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Exploratory Factor Analysis of the Supply Chain Management in Sport Tourism Based on the Principles of the Sustainability Balanced Scorecard

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Abstract

This exploratory research aims to study the components in the supply chain management in sport tourism by compiling data from the 400 samples of the stakeholders, ranging from public authorities, independent organizations/associations, businesses and participants of the activities related to sport tourism management. By deploying a questionnaire as an analysis tool, together with advanced statistical analysis software and exploratory factor analysis, the researchers have found that there are five components of the supply chain management in sport tourism, which are the internal process perspective, customer perspective, sustainability perspective, learning and growth perspective and financial perspective. All the five perspectives can explain 75.77% of the total variance. Thus, these five elements, along with the eighteen influencing factors in sport tourism supply chain management, can serve as effective criteria for the meticulous selection of appropriate sport tourism cities in Thailand.

Keywords: Supply chain management, Sports tourism, Balanced scorecard

Type of Article: Research Article

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การวิเคราะห์ปัจจัยเชิงสำรวจของการจัดการโซ่อุปทานการท่องเที่ยวเชิงกีฬา ตามหลักการความยั่งยืนของการวัดผลแบบดุลยภาพ

กรรทอง ทิพย์โคกสูง¹, วันชัย รัตนวงษ์² และ วรินทร์ วงษ์มณี^{3*}

บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาองค์ประกอบการจัดการโซ่อุปทานการท่องเที่ยวเชิงกีฬา ใช้รูปแบบการวิจัยเชิงสำรวจและพัฒนา โดยทำการเก็บข้อมูลจากกลุ่มตัวอย่างของผู้มีส่วนได้ส่วนเสียของการจัดการโซ่อุปทานการท่องเที่ยวเชิงกีฬา ไม่ว่าจะเป็น หน่วยงานทางภาครัฐ องค์กร/ สมาคมอิสระ องค์กรธุรกิจ และ ผู้ที่เคยเข้าร่วมกิจกรรมที่เกี่ยวข้องกับการจัดการท่องเที่ยวเชิงกีฬา จำนวน 400 คน โดยใช้แบบสอบถามเป็นเครื่องมือที่ใช้ในการวิจัยการวิเคราะห์ข้อมูลโดยใช้โปรแกรมสำเร็จรูปทางสถิติขั้นสูง การวิเคราะห์องค์ประกอบเชิงสำรวจ ผลการวิจัยพบว่า องค์ประกอบที่เหมาะสมสำหรับการจัดการโซ่อุปทานการท่องเที่ยวเชิงกีฬา ประกอบด้วย 5 องค์ประกอบ คือ 1) มุมมองด้านกระบวนการภายใน 2) มุมมองด้านลูกค้า 3) มุมมองด้านความยั่งยืน 4) มุมมองด้านการเรียนรู้และการพัฒนา และ 5) มุมมองด้านการเงิน โดยองค์ประกอบทั้ง 5 องค์ประกอบ สามารถอธิบายปัจจัยการจัดการโซ่อุปทานการท่องเที่ยวเชิงกีฬาได้ 75.77% โดยทั้ง 5 องค์ประกอบ ประกอบด้วย 18 ปัจจัยที่ส่งผลต่อการจัดการโซ่อุปทานการท่องเที่ยวเชิงกีฬา สามารถนำไปใช้ในการพัฒนาเพื่อเป็นเกณฑ์ในการคัดเลือกเมืองการท่องเที่ยวเชิงกีฬาสำหรับประเทศไทยได้อย่างเหมาะสม

คำสำคัญ: การจัดการโซ่อุปทาน, การท่องเที่ยวเชิงกีฬา, การวัดผลแบบดุลยภาพ

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1. Introduction

The studies in supply chain, specifically under the topic of sport tourism, have become crucial to improve effectiveness in organizing sport tourism in Thailand. By utilizing government supports to promote the activity, sport tourism can attract audiences, participants and the stakeholders that are willing to spend for their travels, consumption and relaxation after participating in a competition. Therefore, sport tourism can generate significant earnings to communities and residents. The concept of sport tourism has been perceived as guidance for the integration of tourism, sport and workforces in related industries. Moreover, the host city can extend the scope of events and developed itself into smart tourism city (Heebkhoksung et al., 2023). However, large-scale events face challenges in complexity management. As a result, the stakeholders in supply chain management have united to co-manage for the benefits of the industry and their companies. The action has developed the management practices that each member works together to ensure efficiency and effectiveness of the overall supply chain. In return, the members share the benefits from the cooperation in supply chain management (Black & Boal, 1994).

