% of respondents identifying as male. The average age of the participants was 49 years. Regarding education, the majority held a bachelor's degree (64%), followed by postgraduate degrees (16%), high school diplomas (13%), and associate degrees (7%). In terms of monthly income, 41% of respondents reported incomes of THB 50,000-75,000, 33% reported incomes of THB 25,000-49,999, 19% had incomes higher than THB 75,000, and 7% had incomes less than THB 25,000.

Analysis

A multistep process was employed to analyze the data, ensuring methodological rigor and alignment with previous research in SEM literature. The dataset was initially divided into two portions: a training sample (70%) and a testing sample (30%).

The first step involved using factor-based Structural Equation Modeling (SEM) to verify the research model, test basic hypotheses, and obtain factor scores. This approach allowed for a robust validation of the underlying theoretical constructs, as all constructs in this study are theoretically and empirically considered as factors.

Next, the factor scores obtained were rescaled and calibrated to range proportionally from 0 to 1. These calibrated scores were then used to test the single NCA for the desired high-level outcomes. The single NCA technique was employed to determine if specific variables were essential for the occurrence of the outcomes under study. Following this, NCA based on the fsQCA technique was employed to reduce common method bias by cross-validating the results generated from the single NCA, thereby ensuring methodological robustness through the application of multiple methods.

Finally, the scaled factor scores were reanalyzed using both additive and necessity logics to determine whether attitudes, subjective norms, or perceived behavioral control were necessary conditions for generating high levels of behavioral intentions or sufficient to explain variation in behavioral intentions. By applying these complementary analytical perspectives, the study achieved a comprehensive understanding of the factors influencing behavioral intentions. This multistep approach not only aligns with established practices in SEM but also provides a nuanced analysis of the necessary and sufficient conditions underlying the research model.

RESULT

This study used the traditional factor-based structural equation modeling to validate the research model. This technique suited the analysis since its main objective is for testing theory, in this case the TPB in the context of sport tourism marketing.

Reliability and Validity

The reliability of the constructs was assessed using the alpha coefficients and AVEs, as indicated in Table 1. All reliability estimates exceeded the threshold values (alpha > .6 and AVE > .5), confirming construct reliability. Construct validity was evaluated using convergent and discriminant validity measures. Factor loadings exceeded .7 in both training and testing datasets, demonstrating strong convergent validity.

Discriminant validity was formally tested using CI-CFA as recommended by Rönkkö and Cho (2022). The findings indicated that the constructs of intentions and attitude, as well as perceived behavioral control and attitude, required close monitoring due to potential multicollinearity issues. However, the conceptual difference between these constructs is well-supported by the theoretical framework. While this multicollinearity could pose some challenges in interpreting the findings, the constructs were not merged to resolve the potential issue, as their distinct theoretical underpinnings are critical.

Additionally, the fit indices for both datasets showed that the model's implied variance-covariance matrix fit the empirical variance-covariance matrix well. The p-value of the Chi-square test was insignificant in both the training and testing datasets, further supporting the model fit. Therefore, construct validity is justified.

Table 1 Evaluation of Construct Reliability and Validity

Type	Construct	Indicator	λ Training	λ Testing
Factor	ATT	For me, attending this sport event is good	.856*	.719*
	Training	For me, attending this sport event is pleasant	.908*	.822*
	AVE = .746	For me, attending this sport event is beneficial	.828*	.856*
	α = .897			
	Testing			
	AVE = .639			
	α = .842			
Factor	SN	Most people who are important to me for this trip think I should attend this sport event	.811*	.820*
	Training	Most people who are important to me for this trip	.903*	.934*
	AVE = .726	want me to attend this sport event		
	α = .886	People whose opinions I value prefer that I attend this sport event	.851*	.841*

Table 1 (Continued)

Type	Construct	Indicator	λ Training	λ Testing
	Testing AVE = .742 α = .889			
Factor	PBC	Whether I attend this sport event is entirely up to me	.762*	.737*
	Training AVE = .607 α = .821	I am confident that if I want to, I can attend this sport event	.806*	.822*
		I have sufficient resources, time, and opportunity to attend this sport event	.768*	.827*
	Testing AVE = .629 α = .834			
Factor	INT	I am planning to attend this sport event again in the near future	.792*	.866*
	Training AVE = .671 α = .803	I will exert an effort to attend this sport event again	.848*	.636*
	Testing AVE = .583 α = .709			

Note. p-value (Chi-square) = .164, GFI = .968, CFI = .990, RMSEA = .041, SRMR = .024 for training dataset (n = 319), while p-value (Chi-square) = .110, GFI = .928, CFI = .972, RMSEA = .067, SRMR = .042 for testing dataset (n = 138). ATT = attitudes, SN = subjective norms, PBC = perceived behavioral control, INT = intention to visit sport event.

