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# Evaluating the performance of tourism supply chain management of tourism companies from the perspective of customer experience

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***Keywords:*** tourism, supply chain, performance, tourism companies.
***Abstract:*** This paper examines the performance of tourism supply chain management (TSCM) in Southeast Vietnam, with a focus on customer experience. Based on Porter's value chain theory, the research divides the tourism process into four key stages: Successful Booking, Pre-traveling, On-traveling, and Post-traveling. Each stage is analyzed for its effect on customer satisfaction and service quality. The findings show that the On-traveling stage has the most significant influence on the overall travel experience, closely followed by the Successful Booking stage. These results highlight the importance of delivering high-quality services during the trip and ensuring a seamless booking process. To evaluate TSCM performance, a survey of 350 frequent travellers was conducted, using the Fuzzy Analytic Hierarchy Process (F-AHP) to assess various criteria, such as accommodation services, information accuracy, and destination attractiveness. The analysis revealed that the On-traveling stage (TRA = 0.4475) is the most crucial, followed by the Successful Booking stage (BO = 0.3408), Pre-traveling (PRE = 0.1365), and Post-traveling (POST = 0.0752). Key factors influencing customer satisfaction include accommodation services (TRA2 = 0.1667) and information accuracy (BO1 = 0.1642). The study emphasizes the need for accurate information throughout the customer journey and improved post-trip interactions to build loyalty. By providing a two-tiered evaluation framework, the research offers theoretical and practical insights for tourism managers to enhance service delivery and customer satisfaction, serving as a foundation for future research on TSCM performance.

## 1 Introduction

Today, the service industry has rapidly become one of the key sectors of the global economy. The most intense competitive activities in the world are taking place mainly within this sector. Over the past few years, the service industry has experienced significant growth, especially in developing countries. The service sector not only plays an important role but is also a major driver of economic growth in many countries [1]. Within the current service sector, tourism is considered a vast field that encompasses various economic industries such as transportation services, restaurants, hotels, handicrafts, and tourist destinations. This makes ensuring service quality in the tourism industry more complex than in other service sectors. Companies in the aforementioned industries are regarded as the supply chains of the tourism industry and also the supply chains of tourism companies. Only when the links in the supply chain operate efficiently and quality is ensured can competitiveness and profitability be enhanced. The competition among companies in the service sector is fierce, and their success or failure depends on their supply chains [2]. Although the domestic tourism industry was heavily impacted by the COVID-19 pandemic in 2020 and 2021, it has positively recovered post-pandemic, especially in domestic tourism. Additionally, the achievements recognized by global awards (such as the World Travel Awards) affirm the continued significance of tourism within Vietnam's economy and globally. Tourism supply chain management is a relatively new field in Vietnam, yet it plays a crucial role in the industry's development. The components of the tourism service supply chain include First-tier suppliers, second-tier suppliers, tourism companies (tour operators), travel agents, and customers [3]. The primary goal of tourism supply chain management is to satisfy tourists through both the products and services they receive. Tourist satisfaction can be viewed from two perspectives, overall satisfaction with tourism products and satisfaction with individual service aspects provided. Measuring the service supply chain involves evaluating the stages of booking-pre-traveling-on-traveling-post-service delivery [4] and measuring according to service management processes [1]. To measure supply chain management performance, managers need to understand their type of supply chain and know how to apply performance measurement methods. Several methods and techniques for measuring supply chain management performance have been systematized through research, including Process-based approaches, the

Balanced Scorecard (BSC) method [5], and the Supply Chain Operations Reference (SCOR) model; hierarchy-based approaches, simulation techniques including the Analytic Hierarchy Process (AHP) [6], and Data Envelopment Analysis (DEA). Additionally, some studies are based on the TOPSIS model (Technique for Order Preference by Similarity to Ideal Situation) [7], the TOPSIS model combined with Fuzzy Logic [8-10]. Each approach offers a distinct perspective depending on the researchers' viewpoints.

