

Reviews on interrelationship between transportation and tourism: Perspective on sustainability of urban tourism development

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Abstract. This paper delivered the review of current research interest in tourism and transport within the context of sustainability. Transportation is important for every tourist traveling to their destinations, tourism industry cannot thrive successfully without it. Thus, this study will demonstrate the relationship of transportation-related to tourist's satisfaction towards tourism transport, factors affected tourist's mode of transport and tourist mobility by using the available transport in the destination to investigate the interaction between the two elements. Therefore, selected keywords will be used to identify articles in Web of Science, Scopus and Google Scholar to sort the most suitable article for review purposes. The review indicated that the tourist's satisfaction is important for the evaluation of transport performance in the destination and different contexts of research. The review also found that existing transport modes in the destination will affect tourist movement, especially in terms of the designated route of transport and walkability to the tourist attraction places. In short, this review paper recommends the aspect of using new technologies as a potential analysis tool that allowed transportation greatly improved in the tourism sector. Overall, this review also aimed to identify the variable or attribute associated with achieving the idea of sustainable development.

1. Introduction

Transport is a fundamental sector in the tourism industry because transportation and travelling can be viewed independently without the tourism industry, but the tourism industry cannot thrive without travel [1]. Prideaux [2] defined tourism transport system is an operation of and interaction between transport modes, ways, and terminals that support tourism resorts in terms of passenger and freight flows into and out of destinations, the provision of transport services within the destination, and the provision of connecting transport modes in the tourism generating region. Hence, an attractiveness of a tourist destination, transport will become key element and function as a secondary destination features which contribute to the attractiveness of a destination. Besides, other transportation modes such as air and sea are the fundamental platform for travelling for long distances which probably the only option for tourists to travel overseas [3]. Yet, these transportation modes are getting cheaper and accessible due to the advancement of development in transportation such as the introduction of numerous budget airlines and cruises. Thus, these improvements have given more people to have the opportunity to travel more frequently than ever before. In short, the readiness and availability of efficient transportation management must be fulfilled in order to cater the huge volume of demands from tourists. On the other hand, the definition of transportation in tourism are meant to carry tourists from one attraction to the



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another but they are now seeking for more by prioritizing into several core aspects such as time limit, distance, status, comfort, security, benefits, price, geographical position and competition [1]. These aspects are defined as the essential experiences for tourists where it has become a trend for them to seek for choices of transportation based on these criteria. Thus, the basic requirements for transportation have been leveraged so high where the importance of transportation has become so obvious in the tourism industry.

Additionally, the 21st century which is the age of digitalization has enabled more people around the world to travel easily from one destination to another as a tourist. In 2017 the international tourist arrivals worldwide has reached a 1.3 billion record which is about 50% growth since 2010 [4]. The drastic growth effect in tourists' movements has made transportation becoming one of the crucial elements to cater for the continuation growth. It is difficult to imagine tourism without transportation because all of the tourism activities will be halt where tourists no longer able access to their destinations. At this moment, transportation has become inseparable from tourism as the fact it is indeed becoming a requirement for every tourist during their vacation. Moreover, the high demand for better transportation will become a big issue if proper transportation planning is not being strategized and prepared for the future. This is because as the world population growing rapidly, the supply has to cope with the demands in terms of tourism transportation needs in order to sustain the growth of tourism industry [5]. Thus, we can foresee and understand there is a strong relationship exists between tourism and transportation. Since it is understandable why transportation plays an indispensable role in tourism development and most researches have concluded that transportation is very important in tourism industry, but there are only a few researches carried out in-depth analysis to understand more into the details of the actual relationship between transportation and tourism [6]. This is crucial because an efficient transportation system must be planned and strategized in an earlier stage to prevent any unsolvable issue in the future. Moreover, the depth analysis is not only targeting to solve tourism transportation issues in the future but also creating a much sustainable way in leveraging tourism development without producing negative impacts.

2. Chronology of tourism transportation classical theory

Transport is the first manifestation of tourism consumption and therefore its psychological impact on the tourist, in an attempt to create the best image of the tourist product, is decisive. In other words, the tourist has the first contact with the product he or she has purchased through the travel service. The importance of transport as an essential component of the tourism system has been a topic of discussion in the literature for a long time. Many authors tried to determinate the importance of transport in tourist flows and its role in the economy of states [4] and the rationale of tourism transport can be traced back to the last century. In the eighties, Kaul [7] recognised the role of transport system as an essential component of successful tourism development and stated that "transport plays an important role in the successful creation and development of new attractions as well as the healthy growth of existing ones. Provision of suitable transport has transformed dead centres of tourist interest into active and prosperous places attracting multitudes of people. After this, Culpan[8] identified transportation modes and management as the "important ingredients of the international tourism system," acknowledging that linkage by air, sea and land modes are essential for the operations as well as the availability of support services such as fuel stations, auto repair, motels and rest facilities for land travel.