Table 2 Formal Evaluation of Discriminant Validity of Training and Testing Dataset

		ATT	SN	PBC	INT
ATT	Estimated		.585	.643	.767
	CI Estimated		[.486,.684]	[.549,.736]	[661,861]
	Degree of problem		No	No	Moderate
SN	Estimated	.586		.632	.550
	CI Estimated	[.418,.775]		[.540,.724]	[.432,.668]
	Degree of problem	No		No	No
PBC	Estimated	.772	.559		.582
	CI Estimated	[.660,.885]	[.422,.696]		[.461,702]
	Degree of problem	Low	No		No
INT	Estimated	.861	.547	.583	
	CI Estimated	[.718,.941]	[.360,.734]	[.416,.750]	
	Degree of problem	High, but conceptually different	No	No	

Note. discriminant validity using CI-CFA recommended by Ronkko, in which the lower diagonal is for the testing dataset, while the higher is for the training dataset. ATT = attitudes, SN = subjective norms, PBC = perceived behavioral control, INT = intention to visit the sport event

Additive Logic

The findings from both the training and testing datasets are consistent, as shown in Table 3. The variation in attitude significantly explains the variation in intentions, while subjective norms and perceived behavioral control do not exhibit the same level of influence. This is evidenced by the insignificant p-values of the Chi-square tests in both datasets (.164 and .110), indicating that the theoretical model fits the empirical data very well. However, when subjective norms and perceived behavioral control are analyzed separately, each construct sufficiently and statistically explains the variation in intentions, as demonstrated by the results shown in Table 4. The p-values of the Chi-square tests for these separate analyses confirm a good fit with the empirical data in both the training and testing datasets. Therefore, while the combined analysis suggests that only attitude is a significant predictor of intentions, the separate analyses affirm that all variables proposed by the theory—attitude, subjective norms, and perceived behavioral control—function as theorized. This nuanced approach underscores the importance of considering both joint and individual effects to fully understand the dynamics at play.

Table 3 Joint Analysis of Additive Logic

Fit indices	Relationship	Training dataset		Testing dataset	
		Beta	p-value	Beta	p-value
	ATT => INT	.625	.000	.981	.000
	SN => INT	.118	.153	.101	.322
	PBC => INT	.106	.291	-.232	.186
p-value (Chi-square)		.164		.110	
GFI		.968		.928	
CFI		.990		.972	
RMSEA		.041		.067	
SRMR		.024		.042	

Table 4 Separate Analysis of Additive Logic

Relationship	Training dataset			Testing dataset		
	Beta	p-value	p-value (Chi-square)	Beta	p-value	p-value (Chi-square)
ATT => INT			.011			.049
	.762	.000	.983 (CFI)	.867	.000	.965 (CFI)
			.022 (SRMR)			.041 (SRMR)
SN => INT	.549	.000	.887	.536	.000	.127
PBC => INT	.576	.000	.720	.620	.000	.401

Necessity Logic

Similar to the results from the additive logic test, the necessity logic analysis (Table 5) indicates that attitude, subjective norms, and perceived behavioral control are all necessary conditions for behavioral intentions. This finding is consistent across both the training and testing datasets, confirming that the three theoretical variables—attitude, subjective norms, and perceived behavioral control—are indeed necessary conditions for a high-level of behavioral intentions.

The bottleneck analysis, which examines a single necessary condition in degree, provides further insights (Table 6). The analysis shows that, on average, when the levels of attitude, subjective norms, and perceived behavioral control are at least .038, .049, and .006,

respectively, the level of intentions is observed to increase, based on the training dataset. Similarly, the testing dataset results indicate that intentions begin to rise when attitude, subjective norms, and perceived behavioral control reach levels of .008, .071, and .075, respectively.

To ensure the robustness of these findings, a necessary condition analysis based on the fsQCA technique was conducted, yielding results as shown in Table 7. The raw data, calibrated to have membership scores ranging from 0 to 1 using the same scale, was used for this test. The results corroborate the findings of the single necessary condition analysis for both the training and testing datasets. The consistency values for all variables exceed .9, leading to the conclusion that attitude, subjective norms, and perceived behavioral control are indeed single necessary conditions for behavioral intentions. These consistent results across different analytical methods and datasets reinforce the theoretical importance of attitude, subjective norms, and perceived behavioral control as essential factors influencing behavioral intentions.