## 2 Literature review

The main focus of the supply chain in the tourism industry is customer satisfaction. Many companies have failed to fully exploit the potential of their supply chains because they have not yet found the solutions and necessary metrics to integrate into a complete supply chain. Meanwhile, current research on supply chain performance metrics tends to focus internally and does not extend across the various supply chain members. Most measurement frameworks have been developed based on the characteristics of the service industry. Services have distinct features such as intangibility, inseparability, heterogeneity, and perishability [11]. Based on these characteristics, Baltacioglu et al. [12] and Ellram et al. [13] began developing research models for the service industry supply chain. In their research, the core processes that need to be controlled in the service industry include six processes, Information and technology management, demand management, capacity and resource management, supplier relationship management, service operation management, and financial management. Measuring the performance of a company's supply chain management aims to engage all members of the supply chain and achieve their objectives, such as improving service quality, enhancing financial efficiency, and increasing customer satisfaction across the entire supply chain. Although foundational theories exist, research on measuring service supply chain management performance, especially in tourism, remains limited compared to studies in manufacturing industries. The evaluation criteria from previous studies primarily focus on assessing the performance of industrial supply chains. Some prominent studies on service industry supply chain management frameworks include works by Rio et al. [4], Zhang et al. [14], Dawei [15], Ţigu & Călăreţu [16], Palang & Tippayawong [17], Joshi, Sharma, & Keller [18], Nagariya et al. [19], Yang [20], and Heebkhoksung [21]. Porter [22] was the first to introduce the concept of the "value chain", stating that each company comprises a series of activities performed to design, produce, market, distribute, and support its products. Building on this concept, the tourism value chain has been developed by various authors such as Rio et al. [4], Romero & Tejada [23], Song et al. [24], and Yilmaz & Bititci [25], who have constructed frameworks for evaluating tourism SCM performance. In terms of analytical techniques, these studies have developed performance evaluation scales for service and tourism supply chain management using techniques such as AHP, Fuzzy-AHP, TOPSIS, AHP-TOPSIS, F-AHP, IPA, SCOR, and Delphi. However, these studies are limited in several aspects, such as stopping at supplementing the theoretical framework without empirical validation [2,14], and not adequately covering and representing the survey subjects [4,17,18]. Furthermore, in Vietnam, there is currently no research on developing a performance evaluation scale for tourism supply chain management. Therefore, it is necessary to design and develop a comprehensive tourism supply chain management performance evaluation scale based on surveys of managers and tourists with appropriate criteria. From these observations, it is evident that an extensive study on evaluating tourism supply chain management is needed, with full representation of survey subjects and suitable techniques for the research. Currently, there are very few studies measuring the performance of the tourism industry, particularly the tourism supply chain. To build a performance measurement scale for the tourism supply chain, it is essential to develop a tourism supply chain performance scale from the customer's perspective. They are the ones who directly interact with services provided by supply chain members such as transportation, accommodation, restaurants, and other activities. Measuring performance from the customer's perspective will provide clearer insights into service quality, customer satisfaction, meeting needs, and the reliability of partners within the tourism supply chain. Southeast Vietnam has 6 out of 8 provinces/cities belonging to the key economic region of southern Vietnam, including Ho Chi Minh City and the provinces of Ba Ria - Vung Tau, Dong Nai, Binh Duong, Binh Phuoc, and Tay Ninh. This is a dynamic economic region leading the process of industrialization and modernization in the country. Not only leading in these two areas, but the service sector here is also equally vibrant especially tourism. For these reasons, the author has chosen Southeast Vietnam to develop criteria for evaluating the performance of tourism supply chain management of tourism companies in this region through customer surveys.

Given the urgency and practical importance of this issue, the author decided to select the topic "Evaluating the Performance of Tourism Supply Chain Management of Tourism Companies in Southeast Vietnam from the Perspective of Customer Experience". Based on Porter's [22] "value chain" theory and the conceptual framework for measuring tourism SCM performance by Rio et al. [4,9] and Yilmaz & Bititci [25], the author develops the research hypothesis, which includes four main criteria (Level 1), Successful Booking Stage, Pre-traveling Stage, On-traveling Stage, and Post-traveling Stage. These are further expanded into sub-criteria (Level 2) under each of the four stages in Level 1 as follows: Successful Booking Stage, Accuracy of Information; Flexible Booking Cycle Time; Complaint-free Booking Service; Service flexibility; Pre-

traveling Stage, Information security; Pre-departure agreements; Accuracy of Information at Destination; On-traveling Stage, Transportation services; Accommodation services; Services of the travel company/travel agent; Destination attractiveness; Resource utilization efficiency; Support from the local community; Post-traveling Stage, Customer satisfaction survey; Customer feedback; Financial performance. To achieve the research objectives, the research team applied the Fuzzy Analytic Hierarchy Process (F-AHP) to evaluate the weights of the factors affecting the tourism supply chain management performance of tourism companies from the customer's perspective. By interviewing 12 experts using the Delphi method, the author eliminated 3 criteria, leaving 13 criteria to proceed with the subsequent research steps (Figure 1).