To date, there has been limited research focusing on supply chain management in sport tourism. Existing studies explored the supply chain only in either sport (Herold et al., 2020) or tourism (Piboonrungraj et al, 2009). In order to comprehend the new concept of supply

chain in sport tourism and sustainability, the Sustainability Balanced Scorecard (SBSC) was introduced. On the other hand, sustainable sport tourism has gained a significant role in organizing activities due to its benefits to effective operation of sport tourism, reduction of impact on the environment, enhancement of local value, and increasing opportunities in education and development. This research aims to establish sustainability for the benefits of the stakeholders in sport tourism, leading to positive impacts on both society and environment.

The concept of Balanced Scorecard or BSC assesses an organization from four different aspects: the financial perspective; internal process perspective; customer perspective; and growth perspective. BSC has been designed to “assess financial measures that show the past performance and include operational measures that drive the performance in the future with the intention to balance financial and non-financial measures”. BSC has been widely acceptable and implemented in businesses with the four following perspectives: 1) the financial perspective, which is important particularly for a for-profit organization because the financial perspective assesses whether the implemented strategies well-function and contribute to the bottom line; 2) the customer perspective measures the ability of an organization to respond to the needs of customers based on its value proposition; 3) the internal process perspective identifies

essential processes that deliver the expected value and drive the organization to achieve further successes; and 4) the learning and growth perspective that crucially impacts the future of an organization because it involves human resource management, data base, reward and punishment mechanism as well as corporate structure. The concept of human resource management has been founded with the underlying background that human resource is necessary to the achievement of an organization, assessed by skills, employees' satisfaction and turnover rate. Database is also included into the learning and growth perspective as it complements individual skills, enabling an organization to achieve its goals (Kaplan & Norton, 2005).

In addition to the four perspectives, sustainability has been introduced into the BSC as a concept for the development that considers limitation of natural resources, preservation and environmental rehabilitation while balancing the responses to human needs. The new concept is assessed by Sustainability Balanced Scorecard or SBSC (Figue et al., 2002).

Realizing the significance of SBSC in the assessment from sustainability perspective, the researchers conducted the study to explore appropriate factors in supply chain management in sport tourism by combining the concept of supply chain management in sport tourism with SBSC. The researchers study the variables by analyzing and compiling outcome variables to illustrate correlations

and identify the factors. The research aims to contribute to activity management, policy drafting and strategy implementation that directly impact the development of supply chain management in sport tourism.

2. Research objectives

1. To study the components of SBSC in the supply chain management in sport tourism
2. To study and conduct exploratory factor analysis in the supply chain management in sport tourism in Thailand.

3. Research hypothesis

Assessed by SBSC and exploratory factor analysis, the result on construct validity in the supply chain management in sport tourism aligns with the theoretical model.

4. Conceptual framework

To explore a topic of the study, the researchers conducted a systematic literature review to research other studies, including experimental research, descriptive research and qualitative research, as a reference and foundation to improve the research related to supply chain management in sport tourism. The systematic literature review consists of the three following stages.

1. Identification stage: to search for the data related to sustainability management in sport tourism, the researchers explored related literatures with keywords on “sport logistics”, “sport supply chain”, “tourism logistics”, “tourism supply chain”, “travel

logistics”, “travel supply chain”, “sport tourism supply chain”, “sport tourism logistics”, “sport tourism”, “tourism sport” and “sport tourist”. The researchers relied on Scopus and Web of Science (SSCI), then selected only the studies published during 2017 and 2021. To reduce bias, the researchers limited the keywords into only English; therefore, all non-English literatures were removed at this stage.