Table 5 Results of the Single Necessary Condition Analysis with Effect Size

	Effect size (Training / Testing datasets)				
Relationship	CE-FDH	p-value	CR-FHD	p-value	Necessary
ATT => INT	.32/.51	.011/.000	.25/.43	.002/.000	Yes
SN => INT	.21/.39	.000/.000	.26/.38	.000/.000	Yes
PBC => INT	.24 /.26	.000/.000	.22/.23	.000/.001	Yes

Table 6 Results of Bottleneck Analysis for all Conditions

	Training dataset (n=319)			Testing dataset (n=138)		
INT	ATT	SN	PBC	ATT	SN	PBC
.0	NN	NN	NN	.008	NN	NN
.1	NN	.049	NN	.092	NN	NN
.2	NN	.049	.006	.177	.071	NN
.3	NN	.049	.006	.261	.172	NN
.4	.038	.049	.063	.345	.274	.075
.5	.111	.115	.082	.430	.375	.173
.6	.266	.272	.226	.514	.477	.272
.7	.421	.428	.369	.599	.578	.371
.8	.577	.585	.512	.683	.680	.470
.9	.732	.742	.565	.768	.781	.568
1	.887	.898	.799	.852	.883	.667

Table 7 Results of NCA Based on fsQCA

	Outcome = INT					
	Training dataset (n=319)			Testing dataset (n=138)		
	Consistency	Relevance	Coverage	Consistency	Relevance	Coverage
ATT	.944	.654	.892	.932	.660	.889
SN	.926	.911	.967	.951	.918	.973
PBC	.906	.808	.928	.913	.798	.926
~ATT	.199	.985	.925	.199	.975	.880
~SN	.284	.967	.897	.251	.955	.845
~PBC	.264	.967	.899	.252	.964	.872

DISCUSSION AND IMPLICATIONS

The single NCA can effectively identify the occurrence of a desired outcome. Principally, NCA can be seen as a superset relationship; for example, perceived behavioral control is a necessary condition for an intention to visit a sport event, which can be viewed as perceived behavioral control being a superset of intentions to visit sport events. This perspective has two typical implications: first, whenever Y is observed, X must also be observed; second, if X is not observed, Y will not be observed either. This necessity logic is rarely found in research within tourism and sport management. Embracing this perspective can enhance understanding and allow complex consumer behavior phenomena to be studied from a different angle.

In the case presented, NCA is used to identify high-level outcomes rather than the mere occurrence of outcomes. This is due to the research design in most surveys, including this study, which presupposes that all variables of interest are present in every respondent. Therefore, data analysis assumes that all variables are present but vary in level, being either high (4-5) or low (1-2). To further test the occurrence of outcome variables from condition variables, the research design should include questions that specifically ask about the occurrence of the variables of interest. For example, before asking about the level of satisfaction with a sport venue, the questionnaire should first ask whether the tourist is satisfied with the venue. Additionally, integrating this perspective with sufficiency logic or additive logic can provide complementary insights rather than relying solely on the traditional view.

Necessity Logic Perspective

In the context of this study, the necessary conditions (X) include attitudes, subjective norms, and perceived behavioral control, while the outcome (Y) is the intention to visit a sport event. Applying the typicality perspective of necessity causality, we can state that if these necessary conditions are not met, an intention to visit the sport event typically will not occur (Dul, 2024). This perspective is crucial for understanding consumer behavior in sport event marketing.

Positive attitudes towards the sport event are essential. If tourists or attendees do not have favorable attitudes, they typically will not intend to visit the event. This is because attitudes strongly influence individuals' readiness to engage in an activity. Subjective norms can be viewed as the perceived social pressure to perform or not perform the behavior. If potential sport tourists do not perceive that important others (friends, family, or peers) think they should attend the sport event, they typically will not form an intention to go. In line with the theoretical suggestion, if the level of social influence is too low, it is typically hard to expect sport tourists to have very high intentions.

Similarly, perceived behavioral control involves the perceived ease or difficulty of performing the behavior. If individuals feel that attending the sport event is beyond their control (due to factors like time, cost, or accessibility), they typically will not develop an intention to attend. Perceived control affects one's confidence in their ability to perform the behavior.

Additive Logic Perspective

The additive logic perspective examines the combined effects of variables in explaining the variance of the dependent variable of interest (Bokrantz & Dul, 2023; Hauff et al., 2021). From the findings of this study, considering a general additive logic analysis, the possible conclusion is that subjective norms and perceived behavioral control do not significantly influence intentions to visit sport events. However, integrating both necessity and additive logics yields a different conclusion: the importance of all variables in the TPB—attitudes, subjective norms, and perceived behavioral control—are confirmed by data in both training

and testing datasets as each of the variables is found to be a single necessary condition for intentions.