Although the importance of tourism transport has been acknowledged in the late 1980's and early of 1990's but the role of the role of transport has not been investigated in any detail [9]. After that, in late nineties, Page[10] has acknowledged that transport is the most significant factors which has contributed to the international development of tourism and provided a comprehensive form of tourism transport theory that related with tourist's movement and tourist's experience, with noted that: "Transport provides the essential link between tourism origin and destination areas. Transport can also form the focal point for tourist activity in the case of cruising and holidays which contain a significant component of travel and yet the mode of transport forms a context and controlled environment for

tourist's movement between destination and attractions, often through the medium of a "tour" and mode of transport tourists choose can often form an integral part of their journeys and experience."

The role of transport in sustainable urban tourism growth

Furthermore, the role of transportation only be clarified as by Prideaux [2], where the transport system is responsible for:

- Providing transport from the tourist's home to the terminal where the journey to the tourism destination commences;
- Providing services that are safe, comfortable, competitively priced and fast;
- Providing transport within the tourism destination and
- Providing freight services into the tourism destination.

According to Høyer [11], the character of transportation in sustainable urban tourism ideology has been defined in term of efficiency, pattern and volume as described in Table 1 below.

Table 1. Transportation role in sustainable urban tourism development.

Efficiency	Pattern	Volume
<ul style="list-style-type: none"> • Energy efficiency; • Alternative energy; • Emission efficiency; • Load factor efficiency, increased load factors 	<p><u>Modal shifts</u></p> <ul style="list-style-type: none"> • From cars to walking/cycling • From cars to urban rail transport • From cars to public transport, buses and rail <p><u>Intramodality</u></p> <ul style="list-style-type: none"> • Larger share of buses and rail transport of total transport chains • Better interconnections between walking/cycling, buses and rail transport 	<p><u>Sustainable development with public transport as a core</u></p> <ul style="list-style-type: none"> • Spatial localising and restructuring to reduce mobility demand • Coordinated land-use and transport planning to reduce mobility demands

Sustainable transportation in tourism is not only prioritizing the continuous flow of tourists to their destinations but also improving the efficiency of movement. Speaking of efficiency, there are several types such as energy, alternative, emission, load factors, and other efficiencies that are important to maintain an adaptable and compatible tourism experience to cater the rapid growth of tourists in the future. Besides, transformation in tourist movement patterns is also considered as one of the key indexes in creating a sustainable ecosystem especially targeting urban transportation. Examples like encouraging tourists from switching the private vehicles to walk or cycling around the tourist attractions or sharing public transportation such as urban rail transport which sometimes is more convenient, accessible and cheap compared to private vehicles. This implementation does not only create an overall better travel experience for the tourists but also contributed to the sustainability of local transportation. A larger share of buses and rail transport of total transport chain and better interconnections between walking/cycling, buses, and rail transports are examples of the respective scenario. Lastly, routes to destination planning in public transportation for tourist attractions can be coordinated based on spatial localizing, land-use and restructuring. Mobility demands will be gradually decreased but created much higher efficiency in transmitting higher volumes of tourists. This methodology has created a sustainable tourism development encouraged by good transportation planning system as a core.

3. Analytical framework of methodology

This study attempts to identify the importance of transportation in sustainable urban tourism development by further understanding of transport system that has an interrelationship with tourist satisfaction, factors influenced tourists on transport mode choice and tourist spatial movement. The research is being conducted according to the board review of academic journals regarding transportation tourism by searching online, internal journal databases to capture the wide range of published academic research on this similar topic. Keywords such as “Tourism Transport”, “Tourist Satisfaction”, “Tourist Travel Behaviour”, “Tourist Mobility” and “Tracking System” have been used to query information from popular citation databases like Science Direct, Web of Science, Scopus and Google Scholar. Web of Science, Scopus and Science Direct provide a large database in primarily index journals and Google Scholar provides a platform for books, chapters, working papers, and theses. To select a suitable source for reviews and come out with the fundamental findings, this study analysed 19 journals, 2 conference proceedings, 1 book, and 1 website information by used related keywords. Those journals consist of “Geografia: Australian Journal of Basic and Applied Sciences”, “Malaysian Journal of Society & Space”, “Transportation Research Procedia”, “Indian Journal of Commerce & Management Studies”, “Journal of Travel Research”, “Tourism Economics”, “Sustainability”, “International Journal of Affective Engineering”, “Institute for Infocomm Research”, “Sustainable Tourism”, “Tourism Geographies”, “International Journal of Tourism Research” and “Tourism Management”. While for the conference proceedings were from “Proceeding of Malaysian Universities Transportation Research Forum” and “Conferences and Proceedings of the Eastern Asia Society for Transportation Studies”.