2. Screening stage: the remaining literature was screened by the preliminary

re-view. Irrelevant papers were removed at this stage.

3. Included stage: the papers were examined thoroughly to review the characteristics of the STSM. During this stage, criteria and indicators of the STSM model were derived.

The conceptual framework in Figure 1, shows the concepts, theories and related studies applied in the research.

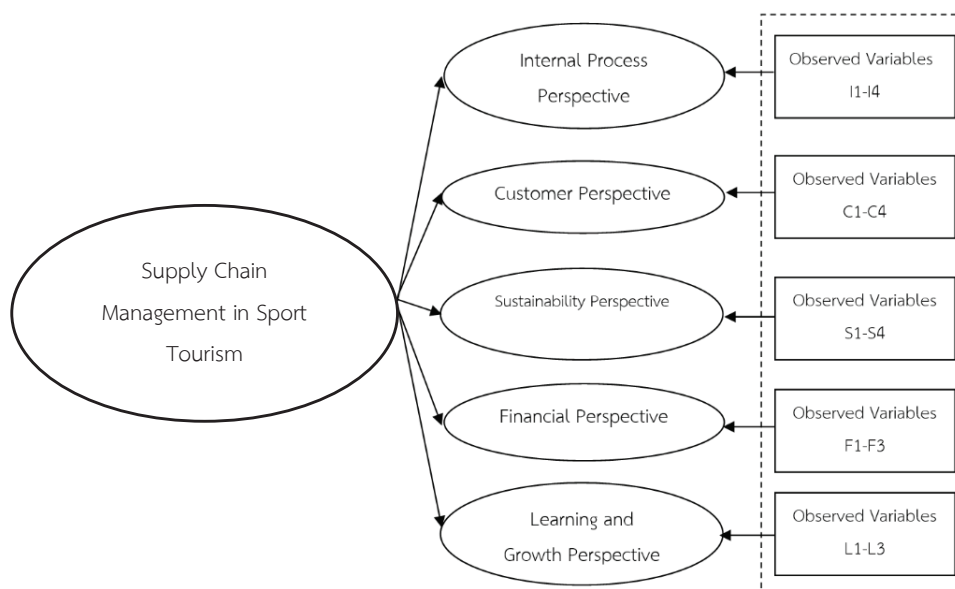


Figure 1 Conceptual framework

5. Literature reviews

5.1 Exploratory factor analysis

The concept of sport tourism was not clear, with varied definitions from studies to studies. Among them, one defined as a non-commercial journey to participate or observe a competition in distant proximity. Another definition was an act of people spending time

in a specific duration such as leisure time during holiday for sport or physical recreation. The other definition referred to any participation in sports, either as active or passive sport tourism, for a non-commercial or profit-generating purpose that leads to a movement from residences or workplaces (Hinch & Higham, 2001).

After the literature reviews, the researchers conducted exploratory factor analysis to explore and identify common factors in the observed variables because there was no explicit supporting theory on the correlations between factors and index scores. The exploratory factor analysis was conducted with the four following steps.

STEP 1: The researchers created the correlation matrix to analyze the absolute correlation matrix for each pair of variables. The acceptance criteria were 1) the correlation should not be zero, verified by the significance in Bartlett's test of Sphericity and 2) the Kaiser-Meyer-Olkin measure of sampling adequacy should be closer to one (Ritmak et al., 2023).

STEP 2: The researchers extracted the factors by conducting principal component analysis and common factor analysis, where the two methods were applied in the cases as follows.

1. Principal Component Analysis or PCA: PCA focused on linear correlations in variables. The components were linear combinations of the variables with the most explanatory power to total variance.