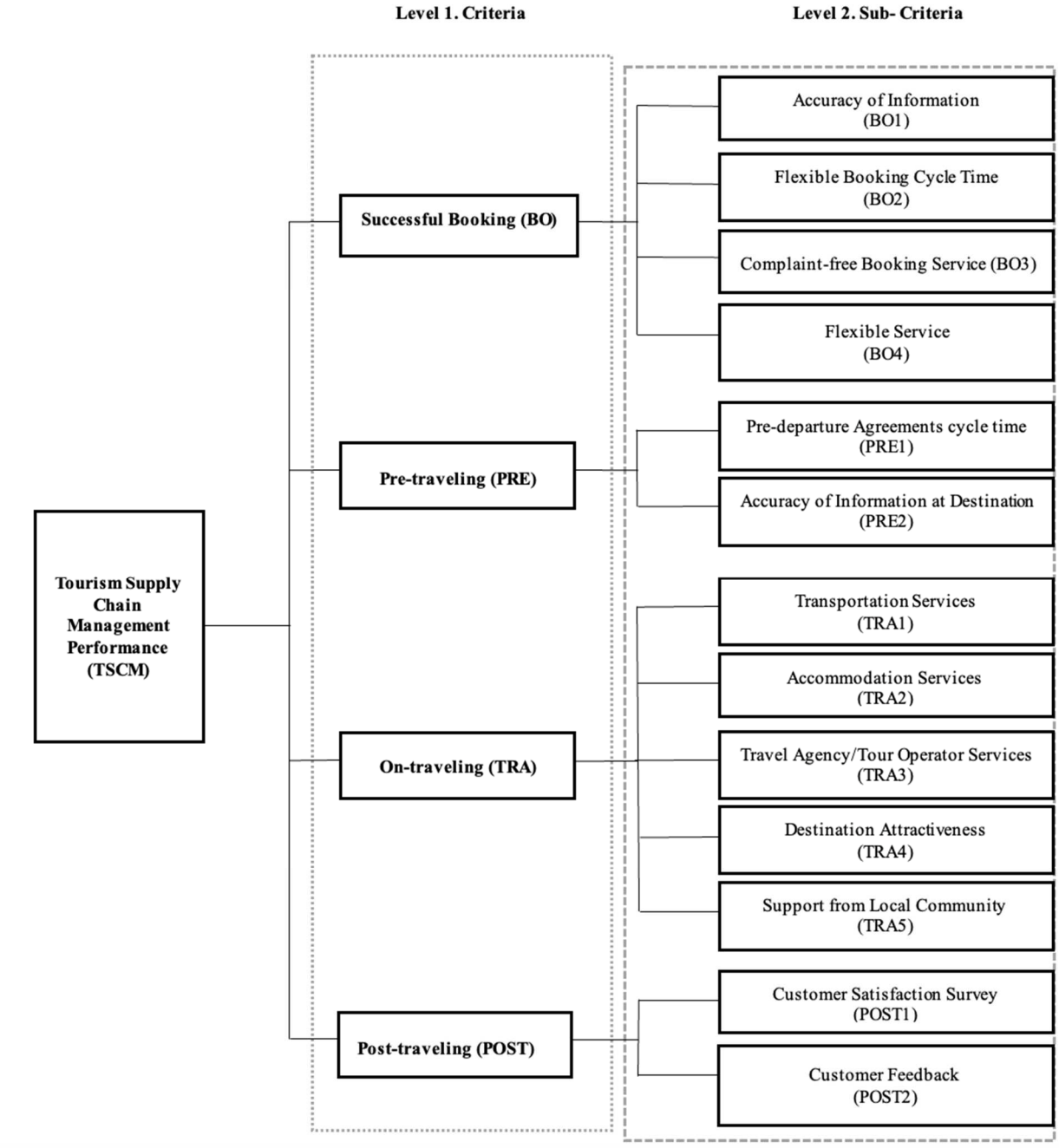


*Figure 1 Hierarchical structure model for evaluating supply chain management performance*

# 3 Methodology

## *3.1 Sampling method*

Before conducting the tourist survey, the author performed a preliminary study with 16 experts to confirm that the consistency ratio met the required standards. The research team then employed the Comrey & Lee method [26] to gather 400 data points. After a thorough screening and verification process, 350 valid samples were selected for analysis. As detailed in Table 1, the gender distribution of these samples was as follows: 126 males (36.00%), 216 females (61.71%), and 8 respondents who chose not to disclose their gender (2.29%). This sample size of 350 is categorized as 'good' according to the evaluation scale, which ensures high reliability and accuracy in data analysis, particularly when utilizing complex analytical methods such as the Fuzzy Analytic Hierarchy Process (F-AHP).