4. Main findings of literature review

To understand the vital of transport in sustainable urban tourism development, the findings from the literature review has been divided into 3 review sections, as to allow the findings can discuss comprehensively:

Section I: Dimensions of tourist satisfaction toward tourism transport

Section II: Factors that influenced tourists on transport mode choice

Section III: Tourist mobility and advanced tracking technologies used

4.1. Dimensions of tourist satisfaction toward tourism transport

Tourist satisfaction is a key factor for a successful destination marketing its influences the choice of destination, the consumption of products and services as well as the decision to return [12]. The tourist satisfaction for destination can be start evaluating through the transport service that helps tourists get to the destination. This is because according to Thompson and Schofield[13], they mentioned that tourists’ experience with transport service may influence their satisfaction with the destination image as transportation has assumed the role of facade in tourism. In past, most of the researches have been using the similar variables to assess the satisfaction level of tourists toward the tourism transport. However, the finding of literature review showed that by conducting the research in different contexts especially subject to mode of transport, social cultural and the geography’s location of destination, the fundamental factors that impacted the satisfaction level of tourists was different. Not only that, as stated by Virkar and Mallya [14] tourist satisfaction toward the transportation may be the result of multiple factors including the expectations generated before and during the trip as well as the tourists’ perceptions of the service received.

According to table 1 below the research conducted by [15] found that tourist’s characteristics have no impactful relationship with tourist satisfaction adverse the performance of bus operator in term of service quality, reliability, accessibility, safety and security. Rudjanakanoknad [16] provided a research result that demographic of tourists with reference to local tourists or international tourists have different preference and dissimilar factor that affecting satisfaction level. Ismail et al [17] found that only certain variables such as comfortless and quality of services have a stronger relationship with the tourist satisfaction. Hall and Gerike[18] identified visitors were found to be generally satisfied with public transport services in Munich, and their perceptions are independent from most factors. Zainol [19] researched availability of information, punctuality, care for customer and security will have to be dealt

with wisely in order to increase tourist' satisfaction and higher ridership to alleviate negative impact on the environment and provide a more liveable environment. Time punctuality was identified to be the notable factors that affecting tourist' satisfaction due to the long travel time as the heavy traffic congestion and long waiting time at the bus stops [20]. Bajada and Titheridge [21] investigated related transport policy need to implement as to increase tourist satisfaction and based on their research tourist satisfaction was highly depends on service quality such as 'time', 'information', and 'comfort'. [14] summed up "accessibility", "service quality" and "perceived value" where significant influence tourists satisfaction level according to their review of others researcher's research.

Table 2. Review of tourist satisfaction variable.

Author	Accessibility	Information	Time Punctuality	Safety	Service Quality	Reasonable Fare	Bus Drivers Quality	Perceived Value
Haron, Noor, Farhan, Sadullah, & Leong [15]	√	√		√	√		√	
Rudjanakanoknad [16]	√	√		√	√	√	√	
R. Ismail, Hafezi, Nor, & Ambak [17]	√	√	√	√	√	√	√	
Hall & Gerike [18]	√	√	√	√	√	√	√	√
Zainol[19]	√	√	√	√	√		√	
Ismail, Leh, and Zaki[20]	√	√	√					
SPAD[22]	√	√	√	√	√			
Bajada and Titheridge[21]		√	√		√	√	√	
Virkar & Mallya [14]	√				√			√

4.2. Factors that influenced tourists on transport mode choice

Transport plays an important role in providing mobility for tourists from, to, and within the destination, so the choice of a transport mode is probably one of the most important classic models in tourism planning [23]. Since the tourist's satisfaction is an important performance measure for the transport service providers and a determinant factor affecting the mode choice [24] analysing travellers' behaviour in the aspects of mode choice is vital.

