Tomas Bata University in Zlín
Faculty of Management and Economics

Doctoral Thesis

Indicators of sustainable tourism and their application to Pakistan

Ukazatele udržitelného cestovního ruchu a jejich aplikace v Pákistánu

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ABSTRACT

Tourism as a globally important sector and the world's fastest-growing industry is a source of job creation for millions of people and contributes to global GDP significantly. The role of tourism in the contemporary era is enormous and will be even more vital in the coming years. However, there are some downsides related to tourism, which demands serious attention for future sustainability to reap long-term benefits. Therefore, the researchers and policymakers focused on sustainable tourism to get around and minimize the underlying negative impacts of tourism. However, previous studies contain research gaps regarding sustainability indicators:

a) Careful assessment of the indicators is needed for higher validity and reliability and that has been overlooked.
b) Traditional dimensions of sustainable tourism are unable to achieve a higher level of total variance explained; therefore, the new dimensions related to infrastructural sustainability and technological sustainability are important to consider for developing sustainable tourism.
c) The development of a multidimensional sustainable tourism index with new dimensions and the use of an index for cross-location comparisons is undeveloped yet.

Thus, this thesis aims to fill these research gaps. Mainly, this research examines the traditional dimensions as well as introduce the two new dimensions (infrastructural and technological dimensions), and develop a comprehensive set of indicators and index to monitor parameters of sustainable tourism. Using the Delphi method, the initial list of indicators has been reduced, and a survey method is used to collect data from selected cities of Pakistan (Lahore, Islamabad, and Faisalabad). The validity and reliability have been assessed by using different methods including Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM). Furthermore, the Multidimensional Sustainable Tourism Index (MSTI) has been developed by including two new sustainable dimensions to conduct comparisons among three destinations. The thesis provides theoretical contributions as follows:

a) By introducing two new dimensions of tourism sustainability (infrastructural and technological dimensions) to give a broad and thorough view of sustainable tourism.
b) By considering the three traditional and two new dimensions, the development of multidimensional sustainable tourism index (MSTI) to do cross-location comparisons.

Besides, the doctoral thesis gives benefits for practice, by helping the stakeholders of the tourism industry to choose robust indicators. The developed MSTI will provide sustainability status in the selected cities of Pakistan and will come up with practical suggestions to achieve sustainability.

ABSTRAKT

Cestovní ruch jako důležité odvětví a jedno z nejrychleji rostoucí odvětví na světě je zdrojem vytváření pracovních míst pro miliony lidí, čímž významně přispívá k tvorbě celosvětového HDP. V současné době je role cestovního ruchu ve společenském kontextu významná a jak uvádějí odhady, bude v nadcházejících letech ještě sílit. Existují však i rizika související s tímto odvětvím, která vyžadují jistou pozornost. Je tedy nutné zachovat budoucí udržitelnost tohoto odvětví, proto aby bylo možné čerpat jeho výhody i v budoucnu. I z tohoto důvodu se vědci o tuto udržitelnost zajímají a jejich cílem je mimo jiné minimalizovat negativní účinky tohoto působení. Předchozí dostupné studie však obsahují mezery ve výzkumu týkající se např. i aplikace ukazatelů udržitelnosti jako např:

a) Je nutné, tyto ukazatele pečlivě posoudit z pohledu významnější spolehlivosti a dlouhodobé použitelnosti. Tyto skutečnosti jsou v dostupných studiích zatím přehlíženy.

b) Tradiční principy udržitelného cestovního ruchu nejsou schopny dosáhnout vyšší úrovně celkového využití, a proto je nutné vzít v úvahu nové dimenze a to udržitelnost infrastruktury a technologickou udržitelnost.

c) Rozvoj vícerozměrného indexu udržitelného cestovního ruchu s novými dimenzemi (udržitelnost infrastruktury a technologická udržitelnost) včetně použití indexu pro srovnání napříč různými lokalitami, není doposud rozpracováno.

Tato práce si klade za cíl zaplnit tyto mezery výzkumu. Cílem tohoto výzkumu je prozkoumat zejména tradiční dimenze, zavést dvě nové dimenze a vyvinou komplexní soubor ukazatelů a indexů k měření udržitelného cestovního ruchu. Použitím Delphi metody se zredukoval původní seznam ukazatelů. Pomocí metody sběru dat byly shromážděny data z vybraných měst Pákistánu (Lahore, Pakistan a Faisalabad). Platnost a spolehlivost dat bude ověřena pomocí různých metod včetně konfirmační faktorová analýza (CFA) a modelování pomocí strukturálních rovnic (SEM). Kromě toho bude charakterizován index vícerozměrného udržitelného cestovního ruchu (MSTI), který zahrnuje dvě nové dimenze udržitelnosti tak, aby bylo možné porovnávat jednotlivé destinace. Práce přispívá svými teoretickými poznatky následovně:

a) zavedením dvou nových dimenzí využití principů udržitelnosti cestovního ruchu s cílem poskytnout široký a přesný pohled na udržitelný cestovní ruch;

b) posouzením tří tradičních i dvou nových rozměrů pomocí vícerozměrného indexu udržitelného cestovního ruchu (MSTI) bude možné srovnávat jednotlivé destinace cestovního ruchu.

Studie navíc obohatí praxi tím, že pomůže se zúčastněným stranám v odvětví cestovního ruchu při výběru mezi velkým množstvím ukazatelů a jejich aplikaci. Aplikace vícerozměrného indexu udržitelného cestovního ruchu MSTI, poskytne významnou informovanost o využití principů udržitelnosti ve vybraných městech Pákistánu a pomůže s praktickými návrhy, které povedou k významnému zvýšení aplikace těchto principů v dané lokalitě.

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LIST OF SYMBOLS, ACRONYMS AND ABBREVIATIONS USED

WTO: World Tourism Organization
WTTC: World Travel and Tourism Council
UNEP: United Nations Environment Program
IUCN: International Union for Conservation of Nature
GSTC: Global Sustainable Tourism Council
PTDC: Pakistan Tourism Development Corporation
STI: Sustainable Tourism Index
MSTI: Multidimensional Sustainable Tourism Index
CFA: Confirmatory Factor Analysis
EFA: Exploratory Factor Analysis
SEM: Structural Equation Modeling
AMOS: Analysis of Moment Structures

1. INTRODUCTION

1.1 Background and Motivation for the study:

Tourism is a globally and dynamically growing industry. The majority of the people consider tourism as a journey for relaxation and a source of fun due to their enjoyable time of holidays or retirement life. Many travel for short-term and temporary jobs or business (Robinson, Luck, & Smith, 2013). Every year, hundreds of millions of people with billions of tourism trips lead to the use of natural resources and environment, local facilities such as transportation, accommodation, and restaurants. Such tourism activities cause significant environmental impacts and put pressure on natural resources (Robertson & Barling, 2017; Rhead, Elliot, & Upham, 2015). Therefore, sustainability in tourism and protection of the environment have become global concerns.

The tourism industry is complex and has symbiotic relationships as well as adverse global impacts. These global impacts grabbed considerable societal intentions due to climate change, biodiversity loss, coastal urbanization, disease transmission, fossil fuel consumption, and cultural commoditization (Hall et al., 2015). Hence, tourism firms should not only enhance their efficiency but also accept responsibility for the protection of the environment (Yong et al., 2019). Hence, the role of tourism firms comes up as major tourism performers to contribute to environmental and tourism sustainability.

Although the concept of sustainability and sustainability development of tourism lacks a mutually acceptable definition (Murray et al., 2003) and Mundt (2011) regards sustainability and sustainable tourism as a vague concept, yet there is a way forward (Fletcher et al., 2017). Sustainability involves the mechanism of recognition and realization of responsibility. A recognition that the resources are limited and vulnerable, and a sense of responsibility that all stakeholders should use resources rationally from the government to planners, and tourism firms to tourists. Hence, to ensure sustainability all the stakeholders should be involved with active participation and cooperation in a sustainable strategy (Fletcher et al., 2017; Tučková & Jurigová, 2014).

The emergence of the concept of sustainability and improved understanding of sustainable tourism put the issue of tourism in limelight to manage it sustainably. Therefore, the general understanding developed about sustainable tourism is to minimize the damage to the natural environment along with the protection of the community and cultural values of a destination as well as create income generation opportunities (Robinson et al., 2013).

In the past, several attempts have been carried out to create a sense of responsibility towards sustainability and greening of the tourism industry (Mycoo, 2006; Hobson & Essex, 2001; Welford, Ytterhus & Eligh, 1999; Font, 2002; Fletcher et al., 2017). Such attempts involve sensitization campaigns along with certification schemes. However, such attempts could not be successful due to several reasons. Mainly, there was an increasing realization at the organizations and companies level that such certifications involve additional demand for money. Secondly, the organizations, tourist firms, tourists, and other stakeholders are not well aware of the sustainable tools, indicators and strategies to follow. Therefore, this doctoral thesis attempts to provide a comprehensive list of indicators to be followed for sustainable development of tourism covering traditional as well as some new dimensions, for which other authors have not worked explicitly.

In this context, the economic dimension of sustainable tourism requires holistic planning among all industrial segments. The jurisdiction of economic sustainability towards tourism development does not only comprise of destination management but also considers other intermediaries to make sure that others do not put undue stress and pressure on the system of the planning process. Therefore, throughout the industry, solid partnership channels and chains are needed to be formulated by enhancing the quality of tourism products, better staff training, and creating a sound economic environment (Garrigós-Simón, Galdón-Salvador, & Gil-Pechuán, 2015; Fletcher et al., 2017).

Although the primary driving force for the development of tourism is to reap financial gains and exploit economic benefits such as the generation of income and employment opportunities, foreign exchange earnings yet the existence of some negative aspects of tourism development demands careful consideration of such issues to make the tourism development economically sustainable. Primarily, the negative economic impacts of tourism involve the commitment of resources for the production of goods and services related to tourism, and not to use otherwise for alternative purposes. Similarly, the allocation of capital resources out of scarce endowments makes it unavailable for other types of economic development.

Furthermore, inflation, a higher level of the initial cost to set up tourism infrastructure, seasonal jobs, higher prices of real estate, lack of benefits to the local community, and promotion of prostitution industry are some of the adverse economic impacts of tourism. Sustainable development of tourism put efforts to cater to such a situation for neutralizing the negative impacts of tourism. Such a situation demands a better understanding of the affairs and a robust set of indicators to cope up with the problem.

The environmental dimension of sustainable tourism requires that there should be enhanced knowledge and greater awareness about the environmental impacts and their translation into the economic marketplace. The responsibilities for businesses and tourists should be clear to follow in a conducive way and penalization on failure through the legislative system. Hence, the increasing concern for the environment leads towards the adoption of sustainable practices in the tourism industry by adopting better environmental management practices, training of the personnel as knowledge agents, and making tourists aware of achieving the common goal of sustainability (Martínez-Martínez, Cegarra-Navarro, Garcia-Perez, & Wensley, 2019; Fletcher et al., 2017). Also, such involvement of employees is beneficial for employee wellbeing and sustainability (Hussain et al, 2020).

In light of this, to assess environmental stress and pressure, the OECD formulated a strategic framework (OECD,1994). This highlighted four major categories as stressful activities, includes permanent environmental restructuring (constructions works, like highways, resorts, and airports); the generation of waste products (biological and non-biological); stress to the environment directly caused by the destruction of reefs and dunes, etc.; and impacts on the population dynamics. Environmental sustainability requires that to tackle such issues by offering indicators, guidelines, and application practices. Therefore, physical impacts should be considered due to tourism activities. Again, changes in the inventory of flora and fauna, the consideration of baselines for making comparisons, as well as environmental impacts at the secondary levels are at the forefront of environmental sustainability in tourism development.

Although there are positive environmental impacts such as the preservation of the ancient monuments, the creation of the wildlife parks, protection of the beaches and reefs, and looking after of forests for their better maintenance, yet negative environmental impacts seek serious attention to get around with such impacts for contributing towards tourism sustainability. On the side of adverse impacts, the quality of water, higher noise levels, the sewage disposal into the water, more oil burning, the need for electricity, and use of combustion engines, all contribute to poor air quality. In tourism cities, dramatically increased noise through nightclubs, entertainment events, and more traffic on roads put a bad impact on the deterioration of the environment. Hence, environmental sustainability needs careful attention and should adopt better practices by applying comprehensive indicators for environmental protection (Fletcher et al., 2017).

The socio-cultural dimension of sustainable tourism requires that tourists and visitors should respect the socio-cultural authenticity of host communities, and tourism should enhance the inter-cultural understanding and tolerance between tourists and host communities (World Tourism Organization, 2005). The literature revealed that sustainable tourism is sometimes restricted by focusing on ecological and economic impacts. However, Boksberger & Laesser (2007) asserted to incorporate the relatively neglected impact of the socio-cultural dimension of tourism. The recognition and consideration of such socio-cultural impacts are quite essential for the sustainable development of tourism.

The bi-fold impact of tourism is often overlooked, impacts not only host communities but also the visitor population. In 1960s and 1970s, the changes in the culinary and beverage in the UK resulted due to the growth of visitors from the UK to Spain, which is an example of such impacts. Further, tourism also promoted beach-based lifestyle and barbecue parties, such as in Australia, is another evidence of socio-cultural impacts. Hence, socio-cultural impacts are wide enough to affect the wearing of clothes, eating of foods, as well as social attitudes and general lifestyles.

The positive impacts of tourism-related to the socio-cultural dimension are the recognition of the destination's heritage and foster local pride, an important role in the socio-cultural awareness and promotion of peace, and the availability of funds for direct socio-cultural support. Some general and negative impacts are the creation of social tension due to the rich and wealthy tourists and poor residents. Further, an additional tax burden on local residents for building and improving infrastructure also creates social tension in society. Apart from this, sex tourism has also become a major tourism market, such as Thailand, some parts of Gambia, as well as some countries in Central Europe, are worthwhile to mention. Tourism also increases crimes, robberies, and vandalism as tourists from richer countries carry large sums of money and some other valuable items. Therefore, to tackle such an issue is of prime importance for the sustainability of tourism.

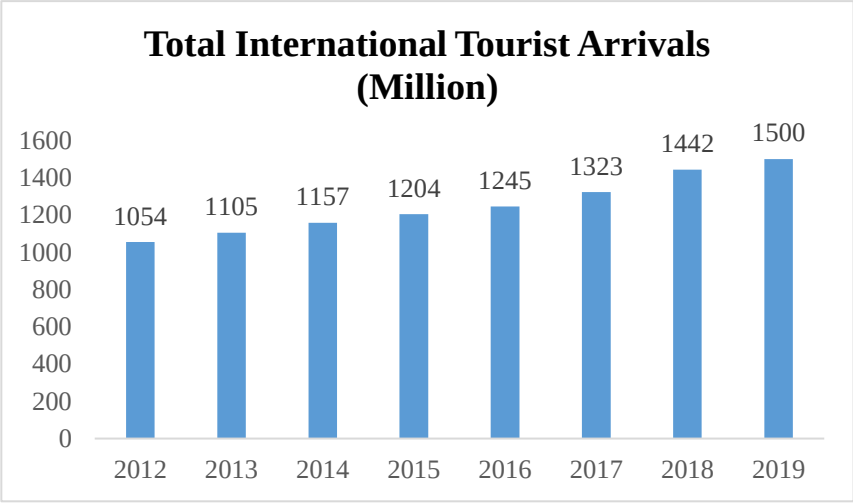
Apart from the aforementioned traditional dimensions of sustainable tourism, some studies implicitly highlighted the importance of improved infrastructure and better technological accessibility (Johnston & Tyrrell, 2005; Casagrandi & Rinaldi, 2002; Panasiuk, 2007; Rantala et al., 2018; Jun, 2018). Consequently, this research incorporates infrastructural and technological sustainability as two new dimensions of sustainable tourism. Therefore, in the process of assessing and validating a comprehensive set of indicators, this research considers not only traditional dimensions but also two novel dimensions

(infrastructural and technological sustainability). Besides, to carry out cross-location and cross-temporal comparisons this research also developed the Multidimensional Sustainable Tourism Index (MSTI) to help the policymakers, researchers, destinations managers, and local administrators to keep an eye on the changing situation and peep into the matter deeply.

1.2 International Scenario of Tourism

Historically, international tourist arrivals showed extraordinary and outstanding growth over the past decade, especially from 1980s. There were 25 million international tourist arrivals in 1950, exceeded 1200 million by 2017 (UNWTO, 2018). At the same time, tourism is a very complex field with multiple stakeholders and interrelated industries such as airlines, hotels, natural areas, and attractions etc. This dynamic branch requires cooperation among the private sector, public sector and other stakeholders to sustain in the long-run (Tučková & Jurigová, 2014).

Overall, from the past, some decades travel and tourism is contributing as a significant force of economic growth. The tourism industry is also providing unique opportunities for less-developed and emerging nations (Crotti & Misrahi, 2017). According to the tourism highlights, published by UNWTO, international tourist arrivals showed the highest growth in the seven years since 2010. Many destinations also showed recovery from security challenges and Pakistan is one of the best examples in the current scenario. Total international tourist arrivals reached 1323 million in 2017 with 7 percent growth (Figure 1). Similarly, total international tourism receipts showed a 5 percent growth and reached US$ 1340 billion.



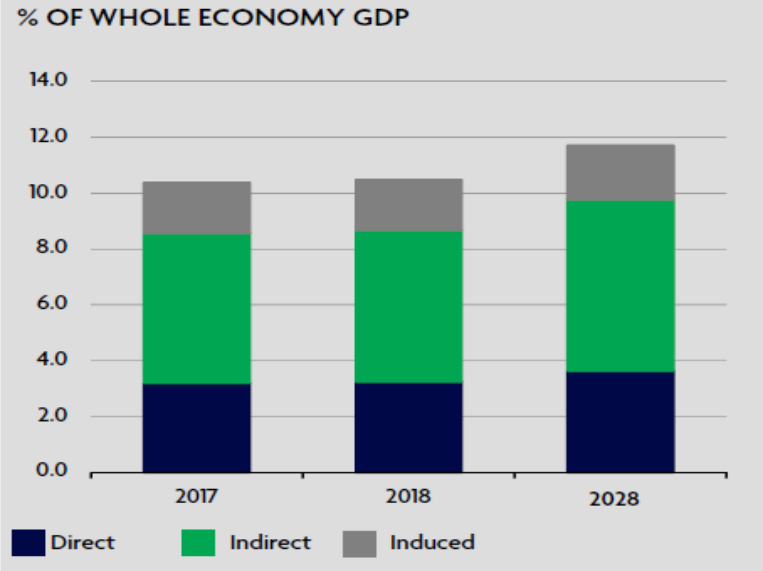
Source: World Tourism Organization (2020).

Figure 1: International Tourist Arrivals (Million)

Tourism matters a lot in terms of cultural representation, job creation, economic growth and development. Globally, 10 percent of world jobs are due to the tourism industry. Furthermore, the share of the tourism industry is 10 percent of the world's GDP (World Tourism Organization, 2018).

In terms of continuant share, Europe is at the top with 51 percent share, Asia and the Pacific is receiving 24 percent share in the total international tourism arrivals. Likewise, Europe is receiving a 39 percent share, Asia and the Pacific receiving 29 percent share in the total international tourism receipts (World Tourism Organization, 2018).

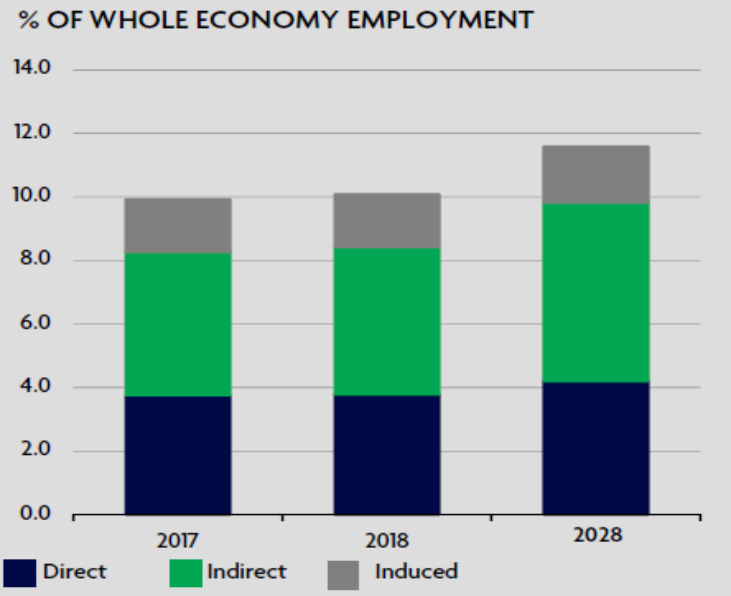
Tourism is somehow complicated when referring to economic contributions and impacts because it has a direct contribution to GDP and employment, also an indirect contribution to GDP and employment as well as an induced contribution to GDP and employment. In 2017, the direct contribution of travel and tourism to GDP was 3.2 percent, the indirect contribution was 5.3 percent, whereas the induced contribution to GDP was 2 percent (World Travel and Tourism Council, 2018).



Source: World Travel and Tourism Council (2018).

Figure 2: Percentage Contribution of Travel and Tourism to GDP

Travel and tourism are also contributing to employment significantly. In 2017, 3.6 percent of total employment was the direct contribution of travel and tourism, indirect contribution to total employment was 4.2 percent while induced contribution to total employment was 1.8 percent.



Source: World Travel and Tourism Council (2018).

Figure 3: Percentage Contribution of Travel and Tourism to Employment

1.3 Profile of Pakistan and Tourism in the Country

Pakistan is a South Asian country and the world's fifth-most populous country with more than 200 million inhabitants. By area, Pakistan is the 33rd largest country with an area of 881,913 square kilometers. Pakistan is a strategically important country due to its geographical and regional location. The coastline of Pakistan is 1046 kilometers, mostly on the south-side with the Arabian Sea and the Gulf of Oman. The neighboring countries of Pakistan are India to the east, China to the northeast, Afghanistan to the west, and Iran to the southwest.

Historically, several ancient cultures can be found in Pakistan with links to the Indian subcontinent before the partition of India and Pakistan. The ancient history of the country involves the Bronze Age Indus Civilization and Neolithic site of Mehrgarh, and later on ruled by the kingdoms of different cultures and faiths, such as Muslims, Indus-Greeks, Hindus, Afghans, Turco-Mongols and Sikhs.