*Table 1 Demographic statistics*

| Category | Frequency | Percentage (%) |
|---|---|---|
| Gender | **350** | **100** |
| Male | 126 | 36.00 |
| Female | 216 | 61.71 |
| N/A | 8 | 2.29 |
| **Field of Occupation** | **350** | **100** |
| Logistics and Supply Chain Management | 93 | 26.57 |
| Travel and Tourism | 87 | 24.86 |
| Business and Management | 44 | 12.57 |
| Education and Training | 41 | 11.71 |
| Information Technology | 24 | 6.86 |
| Communication and Marketing | 33 | 9.43 |
| Healthcare and Medical Services | 16 | 4.57 |
| Others | 12 | 3.43 |
| **Age** | **350** | **100** |
| 20-29 | 49 | 14 |
| 30-39 | 81 | 23.14 |
| 39-40 | 97 | 27.71 |
| 40-49 | 67 | 19.14 |
| Trên 50 | 45 | 12.86 |
| N/A | 11 | 3.14 |
| **Nationality** | **350** | **100** |
| Domestic | 287 | 82 |
| International | 63 | 18 |

## *3.2 Data processing method*

In this study, the author employs the Fuzzy Analytic Hierarchy Process (FAHP) to measure the weights of factors influencing the performance of tourism supply chain management from the customer's perspective. The AHP method is based on the Analytic Hierarchy Process (AHP) framework, which is one of the most widely used methods in multi-criteria decision-making across fields such as management, business, and engineering, where decisions must be made based on various factors, evaluating the priority levels among criteria, and choosing between different options [6] (Saaty, 1980). However, a limitation of the AHP method is that the judgments of respondents are often uncertain, vague, and may not fully represent the actual assessments [27, 28]. To overcome this limitation, the Fuzzy Analytic Hierarchy Process was developed by combining Saaty's AHP [6] with Zadeh's fuzzy theory [29]. Fuzzy set theory, introduced by Zadeh, provides the basic concepts and definitions related to fuzzy sets, extending traditional mathematical concepts to address ambiguous situations in reality. A fuzzy set is characterized by a membership function, which determines the degree of membership of an element in the fuzzy set with a value ranging from 0 to 1.

$$\forall x \in X, \mu_A(x) = \begin{cases} 1 \; if \; x \in A \\ 0 \; if \; x \notin A \end{cases}$$

A fuzzy set can be defined as follows, Let X be a set of elements. A fuzzy set is a set represented as a membership function μA(x), which indicates the degree of membership in set A. If μA(x) = 0 it means the element does not belong to set A at all, whereas if μA(x)=1 it means the element fully belongs to set A.

Based on this concept, the FAHP method has been applied in previous case studies in the fields of tourism management and tourism supply chain management. The FAHP analysis process includes the following steps:

*Step 1: Constructing the hierarchical structure.*

Based on the proposed supply chain management performance measurement framework the author develops a hierarchical structure for evaluating the supply chain management performance of tourism companies in Southeast Vietnam (1), (2), (3).

$$A(k) = [a_{ij}^k] \quad (1)$$

$$\boldsymbol{a_{ji}^k = \frac{1}{a_{ij}^k}} \quad (2)$$

$$A^{(k)} = \begin{bmatrix} a_{11} & a_{12} & a_{1n} \\ a_{21} & a_{22} & a_{2n} \\ \vdots & \vdots & \vdots \\ a_{n1} & a_{n2} & a_{nn} \end{bmatrix} \quad (3)$$

Let *n* be the number of main (or sub) factors included in the research model. Based on the formula nC2 (the combination of n elements taken 2 at a time), the pairs of factors for comparison will be established. Here, a(k)ij

represents the evaluation score of the expert regarding the comparison of the factor in row i with the factor in column j, where k. The evaluation score in the lower triangular matrix below the diagonal is the reciprocal of the evaluation score in the upper triangular matrix above the diagonal.

*Step 2: Designing the survey questionnaire (Table 2).*

*Table 2 Survey questionnaire for triangular fuzzy AHP scale [6]*

| Intensity of importance | Linguistic Definition | Fuzzy Triangular Numbers |
|---|---|---|
| 1 | Equal importance | (1,1,1) |
| 3 | Weak importance of one over the other | (2,3,4) |
| 5 | Strong importance | (4,5,6) |
| 7 | Very strong importance | (6,7,8) |
| 9 | Absolute importance | (9,9,9) |
| 2,4,6,8 | Intermediate scales | (1,2,3) (3,4,5) (5,6,7) (7,8,9) |

*Step 3: Triangular fuzzy AHP scale and establishing the fuzzy symmetric matrix.*

In this step, a fuzzy symmetric matrix is established based on the theory of triangular fuzzy numbers (Figure 2). Accordingly, a triangular fuzzy number has three values: the smallest value ($l_{ij}$), the median value ($m_{ij}$), and the largest value ($u_{ij}$).