2. Common Factor Analysis or CA: CA could be further divided into five estimation methods: the principal axis factoring; unweighted least square; generalized least square; maximum likelihood method; alpha method; and image method (Kim, 2008). The five estimation methods did not fix the communality of one, rather they estimated

the coefficient of determination or R^2 of the target and other variables. In general, the R^2 would rarely be different after iterating the process of factor extraction.

STEP 3: Factor rotation was conducted to simplify the results obtained from factor extraction. The factors were then furthered compiled into a group or a component to obtain more simplified common factors. Factor rotation distinguished variables in a component with two types of transformation as described below.

1. Orthogonal Rotation: The rotation was performed with uncorrelated factors under three different methods: the varimax method; quartimax method; and equamax method (Holmes Finch, 2011).

2. Oblique Rotation: The rotation was performed with correlated factors with oblimin and promax (Heebkhoksung et al., 2023).

STEP 4: The researchers named the factors and variables for the purpose of communication by considering the variables in each factor.

1. A common factor was a factor consisting of at least two variables. The common factor refers to the absolute correlation or r of the factor. The factor with high correlation was considered to possess high impact in explanatory factor analysis (Browne, 2001).

2. Communality was a correlation coefficient from one variable to other variables with the value ranged from zero to one. Any variable with low correlation coefficient,

observed from the diagonal of the reproduced correlation matrix, were removed.

3. Factor loading was the correlation coefficient for a variable and a factor, with the acceptance criteria of 0.5 or above. A variable with high factor loading in any factor would be grouped into the factor. In SPSS program, factor loading could be found in a component matrix before factor rotation or the eigenvalues of a diagonal matrix (Browne, 2001).

4. Factor score was a composite score for each subject in each factor. It was calculated from factor loading and variables used as a component. The factor score of each component could partially correlate in case numbers of components existed in the study. In this study, a variable could appear in multiple components, depending on factor loading.

Eigenvalue was the total amount of variance for a given factor. In factor analysis, the factor with the largest eigenvalue would be firstly extracted as a common factor that has the most covariates (Joliffe & Morgan, 1992).

5.2 Supply chain management in sport tourism

The supply chain management in sport tourism is divided into four pillars: tourism logistics management; venue logistics management; participants logistics management; and equipment logistics management. Among the four pillars, venue logistics management aligns with the proposal of Herold et al. (2020).

5.3 Sustainability balanced scorecard

The concept of balanced scorecard or BSC was to assess the performance of an organization from four different aspects: the financial perspective; internal process perspective; customer perspective; and growth perspective. The BSC was designed to “assess financial measures that show the past performance and include operational measures that drive the performance in the future with the intention to balance financial and non-financial measures”. BSC has been widely accepted and applied in businesses with the key following details: 1) the financial perspective, particularly important for a for-profit organization because financial perspective assesses whether the implemented strategies are effective, contributing to the company’s bottom line; 2) the customer perspective that measures the ability of an organization to respond to the needs of its customers, delivering its value to each segment of customers; 3) the internal process perspective that identifies essential processes to deliver the value and drive the organization to achieve higher goals; and 4) the learning and growth perspective that crucially impacts the future of an organization because of its involvement in human resource management, data base, reward and punishment mechanisms as well as corporate structure. Driven by the thought that human resource is necessary to the achievement of an organization, skills, satisfaction and attitudes of employees, as well as the turnover rate, are constantly

assessed. Moreover, database is included in this perspective due to its function in complementing the skills of employees and driving an organization to achieve its goals (Kaplan & Norton, 2005).

In addition to the four perspectives, sustainability has been included in BSC when considering a development that recognizes limitation of natural resources, preservation and environment rehabilitation while responding to human needs. The new concept is known as Sustainability Balanced Scorecard or SBSC (Figge et al., 2002).

1. Internal process perspective: the internal process in both public and private organizations plays a significant role in enabling an organization to achieve its goal and sustainability. The perspective focuses on development and improvement of the internal process to increase efficiency and reduce losses to modify an operation in alignment with strategies (Kaplan, 1996).