Pakistan gained independence on 14th August 1947 followed by the Pakistan Movement based on the Muslim-majority regions and became an independent state in 1947 (Khan, 2013; Shehabuddin, 2008; Heo, 2007). Pakistan is a linguistically and ethnically diverse country and rich in culture. Interestingly, Pakistan is a country with the sixth-largest armed forces, nuclear power and also a declared state with nuclear-weapons (Buzan et al., 2003; Rajagopalan, 2011; Paul, 2012; Buzan, 2004). Pakistan is also a member of international unions and organizations such as the United Nations (UN), Commonwealth of Nations,

Organization of Islamic Conference (OIC), the Shanghai Cooperation Organization, the SAARAC (South Asian Association for Regional Cooperation), and is also a major non-NATO (North Atlantic Treaty Organization) ally (Joseph, 2017; Roston & D'Souza, 2004).

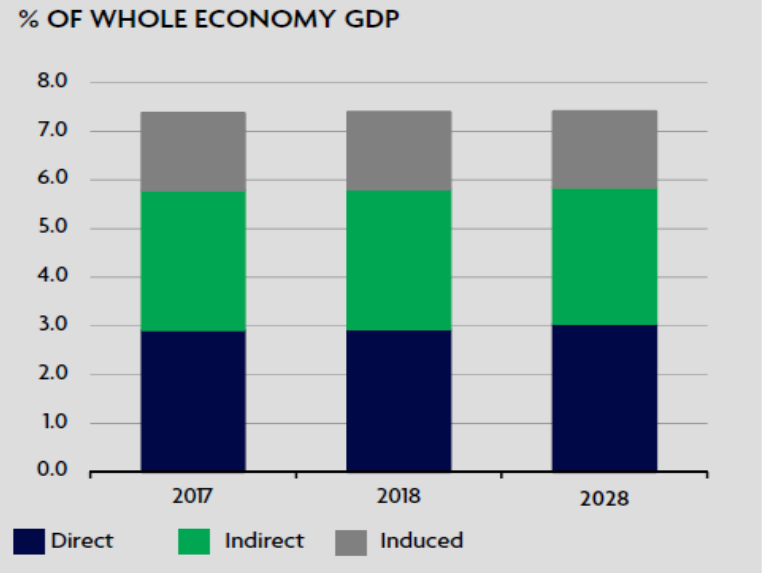
The diversity of Pakistan can also be seen in its geography and climate, and a wide kind of wildlife. Geographically, Pakistan is divided into three areas, precisely are the northern highlands, the Baluchistan Plateau, and the Indus River Plain (Mohiuddin, 2007). The mountain ranges of northern highlands such as Hindu Kush, Karakoram, and Pamir are important to mention here because five out of fourteen mountains are over 8000 meters, such as K2 with a height of 8611 meters and Nanga Parbat with a height of 8126 meters (PTDC, 2020). The Indus River with a length of 1609 Kilometers along its tributaries flows from the region of Kashmir to the Arabian Sea (Infoplease, 2009).

The climate of Pakistan is diverse with variations from tropical to temperature, and arid conditions are common in the coastal south. Importantly, the frequent flooding after the monsoon season due to heavy rains is common, and sometimes dry seasons with less rain. Pakistan has four seasons, a dry winter season from December to February, a hot spring season from March to May, a rainy summer season from June to September, and a retreating monsoon and fall season from October to November (Library of Congress, 1995). Due to such a diverse climate and fertile landscape, there are a wide variety of plants and trees flourish in Pakistan. The trees of coniferous alpine and subalpine such as pine, spruce and deodar cedar in the northern mountains of the country, palms such as date and coconut in southern Punjab and southern Baluchistan, as well as in most of the Sindh province (Khan & Khan, 2018). However, the prevailing problems in the country such as the highest number of deforestation in the world with increasing hunting and pollution, and the resulting adverse impacts on the ecological system (Malik, 2019).

The diversity of cultures, friendly people, and beautiful landscape of Pakistan has a great potential for attracting domestic and international tourists. There was a time when a large number of foreigners including British, Americans, Canadians, Germans, Chinese and tourists from other countries use to visit Pakistan due to its natural beauty, cultural heritage and impressive history. In the 1990s and the coming years especially after the 9/11 incident, there was a wave of terrorism and instability in the country so poor law and order situation leads to a very low number of tourists. However, tourism potential in Pakistan is matchless due to its scenic places, beautiful lakes, history, heritage, and tallest mountains. Many countries issued advisories for the safety of their citizens. Therefore,

tourism opportunities in Pakistan couldn't be exploited up to their full potential. The revival of peace and security situation from the last three years has led to an increase in the number of domestic and international tourists all around the country (PTDC, 2018). British Backpacker Society has ranked Pakistan the world's top travel destination for 2018 while competing for 20 countries including Russia, India, China and Kyrgyzstan, which explicated Pakistan as a paradise for tourists and "one of the friendliest countries on earth, with beyond imagination mountain scenery (British Backpacker Society, 2017).

In Pakistan, International tourist arrivals have boosted by 300 percent since the past few years and this growth is quite impressive (Pakistan Tourism Development Corporation, 2018), and hence Pakistan attracted more than 6.6 million foreign tourists in the year 2018 (Dawn, 2019). The economic impact report 2018 published on Pakistan reveals interesting facts regarding tourism in Pakistan. According to the World Travel & Tourism Council (WTTC, 2018) statistics, the direct impact of travel and tourism contributing 3 percent of GDP in 2017 and is projected to rise by 5.9 percent in 2018 whereas the total contribution to GDP is 7.4 percent.



Source: World Travel and Tourism Council (2017).

Figure 4: Percentage Contribution of Travel and Tourism to GDP in Pakistan

This widespread traveling also caused some problems regarding environmental damage, socio-cultural issues and economic impacts. So, future sustainability and competitiveness is much considerable issue of debate for the past two decades. Some of the impacts of tourism are positive such as enhancing understanding across cultures however, the pollution because of tourism and harm to the environment due to the irresponsible behavior of tourists is enormous and

alarming (Patterson, 2016). That's why the concept of sustainable tourism is got considerable attention from researchers and policymakers. This concept of sustainable tourism emerged in the 1980s that refers to the low impact on the environment and local culture while helping to generate future employment for local people. The positive of sustainable tourism is to ensure that development is a positive experience for local people, tourism companies and tourists themselves. It establishes a balance between conserving biodiversity. Sustainable tourism maximizes the positive contribution of tourism to biodiversity conservation and thus to poverty reduction and the achievement of common goals towards sustainable development.

1.4 Organization of the Thesis

This thesis develops indicators of sustainable tourism and attempts to assess their application to the selected cities of Pakistan through the proposed multidimensional sustainable tourism index (MSTI). To address the research questions and achieve the objectives of this doctoral thesis, the organizations of the chapters are as follows. Chapter 2 provides an overview of the literature related to sustainable tourism. In this vein, tourism and sustainability, global initiatives and sustainable tourism, and indicators of sustainable tourism developed and proposed in the literature have been discussed. Based on the reviewed literature, Chapter 3 discusses the research gap, presents the research problem, research questions and objectives of the doctoral thesis. Proceeding ahead, Chapter 4 describes the research methodology used in the doctoral thesis; precisely a mixed-method approach has been used in this doctoral thesis and a factor analysis approach on the data collected from the selected cities of Pakistan for assessment purposes. Chapter 5 gives the results and data analysis along with interpretations and discussions. Chapter 6 summarizes the results and concludes the thesis by highlighting the theoretical and practical contributions of the research thesis.

2. LITERATURE REVIEW

2.1 Historical Development of Sustainable Tourism

Sustainable tourism operates in such a way that meets the needs of current travelers, host communities without harming the future requirements needs for coming generations. According to United Nations Environment Program (UNEP) & UNWTO (2005), sustainable tourism is defined as, "Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities". Hence, sustainable tourism makes the optimal use of resources whilst protecting the environment and conversing heritage and biodiversity, enhances the inter-cultural understanding and socio-cultural harmony, economic gains for the host communities, and looks after the needs of all stakeholders.
Tourism is regarded as a complex field due to the involvement of certain segments such as restaurants and hotels, tourist attractions, airlines, and natural areas (Patterson, 2016). Such a big-size industry has certain impacts on the environment and other stakeholders. To mitigate such impacts and make tourism sustainable a better understanding of the historical development of sustainable tourism is worthwhile.

Although traveling and tourism are not a new phenomenon yet the United Nations started to compile tourism statistics in the year 1950. The previous few decades' growths are unprecedented as international tourist arrivals in the year 1950 were only 25 million, whilst these arrivals exceeded 1500 million in the year 2019 (UNWTO, 2020). In light of this, the big-size tourism industry has impacts on the environmental, socio-cultural, and economic aspects. Therefore, the adverse impacts could be mitigated through a sustainable approach for tourism, and different global institutions have taken historically different initiatives.

Based on the UNWTO statutes of 1970 to address the issues related to tourism and sustainable development of tourism, world tourism day is being celebrated from the year 1980. In 1976, the World Tourism Organization (WTO) has been declared an executing agency of the United Nations. After a few years, IUCN (International Union for the Conservation of Nature) issued the world conservation strategy in 1980. Meanwhile, the term 'ecotourism' became popular to address environmental concerns. In the context of sustainable tourism development, the Brundtland Report, *"Our Common Future"* has important significance, which resulted as a gathering of the world leaders in the year 1987 to focus the issues related to unplanned development (World Commission on Environment and Development, 1987). The report defined sustainable tourism as

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs" and recognized the importance of collaborative effort for the required solutions.

The International Ecotourism Society is also founded in the year 1990. Eventually, the Brundtland report paved the way for the United Nations Conference on Environment and Development held in Rio de Janeiro in the year 1992 called "Earth Summit", which brought the government of 172 countries and 2400 non-government organizations together for finding solutions to issues related to sustainability. This Earth Summit led the world nations towards Agenda 21, the Statement of Forest Principles, the United Nations Framework Convention on Climate Change, and the United Nations Convention on Biological Diversity. All the outcomes have a direct or indirect focus on environment protection, sustainable use of resources and conservation for long-term sustainability (Patterson, 2016).

In the vein of sustainable development and based on the Agenda 21 guidelines, the global leaders built the Millennium Development Goals in the year 2000. All member states agreed to achieve these goals in the year 2015 which were related to eradicating poverty, providing education, gender equality and women empowerment, and also environmental sustainability and global partnership for development. As mentioned earlier, the term ecotourism became popular with the focus on ecological tourism, environmentally and culturally sustainable. To achieve this goal through membership, education and training, the International Ecotourism Society came into being in the year 1990.

Importantly, the United Nations gave the status of a specialized agency for tourism to the World Tourism Organization (WTO) in the year 2003. Moreover, the same WTO also sponsored the first international conference on climate change and tourism in Djerba, Tunisia. Consequently, several global initiatives were taken to apply the principles of sustainable development throughout the tourism industry, such as holistic and cross-sectoral planning, preserving essential ecological processes, protection of human heritage, and development as a way forward to avoid depletion of resources for future generations (Lane, 2014).

One such significant initiative was the establishment of the Global Sustainable Tourism Council (GSTC) and the formulation of GSTC criteria. To promote sustainable tourism, the GSTC was created when 50 industry leaders and UN representatives gathered in 2008. The major focus was to get criteria towards specific actions for tourism organizations. In this vein, the GSTC issued criteria for hotels, tour operators, and destinations. One big benefit of the GSTC criteria is the better understanding of sustainability through common language and

terminologies with a focus on minimizing negative environmental and social impacts, maximizing economic benefits for the host communities, memorable experience for travelers by interacting with local culture and people (Patterson, 2016). With the passing of every year, the importance and popularity of sustainable tourism are increasing, that's why, United Nations General Assembly declared the year 2017 as the international year of sustainable tourism for development (UNWTO, 2017).

One difference is also needed to be clarified about the sustainability and competitiveness. These two terms sometimes are being used interchangeably and often used in the tourism literature (Javed & Tučková, 2020; Javed & Tučková, 2019), however, technically these two terms are not the same. As mentioned above, sustainability refers to meet the needs of present generations without compromising the future. According to Vehbi (2012), sustainability is "long-term economic, environmental, and community health".

The term competitiveness is difficult to define straight due to its complexity (Tučková & Jurigová, 2014). Competitiveness can be considered as the ability to design, produce, and then commercialize any product or service. At the organization level, competitiveness can be regarded as the ability of an organization to achieve its goals and mission more successfully than competing in terms of goods. Regarding tourism destination, the competitiveness defined by Ritchie & Crouch (2003) is related to enhance tourism expenditure, attract more visitors, satisfying their needs and increase profitability as well as enhance the well-being of residents. Whilst a few years back OECD defined as, *"Tourism competitiveness for a destination is about the ability of the place to optimize its attractiveness for residents and non-residents, to deliver quality, innovative, and attractive (for example, providing good value of money) tourism services to consumers and to gain market shares on the domestic and global market places, while ensuring that the available resources supporting tourism are used efficiently and in a sustainable way"* (Dupeyras & MacCallum, 2013).

2.2 Tourism and Sustainability

Much of the literature discusses the issue of tourism as well as its sustainability along with related concerns. In this vein, Blancas et al. (2015) presented analytical tools to address the two key issues, which the European Commission considers to provide a better base of socio-economic knowledge and improved image as quality sustainable tourism destinations of European areas. They defined a system of sustainable tourism indicators and obtained a composite indicator having weights as well as sustainable tourism country brand ranking.

While Ziaabadi et al. (2017) determined the sustainability and indicators of sustainable tourism by using a composite indicator and a linear programming model. They explored that situation for sustainable tourism is not appropriate and environmental health is even having the lowest level of sustainability as compared to social and economic aspects. So the issue of sustainability in tourism should be considered seriously and more attention should be paid.

WTO (1996) played its leadership role in the field of sustainable tourism, by establishing a task force and 11 core indicators have been identified by the WTO process for sustainable tourism management which includes site protection, stress, use intensity, social impact, development control, waste management, planning process, critical ecosystems, consumer satisfaction, local satisfaction and tourism contribution to the local economy. However, these WTO indicators are 'demand-driven' and are helpful for managers to make decisions of practical nature.

In the same way, Lee and Hsieh (2016) identified indicators of sustainable tourism. They explored key dimensions and indicators by using the fuzzy Delphi method and examined weights by using the analytic hierarchy process. The process revealed 141 indicators for sustainable tourism. Based on stakeholder theory and environmental impact theory for incorporating stakeholder's roles in the assessment of sustainable tourism, they examined indicators and came with the need to foster stakeholder involvement as well as better planning for sustainable tourism.

There was the need to analyze residents' perceptions about sustainable tourism initiatives so Boley et al. (2017) examined the sustainable tourism initiatives for residents' perceptions across three US counties and found uniformly high levels of importance towards sustainability but these residents have varied perceptions of performance. They also have discussed methodological and theoretical considerations and showed importance-performance analysis (IPA) within social exchange theory as well as Oliver's expectancy-disconfirmation paradigm. To analyze the sustainability achievement at the destination level, a study by Ng et al. (2017) evaluated the sustainability achievement of Tioman Island by using the sustainable Ecotourism Indicator system (SEIS) which considers sustainability if stakeholders make a positive contribution to one another. They carried out the study by designing three versions of the questionnaire and found Tioman Island potentially sustainable with 58.89%.

Dedeke (2017) explored the creation of sustainable tourism business in the Amazon forest. He found that the process proposed by actor-network theory (ANT) has been followed and form principal actor the ability to learn new thing,

capacity to adapt changes and participation of experts plays role in success. Analyzing differently, Dvarskas (2017) described one approach for connecting recreational visitor behavior with an ecological model that captures the negative effect of increased visitors upon the environment. He concluded that the resilience of a tourist destination plays important role in sustainability as a result of increasing tourist numbers. He has also given directions for future work such as additional model components, refinement of the relationships and its application in additional areas.

Although tourism is a source of revenue and growth yet adverse impacts are a much concerning issue for its sustainability, the same issue addressed by Paramati et al. (2017) and they investigated the impact of tourism on economic growth and emission of carbon dioxide in eastern and western EU countries. They found that there is a relationship between the variables and tourism stimulates economic growth in both western and eastern EU countries. Interestingly, they found that tourism increases CO_2 emissions in eastern countries but reduces in western countries of EU and it only depends on the sustainable tourism policies and good management. One country-focused study of Brendehaug et al. (2017) is good to analyze policy shift of Norwegian government and he examined how sustainability can be integrated with tourism planning due to the shift of Norwegian government from sector approach to integration approach. By applying the integration of environmental policy concept, they showed that sustainable tourism is partially integrated with three issues that Norway has a weak structure for policy integration and sustainable tourism integration is stimulated by bottom-up integration and national horizontal integration as well as they found no evidence for this shift for sustainable tourism from sector approach to integration approach.

The exploratory study conducted by Romolini et al. (2017) to analyze the phenomenon of the Albergo diffuse (AD) model and found that considerable investment is required for structural renovation and greatest importance of sustainability and stakeholder relations, as well as they, identified that Italian Ads are small but considers communications, marketing policy and use of digital technology.

Furthermore, small and medium-sized tourism enterprises can play their role in sustainability, a study focusing on this conducted by Coles et al. (2017), analyzed environmental resources and costs in the business model of small and medium-sized tourism enterprises. They reported that economic and environmental performance in the case of sustainable tourism discourse is overlooked. They stressed with strong evidence that in environmental

management by SMTE's contemporary approaches should consider the current and changing conditions to form business models. In another such type of study, Borden (2017) investigated the initiatives of small and medium-sized enterprises and their impacts on the guest experience. By interviewing 16 SMTE managers and 408 guests, cluster analysis results showed that in water use segments one cluster focused to increase return on investment while guests reported that these initiatives are not operationally viable. They found that two initiatives suggested by managers are viable and appropriate.

The above-mentioned literature indicates the current status and importance of sustainable tourism as the three aspects of sustainable tourism must be in a good balance for future growth and sustainability of tourism. A better understanding of sustainable tourism, determination of sustainability, different factors and indicators and better practices in this regard can play a vital role in the future sustainability of tourism.

2.3 Global initiatives and Sustainable Tourism

There is a dire need for integration in support of global initiatives, and United Nations' 2030 agenda for sustainable development is at the top for the consideration of tourism and sustainability. In 2015, the General Assembly of the United Nations adopted the 2030 agenda and its 17 sustainable development goals to end poverty, protect the planet and ensure prosperity for all. Tourism is included in the sustainable development goals (SDGs) in the introduction, as well as a target in Goal 8 (promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all), in Goal 12 (sustainable consumption and production patterns), and Goal 14 (conserve and sustainable use of the oceans, seas and marine resources). So, the key role of sustainable tourism is explicitly mentioned in three of the 17 sustainable development goals. The 10-Year Framework of Programs (10-YFP) on sustainable consumption and production patterns is also at the forefront, which is a global commitment to accelerate the shift towards sustainable consumption and production in both developed and developing countries, adopted in 2012 at the World Summit on sustainable development (United Nations, 2015).

The 20 indicators proposed by Eurostat (directorate-general of European Commission) in 2005 are also worthwhile to mention, covering economic, environmental, and social domains however are intended to be applied at the regional level only (Eurostat, & Statistical Office of the European Communities, 2005). The OECD workshop in 2010, also showed concern by highlighting three major challenges for sustainable tourism which are climate change, resource

conservation and social cohesion and these issues requires attention at the regional and well as the national level (OECD, 2010).

The European Tourism Indicator System (ETIS) launched by the European Commission, has defined 43 core indicators and has been trailed in NECSTouR regions (Network of European Regions for Sustainable and Competitive Tourism) and other destinations are also very encouraging as an example of best practice (European Commission, 2016).

2.4 Indicators of Sustainable Tourism

The concept of sustainable tourism needs good and clear indicators for measurability and assessing the impacts of tourism. In tourism planning, policies and management sustainable development is a prevailing paradigm (Bianchi, 2004; Bramwell & Lane, 1993). The sustainability of tourism is more than just the physical environment and covers different aspects (Bramwell & Lane, 2008; Holden, 2003). At the same time, Sustainable tourism is a controversial concept (Liu, 2003; Sharpley, 2009; Wheeller, 1993) but indicators are important to measure and monitor the impacts of tourism (Butler, 1993; Wheeller, 1993). Therefore, the formulation of indicators is necessary for practices and research on sustainable tourism. Indicators provide essential information regarding sustainable tourism and an operative framework with policy relevance (Hezri & Dovers, 2006).

The focus on the use of indicators is increasing to assess the level of sustainability since the United Nations Earth Summit of 1992 and as a result, international organizations suggested different indicators from time to time (Vera & Ivars, 2003). The main purpose of all such efforts is to keep the growth of tourism in limits (Holden, 2007; Hunter, 1995). The literature refers to indicators as a necessary tool to measure sustainability by monitoring development in the tourism sector (Castellani & Sala, 2010; Crabtree & Bayfield, 1998; Dahl, 1995; Gahin, Veleva, & Hart, 2003; Smeets & Weterings, 1999; Valentin & Spangenberg, 2000) and communicating the knowledge in the form of reliable data on tourism (Blackstock, McCrum, Scott, & White, 2006; Blancas, Gonzalez, Lozano-Oyola, & Perez, 2010; Roberts & Tribe, 2008; Sanchez & Pulido, 2008; WTO, 1996).

The first work on tourism in terms of sustainability and indicators development is of the International Federation of Tour Operators under the project of the European Community Models of Sustainable Tourism in the year 1994 (Hughes, 1994). Then, the guidelines of indicators provided by the World Tourism Organization in 1995 as well as an updated version in 2005 which is

being regarded as a very helpful guidebook for researchers and the relevant stakeholders (WTO, 1995; WTO, 2004). Furthermore, the indicators developed by the German Federal Environment Agency in 2001, the headline indicators by English Tourism Council in 2002 as well as national indicators by French Institute for Environment are worthwhile to mention in the tourism literature. These indicators and also other country-specific indicators developed by other researchers are providing a guideline for sustainability monitoring and measurement in the tourism industry. However, these indicators are not without problems as these vary with the stakeholder needs and place and the type of dimension under consideration and indicators should follow certain characteristics for convenience, to make them effective and user-friendly.