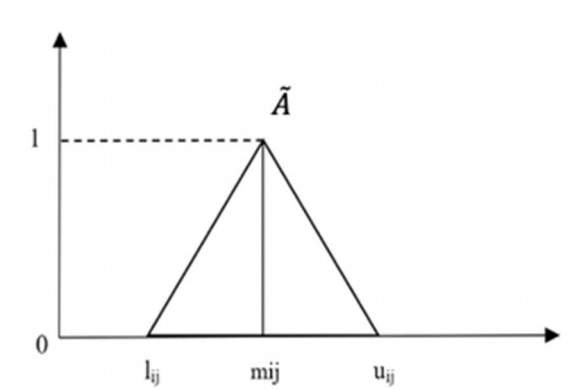


*Figure 2 Triangular fuzzy number [29]*

$$\tilde{A}^{(k)} = [\tilde{a}_{ij}^{k}] = \begin{bmatrix} \tilde{a}_{11l}\tilde{a}_{11m}\tilde{a}_{11u} & \tilde{a}_{12l}\tilde{a}_{12m}\tilde{a}_{12u} & \tilde{a}_{1nl}\tilde{a}_{1nm}\tilde{a}_{1nu} \\ \tilde{a}_{21l}\tilde{a}_{21m}\tilde{a}_{21u} & \tilde{a}_{22l}\tilde{a}_{22m}\tilde{a}_{22u} & \tilde{a}_{2nl}\tilde{a}_{2nm}\tilde{a}_{2nu} \\ \tilde{a}_{n1l}\tilde{a}_{n1m}\tilde{a}_{n1u} & \tilde{a}_{n2l}\tilde{a}_{n2m}\tilde{a}_{n2u} & \tilde{a}_{nnl}\tilde{a}_{nnm}\tilde{a}_{nnu} \end{bmatrix} \quad (4)$$

$$\tilde{a}_{ij}^{k} = \begin{cases} if\ i > j\ , & [l_{ij}, m_{ij}, u_{ij}] \\ if\ i = j, & [1,1,1] \\ if\ i < j, & \left[\frac{1}{l_{ij}}, \frac{1}{m_{ij}}, \frac{1}{u_{ij}}\right] \end{cases} \quad (5)$$

*Step 4: Consistency check.*

When comparing pairs of factors in the multi-criteria decision-making matrix, it is easy to encounter inconsistencies in responses. To address this limitation, Saaty (1980) introduced a consistency ratio (CR < 10%) to ensure consistency in the evaluation process.

First, defuzzification must be performed (4), according to formula (5)

$$A_{crisp} = \frac{l+4m+u}{6} \quad (6)$$

for each triangular fuzzy number $\tilde{A}$ (6)

$$W_{ij} = \frac{a_{ji}^{k}}{\sum_{ij=1}^{n} a_{ji}^{k}} \quad (7)$$

where *n* is the number of factors

Based on the normalized relative weights $W_{ij}$ (7), the official normalized weight $W_i$ (8) of the i, the factor can be calculated, which is the average value across all rows j for i the factor. Subsequently, the matrix X represents the total weighted (9).

$$W_i = \frac{\sum_{ij=1}^{n} W_{ij}}{n} \quad (8)$$

*n* is the number of elements;

$$X = AW \quad (9)$$

Next, the maximum eigenvalue $\lambda_{max}$ is the average of the $\lambda$ values (10), (11):

$$AW = \lambda\ W_i \text{ so } \lambda = \frac{AW}{W_i} \text{ hay } \lambda = \frac{X}{W_i} \quad (10)$$

$$\lambda_{max} = \frac{\sum_{i=1}^{n} \lambda}{n} \quad (11)$$

Consistency Index (12):

$$CI=\frac{\lambda_{max}-n}{n-1} \quad (12)$$

Finally, to achieve consistency in the survey process, the consistency ratio (CR) (13) must be less than 10%. The formula for calculating CR is as follows:

$$CR=\frac{CI}{RI} \text{ (CR<10\%)} \quad (13)$$

RI is the random index (standard) based on the number of evaluation factors according to the following table (Table 3):

*Table 3 Random Index corresponding to the number of factors (RI) [6]*

| n | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| RI | 0 | 0 | 0.58 | 0.9 | 1.12 | 1.24 | 1.32 | 1.41 | 1.45 | 1.49 |

*Step 5: Calculating and normalizing the weights of the factors.*

From the fuzzy matrix, the author proceeds to normalize using the row geometric mean method (14).

$$\tilde{r}_i = \left(\prod_{j=1}^{n} \tilde{a}_{ij}\right)^{1/n}=\left[\left(\prod_{j=1}^{n} l_{ij}\right)^{1/n}, \left(\prod_{j=1}^{n} m_{ij}\right)^{1/n}, \left(\prod_{j=1}^{n} u_{ij}\right)^{1/n}\right], \text{ i= 1,2,3,...,n.} \quad (14)$$

From there, the relative fuzzy weights can be calculated (15).