2. Customer perspective: the customer perspective focuses on attracting and creating a positive impression of services to increase satisfaction and happiness for customers. This perspective relates to improving products or services in response to customer needs and fostering long-term contentment (Kaplan, 1996).

3. Sustainability perspective: the perspective supplements the balanced scorecard by combining social, environmental and economic dimensions of sustainability to measure performances with the goals and

objectives in sustainability. The concept includes indicators such as environmental impact, social responsibility, resource efficiency and participation of stakeholders (Epstein, 2001).

4. Learning and growth perspective: the capacity to learn and develop of an individual, an organization and a public entity lead to flexibility and innovation. This perspective highlights organizational adaptability and incubation of innovators to lead an organization (Kaplan, 1996).

5. Financial perspective: all organizations in the public and private sectors implement strategies and action plans to achieve their goals. Well-developed strategies lead to favorable performances, resulting in financial impacts and generating returns subsequently. This perspective aims to create financial stability, increase revenue, control costs, and generate value for an organization (Kaplan, 1996).

6. Methodology

This study implemented exploratory research to analyze the factors in the supply chain management in sport tourism with the following steps.

6.1 Population and sample

The population used in this research includes government agencies under the Ministry of Tourism and Sports, private businesses such as restaurants, hotels, and retail stores, as well as independent organizations and associations such as the

Thai Chamber of Commerce and professionals in sport tourism management, who were selected from the stakeholders in the supply chain management in sport tourism.

Based on the calculation, the sample size was determined from an infinite population using the formula by Roscoe (1975) with a minimum confidence level of 95 percent, and it was found that 384 individuals and the recommended size of the sample was 300 or above as it was considered suitable for conducting an Exploratory Factor Analysis (EFA), in accordance with Tabachnick and Fidell (2007). The sample size of 400 individuals was determined for use in the research.

6.2 Research instruments

To develop a questionnaire for the study of the factors in supply chain management in sport tourism, the researchers conducted literature reviews and designed the set of questions. Afterward, it was presented to three experts to assess content validity by using the Item-Objective congruence (IOC) index, where the acceptable IOC value was not less than 0.5 (Rovinelli & Hambleton, 1977). The range of IOC value from 0.67 to 1.00 allowed the researcher to treat the question set as a tool of study in this research. The researchers then assessed the questionnaire's quality and found a reliability coefficient of 0.913, meeting the criterion of not being lower than 0.7. The questionnaire, comprising of eighteen questions, was then designed with a five-point Likert scale (Salkind, 2010) and organized into five sections upon the perspectives:

1) Customer Perspective, 2) Internal Process Perspective, 3) Learning and Growth Perspective, 4) Financial Perspective, and 5) Sustainability Perspective (Epstein, 2001).

6.3 Data collection

The researcher gathered data from two sources as described below.

1. Primary data: the data were collected through a comprehensive questionnaire provided to the individuals engaging in sports tourism, totaling of 400 sets, representing 100 percent of the sample.

2. Secondary data: the researchers studied concepts and theories with information gathered from varieties of sources such as articles, theses, research reports and electronic documents.

6.4 Data analysis

To compile data, the researchers selected the samples from public authorities, independent organization/associations, businesses and the persons involving in the activities related to sport tourism management. After providing the questionnaire online, the researchers analyzed the completeness of the responses and analyzed the result with advanced statistical analysis software.

Factor analysis was conducted with the following steps.

STEP 1: the researchers identified problem statement and reviewed theoretical factors and variables. Afterwards, the researchers analyzed the data and selected the method of analysis suitable to the research objective.

STEP 2: the researchers gathered data through from the questionnaire.

STEP 3: the correlation matrix was developed.

STEP 4: the researchers conducted factor extraction to explore and identify the common factor of the observed variables.

STEP 5: promax rotation was selected as the method for factor rotation.

STEP 6: the researchers identified factor loading.

STEP 7: All factors were named for the purpose of communication.

7. Results

The results were summarized as follows.

From the responses by 400 samples, the mean and standard deviation of all eighteen variables were shown in Table 1.