Despite these developments, still, there is less consensus on the issue of sustainability, its exact meaning and components (Bell & Morse, 2012; Tsaur & Wang, 2007; Weaver & Lawton, 1999, Dimoska & Petrevska, 2012, Javed & Tučková, 2018) while some consider it unachievable target and immeasurable goal (Ko, 2005) so logical assessment methodologies are much needed for higher validity and reliability to build and increase confidence on the results for decision making due to the dynamic and unpredictable nature of the tourism industry (Asmelash & Kumar, 2019). Sustainability of tourism does not refer to a single form but all the aspects related to the tourism industry should be sustainable (Sedai, 2006) and tools developed to assess the impacts are not adequate as well (Asmelash & Kumar, 2019) which hinders the practical assessment of sustainability (Choi & Sirakaya, 2005; Ko, 2001; 2005). Besides, the assessment of tourism sustainability with real cases is also not well-developed (Ko, 2001, 2005; Cernat & Gourdon, 2012, Choi & Sirakaya, 2005) and despite having a lot of indicators in the literature, a very few have been practically implicated and evaluated (Reihanian et al., 2015; Blancas et al., 2010; Rebollo & Baidal, 2003; Lee & Hsieh, 2016). Although Ko (2005) developed a comprehensive methodology for the assessment of sustainable tourism yet a very few scholars followed this model. A practical model has also been developed for the assessment of sustainable tourism in Iran (Mahdav et al., 2013).

Most past studies focused on the traditional dimensions of sustainable tourism, i.e., economic, socio-cultural, and environmental (Dubois, 2005; Schianetz & Kavanagh, 2008) or some added also institutional sustainability.

Table 1: Summary of studies, related to indicators of sustainable tourism

Authors	Methods Used	Country/Research area/Sample	Findings	Journal
Rebollo and Baidal (2003)	Qualitative	A Spanish Mediterranean destination, Torrevieja	Based on, - Pressures on the local environment - Residents' and tourists' perceptions - Policy responses The system of indicators was applied to the municipality of Torrevieja with the obtained results beneficial for decision making concerning resort management along with the understanding of local tourist systems and integration of sustainable development policies.	Journal of Sustainable Tourism
Somarriba-Chang and Gunnarsdotter (2012)	Qualitative and Quantitative (both)	Mambacho Volcano and Datanli-El Diablo in Nicaragua. Using individual structured, semi-structured interviews, and focus group discussions with	This study found that community participation in ecotourism is largely dependent on the management system as well as a minimum of government support to infrastructure and local entrepreneurship is required but ecotourism development is complex and demanding, one	Journal of Sustainable Tourism

		local people, farmers, and tour operators.	approach does not fit all for sustainable development.	
Simpson (2001)	Qualitative-reviewed the literature		This study was about the role of stakeholder as a contributor to sustainability. The review illustrates the evolution of theory related to the sustainability of tourism, stakeholder participation in tourism sustainability and strategic planning as an appropriate framework. It is found that these concepts are well supported in literature with little empirical evidence in practice.	Current Issues in Tourism
Ruhanen (2004)	Quantitative	30 local tourism destinations in Queensland, Australia.	The study utilized a tourism planning process evaluation instrument developed by Simpson (2001), and found that local tourist destinations are not fully integrating the sustainability principles in their planning processes.	Tourism and Hospitality Planning & Development
Nowacki et al. (2018)	Quantitative, a questionnaire evaluation	37 tourism development strategies in 13 provinces, 11 cities, 5 counties, 6	The paradigms of sustainable development of tourism have been implemented to only a small extent. The highest-rated domains of the tourism development strategy in the examined documents are strategic	International Journal of Sustainable Development & World Ecology

		municipalities, and 2 other areas of Poland.	planning indicators and implementations, monitoring and evaluation.	
Ng, Chia, Ho, and Ramachandran (2017)	Quantitative	Data was collected from thirty-nine government officers, 104 local communities, and 105 tourists of Tioman Island, Malaysia.	All the stakeholders rated their perceptions of sustainable relationships with two other stakeholder groups. Using the Sustainable Ecotourism Indicator System (SEIS), The findings indicate that Tioman Island is classified as 'potentially sustainable' with a percentage weighted score of 58.89%.	Tourism Management
Dedeke (2017)	Qualitative	Investigation about the principal actors, who created a sustainable tourism business in the Amazon forest, Brazil.	The actor-network-theory (ANT) revealed that the actors created his/her network by using orchestration. The ability of the principal actor to learn new things, to adapt to change and creating spaces for global experts played a significant role in success.	Tourism Management
Dvarskas (2017)	Quantitative	Two simulations were run from survey data and water quality data for	The study suggested that the resilience of a given tourist location to the changes brought by increasing tourism numbers is important in	Journal of Environmental Management

		two beach locations in Croatia.	determining its long-run sustainability.	
Brendehaug, Aall, and Dodds (2017)	Qualitative	The four case municipalities in western Norway	The concept of environmental policy integration is applied through case analysis and found that sustainable tourism is partially integrated with all cases and outlined three key issues such as the weak structures for overall tourism policy integration and stimulation by national horizontal integration but no evidence found for the announced shift from sector approach to integration approach.	Journal of Sustainable Tourism
Blancas et al. (2011)	Quantitative	The practical use is illustrated using the case of rural zones in a consolidated destination such as Andalusia (Spain).	The authors suggested a method for obtaining sustainability indexes by aggregation with the composite indicator. The procedure is based on the combination of principal component analysis and distance to a reference point.	Science of the Total Environment

Source: Author's elaboration from the literature review (2019)

Despite this existing literature on tourism and sustainability with considerable work on the level of organization and academia, their use has been hampered by technical and conceptual difficulties (Torres-Delgado & Saarinen, 2014; Ceron & Dubois, 2003; Vilà et al., 2010). Similarly, a single set of indicators cannot be used for every destination, as there is no consensus among scholars (Cernat & Gourdon, 2012; Fernández & Rivero, 2009). Therefore, careful assessment is also needed for higher validity and reliability to ensure robustness and this assessment has been overlooked in the majority of previous studies (Reihanian et al., 2015), while some authors such as Choi & Sirakaya (2005), and Ap & Crompton (1998) considered these issues and recommended the application of Structural Equation Modeling (SEM). This doctoral thesis will consider such aspects for higher robustness by using SEM. Furthermore, Asmelash & Kumar (2019) departed from the traditional three dimensions of sustainable tourism and also considered institutional sustainability. However, the total variance explained is of moderate level (49.008%), and hence Asmelash & Kumar (2019) suggested including some additional dimensions of sustainability, such as infrastructural sustainability and technological sustainability along with respective indicators.

The literature quite obviously indicates the importance of infrastructures. Infrastructures are the central nervous system of the entire unit, society and destination; they are net systems that contribute to providing services to the public. Whilst infrastructural sustainability (IS) refers to sustained and effective system functionality for economic, social, and ecological development with the entire life cycle of the infrastructure. The basic form of infrastructure and organizational facilities such as roads, buildings, and power supplies are needed for the smooth operation of any society and enterprise.

In light of this, better infrastructure, wide roads, good transportation is also necessary for tourism sustainability. Johnston & Tyrrell (2005) also stressed that infrastructure should also be considered for sustainability and they presented a dynamic model of sustainable tourism by describing the role of infrastructure. Some other authors also pointed out the role of infrastructure in tourism sustainability, such as Casagrandi & Rinaldi (2002) presented a theoretical approach by discussing the role of infrastructure. Also, Gössling et al. (2002) also acknowledged the need for necessary infrastructure for tourism sustainability which consequently enhances the tourist satisfaction and motivates them to revisit (Javed, Tučková, & Jibril, 2020a, Javed, Tučková, & Jibril, 2020b).

In this vein, Panasiuk (2007) mentioned the overlooked fact of infrastructure in tourism as a necessary component of a tourist product at a regional level. The infrastructure consists of buildings, devices and service institutions with the crucial need of existence for the appropriate functioning of the economy and society. The division of infrastructure is in two categories; technical side (includes the devices and tools used in transport, gas, power, heat and road industry) and social side (includes the devices and institutions concerned with culture, education, science, health, public administration, physical culture and tourism. Tourism infrastructure can also be considered as a backbone of the tourism industry because infrastructure helps the tourists to stay and use tourism attractions such as facilities related to accommodation, gastronomy, and transportation (Panasiuk, 2007). Therefore, a better infrastructure with adequate facilities is essential for the growth and sustainability of tourism. This fact is just described implicitly and authors often overlook to describe and incorporate the infrastructural sustainability in tourism explicitly.

Similarly, the technological aspect of sustainability is also of worthwhile importance and often overlooked by researchers. Technological sustainability is very important for tourism in the modern era because the role of technology in tourism has increased much. The innovations and the use of technology play role in the achievement of sustainability (Rantala et al., 2018). Hence the resulting impact is significant on societal qualities, human well-being, economic growth and sustainable development (Anaddon et al., 2016; Shrivastava et al., 2016). The adoption and utilization of technologies also help to combat the adverse impacts of changing climate (Scherr et al., 2012; Long et al., 2016). From a sustainability perspective, the use of technologies is important and quite essential for competitiveness (Jun, 2018).

The rational exploitation of natural resources is essential for sustainability. Therefore, the use of modern technology can reduce the consumption of energy and minimization of environmental damage (Wasiak, 2004). The term ‘sustainability’ and ‘sustainable development’ are in limelight since the convention of the UN in 1979 on ‘Environment and Development’ (Wright, 2002; Khan & Islam, 2005; Appleton, 2006). Since then, the term sustainability directs to incorporate all sectors, including business operation, technology development, and natural resource management among others (Khan & Islam, 2007). Therefore, in the consideration of sustainable development of tourism other aspects should also be considered to be exhaustive. The issue of technological sustainability has also been asserted by other researchers that salient features of sustainability should be considered and discussed, such as ecology, economy, society,

technology are at the forefront (Cabezas, Pawlowski, Mayer, & Hoagland; 2004). Therefore, technological sustainability in tourism can be linked with sustainable growth and development of tourism.

Furthermore, the role of information and communications technology (ICT) is also at the forefront in the tourism industry to provide reliable information before travel and during travel (Kumar, 2014; Barile, Ciasullo, Troisi & Sarno, 2017). Such as ICT and social media also impacted the behavior of tourists (Javed et al., 2020) and such consideration is important for tourism sustainability and long-term growth at the destination and regional level. Gretzel, Sigala, Xiang, and Koo (2015) discussed the foundations and developments in smart tourism and raised the importance of issues like the availability of free tourist guide through smartphones' app, support services, availability of data, and numbers/web links for a medical emergency.

Although the term technology refers to "any systemic attempt to transform things coming into your organization into things going out", (Haywood, 1990) and might be expanded by including not only physical technology but also a variety of management systems (Levitt, 1976), yet categorization of technologies into hard (traditional), soft (managerial), and combination of both is a convenient way of looking the matter.

The use of technology in the sustainable development of tourism can better be understood by having a holistic view of the role of technology in the tourism industry. In this vein, Stipanuk (1993) explained seven dimensions of technology in tourism. Although the study is not a recent one, yet the defined dimensions are helpful to grasp the essence of the matter.

Firstly, technology played its role by contributing to tourism growth. In recent times, the use of technology is inevitable for sustained growth. Particularly, locational factors such as climate and physical conditions, existing facilities, access to the attractions and use etc. Technology plays a role here in most of the locational factors. The role of technology in the traveler's access to destinations is considerable. Better traveling options such as low price tickets increased range and efficiency of aircraft, as well as high-speed trains also played role in tourism growth (Stipanuk, 1993). Further, in this vein, the use of high-speed trains also played a role to alleviate the overcrowding of airports (Stipanuk, 1993).

Secondly, the role of technology in creating tourism experience is also substantial and important. However, this role is relatively less-focused and ignored in the literature. Skills of engineers in planning the infrastructure, the architect in design, and the craftsman in the construction are the creator of tourism

experience and helpful for the growth and sustainability of tourism. Such a role cannot be ignored to improve the outlook of a tourism destination (Stipanuk, 1993).

Thirdly, the use of technology is also a protector of the tourism experience. Certain tourism events are fragile and vulnerable due to the involvement of risk, safety, and security. The use of technology is beneficial for the protection such as to maintain law and order situation by using walk-through gates, weapon and bomb detection, and metal detectors at the tourist site. Further, the use of technology is a protector of the tourism experience through close-circuit television cameras, smoke detectors, as well as life-safety systems (Stipanuk, 1993).

Fourthly, the use of technology as an enhancer of the tourism experience is also worthwhile since technology can contribute towards a more favorable or pleasurable experience and can help to operate the tourism industry more efficiently and economically. The use of technology in capacity management is very important such as if the facility of multi-language commentary is available can be an enhancer of the tourism experience. The inflight or bus travel videos for entertainment and the use of high-tech glazing materials to walk through the water in marine tourism (Stipanuk, 1993).

Fifthly, tourism also exists as a focal point by visiting enterprises in operation such as ports, laboratories, and farms and even by offering visits to the hospitals. Hence, tourism moved ahead from just mindless sunbathing or visiting museums. Therefore, the role of technology is also like a tool to give efficiency, quality, new services, new combinations, and new best practices (Stipanuk, 1993).

In a recent study carried out by Rantala et al. (2018) about the use of technology, they explored that technology and adoption of technology plays role in sustainability, particularly if firms and destination management enterprises like to enhance economic growth and financial performance.

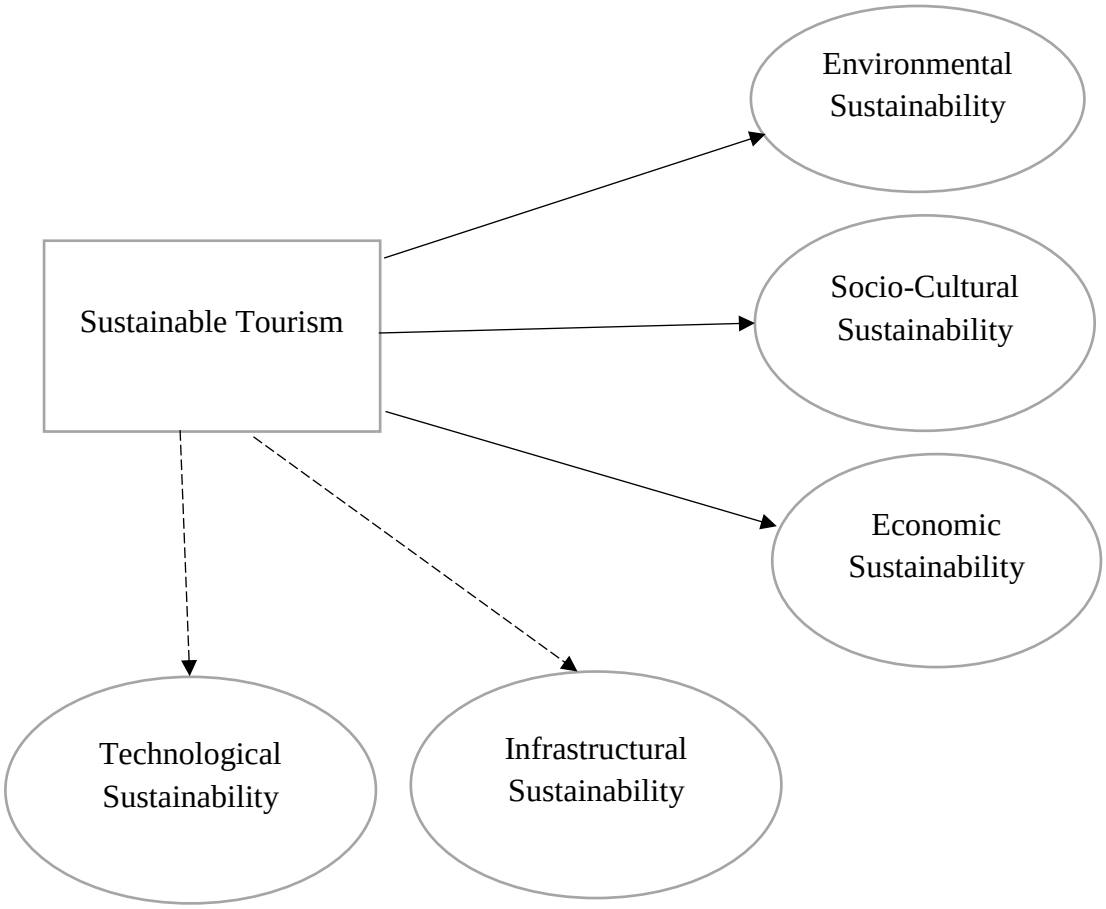
Furthermore, during the late 1990s, the introduction of internet and information communication technologies (ICTs) introduced the second industrial revolution (Fletcher et al., 2017) which affect almost all industries including travel and tourism, and makes it necessary to adopt changing scenario of doing business for enhancing competitiveness and sustainability. Hence, it can rightly be said that the enhanced use of ICTs has changed the best way of operation and strategic practices by altering the competitiveness of enterprises at the regional and global level (Buhalis & Law, 2008). Then, due to the increasing use of technology, a term with the name eTourism emerged and was defined as the application of 'ICTs

on the tourism industry has put dramatic impacts on the tourism organizations in terms of their strategic and operational management practices (Buhalis, 2003).

The emergence of Web 2.0 and internet-based applications helped to create and share user-generated content (Kaplan & Haenlein, 2010), also created a revolution to reach the potential tourists and build a destination image (Javed et al., 2020). Hence, based on the virtual representations destinations could enhance their image globally (Fletcher et al., 2017). Interestingly, in such a dynamic and changing business environment many tourism organizations failed to meet the challenges of eBusiness. With the changing and improving capabilities in ICTs, almost everybody has access to unprecedented levels of information and knowledge, therefore for competitive advantage and sustainability tourism organizations must incorporate ICTs in their business strategy due to the significant changes happened in the tourism industry caused by technology (Ali & Frew, 2013). Keeping this in view, tourism businesses and destinations should re-engineer their businesses to take advantage and be technologically sustainable.

Along with the use of ICTs, certain prerequisites are necessary to be successful such as long-term planning, rational management of hardware and software, re-engineering of the processes, management commitment, and training. Hence, the processes and systems related to technology should be redesign to achieve sustainable competitive advantage and eTourism should be considered for the digitization of all processes. Consequently, it is the imperative partner for the marketing, promotion, and better coordination of the tourism sector (Ali & Frew, 2013). In light of this, it is right to claim that technological sustainability is quite essential for the competitiveness and long-term sustainability of tourism businesses.

The identified research gap related to infrastructural and technological dimension of sustainable tourism to improve the total variance explained (Asmelash & Kumar, 2019) that there have been no studies concentrating on this gap so far (Javed & Tučková, 2019). Therefore, this doctoral thesis will fulfill the said research gaps by introducing two new dimensions of sustainable tourism along with respective indicators in an attempt to improve and moving towards an exhaustive approach.



Note: Continuous lines indicate traditional dimensions, dashed lines indicate new dimensions
(Source: Author's own elaboration)

Figure 5: Traditional Versus Suggested New Dimensions of Sustainable Tourism

3. RESEARCH PROBLEM, QUESTIONS, AND OBJECTIVES

This doctoral thesis focuses to develop indicators for assessing and measuring tourism sustainability for the selected destinations in particular cities of Pakistan. As discussed above, tourism has some downsides along with benefits so the need to keep an eye on over-tourism status and impacts to maintain balance among environmental, economic and socio-cultural aspects. In the coming years, it is expected that tourism will show impressive growth as international tourists increased by 300 percent in a previous couple of years by reaching around two million (Pakistan Tourism Development Corporation, 2018). However, the tourism business is not following the contemporary way of action in providing quality services and very little dissemination of information among tourism stakeholders for achieving sustainability. Further, the indicators developed and suggested by other researchers and international organizations cannot be followed blindly in Pakistan due to different types of destinations, for example, suggested by World Tourism Organization (WTO) and European Commission ETIS toolkit and to develop good indicators it is strongly recommended to include the relevant stakeholders as much as possible (WTO, 2004; Organization for Economic Cooperation and Development, 1994; Miller, 2001; Choi and Sirakaya, 2005; Ap & Crompton, 1998) and this doctoral thesis involves key stakeholders in the development of the indicator. The total variance explained should be 60% or more but in the study of Asmelash & Kumar (2019), it is 49% which invites some more dimensions to be included to improve this value so, this doctoral thesis includes some more dimensions for the sustainability of tourism.

The new important dimensions are infrastructural sustainability and technological sustainability, recommended by Asmelash & Kumar (2019) along with running different tests including Principal Component Analysis (PCA) and Structural Equation Modeling (SEM) for assessing reliability and validating the indicators. Furthermore, to assess the change of tourism status and to have cross-location comparisons and different temporal units the use of an index is better (Mayer, 2008; Torres-Delgado & Saarinen, 2014), therefore this doctoral thesis develops an index, based on the methodology used by Alfaro Navarro, Martinez & Jimenez (2020), along with the introduction of two new dimensions (infrastructural and technological aspects) of sustainable tourism (Figure 5).

Thus, previous works have some research gaps related to

- *two new dimensions, such as infrastructural sustainability and technological sustainability, suggested by Asmelash & Kumar (2019), which are important for developing sustainable tourism but published papers have not focused on so far,*
- *development of multidimensional sustainable tourism index with new dimensions and the use of this index for cross-location comparisons that prior papers have undeveloped.*

3.1 Research Problem

Based on the above arguments, the research problem of this work is to develop a comprehensive set of indicators and index to monitor the sustainable tourism parameters in Pakistan including practical implications.

3.2 Research Questions

Based on the research problem and research gaps, this thesis provides the following main research questions:

RQ1: What are the validated indicators of sustainable tourism for developing the tourism industry?

RQ2: How to develop the multidimensional sustainable tourism index (MSTI) to monitor sustainable tourism?

RQ3: How to apply MSTI to compare sustainable development of tourism among locations?

RQ4: What are the practical implications for local authorities aimed at developing sustainability for the tourism industry?

3.3 Research Objectives

The main research purpose of this work is to develop a tool that provides meaningful decisions to local authorities to advance sustainable tourism and improve the image of destinations. Thus, this research achieves the following objectives concerning sustainability indicators and tourism to fulfill the aforementioned research gaps:

- To develop and validate sustainability indicators based on traditional dimensions (economic, social, and environmental aspects) and two new dimensions (infrastructural and technological aspects).
- To develop the multidimensional sustainable tourism index.

- To compare the multidimensional sustainable tourism index among selected cities in Pakistan.
- To provide some practical suggestions for local authorities to improve the destination's image and sustainability in such cities in Pakistan.