$$\tilde{w}_i = \tilde{r}_i \times (\tilde{r}_1+\tilde{r}_2+\tilde{r}_3+...+\tilde{r}_n)^{-1} = (lw_i, mw_i, uw_i) \quad (15)$$

Next, the defuzzified weight M (16) will be calculated using the following formula.

$$M_i=\frac{lw_i+mw_i+uw_i}{3} \quad (16)$$

Finally, the normalized weight N (17) is calculated using the following formula.

$$N_i=\frac{M_i}{\sum_{i=1}^{n} M_i} \quad (17)$$

# 4 Results and discussion

## *4.1 Results*

### 4.1.1 Check the consistency of the evaluation process

To check the consistency of the survey data, the first step is to denazify the survey results. The scores in the comparison matrix (Table 4) are taken from the average survey scores of 350 customers. Then, the matrix is defuzzified using formula (5), and formula (6) is used to calculate the relative normalized weights ($W_{ij}$) of the criteria. Next, formula (7) is used to calculate the official weights ($W_i$), and matrix X (8). Finally, the eigenvalue λ is calculated using formula (9) (Table 5). This process is repeated for the remaining comparison matrices.

After calculating the eigenvalue, the author uses formula (10) to calculate the maximum eigenvalue ($\lambda$max) of the factors. Based on the number of criteria in each comparison matrix (or supply chain stage), the random index (RI) is determined. The consistency index (CI) and consistency ratio (CR) are calculated using formulas (11) and (12). The results are presented in Table 4.

*Table 4 Consistency in the Evaluation Process*

| | **Criteria (n)** | **Random Index (RI)** | **$\lambda_{max}$** | **Consistency Index (CI)** | **Consistency ratio (CR)** | **(CR<0.1)** |
|---|---|---|---|---|---|---|
| **TSCMP** | 4 | 0.9 | 4.1665 | 0.0555 | 0.0617 | Accept |
| **BO** | 4 | 0.9 | 4.2387 | 0.0796 | 0.0884 | Accept |
| **PRE** | 2 | 0.0 | 2.0071 | 0.0071 | - | Accept |
| **TRA** | 5 | 1.12 | 5.2664 | 0.0666 | 0.0595 | Accept |
| **POST** | 2 | 0.0 | 2.0126 | 0.0126 | - | Accept |

### 4.1.2 Calculate the weights of the criteria

Based on the results of the comparison matrix (TSCM, BO, PRE, TRA, POST), from Table 4, normalization is performed using the row geometric mean method (13), and the fuzzy weights are calculated (14). Then, the defuzzified weight $M_i$ is calculated using formula (15), and the normalized weight is calculated (16).

The table 5 summarizing the performance evaluation results of tourism supply chain management highlights the significance of each stage in the customer journey, including the Successful Booking Stage, Pre-traveling Stage, On-traveling Stage, and Post-traveling Stage. Each criterion is assigned a weight (Ni), reflecting its importance in the evaluation process. Within each stage, sub-criteria are listed alongside their local weights (indicating their contribution within the stage) and global weights (showing their overall impact), along with the ranking of each sub-criterion. This structure helps identify areas for improvement. For instance, "Accuracy of Information at Destination (PRE2)" has the highest global weight (0.0707) and ranks 6th, indicating its critical role in customer satisfaction. Conversely, "Complaint-free Booking Service (BO3)" holds the lowest global weight (0.0339) and ranks 12th, suggesting significant

improvements are needed to enhance customer experience during the booking phase. Overall, the evaluation table provides a comprehensive overview of performance and highlights priority areas for improvement in tourism supply chain management.

*Table 5 Results of the Tourism Supply Chain Management Performance Evaluation*

| Criteria | Weight ($N_i$) | Sub-Criteria | Local Weights | Global Weights | Rank |
|---|---|---|---|---|---|
| **Successful Booking Stage (BO)** | 0.3408 | Accuracy of Information (BO1) | 0.4818 | 0.1642 | 2 |
| | | Flexible Booking Cycle Time (BO2) | 0.1950 | 0.0665 | 7 |
| | | Complaint-free Booking Service (BO3) | 0.0994 | 0.0339 | 12 |
| | | Service flexibility (BO4) | 0.2238 | 0.0763 | 4 |
| **Pre-traveling Stage (PRE)** | 0.1365 | Pre-departure agreements (PRE1) | 0.4818 | 0.0658 | 8 |
| | | Accuracy of Information at Destination (PRE2) | 0.5182 | 0.0707 | 6 |
| **On-traveling Stage (TRA)** | 0.4475 | Transportation services (TRA1) | 0.1397 | 0.0625 | 9 |
| | | Accommodation services (TRA2) | 0.3725 | 0.1667 | 1 |
| | | Services of the travel company/travel agent (TRA3) | 0.1646 | 0.0737 | 5 |
| | | Destination attractiveness (TRA4) | 0.2401 | 0.1074 | 3 |
| | | Support from the local community (TRA5) | 0.0831 | 0.0372 | 11 |
| **Post-traveling Stage (POST)** | 0.0752 | Customer satisfaction survey (POST1) | 0.3827 | 0.0288 | 13 |
| | | Customer feedback (POST2) | 0.6173 | 0.0464 | 10 |