There have several studies focused on tourist transport mode choice behaviour have provided a better understanding of the behaviours of tourist's in selecting the most suitable transportation mode. The findings of the review indicated that the factors affected tourist choice of transport has been enlarged to a comprehensive range consist of numerous sub variables following by different categories. Those details variables were to make sure that the most fundamental factor that affected tourist transport mode choice has been successfully identified in the research. Therefore, the table 3 below shows the evolution of the factors influenced tourist mode of transport begin with general factors till the recent extensive tourists travel characteristic. This is because by further understand the factors that influenced their mode of transport is rather important for the public and private tourism-related sectors to design and improve their services and enhance destination competitiveness.

Table 3. Factors considered in the research of affecting tourists on transport mode choice.

Authors	Variables
Nerhagen [25]	Travel time, cost, frequency, convenience, flexibility, comfort and safety

Westlake and Robbins [26]	Time limit, distance, status, comfort, security, benefit, price, geographical position and competition		
Bakan [27]	The choice of destinations, length of the journey, mode of travel agencies, the level of available information, access to information, existing opportunities in transport, the availability other modes of transport and information about them, buying power of individuals and price / cost of transport		
Kelly, Haider, & Williams [28]	Individual characteristics, travel time, travel cost, frequency, arrival and departure point and inclusive values		
Ortúzar & Willumsen [29]	<u>Characteristics of The Trip Maker</u> Age/Gender Income Vehicle ownership Household structure Possession of a driving license Residential density	<u>Characteristic of The Journey</u> • Trip purpose • Time of the day, when the trip is undertaken • Whether the trip is undertaken alone or with others etc.	<u>Characteristic of The Transportation Facility</u> • Vehicle in time • Component of monetary cost • Availability and cost of parking • Reliability of travel time • Comfort and convenience • Safety
Le-Klähn, Roosen, Gerike, & Hall[30]	Demographic Characteristics Trip Characteristics Destination Features Travel Motivations Mode Quality and Travel Planning		
Madhuwanthi, Marasinghe, Rajapakse, Dharmawansa, & Nomura[31]	<u>Personal Characteristics</u> Family Income Residence Type Earning Member Vehicle Ownership Gender Age Education Occupation License Holder	<u>Travel-Based Characteristics</u> Waiting time Vehicle Travel Time Subsidized Cost Access Time Comfort Time Reliability Trip Purpose Trip Distance Trip Time	

4.3. Tourist mobility and advance tracking technology

Tourist's directional movements and designated routes are the key aspects that defines the representation of tourism mobility. Previously, tourism movement was captured by using traditional ground survey methodology through physical counters on tourists based on observation and questionnaire survey. However, new technological approaches such as GPS trackers and GIS tool have been widely used for remote data collection [32]. This methodology creates vast amount of data that are more accurate and feasible to enable the illustration of complete tourism mobility patterns and better insights on individual tourist's travel behaviours. Before this, research on tourist's mobility often focuses on the factors that influence tourists travel [33] pattern until the last few years with the rapid development of technology, there are only a few studies are using tracking system to understand the tourist mobility based on mode of transport used by tourists. Unfortunately, those researches are focusing only on biased samples such single transportation mode and certain group of tourists with a clear example majority of elder tourists may not use GPS for their trip [34]. This is very inaccurate because it will not able to provide tourism

planners with useful insights about tourist's responses to potential transportation-management strategies and construction of clear image for the transportation and tourism planner.

Table 4. Tourist mobility and advanced tracking technologies.

Author	Title	Mode of Transport	Journal
Wu, Tan, & Chen[34]	FTT: A System for Finding and Tracking Tourists in Public Transport Services.	Integrated Transport (MRT, LRT & Bus)	Institute for Infocomm Research
Edwards & Griffin[35]	Understanding Tourists' Spatial Behavior: GPS Tracking as An Aid to Sustainable Destination Management.	Public Transport	Sustainable Tourism
Grinberger, Shoval, & McKercher [36]	Typologies of Tourists' Time-Space Consumption: A New Approach Using GPS Data and GIS Tools.	Ferry, Light Rail, Subway and On Foot	Tourism Geographies
Bauder[37]	Using GPS supported speed analysis to determine spatial visitor behavior.	On Foot (Pedestrian)	International Journal of Tourism Research
De Cantis, Ferrante, Kahani, & Shoval[38]	Cruise passengers' behavior at the destination: Investigation using GPS technology.	On Foot, Taxi, Coach or Sightseeing Bus.	Tourism Management
Martín, Martínez, Moreno, & Rodríguez [39]	An Analysis of the Tourist Mobility in the Island of Lanzarote: Car Rental Versus More Sustainable Transportation Alternatives	Public Bus, Taxi, Rental Vehicle, Bicycle, Tourist Transportation	Sustainability
Sugimoto, Ota, & Suzuki [33]	Visitor Mobility and Spatial Structure in a Local Urban Tourism Destination: GPS Tracking and Network Analysis.	Transport Hubs (Railway Stations)	Sustainability