In light of the aforementioned research questions, problem and objectives, this doctoral thesis attempts to fulfill some research gaps for overviewing sustainable tourism comprehensively. As mentioned earlier, specific research gaps are related to two new dimensions of infrastructural and technological sustainability. In the vein of sustainability assessment, some authors made logical assessment methodologies (Guijt & Moiseev, 2001; Cernat & Gourdon, 2012; Ap & Crompton, 1998; Ko, 2001, 2005; Bell & Morse, 2012) but the achievement of dependable results are lacking in the literature. Further, indicators of sustainable tourism as assessment tools are considered to be reliable, simple, clear and flexible. Therefore, to develop and validate sustainability indicators is necessary because such development and validation is rare in the literature. Hence, the first research question and objective particularly focuses on the development and validation of sustainability indicators of tourism.

Based on the robust and validated indicators, the measurement and monitoring of sustainability are quite beneficial for any destination or location (Alfaro Navarro et al., 2020). Therefore, the second research question and objective directly relate to the development and monitoring of the multidimensional sustainable tourism index (MSTI). Such an index is based on the assessment of all the relevant indicators and predicts the overall level of sustainability for each dimension as well as for all the dimensions simultaneously. This developed MSTI is also helpful for cross-location and temporal comparisons.

Similarly, the third research question deals with the application of the developed MSTI to compare sustainable development of tourism among locations, such as the selected cities in Pakistan for this doctoral thesis. In this vein, three cities of Pakistan have been selected to monitor sustainability and have comparisons among cities. The validated indicators for the traditional dimensions of sustainability (economic, environmental, and socio-cultural) and two new dimensions of sustainability (infrastructural and technological) have important practical implications for local authorities, destinations managers, practitioners, policymakers, and administration to improve the destination's image and sustainability. Therefore, the fourth research question and objective directly deals with important practical implications.

4. RESEARCH METHODOLOGY

4.1 Research Design

A good research design is defined as the overall strategy adopted to carry out research, address the research problem and achieve the objectives of the study. Hence, a good research design is quite essential and works as a tool effectively and coherently. This doctoral thesis used a mix-methods approach to fulfill the research gaps and achieve the objectives of the research. A mix-methods approach is considered more suitable and preferable over qualitative or quantitative due to the provided avenues for better understanding of complex issues and addresses the research problem comprehensively (Creswell & Creswell, 2017). The mix-methods approach can be applied either sequentially or simultaneously in a single study (Creswell & Creswell, 2017), hence corroborates the findings from qualitative and quantitative analyses (Saunders, Lewis, & Thornhill, 2009). In this vein, a mixed methodology approach is regarded as a preferable and better approach for improving the validity and reliability of the study (Bell, Bryman, & Harley, 2018).

To do qualitative analysis, this doctoral thesis employed the Delphi method, which is a pragmatic approach based on the philosophical assumptions of a great educator and philosopher John Dewey who asserted to relate the social science research with practice and the process of decision-making (Kirk & Reid, 2002). Furthermore, in the vein of qualitative inquiry, such as well-known approaches, grounded theory, constructivist inquiry, phenomenology, and narrative inquiry, the Delphi method is often overlooked and less discussed in the literature (Brady, 2015). Hence, this thesis discussed and used the Delphi method as a tool for qualitative analysis based on its appropriateness for getting consensus-base indicators.

The thesis also employed a survey method for quantitative analysis. Quantitative research either uses an experiment or survey method to collect data (Creswell, 2003). The arguments of Creswell (2003) also clarifies that the quantitative approach is associated with the paradigm of positivism. This paradigm in the methodological context is the deductive approach (Saunders et al., 2003). In the survey method, the data was collected from 450 respondents in three cities of Pakistan through quota sampling to get the questionnaires filled by local tourists (residents), domestic tourists, and international tourists. In each selected city of Pakistan, five tourist attractions have been selected to get data as mentioned in Figure 7.

Table 2: Proposed Research Methodology in Short

Research Approach	**Mixed-Method**	
Research Design	Qualitative (Inductive)	Quantitative (Deductive)
Research Paradigm	Pragmatism	Positivism
Research Method (strategies)	Delphi Method	Survey
Data Collection Technique	Consensus through expert opinion	Questionnaire
Sampling Techniques	Experts Selection	Quota Sampling
Study Context	Pakistan	Pakistan
Data Analysis techniques	Initially, a list of indicators was sent to experts to get the consensus-based indicators based on the Delphi method. The thesis carried out two rounds of the Delphi method to obtained consensus-based indicators	Structural equation modeling (using confirmatory factor analysis)

4.2 Indicators Development Procedure

The previous studies related to the development of indicators for sustainable tourism are worthwhile, however, these indicators are not exhaustive and this doctoral thesis follows the compatible approach, for including additional indicators (Ap & Crompton, 1998; Choi & Sirakaya, 2005; Miller, 2001). This doctoral thesis makes sure of the participation of key stakeholders including residents, tourists, and experts from the selected areas by quota sampling.

In this doctoral thesis, a mixed-method approach is used for the development and validation of sustainability indicators. The indicator collection process ended up with 192 indicators to be applied for the selected cities of Pakistan (Lahore, Islamabad, and Faisalabad). As WTO (2004) argues that 12 to 24 indicators are sufficient for any destination but on the other side if indicators

are more than 100, it's impractical too. Another author suggested that 20 to 50 indicators are very reasonable (Sors, 2001). Therefore, this thesis uses the Delphi method to reduce the number of indicators and this method is also compatible with the past studies (Amiryan, 2013; Miller, 2001; Ap & Crompton, 1998; Choi & Sirakaya, 2005).

The Delphi method firstly developed and introduced by Rand Cooperation in the 1950s and this method serves as a tool to reduce the number and range of responses to achieve consensus (Dalkey, 1969; Giannarou & Zervas, 2014). The Delphi method is particularly preferred when the exact knowledge is lacking and the goal is to obtain the most reliable opinion from a group of experts (Kittell-Limerick, 2005; Adler & Ziglio, 1996; Kreitner & Kinicki, 1992). However, there is no consensus concerning the common practice of statistical analysis of Delphi results (Landeta, 2006). Generally, a 10-point Likert scale is used when investigation about the level of importance is desired. On the contrary, the 5-point Likert scale is suitable and most common when the level of agreement is needed to investigate (Giannarou & Zervas, 2014). Therefore, a group of experts and scholars have been selected, having expertise in the relevant field. So, these experts will include faculty members from the selected universities, personals from local government, and some from tourism organizations.

The thesis uses the two-round Delphi method for reaching the final list of indicators by exploiting a five-point Likert scale, as also recommended by Green, Hunter, and Moore (1990) and Choi and Sirakaya (2005). In the first round of Delphi, 22 respondents were invited by sending a questionnaire for the evaluation process. However, only 15 participants returned the questionnaire, so the response rate was 68.18 percent. Internationally accepted criteria of sustainability indicators selection will also be provided to reduce subjectivity, the criteria include: relevance of the indicator to tourism issues in the region (European Commission, 2009; Miller, 2001; WTO, 2004), credibility of the information and reliability for users of the data (WTO, 2004), feasibility of obtaining and analyzing the information required (European Commission, 2009; WTO, 2004), clarity and ease of understanding amongst users (WTO, 2004; European Commission, 2009), limited in number, broad coverage of each indicator (European Commission, 2009), comparability over time and across regions (WTO, 2004; Tanguay et al., 2013). Along with this, respondents also requested to suggest any important and relevant indicators missed on the list.

In the second round of the Delphi method, the number of respondents was less (18 respondents) to reduce the subjectivity (Choi & Sirakaya, 2005). Out of

18 participants, only 13 participants returned the questionnaire with a response rate of 72.22 percent.

4.3 Purification of the indicator development

The relevant feedback can be obtained about the clarity, validity, and other key issues by conducting a pilot study (Cohen, Manion, and Morrison, 2002). Any ambiguity related to the research instrument can also be reduced in this way (Choi & Sirakaya, 2005).

The sample size for the pilot study should also be based on the eminent scholars' recommendations. Isaac and Michael (1995) suggested the sample size between 10 to 30 is suitable due to certain advantages such as easy calculation, simplicity, and the ability to test hypotheses. Similarly, Hill (1998) also recommended 10 to 30 participants for carrying out a pilot study. Treece & Treece (1982) referred that for 100 people, the participation of 10 would be a reasonable number for a pilot study. Johanson and Brooks (2010) also of the view that 30 representative participants are a reasonable number, whilst a little higher number is better.

Keeping in view the aforementioned guidelines, the questionnaire is distributed to 50 respondents including residents, tourists and tourism experts, by the way of convenient sampling method with the request to rate the indicators of the Likert scale (anchored at 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). However, only 37 questionnaires (74%) were valid and useable.

The corrected item-total correlations (CITC) is analyzed for reliability, as higher correlations are better instruments (Choi & Sirakaya, 2005). Several authors have used item-total correlation for the initial assessment and purification of indicators. Francis & White (2002) recommended that items with an item-total correlation coefficient of 0.5 or more should be retained. Wolfinbarger & Gilly (2003) also suggested a cut-off point of 0.5 or more is better for the coefficient of item-total correlation as a purification criterion of items. Churchill Jr (1979) suggested that reliability and internal consistency can be ensured by carrying out a purification process. Therefore, the item-total correlation coefficient is very helpful to get rid of unnecessary items having lower correlations.

Some authors suggested using corrected-item-total correlation as a criterion for the assessment and purification of items. However, both criteria are equally viable with almost the same results. Krishnaveni (2008) indicated the same state of affairs and concluded that corrected item-total correlation (CITC) is a good indicator to explain well the contribution of each item in the internal consistency.

The difference between item-total correlation and corrected-item-total correlation is the exclusion of the concerned item from the scale score otherwise both indicate the correlation between each item and the scale score (Nunnally & Bernstein, 1994). Hence, the items with CITC with a coefficient below 0.5 can be deleted for purification and enhancing the overall reliability (Krishnaveni, 2008; Asmelash & Kumar, 2019).

Table 3: Development of Indicators and Validation Phases

Indicators Development and Validation Steps	**Number of Indicators Evaluated and Retained**	**Number of Participants**
First Round Delphi Method	Initially, 192 total indicators were sent to the experts. First Round to Delphi method ended with consensus on 40 indicators	22 participants took part in the Delphi method First Round and 15 participants returned the completed questionnaire
Second Round Delphi Method	152 indicators were sent to the experts. The Second Round of the Delphi method ended with consensus on 28 indicators	18 participants took part in the Delphi method Second Round and 12 participants returned the completed questionnaire
Purification Phase	A pilot study was carried out based on 68 indicators. Based on the results, 61 indicators were retained, whilst 7 were excluded	50 participants (residents, tourists, and tourism experts) took part in the pilot study Only 37 questionnaires were valid and usable
Validation Phase	Out of 61 indicators, 5 indicators were dropped and 56 indicators were retained.	Questionnaires were distributed to the respondents at three selected destinations, with resulting 450 usable questionnaires

The five dimensions of sustainable tourism are labeled as follows, mentioned below with the help of Figure 6.

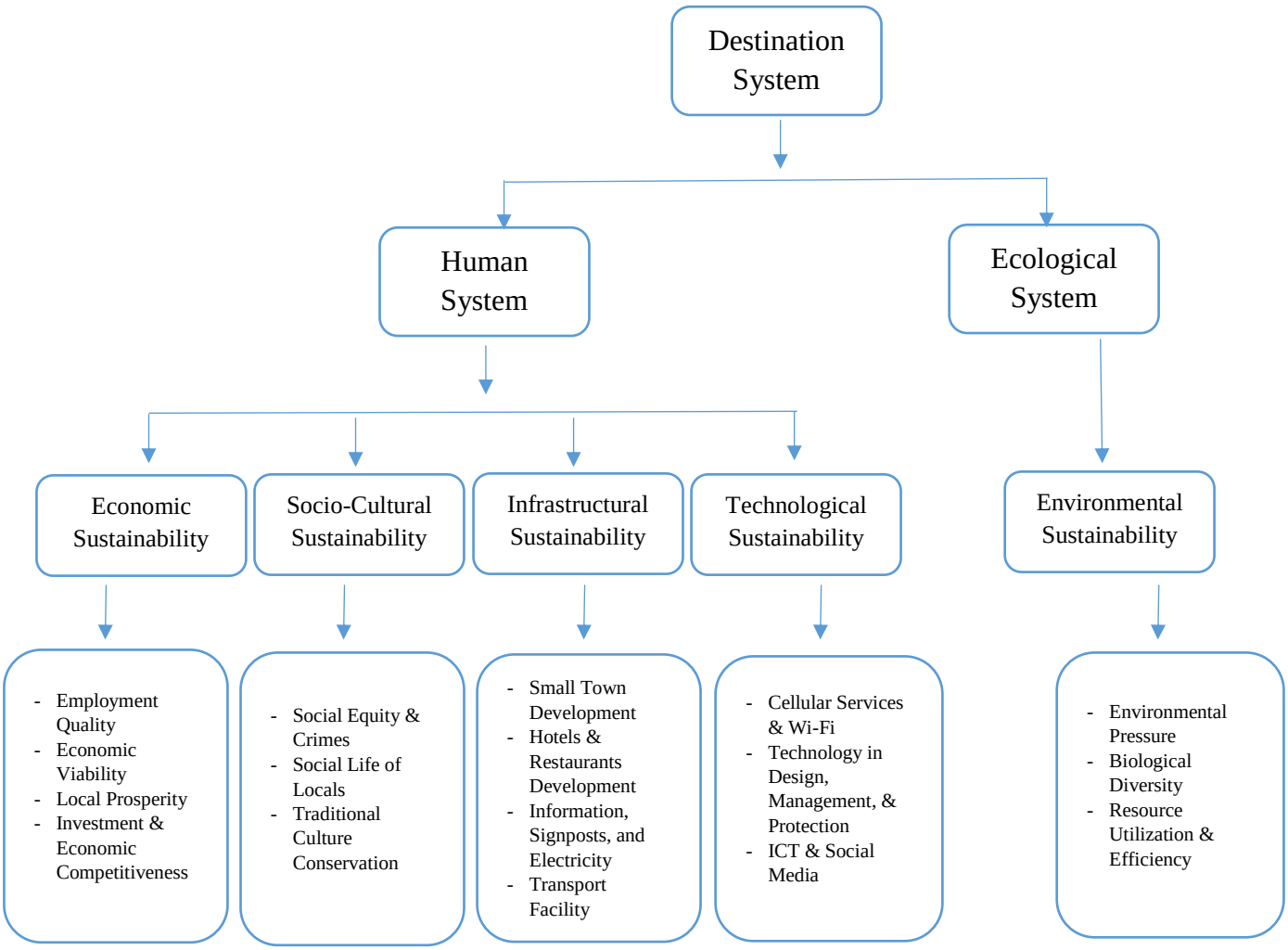


Figure 6: Destination System and Assessment of Sustainable Tourism

4.4 The Research Context and Sample Selection

The thesis purposefully selected the case of Pakistan due to the improved law and order situation, and consequently increasing number of tourists such as international tourist arrivals showed growth of 300 percent in the previous years (Pakistan Tourism Development Corporation, 2018). The studies often overlooked the issues related to tourism and sustainability in the context of Pakistan. The contemporary scenario makes it much desirable to address the issues related to sustainable tourism and to develop its indicators on a contextual basis by having the participation of relevant stakeholders. Therefore, by taking the context of Pakistan and its selected cities, the thesis attempts to develop sustainable tourism indicators along with its application to Pakistan.

The cities of Pakistan have also been purposefully selected, precisely are Islamabad, Pakistan, and Faisalabad due to certain reasons. Firstly, these cities are the most peaceful cities of Pakistan with well-maintained law and order situation.

Secondly, the responsible tourism development offices are opened in these cities with efforts to facilitate tourists especially coming from foreign countries. Thirdly, these cities are also away from seasonal impacts by receiving tourists around the year.

The first selected city is the capital of Pakistan situated on the northwestern side of the country. Since 1963, Islamabad is the new capital of the country by replacing Karachi. Due to the proximity of Islamabad to Rawalpindi, both cities are often referred to as "twin cities" (Capital Development Authority, 2020). In comparison with other cities of Pakistan, Islamabad is a very quiet, clean and green city. The lush green Margalla Hills towards the northern side of the country make the city more beautiful covered with natural beauty.

The city of Islamabad has numerous tourist attractions worthwhile to visit for domestic as well as international tourists. In such attractions, Faisal Mosque, Daman-e-Koh, Pakistan Monument Museum, Margalla Hills, Saidpur Village and Lakeview Park are notable places of considerable interest for tourists (Tripadvisor, 2020). Some pictures of the aforementioned attractions are in the appendix section at the end section of the thesis (Annexure 6).

The second selected city Lahore is the provincial capital of the Punjab province. Lahore is the second-largest city of Pakistan after Karachi and is known as the cultural center of Pakistan (City Population, 2020). Before the partition of the sub-continent, Lahore was also the center of the independence movement between India and Pakistan. Consequently, Lahore also experienced the worst riots at the time of partition (Tan & Kudaisya, 2000). Due to its old history and diversity, Lahore is considered the cultural hub with strong influence over Pakistan (Global Security, 2020).

Besides, Lahore city is also famous city due to certain features such as the major publishing center of the country, a center of the literary scene, a major center of education, home of the film industry and a center of Qawwali music (Daily Times, 2005; Dawn, 2020; Windsor, 2006). The city of Lahore is also a famous tourist destination specifically due to certain attractions in the old city, such as Badshahi Mosque, Wazir Khan mosque and Sikh shrines (Windsor, 2006; Lonely Planet, 2020). Importantly, two attractions of Lahore city, the Lahore Fort and Shalimar Gardens are included in the UNESCO World Heritage Sites (Lonely Planet, 2020). There is a long list of tourist attractions to visit in Lahore, some of them are Badshahi Mosque, Lahore Fort, Minar-e-Pakistan, The Delhi Gate, Masjid Wazir Khan, Tomb of Anarkali, Lahore Museum, Fort Food Street, Sheesh Mahal, Shalimar Garden are some of them (Sherchand, 2020). Some pictures of the selected attractions are in the appendix section (Annexure 7).

The third selected city Faisalabad (formerly known as Lyallpur) is another big city of Pakistan and is often referred to as the Manchester of Pakistan due to its textile industry just like in Manchester of UK (University of Agriculture-Faisalabad, 2015; History Pakistan, 2020). Over the years, Faisalabad is developed as a major industrial and distribution center due to its central location in the Punjab province along with its connecting rails, roads, and air transportation (Government College University-Faisalabad, 2015). The city of Faisalabad is famous for certain cultural and religious festivals including arts and crafts, local events, music and religious celebrations. The clock tower of Faisalabad is famous due to its unique location amidst the eight bazaars (Annexure 8). Certain tourist attractions of Faisalabad are worth much to visit including Clock Tower, Jinnah Garden, Lyallpur Museum, Sir Charles James Lyall Monument, Fun Dunya Amusement Park, and Water park of Faisalabad.

The sample has been selected from the aforementioned three destinations. In this vein, five attractions have been selected from each destination with a sample size of 150 respondents. The selected attractions of Islamabad are Faisal Mosque, Pakistan Monument, Daman-e-Koh, Saidpur Village, and Lakeview Park. A similar practice has been carried out for the other two destinations. The selected attractions of Lahore are Badshahi Mosque, Lahore Fort, Minar-e-Pakistan, Shalimar Garden, and Masjid Wazir Khan. Whilst the selected attraction of Faisalabad are Jinnah Garden, Lyallpur Museum, Fun Dunya Amusement Park, and Clock Tower. The overall sample size from three destinations is 450 respondents including residents, domestic tourists, and foreign tourists.

The selected sample size is sufficient enough to apply Factor Analysis and Structural Equation Modeling (SEM). Different authors also recommended that the sample size should be at least 200 for most Structural Equation Modeling or other statistical tests (Kline, 2013; Byrne, 2016; Iacobucci, 2010). So the sample size used in this thesis meets this condition well to fulfill this requirement.

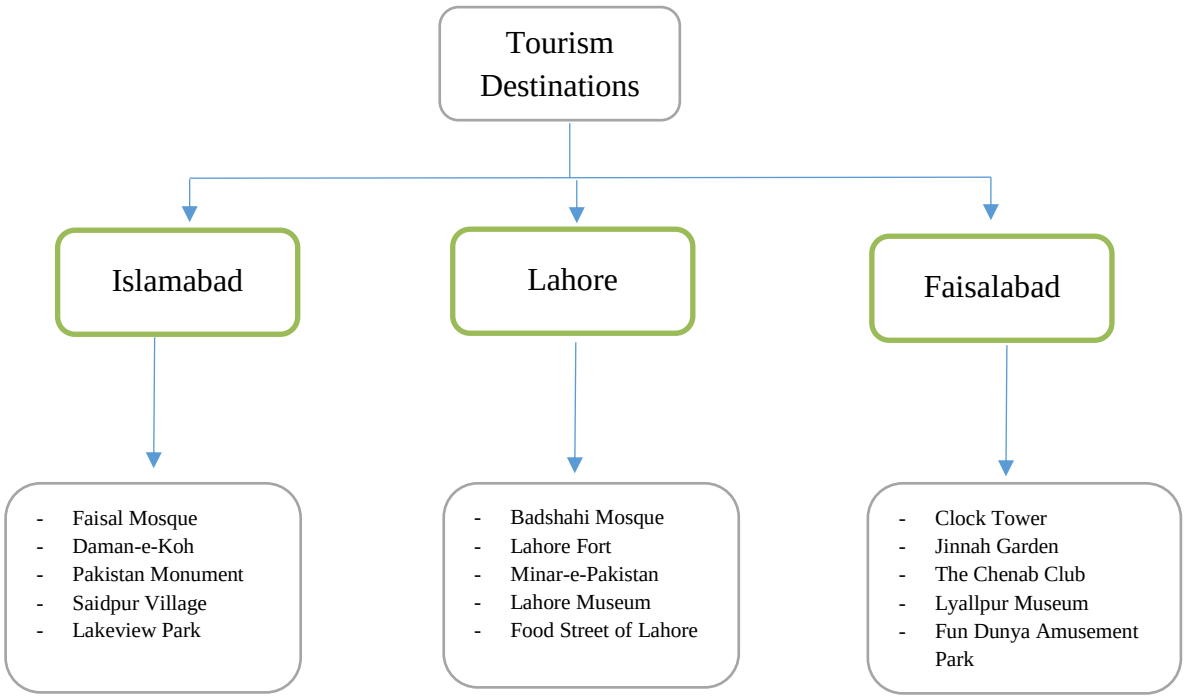


Figure 7: Selected Tourism Destinations and Attractions

4.5 The development of Multidimensional Sustainable Tourism Index (MSTI)

Many studies suggested indicators and indexes for monitoring sustainability; however, this doctoral thesis presents indexes for each of the dimensions as well as an overall index. This also helps how positive and negative performances balance out in the overall index (Alfaro Navarro, Martinez, and Jimenez, 2020).