Implications from the bottleneck analysis tell us that whenever predictor variables do not have high levels, intentions also have low levels, and vice versa. Therefore, these variables are deemed indispensable, although subjective norms and perceived behavioral control fail the traditional hypothesis testing in SEM. However, it should be noted that although jointly testing fails, testing individual variables with sufficiency logic produces results consistent with the theory: in summary, changes in attitude influence changes in intentions, and similarly for subjective norms and perceived behavioral control.

When considered together, only attitude remains significant in both training and testing datasets, while other variables are shown to be insignificant. However, when considered individually, they become significant. For instance, the effect of subjective norms and perceived behavioral control on intentions to visit sport events is statistically significant in the training dataset (.549/.576) and the testing dataset (.556/.620). This point is crucial because relying solely on the additive logic perspective could lead to erroneous conclusions that variables such as subjective norms and perceived behavioral control are not significant in the context of sport event marketing.

Integrating Perspectives for a Comprehensive Understanding

Combining necessity and additive logics provides a fuller picture of consumer behavior. While additive logic helps understand the overall influence of variables, necessity logic highlights the critical conditions without which the desired outcome typically cannot occur (Bokrantz & Dul, 2023). This dual approach ensures that all significant variables are considered indispensable, providing robust support for the TPB in this context.

Dominance of Attitudes and Potential of Multicollinearity

The insignificance of some variables might result from the dominance of the impact of attitude and issues with multicollinearity. First, attitudes might be the most dominant predictor of intentions in this context, having a more direct and stronger influence on intentions to visit sport events compared to subjective norms and perceived behavioral control. Specifically, the influence of subjective norms and perceived behavioral control might be partly mediated through attitudes (Bananuka et al., 2020). Therefore, once attitudes are included in the model, they absorb much of the variance explained by the other two predictors. This is consistent with the TPB, where attitudes, subjective norms, and perceived behavioral control collectively influence intentions. However, empirical studies often find that attitudes are the strongest predictor, aligning with this finding that attitudes are significant in the multiple regression model (Manosuthi et al., 2020). Many studies in marketing and psychology contexts support the dominant role of attitudes in predicting behavioral intentions (Bamberg & Möser, 2007), providing empirical backing for these findings.

Second, multicollinearity occurs when predictors are highly correlated with each other. In this case, attitudes and intentions as well as attitudes and perceived behavioral control might be highly interrelated. As suggested from the results shown in Table 2, the discriminant analysis with CI-CFA implies that the multicollinearity level of some variable pairs is quite high. Although theoretically distinct, these variables might be perceived similarly by consumers in empirical studies, leading to multicollinearity issues in interpretation. When included together in a regression model, the shared variance among these predictors can cause some predictors to lose statistical significance, with the variable having the strongest unique contribution (attitude) remaining significant.

FUTURE RESEARCH DIRECTIONS

As illustrated in the case of sport events, considering both necessity and sufficiency logics helps decode the complex phenomenon of consumer behavior in sport and tourism settings. This approach, as demonstrated in this research, allows for a more comprehensive understanding of the factors influencing consumer intentions. Future studies should emphasize complementary perspectives in analysis to provide deeper and more robust insights, reducing errors from relying on a single perspective and advancing academic knowledge significantly.

Relying solely on traditional additive logic can lead to erroneous conclusions, as it often automatically assumes that the constructs being tested exist at varying levels. In reality, reconsidering the research design for surveys from the perspective of necessity logic, by first examining the occurrence of the constructs of interest, allows us to identify which constructs are indispensable. Even if these constructs do not show significant results in additive logic tests, their critical role can be better understood through necessity logic.

For example, in the context of sport event marketing, analyzing constructs that are essential for driving intentions can highlight their importance even if they fail traditional hypothesis testing. If a variable is truly indispensable, block analysis in additive logic might be more appropriate than simultaneous analysis, due to the varying importance of constructs in achieving the outcome.

Moreover, embracing multiple causal perspectives, including deterministic, probabilistic, and typicality perspectives, can provide a holistic understanding of the factors influencing consumer intentions (Dul, 2024). Each perspective offers unique insights: The deterministic perspective helps identify conditions that must be met without exception for the desired outcome to occur while the probabilistic perspective highlights conditions that likely influence the outcome but allow for exceptions. Finally, the typicality perspective recognizes general trends and patterns, acknowledging occasional deviations (Dul, 2024). Integrating these perspectives enriches the analysis and offers a more nuanced view of the causal relationships.

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