The researchers verified data appropriateness by conducting factor analysis to assess the adequacy of correlations using the KMO and Bartlett's Test. In Table 2, the KMO of 0.845, which is close to 1, implies that the data and variables were highly correlated and adequate for the research. The Bartlett's Test showed that the relevant eighteen variables are sufficiently correlated to conduct factor analysis.

The communalities began from estimating initial communality from Principal Component Analysis. The initial communality showed whether the variable was appropriate when compared with other variables.

Table 1 Mean and Standard Deviation of All 18 Variables.

Factors Influencing Supply Chain Management in Sports Tourism.	Code	Mean	Std. Deviation	Reference
1. City Management	I1	3.82	0.90	(Myburgh et al., 2018, (Zarei et al., 2018), (Stoll et al., 2020), (Malchrowicz-Mośko et al., 2019)
2. Commitment of management team	I2	3.88	0.92	
3. Venue and logistics	I3	3.92	0.89	
4. IT management	I4	3.95	0.85	
5. Accommodation quality	C1	4.23	0.80	(Edensor et al., 2021), (Zarei et al., 2018)
6. Travellers' impression	C2	4.18	0.86	
7. Customer data management	C3	3.27	0.78	
8. Local Cooperation	C4	4.34	0.77	

Table 1 Mean and Standard Deviation of All 18 Variables. (Cont.)

Factors Influencing Supply Chain Management in Sports Tourism.	Code	Mean	Std. Deviation	Reference
9. Safety	S1	3.76	0.77	(Myburgh et al., 2018, (Stoll et al., 2020), (Hemmons-bey et al., 2021))
10. Environment and hygiene	S2	3.73	0.88	
11. Operation and management	S3	3.86	0.81	
12. Energy management	S4	3.79	0.79	
13. Knowledge management	L1	4.30	0.89	(Ahmad et al., 2019), (Uesugi & Kudo, 2020), (Lesjak et al., 2017),
14. Product and service	L2	4.31	0.84	
15. Tourism management	L3	4.25	0.83	
16. Cost management and quality assurance	F1	3.80	0.71	(Joksimovi et al., 2020), (Pookaiyadom, 2019),
17. Investment plan	F2	3.74	0.79	
18. Financial risk management	F3	4.05	0.82	

Table 2 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.84
Bartlett's Test of Sphericity	Approx. Chi-Square	5145.75
	df.	153
	Sig.	0.00

Table 3 Communalities

Variable	Initial	Extraction
L1	1.00	0.81
L2	1.00	0.70
L3	1.00	0.73
C1	1.00	0.69
C2	1.00	0.70
C3	1.00	0.72
C4	1.00	0.64
I1	1.00	0.81

Table 3 Communalities (Cont.)

Variable	Initial	Extraction
I2	1.00	0.81
I3	1.00	0.81
I4	1.00	0.74
S1	1.00	0.81
S2	1.00	0.64
S3	1.00	0.78
S4	1.00	0.73
F1	1.00	0.92
F2	1.00	0.88
F3	1.00	0.63

The total variance concluded five factors with the eigenvalue from 1.00 to 7.37 and the cumulative of variance of 75.77%. The explanatory power of the first factor to the fifth factor were 40.96%, 13.28%, 9.41%, 6.53% and 5.57% of the total variance respectively. Regarding the factor rotation, the researchers selected Principal Component Analysis with promax and found the factor loading was over 0.50 (Rafiq et al., 2021). Therefore, the factors were acceptable to be used as components, as shown in Table 4.