A novel aspect of this thesis is that this thesis is going to introduce two new dimensions of sustainability to grasp an exhaustive view of sustainability. The two new dimensions are infrastructural sustainability, and technological sustainability has also been suggested by Asmelash and Kumar (2019).

Mendola and Volo (2017) and OECD (2008) suggested guidelines to be followed for the construction of the index. These guidelines reveal that the aggregation of indicators using weights is important to consider as well as normalization of the values due to the different nature of indicators.

Keeping in view the aforementioned guidelines, a weighted aggregation has been used as all the indicators do not have the same importance. So, instead of subjective weights assigned by experts, objective weights have been used by the application of Principal Component Analysis (PCA). Furthermore, the geometric mean has been used for aggregation, which is better for indicators in relative terms (Böhringer & Jochem, 2007).

In calculating the index, the first step is to transform indicators into the same number of principal components by PCA.

$$PCi = \sum_{i=1}^{k} uixi$$

Ui = characteristic vector of each principal component

Xi = indicators used for each dimension

The indicator is constructed by geometric mean and the weights assigned according to the variance retained;

$$C = \sqrt[\sum_{i=1}^{h} wi]{\prod_{i=1}^{k} PCwi}$$

Wi = the percentage of variance retained by each component

Using the objective weights assigned by PCA, the index for each of the dimensions would be:

$$EcI = \sqrt[\sum_{1}^{h} \alpha i]{\prod_{i=1}^{h} PCE\alpha i}$$

$$SI = \sqrt[\sum_{1}^{t} \beta i]{\prod_{i=1}^{t} PCS\beta i}$$

$$EI = \sqrt[\sum_{1}^{s} \delta i]{\prod_{i=1}^{s} PCE\delta i}$$

$$II = \sqrt[\sum_{1}^{j} \theta i]{\prod_{i=1}^{j} PCI\theta i}$$

$$TI = \sqrt[\sum_{1}^{k} \lambda i]{\prod_{i=1}^{k} PCT\lambda i}$$

Where,

EcI = sustainability index for Economic dimension

SI = sustainability index for Social dimension

EI = sustainability index for Environmental dimension
II = sustainability index for Infrastructure dimension
TI = sustainability index for Technological dimension

Lastly, the aggregation process can construct an overall index; denoting the Multidimensional Sustainable Tourism Index (MSTI), expressed as:

$$MSTI = \sqrt[\alpha+\beta+\delta+\theta+\lambda]{EcI^{\alpha}.SI^{\beta}.EI^{\delta}.II^{\theta}.TI^{\lambda}}$$

This index has a very useful application in the measurement and monitoring of sustainability, and comparison among destinations as well as comparison among different years, depending upon the availability of data. The ranking provided by this index highlights relatively more sustainable and competitive destinations that provide opportunities for improvement and pave the way to achieve better results.

In addition, each dimensional index helps to identify the respective weaknesses and strengths of each city/destination which will improve weaker areas and of issues of considerable attention. In this regard, the proposed index provides an addition to the already available index suggested by Alfaro Navarro, Martinez and Jimenez (2020), which just considers the traditional dimensional of sustainable tourism however this thesis proposed a multidimensional sustainable tourism index (MSTI) by including two new dimensions of sustainable tourism (infrastructure, and technological dimension) to have an exhaustive look and peep into the matter deeply, as suggested by Asmelash and Kumar (2019).

Table 4: Process of the Research Methods

Steps	**Procedures**
Step 1: Indicators Development Procedure	- Previous Literature + Expert Opinion - Use of Delphi method to reduce the number of indicators by including experts of relevant fields
Step 2: Purification of the Indicator Development	- Use of pilot study to obtain relevant feedback about the clarity and validity of indicators - For the pilot study, the questionnaires were distributed among 50 respondents
Step 3: Verification of the Indicator Development	- Total variance explained - Cronbach's alpha

	- Kaiser-Meyer-Olkin (KMO) value for sample adequacy - Bartlett test of sphericity
Step 4: Assessment of Multivariate Normality and Multicollinearity	- Q-Q plot - Kurtosis and Skewness - Value of Determinant
Step 5: Validation of the Indicator Development	- Internal reliability - Composite reliability Confirmatory Factor Analysis to examine the validity - Convergent validity - Discriminant validity - Content validity
Step 6: The development of MSTI	- The development of individual indexes (including new dimensions) as well as an overall index - The use of weighted aggregation - Objective weights by using PCA - The obtained index represents the level of sustainability based on the Likert Scale

Source: Author's own elaboration (2018).

5. DATA ANALYSIS AND MAIN RESULTS

The thesis carried out data analysis through the use of software IBM SPSS 25.0, IBM AMOS 25.0, and NumXL.

5.1 Delphi Method and Indicators Selection through Experts' Consensus

Initially, the questionnaire prepared for the Delphi method was sent to the experts consisted of 192 total indicators based on traditional sustainability dimensions as well as two new proposed dimensions related to infrastructural sustainability and technological sustainability. During the first round of the Delphi method, questionnaires were sent to 22 participants while only 15 participants (68.18%) returned the questionnaire. The participants were requested to rate the indicators on the 5-point Likert Scale. To reach consensus, two criteria were followed that at least 51 percent of experts should respond close to agree and strongly agree (Hackett et al., 2006) and the interquartile range should be at most 1 (Raskin, 1994; Rayens & Hahn, 2000). Hence, in light of this, all the indicators reached consensus followed the aforementioned criteria. It is also worthwhile to mention here that the questionnaire developed for the Delphi method used only the positive statements for sustainable tourism.

The first-round results of the Delphi method indicate that the indicators for economic sustainability reached consensus are, *"number of local people/ residents employment in tourism", "Average tourism employee income", "number of tourism businesses owned by the local community", "ratio of the number of local to external businesses involved in tourism", "total fees collected by the community for access/use of community attractions", "percentage increase in land and housing prices over time", "tourism resulted in local economic diversification", "tourism development increased the community's quality of life", "tourism attracts investment and spending for the tourism site", and "site appears to be competitive with surrounding states in tourism development"* (Annexure 1). Similarly, the indicators reached a consensus for the dimensions related to environmental sustainability, socio-cultural sustainability, infrastructural sustainability, and technological sustainability are given with details in Annexure 1. Proceeding ahead, for the second round of the Delphi method, the questionnaires were sent to 18 participants and only 12 returned (66.67%).

In round two, the indicators reached consensus for the dimension of economic sustainability are, *"Ratio of tourism employment to total employment", "Average tourism wage in community", "Occupancy rates in accommodation*

establishments", "Percentage increase in expenditures (groceries, transportations, leisure, etc.), "Tourism created job opportunities for local people", "Tourism as strong economic contributor to the community", "Tourism generates substantial tax revenues for the local government", and "Tourism creates new markets for our local products" (Annexure 2). Similarly, all the indicators reached experts' consensus for environmental, socio-cultural, infrastructural, and technological sustainability are given in Annexure 1 (for Round 1) and Annexure 2 (for Round 2) with the details of mean, median, and interquartile range values.

5.2 Pilot Study for Purification of Indicators:

A pilot study is carried out as an important part of research activity and purification of indicators. Just like mentioned in the previous section about research methodology, a corrected-item-total-score correlation has been calculated through the statistical software IBM SPSS 25.0 and all the indicators below the value of 0.5 are deleted to enhance the reliability. Table 5 to Table 9 also shows that items deleted are in bold font, hence excluded from further analysis.

Table 5: Purification of Economic Sustainability Indicators

Economic Sustainability Indicators	Corrected Item-Total Correlation	Total Indicators	Coefficient of Cronbach's Alpha
1. Number of local people/local residents' employment in tourism	0.558	18	0.903
2. Ratio of tourism employment to total employment	0.550		
3. Average tourism wage in community	**0.428**		
4. Average tourism employee income	**0.384**		
5. No. of tourism businesses owned by the local community	0.690		
6. Ratio of the number of local to external businesses involved in tourism	**0.442**		
7. Occupancy rates in accommodation establishments	0.799		
8. Total fees collected by community for access/use of community attractions	0.537		
9. Percentage increase in land and housing prices over time	0.807		
10. Percentage increase in expenditures (groceries, transportations, leisure, etc.)	0.748		

11. Tourism created job opportunities for local people	0.729		
12. Tourism resulted in local economic diversification	0.634		
13. I believe tourism is a strong economic contributor to the community	0.700		
14. Tourism generates substantial tax revenues for the local government	0.522		
15. Tourism creates new markets for our local products	0.664		
16. Tourism development increased the community's quality of life	0.816		
17. Tourism attracts investment and spending for the tourism site	0.694		
18. This site appears to be competitive with surrounding states in tourism development	0.729		

Table 6: Purification of Environmental Sustainability Indicators

Environmental Sustainability Indicators	Corrected Item-Total Correlation	Total Indicators	Coefficient of Cronbach's Alpha
1. Tourist cause pollution of environment (water, soil, and air)	0.729	15	0.934
2. The number of visitors results in disturbance of plants and animals	0.595		
3. Increasing exhaustion of water and energy resources was caused by tourist activities	0.775		
4. Tourist needs to be developed in harmony with natural and cultural environment	0.571		
5. Tourism development must promote positive environmental ethics among all parties that have a stake in tourism	0.686		
6. The natural beauty of the site is well protected	0.513		
7. Tourism development for the said site should take into account the environmental protection	0.716		
8. Touring around the site increases environmental awareness	**0.324**		
9. Tourism activities contributes to compilation of solid waste at the site	0.914		

10. Land use for tourism development activities results in loss of empty land	0.920		
11. Improperly treated sewage waste from tourism premises affect the environment	0.838		
12. Smoke released by vehicles and open burning effect the health and environment	0.811		
13. Poor air quality affects tourism activities	0.797		
14. Visitors visiting the site protect the environment	0.513		
15. Percentage of energy consumption attributed to tourism	0.841		

Table 7: Purification of Socio-Cultural Sustainability Indicators

Socio-Cultural Sustainability Indicators	Corrected Item-Total Correlation	Total Indicators	Coefficient of Cronbach's Alpha
1. Tourism increased the level of criminality, alcoholism, vandalism	0.686	13	0.795
2. Tourism negatively influences norms and values in the area	0.644		
3. Local traditions became less important because of tourism	0.670		
4. My quality of life has deteriorated because of tourism	0.702		
5. I often feel irritated because of tourism in the community	0.580		
6. Community recreational resources are overused by tourists	0.585		
7. My community is overcrowded because of tourism development	0.534		
8. Tourists should respect the values and culture of local residents	0.569		
9. Local residents should be treated fairly and equitably	0.519		
10. Tourism development improves the socio-cultural appearance of the site	**0.325**		

11. Tourism contributes to the conservation of traditional culture	0.604		
12. Proportion of traditional events in tourism festivals	0.672		
13. Tourism operators informing visitors of site protocol	0.507		

Table 8: Purification of Infrastructural Sustainability Indicators

Infrastructural Sustainability Indicators	Corrected Item-Total Correlation	Total Indicators	Coefficient of Cronbach's Alpha
1. Rural and small towns benefit from tourist activities and development due to improved infrastructure	0.850	12	0.946
2. The site has good long and wide roads with easy accessibility	0.723		
3. The available hotels are adequate with well-managed facilities	0.805		
4. The nearby restaurants are enough providing high standard food at reasonable prices	0.817		
5. The bars and cafes around the tourist site are enough, offering cozy services to sit and relax	**0.336**		
6. The restaurants also offer high quality and well-cooked traditional foods	0.841		
7. The available and provided tourist information is complete and up-to-date	0.759		
8. The trails, marks and signposts are enough and provide sufficient guidance	0.684		
9. The available transport to reach the site/city is enough with good frequency	0.770		
10. The taxis are available to move around the site/city at affordable price	0.876		
11. The available local transport is enough and provides quality service with good frequency	0.814		

12. The site has the uninterrupted availability of electricity	0.711		

Table 9: Purification of Technological Sustainability Indicators

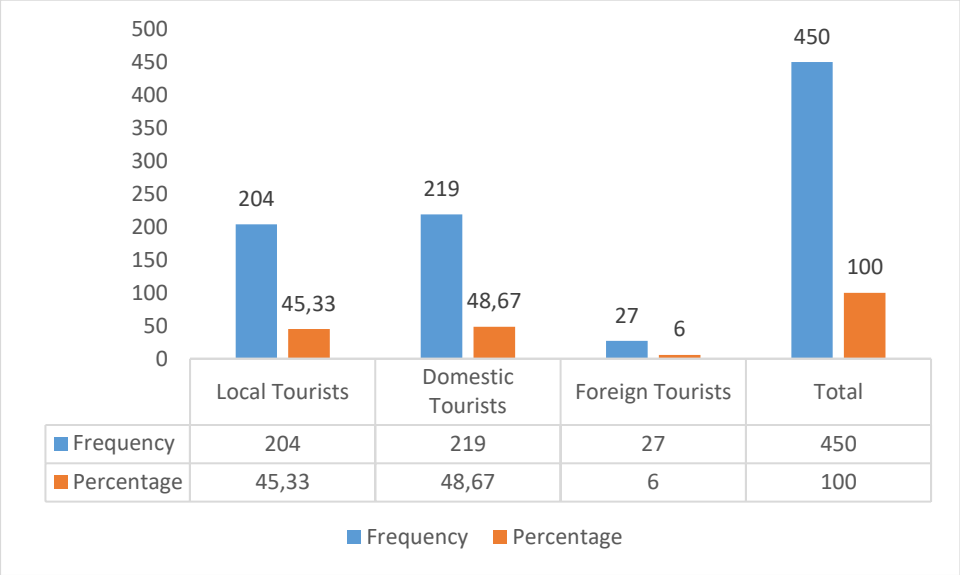
Technological Sustainability Indicators	Corrected Item-Total Correlation	Total Indicators	Coefficient of Cronbach's Alpha
1. The site has enough facilities like availability of cellular services with good signal strength and connectivity	0.730	10	0.773
2. The site has free facility of Wi-Fi	0.511		
3. I think, there is the use of technology in the design and developmental aspects of destination facilities	0.633		
4. In my opinion, there is the use of technology for the protection, such as walk-through gates, metal detectors, weapons and bomb detection at the tourist site	0.592		
5. In my opinion, there is the use of technology for the protection, like observation through closed-circuit television cameras, addressable smoke detectors, and life-safety systems	0.635		
6. In my opinion, the use of technology is good for a more careful management of tourist numbers to reduce overcrowding at the tourist site	0.543		
7. The online facility to buy tickets, use of credit cards/debit cards for on spot buying is available at the tourist site	0.623		
8. The site promotes its products through its website quite effectively	**0.319**		
9. The site has an active Facebook page to provide expeditious information and engage in conversation with consumers	0.545		
10. The site uses Twitter to have open discussions using hashtags and uploading media-rich content	0.503		

Further steps involved in the analysis of data are as follows:

5.3 Demographic and Descriptive characteristics of respondents:

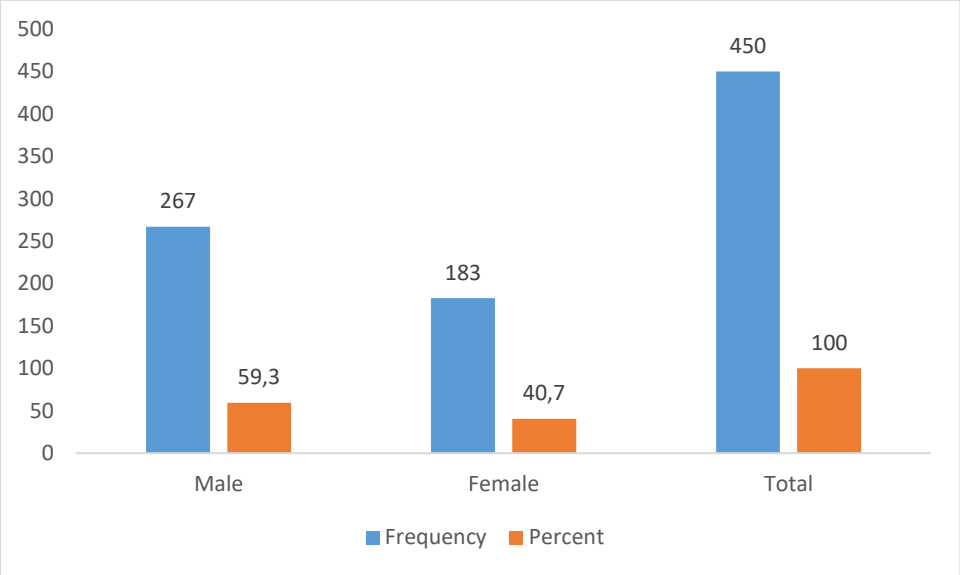
Descriptive statistics are very important to reveal to the characteristics of the research sample to have a clear view and better understand the situation at hand by looking at the corresponding values of central tendency, dispersion, and variability as well as the information related to the demographic features. For example, the statistics about respondents from the selected cities of Pakistan, precisely Islamabad, Lahore, and Faisalabad based on the categories such as domestic tourists, local residents and foreign tourists, males and females, single, married, and divorced, respondents falling in different categories, respondent's status in terms of profession, respondent's level of education.

The analysis based on the survey data depicts that the percentage of domestic tourists and local tourists is almost the same (48.67% and 45.33% respectively), followed by foreign tourists (6%) (Figure 8). Concerning the gender of the respondents, males are in majority (59.3%) while the rest are females (40.7%) (Figure 9).



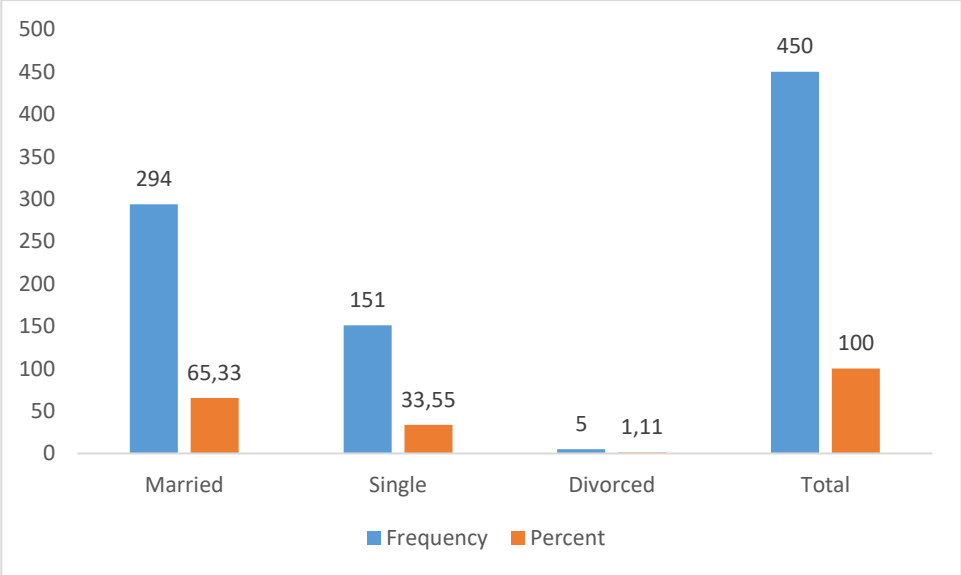
Source: Author's own calculations, based on survey data

Figure 8: Category of respondents



Source: Author's own calculations, based on survey data

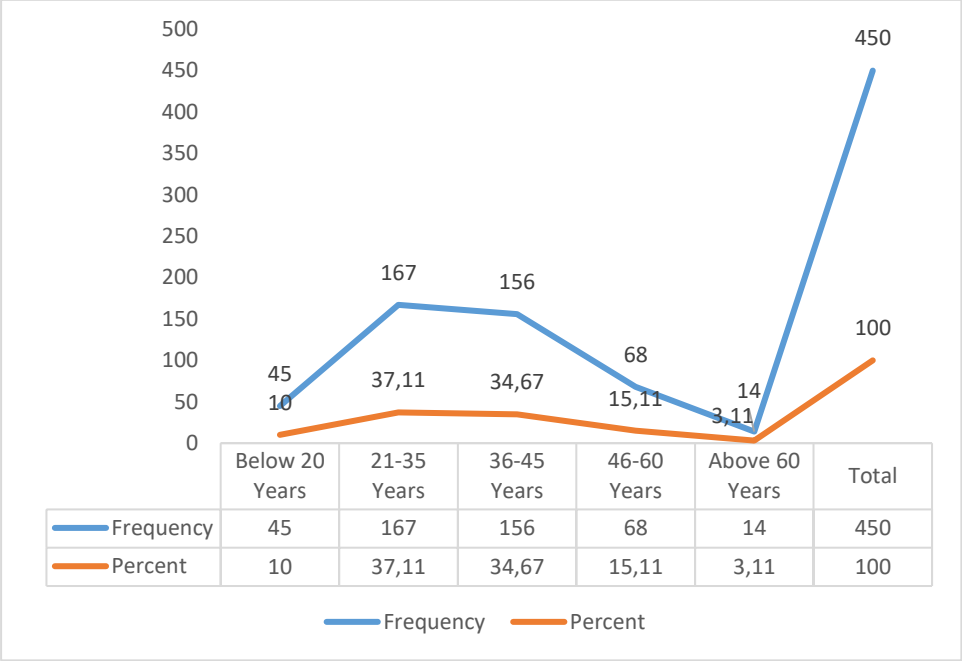
Figure 9: Gender of respondents



Source: Author's own calculations, based on survey data

Figure 10: Marital Status of respondents

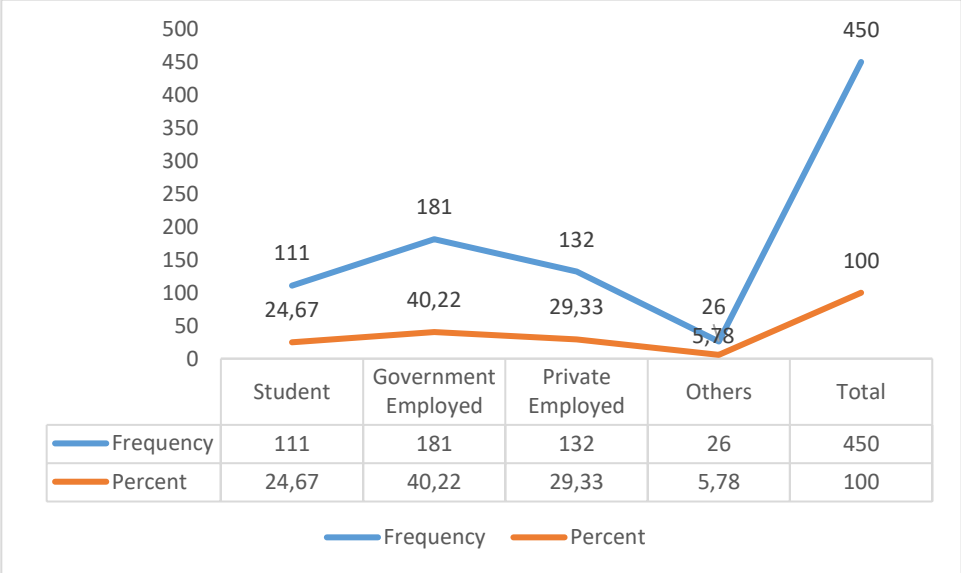
Regarding marital status, most of the respondents are married (65.33%), whilst unmarried respondents are about 34% and 1.11% are divorced (Figure 10).