4.4. Contribution of finding in sustainable urban tourism development

The three sections above have been discussed tourist's satisfaction is a key measurement to identify the performance of transportation. Second, factor that influence tourist mode choice of transport primarily consider on good connections combining of different modes of transport to maximize ease and efficiency for the user in terms of time, cost, comfort, safety, accessibility and convenience as well as thirdly using high technology to track and predict tourist movement as to further understand the travel volume and design of transportation route can be done by using those tracking data and contribute in improving the existing transportation system at the same time tourist satisfaction also can be evaluated as to achieve the sustainable development in tourism industry with reference to balance the social (tourists satisfaction and perceived value toward the mode of transport that has been used), economic (volume and mobility to, from within the tourist destination) and environment (sustainable transportation system) aspects. Sustainable tourism development depends on transportation to a large extent, and both are inextricably linked because of good transportation system which apparently play a key role in both improving tourism development and promoting more sustainable mobility within the region and create a win-win situation for both sectors.

5. Conclusion

In overall, for the tourist satisfaction towards transportation studies, as it is found out transport that has been studied in satisfaction dimension majority refers to means of public transport and neglected another available mode of transport in the destinations that may also influence tourist satisfaction. Therefore, further inquiries of tourist's satisfaction should consist of more than more modes of transport. Besides that, even with the advanced tracking system to track on the tourist mobility based the mode of transport, especially to identify the travel volume and travel pattern, but there are still existed ample room to conduct the tourism research by using other analytical technique. Most tourists' mobility studies have researched the use of GIS and GPS technologies as it is found to be commonly used to identify tourist movement patterns. Tourist mobility analysis is a hot issue in urban tourism research [40] followed by tourism demand prediction, tourist sentiment analysis, tourists behavior analysis and tourism recommendation [41]. For further studies regarding the tourist travel behavior and tourist's movement should include one than one type of traveler which separate domestic tourists and international tourist travel behavior as to selected mode of transport and movement pattern or even the first-time visitors and repeat visitors in the matter of mode of transport and travel patterns. Align with that, a more powerful analysis technique such as big data analysis or even machine learning and deep learning integrated with the larger scale of data, which is promising for tourism research can be used as an advanced analysis.

5.1. *The era of big data contributes in sustainable urban tourism development*

The big data analysis can be done in tourism research by using UGC data, device data and transaction data to analysis the tourist mobility and travel behavior towards the destination. This is because technology has been continuing to shape the way people travels for example Google Travel study that almost 74% of travelers plan their transportations during the trip online. Thus, the revolution has generated vast amount of crucial data that could shape the next generation of transportation in tourism. Speaking of data, most of transportation movements from ride-hailing, remote car rental, hitch riding, online flight bookings and others together with new forms of useful data (transaction data) which eventually could help to make better travel predictions and improvements in view of suggestion and recommendation to resolve issue by using big data analytics that help to generate predictions from tourists' movement patterns and predict the most suitable combination of transportation for them according to tourists travel behavior. In other words, these powerful analysis techniques are strongly recommended in the future tourism research to diversify the exiting traditional analysis method. Besides, the predictive analysis from big data is not only visualizing the movement patterns of tourist but to generate a physical design and strategy plan of route and connectivity to the respective destination. The reason is because once we gathered a huge amount of possibility from predictive pattern of the analysis, the model generate could begin undergoing strategy realization that can help transportation planners to draft and create new useful layout plans. From there, this will not only help transportation planners to create new designs but also maintaining a sustainable development as the same time.

5.2. *Bridging the transportation and sustainable urban tourism*

This literature has discussed the fundamental of transportation as a key element in the tourism sector whereby transport and tourism are interrelated a good tourism destination will never succeed without an efficient and easily accessible transportation. Besides, this literature provided a clearer and better understanding on the connection of urban tourism and transportation with tourist's satisfaction level, factors affecting tourists corresponding to transport mode of choice and tourist's mobility with the existence transportation mode. This research comes out a relation among the tourists travel movement, travel behaviour and satisfaction level, which clearly shows there is an irreplaceable relationship between transportation and tourism and hopefully will assist the transportation and tourism planner to have a better deigns, policies, resource management and marketing strategies, to enhance the image of the destination as well as intensify the sustainable development in the tourism destination.

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