The value from the promax rotation equaled to the correlation coefficient between the variables and rotated factors. The variables

with high factor loading were described as follows. The first factor was the compilation of variables I1-I4, named as “Internal Process Perspective”. The second factor was the compilation of variables C1-C4, named as “Customer Perspective”. The third factor was the compilation of variables S1-S4, named as “Sustainability Perspective”. The fourth factor was the compilation of variables F1-F3, named as “Financial Perspective” and the fifth factor was a compilation of variables L1-L3, named as “Learning and Growth Perspective”. Therefore, the variables could be grouped into five factors and named as shown in Table 5

Table 4 Components from Exploratory Factor Analysis of the Supply Chain Management in Sport Tourism

Factor	Eigen Value	% Total Variance	Variable loaded to factor	Factor Loading
1. Internal Process Perspective (4 variables)	7.37	40.96	City development plan and operational monitor (I1)	0.90
			Commitment of management team (I2)	0.83
			Infrastructure on venue and transportation (I3)	0.84
			IT system management (I4)	0.95
2. Customer Perspective (4 variables)	2.39	13.28	Quality management of accommodation (C1)	0.74
			Interaction with travellers and customer relationship management (C2)	0.84
			Traveler data management (C3)	0.90
			collaboration and alliance among stakeholders (C4)	0.80
3. Sustainability Perspective (4 variables)	1.69	9.41	Safety operation (S1)	0.63
			Hygienic and environmental operation (S2)	0.66
			Economic Operation (S3)	0.97
			Energy related operation (S4)	0.89
4. Financial Perspective (3 variables)	1.17	6.53	Cost and quality management of products (F1)	0.90
			Investment budgeting (F2)	0.98
			Financial risk management (F3)	0.62
5. Learning and Growth Perspective (3 variables)	1.00	5.57	Inclusiveness from institutes and organization in knowledge development (L1)	0.92
			Product development and service management (L2)	0.79
			Tourism management team from community (L3)	0.84

Table 5 Factor categorization

Factor		No. of Variables
Factor 1	Internal Process Perspective	4
Factor 2	Customer Perspective	4
Factor 3	Sustainability Perspective	4
Factor 4	Financial Perspective	3
Factor 5	Learning and Growth Perspective	3
Total		18

8. Discussion and conclusions

Based on the analysis of the factors, it has been found that there are five factors with variables that impact the development of the supply chain management in sport tourism.

The first factor or internal process perspective consists of four variables, I1-I4, that impact efficiency and service capability, delivering impressive experiences to the participants.

The second factor, or customer perspective, consists of four variables, C1-C4, that build awareness and satisfaction among the participants. The satisfaction, in return, turns the participants into customers and increases the value in sport tourism in the long term.

The third factor or sustainability perspective consists of four variables, S1-S4, that lead to the success and sustainability of the activities. Environmental and social sustainability create value to locals and communities while enabling the participants to enjoy and connect each other.

The fourth factor, or financial perspective,

consists of three variables, F1-F3, that support an organization to appropriately adapt and respond to financial and market conditions. Efficiency and prudence are factors in financial management to maintain and deliver the success of supply chain management in sport tourism.

The fifth factor or learning and growth perspective consists of three variables, L1-L3, that are significantly important in supply chain management in sport tourism due to the necessity to respond to rapid change of conditions and requirements of the participants.

To benefit from the study, an organization can identify its strengths and weaknesses in the internal process, customer satisfaction, sustainability practices, financial effectiveness as well as learning process and the initiatives towards growth by assessing the variable in each factor. The factors can be used in decision making in sport tourism industry and strategy drafting to improve efficiency in the supply chain management. For example, a company can implement practices on

sustainability or invest more in learning and training systems to increase customer satisfaction. The analysis in the internal process can identify inefficiency or other causes that highly impact the performance. The insights can improve resource allocation and stimulate collaboration among stakeholders in the supply chain in sport tourism.

9. Recommendation

9.1 Recommendations for implementation

All five elements, comprising eighteen factors, can be utilized as criteria for selecting a sport city and involving relevant agencies from both public and private sectors. The

approach supports collaborative management by integrating the concepts of supply chain and SBSC for optimal efficiency.

9.2 Future research direction

The challenges on interpretation and comparison of the results from exploratory factor analysis to the results of other methods lead to the adoption of confirmatory factor analysis. Therefore, future research should conduct confirmatory analysis. Moreover, the researcher should conduct exploratory analysis to confirm suitability of the questionnaire in case any adjustment is made to the set of questions.

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