Source: Author's own calculations, based on survey data

Figure 11: Age of respondents

It is also of sufficient interest for readers and researchers to know the age groups of the respondents. In this regards, descriptive analysis depicts that the majority of the respondents are young falling in the age category 21-35 (37.11%), followed by the age group 36-45 years (34.67%), the age group 46-60 (15.11%), whilst teenagers below 20 years are less (10%), and above 60 years of age are the least in percentage (3%) (Figure 11).

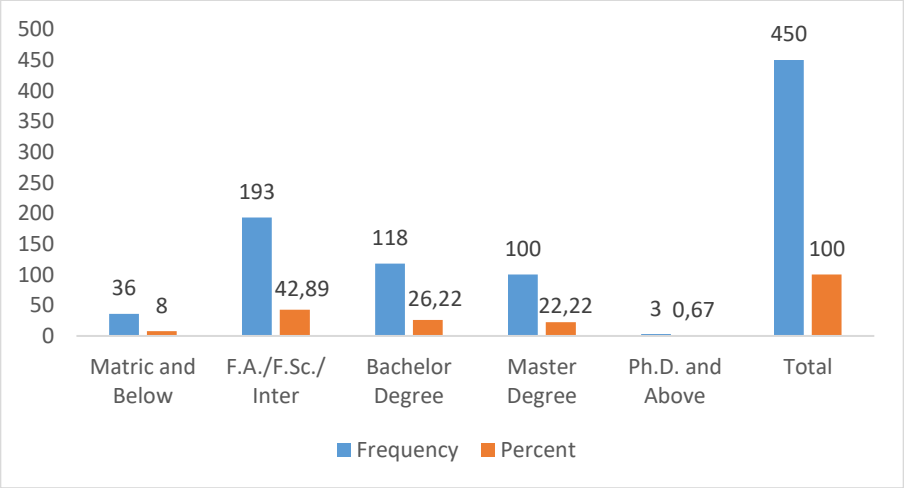


Source: Author's own calculations, based on survey data

Figure 12: Occupation of respondents

Besides this, out of the 450 respondents, most respondents are government employed (40.22%), followed by private employees (29.33%), while students are

almost one-fourth of the total respondents (24.67%), and the remaining (5.78%) are falling in the other categories of the profession (Figure 12). Also, regarding the educational level of respondents, the data shows that most educated travel more, a majority of the respondents are having F.A./F.Sc. a certificate with 12 years of education (42.89%), while almost one-fourth hare having bachelor degree (26.22%). Interestingly, a good percentage of respondents are having a master degree (22.22%), and the rest are the respondents having matric certificate or below (8%), and PhDs and above are less than one percent (1.2%) (Figure 13).



Source: Author's own calculations, based on survey data

Figure 13: Education level of respondents

5.4 Verification of the indicator development:

A principal component analysis (PCA) has been conducted on the selected 61 indicators related to economic sustainability, environmental sustainability, socio-cultural sustainability, infrastructural sustainability, and technological sustainability to determine the dimensionality of indicators. The total variance explained (TVE) of this data is 68.842% which is quite good for studies related to behavioral and social sciences with only 31.158% of the loss of information. This total variance explained is much better than Asmelash & Kumar (2019) where data only explained 49% of the variability. The overall value of Cronbach's alpha is 0.806, which is higher than the benchmark value of 0.6 (Nunnally & Bernstein, 1994). Furthermore, Kaiser-Meyer-Olkin (KMO) is considered a good estimate of sample adequacy. According to Field (2009) and Hair et al., (2005), the KMO sample adequacy ratio can be classified into three categories; such as mediocre adequacy (0.5-0.7), good adequacy (0.7-0.8), great adequacy (0.8-0.9), and superb (above 0.9). For this research thesis, the KMO sample adequacy ratio is 0.79,

which falls in the range of good adequacy ratio and on the edge of adequacy ratio classified as great.

Proceeding ahead, another test Bartlett test of Sphericity widely used by researchers to test the original correlation matrix. In this vein, a significant value of Chi-Square shows that the correlation matrix is not an identity matrix (Field, 2009). Therefore, if Bartlett's test of Sphericity is significant, it suggests that the correlation between the indicators is sufficient to apply PCA (Hair et al., 2005). For this research thesis, the value of Chi-Square for Bartlett's test of Sphericity (Chi-Square = 3421.618) is significant and therefore suggests that factor analysis is quite suitable and appropriate. Hence, this stage led to the exclusion of seven indicators with the reduction of indicators from 61 indicators to 54 indicators.

Besides, the factor analysis based on principal components also tells about the robustness of the results and analysis. For example, the extracted communalities values show the proportion of each variable's variance that can be explained by the extracted component, the higher these values are the better (see Annexure 4). Similarly, the table of total variance explained in Annexure 4 shows how many components have been extracted using principal component analysis. The excluded indicators are, *"Percentage increase in expenditures (groceries, transportations, leisure, etc.)", "Number of tourism businesses owned by local community", "Smoke released by vehicles and open burning effect the health and environment", "Poor air quality affects tourism activities", "My community is overcrowded because of tourism development".*

5.5 Assessment of multivariate normality and multicollinearity:

The normality of the data distribution has been tested in SPSS, using Q-Q plot and observed values fall approximately on the straight line which is sufficient evidence to claim about the normally distributed dataset. The values of kurtosis and skewness are also not exceeding +2 and -2 (see Appendices, Annexure 3). To check the issue of normality, the value of Determinant for this thesis is 9.464E-04 (0.0009464), and this value is greater than the necessary value of 0.00001 so, refers that there is no issue of multicollinearity.

5.6 Validation of the indicator development:

Assessing reliability and validity

In statistics and psychometrics, the reliability of a research study or questionnaire is referred to as the overall consistency of a measuring test (Trochim & Donnelly, 2001) and a research instrument consistently measures the construct (Field, 2009). The assessment of the reliability of the measurement model should satisfy the internal reliability, composite reliability (CR) which refers to the

reliability and internal consistency of a latent construct, and average variance extracted, the average percentage of variation explained by the measuring items for a latent construct. Internal reliability or consistency underpins the strength of measuring items in the measurement of the respective construct. According to Kline (2000) and Hair et al. (2005), the threshold value of Cronbach's Alpha should be 0.7 or more to achieve internal consistency. To achieve the construct reliability, one more condition is to have a sufficient level of composite reliability, which is required to have a level of 0.5 or more, as suggested by Holmes-Smith (2001). Similarly, the average variance explained (AVE) refers to the average percentage of the variation explained by the measuring indicators for a latent variable, and the recommended level of AVE should be 0.5 or more (see Table 10).

Confirmatory factor analysis (CFA) is used to examine the validity of the dimensions, including convergent validity, discriminant validity, and content validity based on the threshold values suggested in the literature. Importantly, composite variables have been formulated based on their sub-dimensions to assess the reliability and validity following the suggestions of Asmelash & Kumar (2019). Several authors also recommended and explained the procedure of using composite variables depending upon the situation at hand and convenience (Hair et al., 2005; Walkey, 1997; Stylidis, Biran, Sit, & Szivas, 2014). In this research thesis, CFA was carried out to investigate the validity of the relevant dimensions (See Figure 14). The concept of CFA indicated the degree or level of a scale or set of indicators accurately measures the relevant concept of interest (Hair et al., 2005; Field, 2009).

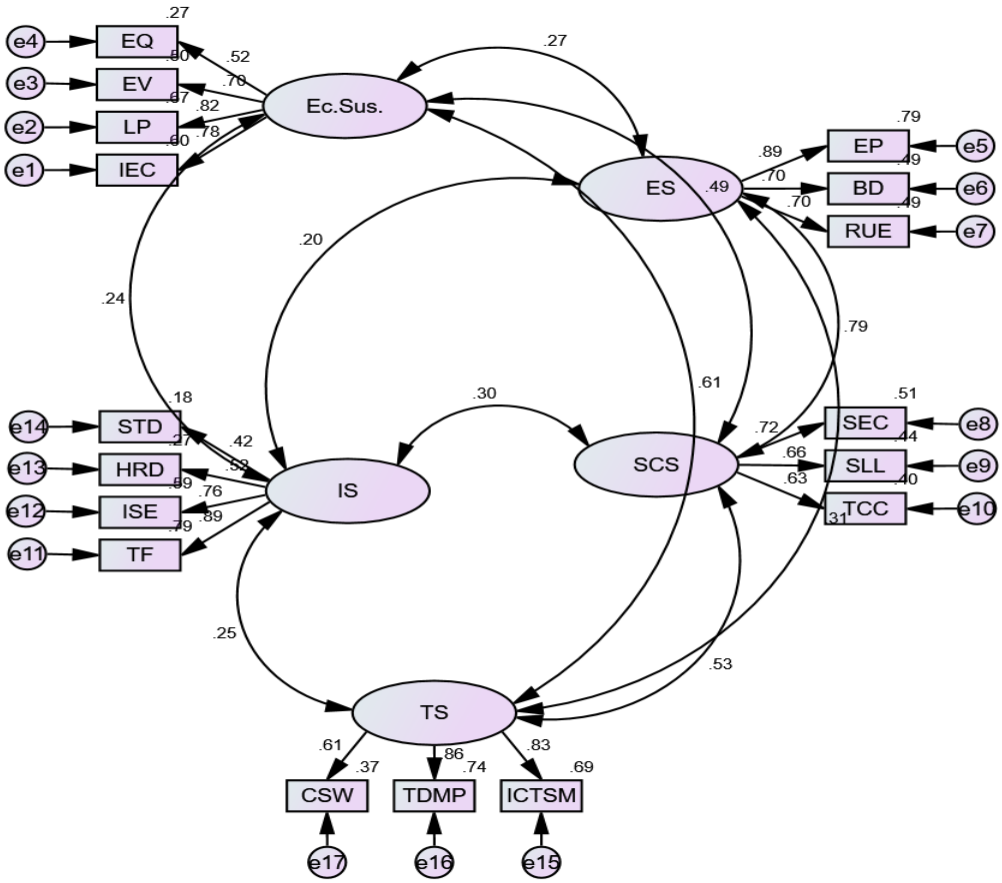
According to the recommended criteria, the estimated value of the average variance explained (AVE) should be 0.5 or more to achieve convergent validity. Moreover, the value of composite reliability (CR) and standardized regression weight (SRW) should be 0.7 or greater (Hair et al., 2005). The values of AVE, CR, and SRW are indicated in Table 10. According to the suggested criteria (Fornell & Larcker, 1981; Hair et al., 2005), the thesis achieved convergent validity for the economic dimension, environmental dimension, and technological dimension (Table 10). However, the values for the socio-cultural dimension and infrastructural dimension are close to the threshold and hence this validity is almost achieved. A bit lower value of average variance explained (AVE) for socio-cultural dimension and infrastructural dimension might be associated with the used composite variables for appropriate representation of the constructs (Hair et al., 2005; Stylidis et al., 2014).

Table 10: Construct Reliability

Construct/Indicator	Standardized Regression Weight (SRW)	Cronbach's Alpha	Composite Reliability	Average Variance Explained (AVE)	Remarks
Economic Sustainability		0.793	0.802613	0.510373	Achieved
1. Employment Quality	0.524				
2. Economic Viability	0.704				
3. Local Prosperity	0.818				
4. Investment and Economic Competitiveness	0.776				
Environmental Sustainability		0.799	0.808988	0.588709	Achieved
1. Environmental Pressure	0.889				
2. Biological Diversity	0.698				
3. Resource Utilization and Efficiency	0.699				
Socio-Cultural Sustainability		0.706	0.710084	0.450165	Almost Achieved
1. Social Equity and Crimes	0.717				
2. Social Living of Locals	0.662				
3. Traditional Culture Conservation	0.631				
Infrastructural Sustainability		0.728	0.75619	0.456369	Almost Achieved
1. Small Towns Development	0.420				
2. Hotels and Restaurants Development	0.523				
3. Information, Signposts and Electricity	0.765				
4. Transport Facility	0.889				
Technological Sustainability		0.790	0.813991	0.598451	Achieved

1. Cellular Services and Wi-Fi	0.607				
2. Technology in Design, Management and Protection	0.861				
3. ICT and Social Media	0.828				

Source: Author's extraction from Amos output



Source: Author's extraction from Amos output

Figure 14: Confirmatory Factor Analysis for validity examination

Table 11: Convergent Validity

Convergent Validity	Economic Sustainability	Environmental Sustainability	Socio-Cultural Sustainability	Infrastructural Sustainability	Technological Sustainability
Average Variance Extracted (AVE) $AVE^a = \sum K^2/n$ (AVE>0.5)	0.510	0.589	0.450	0.456	0.598
Composite Reliability (CR) $CR^b = (\sum K)^2/((\sum K)^2 + (\sum e))$ (CR>0.7)	0.803	0.809	0.710	0.756	0.814
Standardized Regression Weight (SRW) (SRW>0.7)	0.706	0.762	0.670	0.649	0.765
Convergent Validity	Achieved	Achieved	Almost Achieved	Almost Achieved	Achieved

[a]K = refers to factor loading of every item, and n = represents number of items
[b]K = refers to factor loading of every item, and n = represents number of items
Source: Author's extraction from Amos output

The other measure of validity is discriminant validity refers that a measure of a construct is uniquely represents the phenomena of interest more than other measures do not capture (Hair et al., 2005). According to Henseler, Ringle, & Sarstedt (2015), the AVEs of each construct should be greater than the squared correlations of other constructs included in the model. Table 12 shows that the discriminant validity is achieved for all the constructs except for one combination.

Table 12: Discriminant Validity

Discriminant Validity	Factor Correlation (r)	Squared factor correlation (r^2)	AVE1 and AVE2 Criterion: AVEs > r^2	Discriminant Validity
EcS <--> ES	0.270	0.0729	0.510, 0.589	Achieved
EcS <-->SCS	0.486	0.236	0.510, 0.450	Achieved
EcS <-->IS	0.237	0.056	0.510, 0.456	Achieved

EcS <-->TS	0.607	0.368	0.510, 0.598	Achieved
ES <-->SCS	0.788	0.621	0.589, 0.450	Close to Achieve
ES <-->IS	0.197	0.039	0.589, 0.456	Achieved
ES <-->TS	0.311	0.097	0.589, 0.598	Achieved
SCS <-->IS	0.298	0.089	0.450, 0.456	Achieved
SCS <-->TS	0.529	0.279	0.450, 0.598	Achieved
IS <-->TS	0.252	0.064	0.456, 0.598	Achieved

Source: Author's extraction from Amos output

5.7 Assessment of Sustainability, Cross-location Comparisons and Multidimensional Sustainable Tourism Index (MSTI)

As discussed in the research methodology section, the thesis also developed the multidimensional sustainable tourism index (MSTI). The developed multidimensional sustainable tourism index is used to analyze the sustainability in the two cities, based on the overall sustainable tourism index as well as individual dimension sustainable tourism indexes. These cross-location comparisons identify the relative competitiveness of the said locations. The identified weaknesses and suggested implications help the stakeholders especially local administration to improve the image of the destination to enhance sustainability and competitiveness.

In this vein, Table 13 shows the calculated indexes for each dimension of sustainable tourism as well as multidimensional sustainable tourism index for the dimensions related to economic, socio-cultural, environmental, infrastructural, and technological sustainability based on the data collected from the three selected cities of Pakistan, precisely Islamabad, Lahore, and Faisalabad. The index is constructed based on the geometric mean of the principal components and weighting them according to their retained percentage variance.

Table 13: Estimated STI and MSTI for the selected cities of Pakistan

Indexes/Selected Destinations	Islamabad	Lahore	Faisalabad
Sustainability Index for Economic Dimension (EcI)	3.38568	3.87153	3.51771
Sustainability Index for Environmental Dimension (EI)	3.87667	2.93918	3.04206
Sustainability Index for Socio-Cultural Dimension (SI)	3.89676	4.08149	3.56037
Sustainability Index for Infrastructural Dimension (II)	4.13017	3.48620	3.19013
Sustainability Index for Technological Dimension (TI)	4.01019	3.58825	3.14994
Multidimensional Sustainable Tourism Index (MSTI)	3.85071	3.57118	3.28687

Source: Author's calculation on NumXL

According to the estimated sustainability index for the economic dimension (EcI), Lahore is having higher economic sustainability with an index value of 3.87153, whilst Faisalabad is having a value of 3.51771 and Islamabad observed the least economic sustainability with the index value of 3.38568 (Table 13). Although Islamabad is considered a better tourist destination, yet economically opportunities have been exploited in a better way for the city of Lahore and then for the city of Faisalabad. The environmental dimension of sustainable tourism includes indicators related to ecology, environmental protection, and resource utilization. The estimated values of a sustainability index for the socio-cultural dimension (EI) indicates that environmental sustainability for the Islamabad city is better with the sustainability index value of 3.87667, then city Faisalabad with the index value of 3.04206 which is relatively less explored city, and Lahore is having the least environmental sustainability.

Proceeding ahead, the sustainability index for the socio-cultural dimension includes indicators related to the social norms, quality of life, socio-cultural attributes, and site protocol. According to the socio-cultural sustainability index, the estimated index values indicate that Lahore is socio-culturally more sustainable as compared to Lahore and Faisalabad, and Faisalabad is least sustainable in terms of socio-cultural sustainability. The role of infrastructure and availability of better facilities is having vital importance for the sustainability and development of tourism. In this research thesis, the sustainability index for the infrastructural dimension included indicators related to infrastructures such as the development of the rural and small-town due to improved infrastructure, the construction of long and wide roads, hotels and restaurants development and transportation facilities. Regarding the infrastructural sustainability, the estimated index indicates that the city of Islamabad leads in the better infrastructure with an index value of 4.13017 followed by Lahore with an index value of 3.4862 and Faisalabad with an index value of 3.19013.

Similarly, the importance of technological sustainability has increased much due to the rapid rise in the use of technology in providing tourism services to enhance their level of sustainability and competitiveness. The estimated values of the index indicate that Islamabad is having a higher level of technological sustainability with an index value of 4.01019, followed by Lahore with the index value of 3.58825 and then Faisalabad with the index value of 3.14994.

The important aspect of the development of sustainable index is the formulation of the multidimensional sustainable tourism index through the aggregation of each dimensional index by geometric mean. Hence, the estimated values for the MSTI indicate that overall the city of Islamabad is having better sustainability for tourism, with the estimated value of MSTI 3.85071, then Lahore with an index value of 3.57118 and Faisalabad with the index value of 3.28681. Therefore, the developed MSTI indicates how the higher and lower values of individual dimensions balance out in the MSTI.

6. DISCUSSION AND CONCLUSION

The massive growth of international tourist arrivals and easiness of traveling played a crucial role at the global, regional, and domestic levels with certain favorable and unfavorable impacts. The literature indicates many altruistic and well-meaning reasons in favor of tourism development, such as foreign exchange earnings, income, and employment generation are some related economic benefits. In this vein, the purchase of accommodation, food and beverages, transport, communication, entertainment services, and goods bought from retail outlets are examples of related positive economic impacts by tourist spending. However, the leakages of expenditure from the local economy, displacement and opportunity cost, the loss of a productive unit of labor are some adverse impacts.

Similarly, the role of the environment is fundamental in providing any tourism service or product. Tourism can play role in the preservation of ancient monuments and sites such as the Great Wall of China, the Taj Mahal in India and the Pyramids in Egypt. However, tourism is directly linked to the deterioration of the environment; permanent environment restructuring and waste product generation are referred to as the negative impacts.

Besides, the linked issues of social-cultural impacts and some additional dimensions included in the thesis and discussed in detail in the review of the literature suggest a healthy balance of tourism development and resource utilization for the long-term sustainability of tourism. Therefore, to maintain a healthy balance and moving towards sustainable tourism the use of indicators and necessary measures from time to time is very essential.

In light of this, this doctoral thesis attempted to assess the development of sustainable tourism indicators and their validation. Such a robust set of indicators would help to monitor the activities related to tourism along with their impacts. The development of such sustainability indicators for tourism and their validation is also strongly recommended in the literature (Ko, 2005; Cernat & Gourdon, 2012) and yet overlooked in the real sense. As WTO (2004), Choi & Sirakaya (2005), and Miller (2001) also stressed the use of DPSIR framework, related to the broad-based participation of the stakeholders in the development of indicators and systematically transparent approach during their application. In reality, such issues in their early stages of development. Therefore, this thesis attempted to fill this lacuna by following a participatory approach for indicators development and their validation.

The direct measurement and monitoring of sustainable tourism are not possible without breaking down the relevant issues into indicators (Asmelash & Kumar, 2019). Similarly, an identical set of indicators is not suitable for all types of destinations (Cernat & Gourdon, 2012). Interestingly, the issue of sustainable tourism and the development and use of indicators to monitor sustainability is a debatable issue in the literature (Ko, 2005). Logically, the assessment of the sustainability level and the use of the scientific method for this purpose should be at the priority of the countries. However, the progress is very little towards this end (Fernández & Rivero, 2009).

Hence, keeping in view such a prevailing state of affairs, this research worked on the comprehensive list of indicators obtained from the literature and expert opinions. The thesis followed the two-round Delphi method to get the consensus-based indicators following the approach used by other researchers (AP & Crompton, 1998; Choi & Sirakaya, 2005; Miller, 2001). The two-round of Delphi method ended with 68 consensus-based indicators from 192 indicators related to economic sustainability, environmental sustainability, socio-cultural sustainability, infrastructural, and technological sustainability. The purification process based on the data collected from the pilot study also reduced the indicators from 68 to 61.