### *4.2 Discussion*

Based on the weighted results of the criteria in the evaluation scale for tourism supply chain management from the customer's perspective, the findings indicate that among the four stages of the tourism supply chain, the "On-traveling Stage" phase is considered the most crucial by customers when experiencing services (TRA=0.4475). This stage significantly influences the overall travel experience that tourists undergo. The "On-traveling Stage" is when tourists directly interact with tourism services and products, including hotels, restaurants, attractions, and entertainment activities. This phase creates a powerful first impression on tourists and profoundly impacts the image of the destination and related services. Following this is the "Successful Booking stage" (BO=0.3408), the "Pre-traveling Stage" (PRE=0.1365), and finally the "Post-traveling Stage" (POST=0.0752), which has the lowest weight, indicating that the connection between the customer and the travel company tends to end after the trip, significantly affecting the improvement of tourism supply chain management outcomes. Travel companies should take measures to enhance post-trip customer interaction to gather feedback and suggestions and to create lasting memories for the customers. This approach increases marketing effectiveness and the likelihood of customers returning for future trips. Advertising stories from customers' memories during the trip serve as one of the most cost-effective marketing tools [30]. Today's younger generation of tourists tends to be interested in cultural lifestyles and practical experiences throughout their travels. Additionally, they often share their travel experiences on social media, indirectly introducing them to a broader audience [31]. Therefore, tourism service providers should minimize this gap to maximize the benefits of marketing.

In the "Successful Booking stage (BO)", the criterion "Accuracy of Information (BO1)" plays the most important role, with a weight of 0.4818, ranking second overall among the evaluated criteria with a proportion of 0.1642. This reflects the importance of providing accurate information to tourists in Vietnam. Nowadays, tourists tend to search for and confirm information multiple times before making a trip. They require clear and detailed information about booking services, prices, cancellation conditions, and additional services like meals, transportation, or entertainment activities. Ensuring the accuracy and transparency of information during this phase not only helps customers make quick decisions but also builds trust and enhances their satisfaction with the company's services. When customers receive full and accurate information, they are more likely to trust the service, leading to a higher likelihood of booking and an overall better experience. On the other hand, "Complaint-free Booking Service (BO4)" is less of a concern, as if a service provider ensures accurate information, the occurrence of complaints naturally becomes less frequent. This flexibility contributes significantly to retaining customers and enhancing their positive experience from the early stages of the travel process. Based on this result, tour providers should focus on accurate information handling to minimize complaints, enhance customer satisfaction, and optimize supply chain operations.

In the "Pre-traveling Stage (PRE)", the criterion "Accuracy of Information at Destination (PRE2)" has an overall weight of 0.0707, ranking sixth in the overall evaluation. This weight highlights the importance of providing detailed and reliable information about the destination. Modern tourists are highly concerned about factors such as local culture, weather conditions, entertainment activities, and available services at the destination. Providing accurate information not only helps customers better plan their trip but also creates peace of mind and positive expectations for the upcoming experience. Pre-departure agreements (PRE1) also carry a significant weight of 0.0658, nearly equivalent to the other criterion, indicating that preparation and execution of pre-departure procedures remain critical factors in travel decisions. This includes handling necessary paperwork such as visas, pre-booking services, and activities, as well as packing and other personal preparations. Moreover, tourists, especially in the post-COVID-19 era, are very concerned about safety measures, hygiene, and health conditions at the destination, as well as special weather conditions, etc. Providing accurate information not only reassures customers but also helps them better plan their trip. Thorough preparation before departure makes customers feel more confident and minimizes worries about potential issues during the trip. Customers often feel uncomfortable when the trip lacks a specific itinerary and they have to find information on-site [32].