Although the process adopted to develop and validate such sustainability indicators is lengthy and cumbersome, such as the availability and willingness of experts to be available and participate in the Delphi method, and the time and money needed to collect data from selected tourist destinations and attractions yet such process is inevitable. Therefore, the resulting set of indicators is useful, relevant, reliable and robust having higher reliability and validity (see Table 10, Table 11, Table 12, & Figure 14). Such indicators can be used to monitor tourism in terms of sustainability and changing scenarios based on contemporary facts and figures.

This thesis applied the sustainability indicators on the three selected destinations of Pakistan, precisely Islamabad, Lahore, and Faisalabad. The respondents included in the sample are domestic tourists, local residents, and international tourists to have broad-based participation and diverse opinion. The developed indicators for economic sustainability are partially similar to the findings of Asmelash & Kumar (2019), such as the employment of local people/local residents, level of economic diversification. WTO (2004) and Shen & Cottrell (2008) also suggested "number of local people/local residents' employment in tourism" as an important indicator as this doctoral thesis developed. The indicator developed "ratio of tourism employment to total

employment" is compatible with the suggestion of WTO (2004) and Blancas et al. (2010). Another indicator "tourism generates substantial tax revenues for the local government" is in line with the study of Choi & Sirakaya (2005).

Similarly, the indicators of sub-dimension of economic sustainability 'economic viability' has similarities with other studies. The developed indicators "total fees collected by the community for access/use of community attractions", and "percentage increase in land and housing prices over time" are in line with WTO (2004) indicators. The indicator "tourism resulted in local economic diversification" has compatibility with Shen & Cottrell (2008), and Deng & Bender (2007). Whilst the indicators "tourism as strong economic contributor to the community" is the same as in the studies of Choi & Sirakaya (2005), and Deng & Bender (2007). Another indicator developed in this doctoral thesis is also in line with the indicators of WTO (2004) and Blancas et al. (2010).

Proceeding ahead, the other sub-dimensions of economic sustainability 'local prosperity' and 'investment and economic competitiveness' has also the same developed indicators as mentioned by other researchers. The indicator "tourism created job opportunities for local people" has also been suggested by Shen & Cottrell (2008) and Twining-Ward (2003). The indicator "tourism creates new markets for our local products" are also recommended by Choi & Sirakaya (2005) and Nicholas & Thapa (2010). Whilst the indicator "tourism development increased the community's quality of life" has also been suggested by Byrd et al. (2009). However, the remaining two indicators "tourism attracts investment and spending for the tourist site" and "the destination appears to be competitive with surrounding states in tourism development" are in line with the suggested indicators of Deng & Bender (2007).

The developed indicators for environmental sustainability have similarities with other researchers' suggested indicators. The indicator of sub-dimension 'environmental pressure', "tourist cause pollution of the environment (water, soil, and air)" is similar as suggested by Shen & Cottrell (2008) and Byrd et al. (2009). However, Byrd et al. (2009) used a different phrase for the same indicator. Similarly, the indicator "number of visitors results in a disturbance in disturbance of plants animals" have been mentioned in the studies of Shen & Cottrell (2008) and Nicholas & Thapa (2010). On the same line, the indicator "increasing exhaustion of water and energy resources was caused by tourist activities" is similar to the suggested indicator of Shen & Cottrell (2008) and Blancas et al. (2010). The fourth indicator of the sub-dimension 'environmental pressure', "tourism activities contribute to the compilation of solid waste at the site" has been suggested by Ramdas & Mohamed (2014).

Moving ahead to the other sub-dimensions such as 'biological diversity' have indicators similar to the studies of authors. The indicator "tourism needs to be developed in harmony with natural environment" is compatible as mentioned by Choi & Sirakaya (2005) and Dauti (2014), whilst another indicator "tourism development must promote positive environmental ethics among all parties that have a stake in tourism" is same as mentioned by Choi & Sirakaya (2005). The other two indicators "the natural beauty of the site is well protected" and "tourism development for the said site should take into account the environmental protection" have similarities with researchers such as Deng & Bender (2007), Nicholas & Thapa (2010), and Choi & Sirakaya (2005). Similarly, the indicators of sub-dimension 'resource utilization and efficiency' are similar as mentioned in the works of Ramdas & Mohmed (2014), WTO (2004), Blancas et al. (2010), Twining-Ward (2003), and Dauti (2014).

The socio-cultural sustainability as a dimension of sustainable tourism has important indicators developed in this doctoral thesis based on their sub-dimensions related to 'social equity and crimes', 'social living of locals', and 'traditional culture conservation'. The developed indicators have compatibilities with the work of different authors such as Shen & Cottrell (2008), Nicholas & Thapa (2010), Choi & Sirakaya (2005), Deng & Bender (2007), and Twining-Ward (2003). However, it is important to reiterate that the developed indicators have partial similarities with the work of other researchers because the needs of certain destinations and geographical features affect the selection and choice of the indicators.

Likewise, the developed indicators for the new dimensions proposed for sustainable tourism, infrastructural sustainability and technological sustainability are worthwhile for the selected destinations of Pakistan as well as similar destinations. Importantly, different authors discussed issues related to the dimensions of infrastructural and technological sustainability quite implicitly such as Shen & Cottrell (2008) stressed the better infrastructure (roads, water, electricity, and public transport) concerning tourism, WTO (2004) indicators related to the construction of roads, better accommodation facilities, availability of well-cooked food, cozy bars and cafes, and public transport with good frequency (Panasiuk, 2007). However, this lacuna has been filled by the present doctoral thesis by explicitly mentioning these dimensions and developing indicators.

As an important aspect of the thesis, the developed indexes related to economic sustainability, environmental sustainability, socio-cultural sustainability, infrastructural and technological sustainability are important to

monitor the level of sustainability for the relevant dimension of sustainability. Such results show that the level of sustainability is mixed for the three cities in terms of different dimensions. However, the city of Islamabad is better due to the higher level of the index value. Therefore, the developed indexes can be used conveniently to have cross-location comparisons. In light of this, it can be concluded that from the selected cities of Pakistan, although the city Islamabad is better in terms of sustainability based on the overall measurement yet the performance is of moderate level. Whilst other cities Lahore is better in some individual sustainable dimensions. However, there is great room for the improvement of sustainability by monitoring indicators of sustainable tourism and improving the respective dimensions to improve performance at the dimensional level as we all overall measurement performance.

The issues related to the applicability of developed indicators is also worthwhile to mention here. The developed indicators are particularly for the specifically selected destinations of Pakistan. However, these indicators are quite beneficial for other destinations with similar features and attributes. Based on the similar socio-cultural aspects and geographical regions, some destinations in other south Asian countries, such as India, Bangladesh, and Nepal can get benefit from these indicators. Although these indicators could apply to the destinations of other regions such as countries of Europe and America yet cautiously as a few indicators being applicable in the developing country context might not be suitable for developed countries. In this regard, some indicators such as “the availability of cellular services with good signal strength”, “free facility of Wi-Fi”, “uninterrupted availability of electricity” and “online facility to buy a ticket, and option to use credit/debit cards” are not much relevant in the context of developed countries. Moreover, the suggested way of evaluating, developing, and validating the indicators, along with measurement and monitoring through the MSTI is quite helpful to replicate for getting consensus-based indicators important to develop the tourism industry and measuring sustainability across destinations.

7. CONTRIBUTION, LIMITATIONS, AND FUTURE RESEARCH DIRECTIONS

This thesis proves a way forward and platform for future work to assess the level of tourism sustainability, different factors of tourism and the determination of sustainable tourism with novelty and contribution.

In literature, diverse types of indicators are suggested however this thesis contributes by suggesting robust indicators along with a system of verification and validation of indicators, and such efforts are uncommon to see in the literature, as stressed by Asmelash and Kumar (2019). This thesis incorporates two new dimensions of sustainable tourism (infrastructural and technological) which help to peep into the matter exhaustively and consider wider aspects of sustainability for future research and practical implications.

7.1 Theoretical Contributions

This thesis has some important theoretical contributions. Firstly, the involvement and broad-based participation of different stakeholders such as the experts from the selected higher educational institutions, domestic and international tourists as well as local residents are overlooked aspect in the development of sustainability indicators for tourism (OECD, 1994; Ap & Crompton, 1998; Miller, 2001; Choi & Sirakaya, 2005). Such involvement of stakeholders is almost overlooked in the literature and the present thesis addressed this issue having their participation in the development of indicators.

Secondly, during the process of indicators development for sustainable tourism, this thesis incorporated the framework of DPSIR (Driving forces-Pressure-State-Impact-Response) recommended by the European Commission (2009). However, it is uncommon to consider the DPSIR framework (European Environmental Agency, 1998) and very few researchers considered this framework (Viljoen, 2007; Amiryan, 2013; Asmelash & Kumar, 2019). Hence, this thesis attempted a balanced number of indicators development related to the driving forces, pressure, state, impact, and indicators related to response.

Thirdly, this thesis departed from the prevailing state of literature related to traditional dimensions of sustainable tourism and included two new dimensions of sustainable tourism (infrastructural sustainability and technological sustainability) which contribute to the theory by providing a broad and thorough view about sustainable tourism. The included two new dimensions in the assessment of sustainable tourism have also improved the total variance explained (TVE) significantly (68.84%) which was only 49% in the study of Asmelash &

Kumar (2019). Besides, the suggested assessment approach to check unidimensionality, normality and multicollinearity, reliability, convergent and discriminant validity through confirmatory factor analysis (CFA) is another contribution for validating sustainability indicators which is not common in the literature of tourism sustainability.

Fourthly, the development of the multidimensional sustainable tourism index (MSTI) by considering the three traditional as well as two new dimensions (infrastructural and technological dimensions) is another theoretical contribution to capture the broader picture of sustainable tourism. This proposed index measures and monitors sustainability separately for each sustainability dimension (economic, environmental, socio-cultural, infrastructural, and technological dimension) as well as overall sustainability by including all sustainability dimensions simultaneously. This index is very helpful for measuring sustainability at some particular destination or to have cross-location comparisons.

7.2 Practical Contributions

This thesis has very important contributions to practice. Firstly, the suggested system of verification and validation of sustainability indicators will help the stakeholders of the tourism industry to choose robust indicators and will also draw the attention of other researchers to keep in mind the statistically robust criteria for the development of the indicators by doing their verification and validation and this is quite rare in the literature. Hence, it will help the policymakers in making informed decisions, which is often hard to be implemented (Cernat & Gourdon, 2012).

Secondly, on a practical basis, it is often hard and cumbersome to identify key areas where actual action is needed. Mostly, practitioners have to rely on conventional indicators such as GDP, Human Development Index (HDI), number of tourist arrivals, and their spendings (Bell & Morse, 2012). Whilst the robust and validated indicators can help the destination managers to take the required decisions and actions needed to avoid the wastage and miss-utilization of resources, and this is the case in this research. Thus, the indicators developed and validated in such a robust way to bridge the gap between available information and desired actions (WTO, 2004; Twining-Ward & Butler, 2002). Particularly, such cautiously developed and carefully validated indicators will help the developing countries such as the case of Pakistan, to be sustainable and competitive in tourism development.

Thirdly, the developed multidimensional sustainable tourism index (MSTI) will help to have some cross-location comparisons as well as temporal comparisons to improve the image of destinations and enhance competitiveness. The practical suggestions for local authorities will also help to achieve sustainability in the tourism industry and will also provide a way to achieve sustainable development.

7.3 Limitations and Future Research Directions

Despite significant contributions, this doctoral thesis has some limitations and provides avenues for future researchers to carry out further studies.

Firstly, the selected cities for this thesis are only from one province of Pakistan. Therefore, the developed indicators are more appropriate for the destinations of similar characteristics. However, these indicators should be applied cautiously for the destinations in the northern part of the country because a few indicators such as overcrowding might not be the issue for the destinations over there. However, these developed indicators are quite beneficial for other destinations with similar features and attributes. Hence, other such destinations of South-Asian countries such as India, Bangladesh, and Nepal can get benefit from these indicators.

Although most of the indicators could apply to the destinations of other regions such as countries of Europe and America yet cautiously as a few indicators being applicable in the developing country context might not be suitable in the context of developed countries. Such as the availability of cellular services with good signal strength, a free facility of Wi-Fi, uninterrupted availability of electricity, online facility to buy ticket and option to use credit/debit cards are a few examples in this vein. The facility of Wi-Fi is almost every tourist destination in developed countries such as European or American countries but in developing countries, it is not the case, similarly, the continuous availability of electricity in the developing countries need to be addressed for the growth and sustainability of tourism. However, it would be interesting for enthusiastic researchers to adopt the proposed way of developing and validating the indicators, as well as measurement and monitoring process is quite helpful to replicate for obtaining consensus-based indicators for other popular destinations of Europe with different cultural values and settings. Additionally, a comparative study of destinations with diverse features could provide interesting insights with a way forward in policymaking.

Secondly, the selected indicators are only subjective in nature. Similarly, the developed multidimensional sustainable tourism index (MSTI) is based on the

indicators ranked on the five-point Likert Scale. The five-point Likert Scale creates difficulty to monitor sustainability and do comparisons across destinations because the resulting index is based on a five-point scale. Therefore, it is strongly recommended to include a 10-point Likert Scale to monitor sustainability and especially for comparability across destinations to capture a clearer difference.

Thirdly, the subjective indicators which can vary from one destination to other are the limitation of such indicators. Similarly, the developed sustainability index based on sustainability indicators can give measurement and monitoring of sustainability based on subjective assessment. Therefore, it is strongly recommended to include objective indicators for future studies in the measurement of sustainability through sustainable tourism index (STI).

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1. **Javed, M.,** & Tučková, Z. (2020). The role of government in tourism competitiveness and tourism area life cycle model. *Asia Pacific Journal of Tourism Research, 25*(9), 997-1011. **[SSCI, Impact Factor: 2.02]**
2. **Javed, M.,** Tučková, Z., & Jibril, A. B. (2020). The role of social media on tourists' behavior: an empirical analysis of millennials from the Czech Republic. *Sustainability, 12*(18), 7735. **[SSCI, Impact Factor: 2.58]**
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6. **Javed, M.,** Tučková, Z., & Abbas, Z. (2020). Towards Understanding the Challenges of COVID-19 and Tourism Industry. In *14th International Conference INPROFORUM 2020, 5th–6th November, 2020,* Faculty of Economics, University of South Bohemia in České Budějovice, Czech Republic. **[Conference Proceedings Citation Index-Web of Science, Clarivate Analytics]**
7. Abbas, Z., Zámečník, R., **Javed, M.,** Gulzar, S., Hussain, K., Shoaib, M., Yousaf, M. (2020). A systematic quantitative literature review of GHRM under AMO theoretical perspective. In *14th International Conference INPROFORUM 2020, 5th–6th November, 2020,* Faculty of Economics, University of South Bohemia in České Budějovice, Czech Republic. **[Conference Proceedings Citation Index-Web of Science, Clarivate Analytics]**
8. **Javed, M.,** Tučková, Z., & Abbas, Z. (2020), Knowledge agents, organizational and social performance in the restaurant industry. In *22th International Conference on Environmental Economics, Policy and International Environmental Relations*. *19-20 November, 2020,* University of Economics and Business, Prague, & Charles University, Prague.
9. Abbas, Z., Zámečník, R., & **Javed, M.,** (2020). GHRM practices as a predictor of sustainability: the moderating role of employee environmental

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10. **Javed, M.,** Awan, M. S., & Waqas, M. (2017). International migration, remittances inflow and household welfare: An intra village comparison from Pakistan. *Social Indicators Research*, *130*(2), 779-797. **[SSCI, Impact Factor: 1.87]**
11. **Javed, M.,** & Awan, M. (2017). Socio-economic determinants of international migration: Evidence from Pakistan. In *13th Annual International Bata Conference for Ph.D. Students and Young Researchers,* Tomas Bata University in Zlín, Czech Republic. **[Conference Proceedings Citation Index-Web of Science, Clarivate Analytics]**
12. **Javed, M.,** & Tučková, Z. (2018). Factors of sustainable tourism and their application. In *1st International Conference on Tourism Research 2018,* Jyväskylä, Finland. Academic Conferences and publishing limited**. [Conference Proceedings Citation Index-Web of Science, Clarivate Analytics]**
13. **Javed, M.,** & Tučková, Z. (2019). Competitiveness in tourism: a comparative analysis of selected South-Asian countries. In *2nd International Conference on Tourism Research 2018,* Porto, Portugal. Academic Conferences and publishing limited. **[Conference Proceedings Citation Index-Web of Science, Clarivate Analytics]**
14. Ussenova, D., & **Javed, M.** (2018). Comparative analysis of the development of hotel sector in the repulic of Kazakhstan and Czech Republic. International Scientific Conference: Economics, Management, Finance (EMF 2018), Baratislava, Slovakia.

LIST OF ARTICES: ROLE AS A REVIEWER

1. Article reviewed in 2020, Title, 'Local support for tourism development and its determinants: An empirical study of Kashmir region", Asia Pacific Journal of Tourism Research. Routledge Taylor & Francis Group. **[SSCI, Impact Factor: 2.02]**
2. Article reviewed in 2020, Title, 'Solidifying tourists' post-travel memories through souvenir' "GeoJournal of Tourism and Geosites", University of Oradea, Romania. **[Scopus, Cite Score: 2.0]**
3. Article reviewed in 2018, Title, 'Impact of Foreign Remittances on Household Welfare in Sylhet Region of Bangladesh' Reviewed for "International Journal of Finance and Economics". Wiley Publisher. **[SSCI, Impact Factor: 0.94]**

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He published 14 research papers in peer reviewed Journals and international conferences, and made further submissions for forthcoming journal publications.

APPENDICES

Annexure 1: Results of Delphi Method, Round 1

Annexure 1.1: Indicators of Economic Sustainability with Experts' Consensus

Economic Sustainability Indicators	Mean	Median	I.Q.R = Q3 – Q1
1. Number of local people/local residents' employment in tourism	3.933	4	0
2. Average tourism employee income	4	4	0
3. Number of tourism businesses owned by the local community	4.133	4	1
4. Ratio of the number of local to external businesses involved in tourism	3.733	4	0.5
5. Total fees collected by community for access/use of community attractions	3.67	4	1
6. Percentage increase in land and housing prices over time	4.2	4	1
7. Tourism resulted in local economic diversification	4.133	4	1
8. Tourism development increased the community's quality of life	3.733	4	0.5
9. Tourism attracts investment and spending for the tourism site	3.667	4	1
10. This site appears to be competitive with surrounding states in tourism development	4.133	4	1

Annexure 1.2: Indicators of Environmental Sustainability with Experts' Consensus

Environmental Sustainability Indicators	Mean	Median	I.Q.R = Q3 – Q1
1. The number of visitors results in disturbance of plants and animals	3.8667	4	0
2. Tourist needs to be developed in harmony with natural and cultural environment	3.7333	4	0.5
3. Tourism development must promote positive environmental ethics among all parties that have a stake in tourism	4.0667	4	1

4. The natural beauty of the site is well protected	4.2	4	1
5. Tourism development for the said site should take into account the environmental protection	3.8	4	1
6. Improperly treated sewage waste from tourism premises affect the environment	4.1333	5	1
7. Smoke released by vehicles and open burning effect the health and environment	4.2	4	1
8. Poor air quality affects tourism activities	4	4	1
9. Visitors visiting the site protect the environment	4	4	1

Annexure 1.3: Indicators of Socio-Cultural Sustainability with Experts' Consensus

Socio-Cultural Sustainability Indicators	**Mean**	**Median**	**I.Q.R = Q3 – Q1**
1. Tourism increased the level of criminality, alcoholism, vandalism	3.9333	4	0
2. Tourism negatively influences norms and values in the area	4.0667	4	1
3. My quality of life has deteriorated because of tourism	3.9333	4	0.5
4. Community recreational resources are overused by tourists	3.9333	4	0
5. Local residents should be treated fairly and equitably	4.4667	5	1
6. Tourism development improves the socio-cultural appearance of the site	3.667	4	1
7. Tourism contributes to the conservation of traditional culture	3.8	4	0.5
8. Proportion of traditional events in tourism festivals	4.333	4	1

Annexure 1.4: Indicators of Infrastructural Sustainability with Experts' Consensus

Infrastructural Sustainability Indicators	Mean	Median	I.Q.R = Q3 – Q1
1. The site has good long and wide roads with easy accessibility	3.8667	4	0.5
2. The available hotels are adequate with well-managed facilities	4.2667	4	1
3. The nearby restaurants are enough providing high standard food at reasonable prices	4.2	4	1
4. The bars and cafes around the tourist site are enough, offering cozy services to sit and relax	4.5333	5	0.5
5. The available and provided tourist information is complete and up-to-date	4.333	4	1
6. The trails, marks and signposts are enough and provide sufficient guidance	4.4	4	1
7. The taxis are available to move around the site/city at affordable price	4.2667	4	0.5
8. The site has the uninterrupted availability of electricity	4.2667	5	1

Annexure 1.5: Indicators of Technological Sustainability with Experts' Consensus

Technological Sustainability Indicators	Mean	Median	I.Q.R = Q3 – Q1
1. The site has enough facilities like availability of cellular services with good signal strength and connectivity	4.4667	5	1
2. I think, there is the use of technology in the design and developmental aspects of destination facilities	4.2667	5	1
3. In my opinion, there is the use of technology for the protection, such as walk-through gates, metal detectors, weapons and bomb detection at the tourist site	4.1333	4	0
4. In my opinion, the use of technology is good for a more	4.1333	4	0.5

careful management of tourist numbers to reduce overcrowding at the tourist site			
5. The online facility to buy tickets, use of credit cards/debit cards for on spot buying is available at the tourist site	4.2667	4	1

Annexure 2: Results of Delphi Method, Round 2

Annexure 2.1: Indicators of Economic Sustainability with Experts' Consensus

Economic Sustainability Indicators	Mean	Median	I.Q.R = Q3 – Q1
1. Ratio of tourism employment to total employment	4.3846	4	1
2. Average tourism wage in community	4.2307	4	1
3. Occupancy rates in accommodation establishments	4.1538	4	0
4. Percentage increase in expenditures (groceries, transportations, leisure, etc.)	4.4615	4	1
5. Tourism created job opportunities for local people	4.5385	5	1
6. I believe tourism is a strong economic contributor to the community	4.0769	4	1
7. Tourism generates substantial tax revenues for the local government	4.1538	4	0
8. Tourism creates new markets for our local products	4.3846	4	1