The "On-traveling Stage- (TRA)" holds the highest weight, making it the most critical stage in determining the outcomes of tourism supply chain management. "Accommodation services (TRA2)" hold the highest weight during this phase at 0.3725 and rank the highest overall at 0.1667. This emphasizes the importance of accommodation services to tourists in Vietnam. A good accommodation facility contributes to a pleasant holiday experience, while poor accommodation can significantly diminish the quality of the trip. This is also the stage where customers spend the most time during the entire travel process. Accommodation services can include additional amenities such as dining, room service, and other supplementary services. This importance was also highlighted in previous research by [33]. Following this is "Destination attractiveness (TRA4)", which ranks second in the "On-traveling Stage- (TRA)" with a weight of 0.2401 and third overall at 0.1074. Factors such as beautiful landscapes, famous attractions, diverse entertainment activities, and unique cultures all play important roles in the tourism supply chain. Destination attractiveness is one of the key factors in a tourist's travel decision. An attractive destination not only enhances the value and enjoyment of the trip but also significantly contributes to building the reputation and appeal of tourism services. Conversely, "Support from the local community-TRA5" weighs 0.0831, the lowest in the "On-traveling Stage- (TRA)", possibly due to the type of tourism and customer needs (sightseeing, leisure, or co-creation experiences at the destination, etc.). Therefore, interaction with locals during the trip may be limited, and the likelihood of objective risks requiring local community support is also low.

Finally, the "Post-traveling Stage- (POST)" is the least emphasized stage. The criterion "Customer feedback-(POST2)" is of particular interest to customers, with a weight of 0.6173, providing deeper insights into the tourist experience. Collecting feedback contributes to making customers feel more valued and makes it easier to assess the actual and practical limitations of the tourism supply chain compared to traditional customer satisfaction surveys. This also yields high effectiveness in marketing activities. For instance, establishing a feedback collection and sharing system contributes significantly to marketing efforts through word-of-mouth promotion of the trip experience to others.

## 5 Conclusions

In conclusion, this study highlights the critical importance of tourism supply chain management (TSCM) in improving customer satisfaction and service quality within Southeast Vietnam's tourism industry. Grounded in Porter's value chain theory, the research identified four key stages of the tourism process: Successful Booking, Pre-traveling, On-traveling, and Post-traveling. Notably, the On-traveling stage was found to be the most impactful (TRA = 0.4475), as it directly shapes the tourists' overall experience through services such as accommodations, transportation, and destination attractions. This underscores the necessity of maintaining high service quality in these areas to enhance customer satisfaction and foster repeat business.

The study also underscored the importance of accurate information throughout all stages, with the Successful Booking stage (BO = 0.3408) ranking second in significance. The accuracy of booking information (BO1 = 0.4818) was particularly crucial, as modern travelers demand precise details regarding services, prices, and terms to make informed decisions. Meeting these expectations builds trust, reduces complaints, and improves the overall travel experience.

While the Pre-traveling stage (PRE = 0.1365) ranked lower, the provision of clear and reliable destination information was still essential in managing customer expectations and ensuring smooth trip planning. The Post-traveling stage (POST = 0.0752) had the least influence, indicating a common lack of post-trip engagement by companies. However, improving post-travel interactions—such as soliciting feedback and reinforcing positive travel memories—could significantly boost customer loyalty and drive word-of-mouth marketing, particularly valuable in today's social media era.

The Fuzzy Analytic Hierarchy Process (F-AHP) was effectively employed to assess TSCM performance, providing a weighted, criteria-based framework for evaluation. Among the secondary criteria, accommodation

services (TRA2 = 0.1667), booking accuracy (BO1 = 0.1642), and destination attractiveness (TRA4 = 0.1074) emerged as the most influential factors, further emphasizing the critical role of service quality during the On-traveling stage.

Furthermore, the study calls attention to the importance of post-travel engagement by utilizing customer feedback to gain deeper insights into service quality and supply chain performance. Establishing robust feedback systems not only fosters customer appreciation but also enhances marketing efforts through shared customer experiences.

This research fills a significant gap in the relatively sparse literature on tourism supply chain performance in Vietnam, offering practical guidelines for tourism managers to enhance service delivery, streamline operations, and prioritize customer satisfaction across all stages of the supply chain. By adopting these recommendations, tourism enterprises in Southeast Vietnam can improve their competitiveness, ensure sustainable growth, and build a foundation for future research in TSCM performance.

The evaluation criteria and scale developed in this study are valuable tools for tourism enterprises to optimize supply chain management, enhance service quality, and create exceptional travel experiences. By applying the managerial insights derived from these criteria, businesses can strengthen their competitive edge, achieve sustainable development, and ensure long-term success in the rapidly growing tourism sector. However, this study has some limitations. First, the evaluation survey was conducted from the customer's perspective, which, while useful for decision-making, lacks the comprehensive scale needed from a managerial viewpoint within the supply chain. Second, the Fuzzy AHP method, still relatively new in Vietnam, led to some respondent hesitation despite the author's efforts to clarify the questions during interviews. Lastly, due to geographical constraints, the study's measurement criteria were confined to the Southeast region, limiting the generalizability of the findings. Future research will aim to develop evaluation scales for various stakeholders and expand the survey to cover a broader geographical area.

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