Annexure 2.2: Indicators of Environmental Sustainability with Experts' Consensus

Environmental Sustainability Indicators	Mean	Median	I.Q.R = Q3 – Q1
1. Tourist cause pollution of environment (water, soil, and air)	4.4615	4	1
2. Increasing exhaustion of water and energy resources was caused by tourist activities	4.2308	4	1
3. Touring around the site increases environmental awareness	4.4615	5	1

4. Tourism activities contributes to compilation of solid waste at the site	4.2308	4	1
5. Land use for tourism development activities results in loss of empty land	4.0769	4	1
6. Percentage of energy consumption attributed to tourism	4.5384	5	1

Annexure 2.3: Indicators of Socio-Cultural Sustainability with Experts' Consensus

Socio-Cultural Sustainability Indicators	**Mean**	**Median**	**I.Q.R = Q3 – Q1**
1. Local traditions became less important because of tourism	4.2308	4	1
2. I often feel irritated because of tourism in the community	4.1538	4	1
3. My community is overcrowded because of tourism development	4.6154	5	1
4. Tourists should respect the values and culture of local residents	4.6923	5	1
5. Tourism operators informing visitors of site protocol	4.5385	5	0

Annexure 2.4: Indicators of Infrastructural Sustainability with Experts' Consensus

Infrastructural Sustainability Indicators	**Mean**	**Median**	**I.Q.R = Q3 – Q1**
1. Rural and small towns benefit from tourist activities and development due to improved infrastructure	4.1538	4	0
2. The restaurants also offer high quality and well-cooked traditional foods	4.4615	5	1
3. The available transport to reach the site/city is enough with good frequency	4.2308	4	1
4. The available local transport is enough and provides quality service with good frequency	4.1538	4	1

Annexure 2.5: Indicators of Technological Sustainability with Experts' Consensus

Technological Sustainability Indicators	Mean	Median	I.Q.R = Q3 – Q1
1. The site has free facility of Wi-Fi	4.6923	5	1
2. In my opinion, there is the use of technology for the protection, like observation through closed-circuit television cameras, addressable smoke detectors, and life-safety systems	4.1538	4	1
3. The site promotes its products through its website quite effectively	4.3846	4	1
4. The site has an active Facebook page to provide expeditious information and engage in conversation with consumers	4.0769	4	0
5. The site uses Twitter to have open discussions using hashtags and uploading media-rich content	4.3846	4	1

Annexure 3: Mean, Standard Deviation, Factor Loading, and Percent of Variance Explained of Constructs and their Indicators

Factor/Item	Mean	Standard Deviation	Skewness	Kurtosis	Factor Loading	% of Variance Explained
Economic Sustainability						31.478
Employment Quality (EQ)						
EQ1: Number of local people/local residents' employment in tourism	3.21	0.600	-0.117	-0.446	0.585	
EQ2: Ratio of tourism employment to total employment	3.58	0.844	-0.078	-0.581	0.580	
EQ3: Tourism generates substantial tax revenues for the local government	3.82	0.684	0.241	-0.867	0.556	
Economic Viability (EV)						
EV1: Total fees collected by community for access/use of community attractions	3.52	0.738	-0.069	-0.287	0.751	
EV2: Percentage increase in land and housing prices over time	4.13	0.619	-0.093	-0.455	0.851	
EV3: Tourism resulted in local economic diversification	3.88	0.838	0.238	-1.536	0.740	
EV4: Tourism as strong economic contributor to the community	3.67	0.714	-0.681	0.350	0.851	
EV5: Occupancy rates in accommodation establishments	3.53	0.633	0.728	-0.399	0.522	
Local Prosperity (LP)						

LP1: Tourism created job opportunities for local people	3.76	0.816	-0.165	-0.528	0.832	
LP2: Tourism creates new markets for our local products	3.32	0.777	0.329	-0.185	0.652	
LP3: Tourism development increased the community's quality of life	3.73	0.582	0.115	-0.505	0.925	
Investment and Economic Competitiveness (IEC)						
IEC1: Tourism attracts investment and spending for the tourism site	3.77	0.883	0.469	-1.557	0.815	
IEC2: This destination appears to be competitive with surrounding states in tourism development	3.22	0.997	0.452	-0.822	0.834	
Environmental Sustainability						12.658
Environmental Pressure (EP)						
EP1: Tourist cause pollution of environment (water, soil, and air)	3.52	0.972	0.004	-0.981	0.861	
EP2: The number of visitors results in disturbance of plants and animals	3.26	1.018	0.539	-0.799	0.624	
EP3: Increasing exhaustion of water and energy resources was caused by tourist activities	3.52	0.863	0.541	-0.712	0.891	
EP4: Tourism activities contribute to compilation of solid waste at the site	3.91	0.673	0.104	-0.795	0.915	
Biological Diversity (BD)						

BD1: Tourism needs to be developed in harmony with natural and cultural environment	3.72	0.761	0.515	-1.108	0.684	
BD2: Tourism development must promote positive environmental ethics among all parties that have a stake in tourism	3.64	0.615	0.407	-0.660	0.819	
BD3: The natural beauty of the site is well protected	3.50	0.947	-0.625	-0.905	0.697	
BD4: Tourism development for the said site should take into account the environmental protection	3.64	1.102	-0.119	-1.326	0.663	
Resource Utilization and Efficiency (RUE)						
RUE1: Land use for tourism development activities results in loss of empty land	3.44	0.816	-0.120	-0.553	0.911	
RUE2: Improperly treated sewage waste from tourism premises affect the environment	3.51	0.634	0.846	-0.325	0.841	
RUE3: Visitors visiting the site protect the environment	4.02	0.734	-0.028	-1.138	0.838	
RUE4: Percentage of energy consumption attributed to tourism	3.89	0.653	0.114	-0.673	0.960	
Socio-Cultural Sustainability						11.973
Social Equity and Crimes (SEC)						
SEC1: Tourism increased the level of criminality,	3.64	0.783	-0.730	0.062	0.790	

alcoholism, and vandalism						
SEC2: Tourism negatively influences norms and values in the area	3.81	0.972	0.015	-1.346	0.641	
SEC3: Tourists should respect the values and culture of local residents	3.85	0.762	0.235	-1.178	0.583	
SEC4: Local residents should be treated fairly and equitably	3.86	0.532	-0.306	0.730	0.918	
Social Living of Locals (SLL)						
SLL1: My quality of life has deteriorated because of tourism	3.73	0.637	0.302	-0.682	0.858	
SLL2: I often feel irritated because of tourism in the community	3.60	0.857	0.315	-0.815	0.443	
SLL3: Community recreational resources are overused by tourists	3.69	0.840	-0.783	0.042	0.794	
Traditional Culture Conservation (TCC)						
TCC1: Local traditions became less important because of tourism	3.58	0.787	0.906	-0.788	0.863	
TCC2: Tourism contributes to the conservation of traditional culture	3.91	0.755	0.156	-1.231	0.620	
TCC3: Proportion of traditional events in the tourism festivals	3.78	0.944	-0.550	-0.529	0.917	
TCC4: Tourism operators informing	3.81	0.865	-0.168	-0.780	0.665	

visitors of site protocol						
Infrastructural Sustainability						6.996
Small Towns Development (STD)						
STD1: Rural and small towns benefit from tourist activities and development due to improved infrastructure	3.81	0.754	0.327	-1.178	0.688	
STD2: The site has good long wide roads with easy accessibility	3.94	0.691	0.082	-0.899	0.810	
Hotels and Restaurants Development (HRD)						
HRD1: The available hotels are adequate with well-managed facilities	3.66	0.754	-0.132	-0.292	0.567	
HRD2: The nearby restaurants are enough providing high standard food at reasonable prices	3.21	0.966	0.341	-0.858	0.893	
HRD3: The restaurants also offer high quality and well-cooked traditional foods	3.68	0.609	0.306	-0.646	0.464	
Information, Signposts and Electricity (ISE)						
ISE1: The trails, marks and signposts are enough and provide sufficient guidance	3.32	0.814	0.559	-0.103	0.611	
ISE2: The available and provided tourist	3.56	1.013	-0.177	-1.065	0.670	

information is complete and up-to-date						
ISE3: The site has the uninterrupted availability of electricity	2.92	0.839	0.920	0.579	0.952	
Transport Facility (TF)						
TF1: The available transport to reach the site/city is enough with good frequency	4.38	0.744	-0.756	-0.818	0.427	
TF2: The taxis are available to move around the site/city at affordable price	2.52	0.755	0.298	-0.372	0.684	
TF3: The available local transport is enough and provides quality service with good frequency	3.15	0.627	-0.118	0.522	0.807	
Technological Sustainability						5.738
Cellular Services and Wi-Fi (CSW)						
CSW1: The site has enough facilities like availability of cellular services with good signal strength and connectivity	3.38	0.922	0.304	-0.724	0.687	
CSW2: The site has free facility of Wi-Fi	3.16	0.780	-0.279	-1.307	0.710	
Technology in Design, Management and Protection (TDMP)						
TDMP1: I think, there is the use of technology in the design and	3.52	0.770	0.285	-0.411	0.641	

developmental aspects of destination facilities						
TDMP2: In my opinion, there is the use of technology for the protection, such as walk-through gates, metal detectors, weapons and bomb detection at the tourist site	2.62	0.927	0.993	1.075	0.830	
TDMP3: In my opinion, there is the use of technology for the protection, like observation through closed-circuit television cameras, addressable smoke detectors, and life-safety systems	2.46	0.934	1.420	1.763	0.789	
TDMP4: In my opinion, the use of technology is good for a more careful management of tourist numbers to reduce overcrowding at the tourist site	2.75	1.104	1.79	1.948	0.739	
ICT and Social Media (ICTSM)						
ICTSM1: The online facility to buy tickets, use of credit cards/debit cards for on spot buying is available at the tourist site	3.75	1.024	-0.963	0.629	0.615	
ICTSM2: The site has an active Facebook page to provide expeditious information and engage in	3.56	1.065	-0.847	0.378	0.797	

conversation with consumers						
ICTSM3: The site uses Twitter to have open discussions using hashtags and uploading media-rich content	3.22	1.283	-0.508	-0.943	0.603	

Annexure 4: Exploratory Factor Analysis (EFA) for Sustainability Indicators

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.790
Bartlett's Test of Sphericity	Approx. Chi-Square	3421.618
	df	136
	Sig.	.000

Communalities		
	Initial	Extraction
EQ	1.000	.707
EV	1.000	.699
LP	1.000	.778
IEC	1.000	.711
EP	1.000	.766
BD	1.000	.690
RUE	1.000	.722
SEC	1.000	.559
SLL	1.000	.570
TCC	1.000	.726
STD	1.000	.511
HRD	1.000	.522
ISE	1.000	.752
TF	1.000	.758
CSW	1.000	.680
TDMP	1.000	.769
ICTSM	1.000	.783
Extraction Method: Principal Component Analysis.		

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.351	31.478	31.478	5.351	31.478	31.478
2	2.152	12.658	44.136	2.152	12.658	44.136
3	2.035	11.973	56.109	2.035	11.973	56.109
4	1.189	6.996	63.105	1.189	6.996	63.105
5	0.975	5.738	68.842	0.975	5.738	68.842
6	0.811	4.768	73.611			
7	0.713	4.193	77.804			
8	0.611	3.593	81.397			
9	0.579	3.408	84.805			
10	0.505	2.968	87.773			
11	0.434	2.551	90.324			
12	0.344	2.024	92.347			
13	0.322	1.894	94.241			
14	0.3	1.764	96.006			
15	0.288	1.693	97.699			
16	0.22	1.291	98.99			
17	0.172	1.01	100			
Extraction Method: Principal Component Analysis.						

Annexure 5: AMOS Results for Confirmatory Factor Analysis

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
IEC	<---	Ec.Sus.	1.000				
LP	<---	Ec.Sus.	.875	.055	15.978	***	par_1
EV	<---	Ec.Sus.	.725	.051	14.154	***	par_2
Em.Q	<---	Ec.Sus.	.425	.041	10.425	***	par_3
EP	<---	ES	1.000				
BD	<---	ES	.831	.055	15.054	***	par_4
RUE	<---	ES	.837	.056	15.073	***	par_5
SEC	<---	SS	1.000				
SLL	<---	SS	1.049	.087	12.052	***	par_6
TCC	<---	SS	.768	.066	11.559	***	par_7
TF	<---	IS	1.000				
ISE	<---	IS	.874	.063	13.846	***	par_8
HRD	<---	IS	.633	.061	10.295	***	par_9
STD	<---	IS	.453	.055	8.269	***	par_10
ICTSM	<---	TS	1.000				
TDMP	<---	TS	1.027	.059	17.415	***	par_11
CSW	<---	TS	.863	.067	12.807	***	par_12

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
IEC	<---	Ec.Sus.	.776
LP	<---	Ec.Sus.	.818
EV	<---	Ec.Sus.	.704
Em.Q	<---	Ec.Sus.	.524
EP	<---	ES	.889
BD	<---	ES	.698
RUE	<---	ES	.699
SEC	<---	SS	.717
SLL	<---	SS	.662
TCC	<---	SS	.631
TF	<---	IS	.889
ISE	<---	IS	.765
HRD	<---	IS	.523
STD	<---	IS	.420
ICTSM	<---	TS	.828
TDMP	<---	TS	.861
CSW	<---	TS	.607

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Ec.Sus.	<-->	ES	.200	.044	4.593	***	par_13
Ec.Sus.	<-->	F1	.284	.041	6.855	***	par_14
Ec.Sus.	<-->	IS	.167	.041	4.074	***	par_15
Ec.Sus.	<-->	TS	.451	.052	8.645	***	par_16
ES	<-->	F1	.346	.035	9.914	***	par_17
ES	<-->	IS	.104	.030	3.484	***	par_18
ES	<-->	TS	.174	.033	5.301	***	par_19
F1	<-->	IS	.124	.026	4.682	***	par_20
F1	<-->	TS	.232	.031	7.426	***	par_21
IS	<-->	TS	.134	.031	4.376	***	par_22

Correlations: (Group number 1 - Default model)

			Estimate
Ec.Sus.	<-->	ES	.270
Ec.Sus.	<-->	SS	.486
Ec.Sus.	<-->	IS	.237
Ec.Sus.	<-->	TS	.607
ES	<-->	SS	.788
ES	<-->	IS	.197
ES	<-->	TS	.311
SS	<-->	IS	.298
SS	<-->	TS	.529
IS	<-->	TS	.252

Variances: (Group number 1 - Default model)

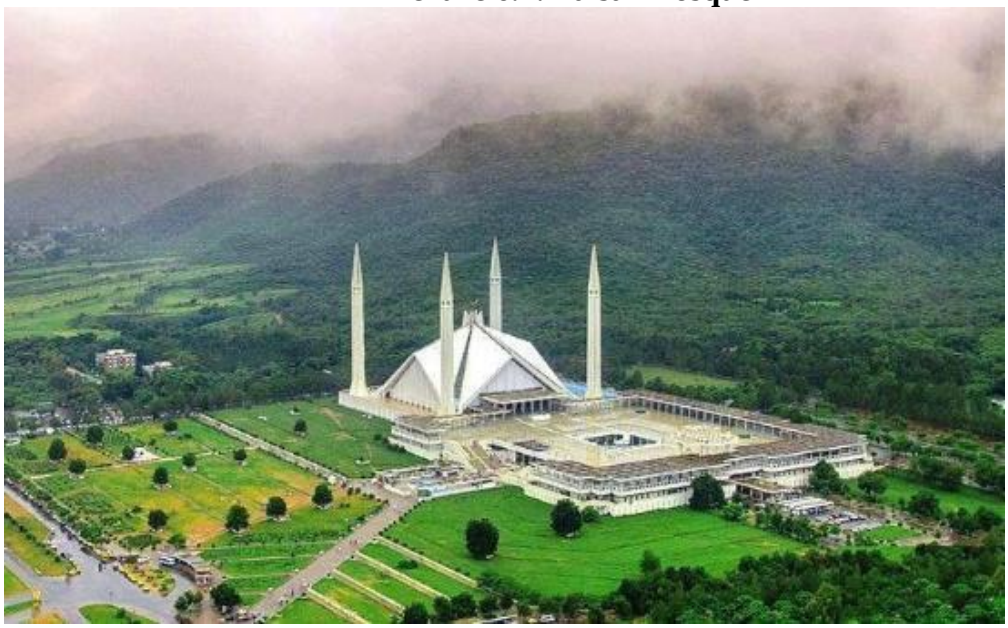
	Estimate	S.E.	C.R.	P	Label
Ec.Sus.	.988	.110	8.995	***	par_23
ES	.559	.052	10.780	***	par_24
SS	.344	.044	7.843	***	par_25
IS	.502	.051	9.891	***	par_26
TS	.560	.057	9.809	***	par_27
e1	.654	.062	10.521	***	par_28
e2	.375	.041	9.110	***	par_29
e3	.528	.043	12.152	***	par_30
e4	.471	.034	13.925	***	par_31
e5	.148	.026	5.782	***	par_32
e6	.407	.033	12.402	***	par_33
e7	.410	.033	12.388	***	par_34
e8	.326	.030	11.047	***	par_35
e9	.485	.040	12.143	***	par_36
e10	.306	.024	12.604	***	par_37
e11	.134	.031	4.370	***	par_38
e12	.272	.029	9.343	***	par_39
e13	.534	.038	13.891	***	par_40
e14	.482	.033	14.395	***	par_41
e15	.257	.030	8.669	***	par_42
e16	.207	.029	7.184	***	par_43
e17	.714	.053	13.526	***	par_44

Squared Multiple Correlations: (Group number 1 - Default model)

Indicators	Estimate
CSW	.369
TDMP	.741
ICTSM	.686
STD	.176
HRD	.273
ISE	.585
TF	.790
TCC	.399
SLL	.439
SEC	.513
RUE	.489
BD	.487
EP	.790
Em.Q	.275
EV	.496
LP	.668
IEC	.602

Annexure 6: Important Tourist Attractions of Islamabad

Annexure 6.1: Faisal Mosque



(Source: Trip Advisor, 2020).

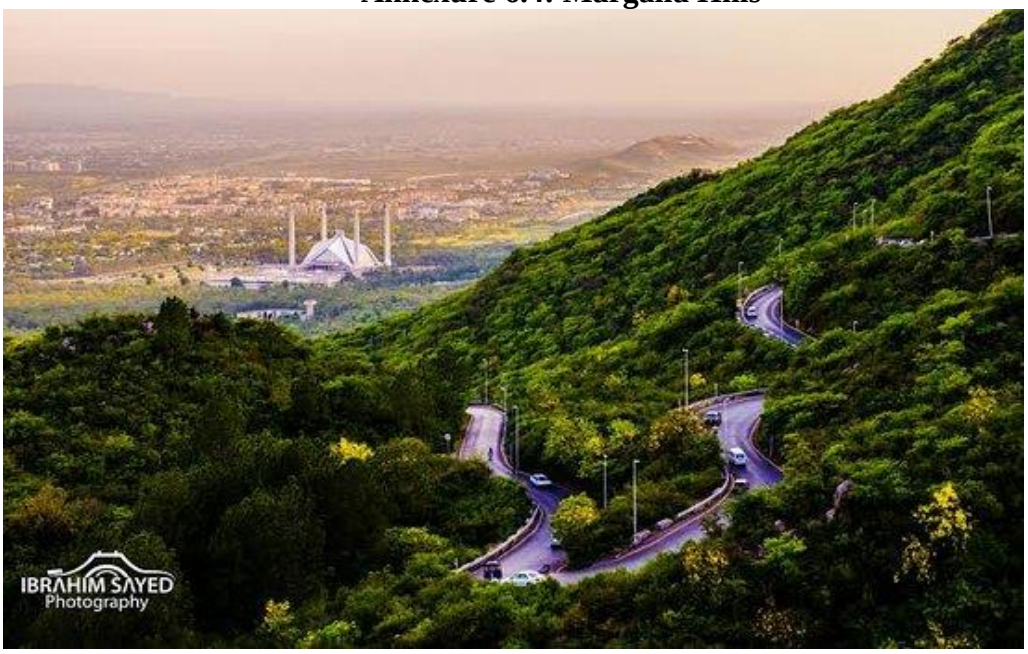
Annexure 6.2: Daman-e-Koh

(Source: Trip Advisor, 2020).

Annexure 6.3: Pakistan Monument

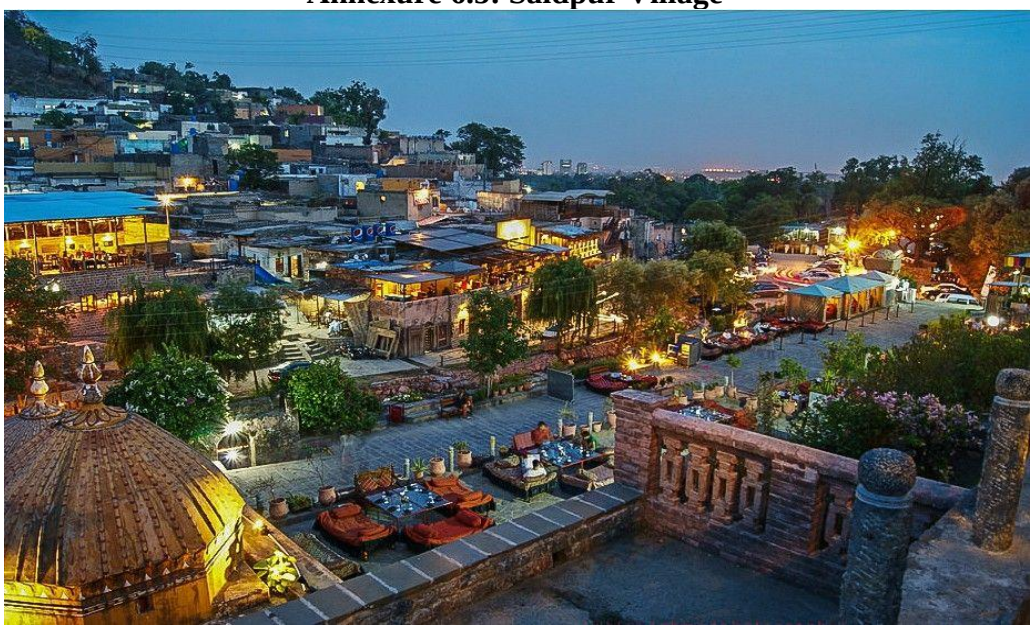
(Source: Dreams Time, 2020)

Annexure 6.4: Margalla Hills



(Source: Trip Advisor, 2020).

Annexure 6.5: Saidpur Village



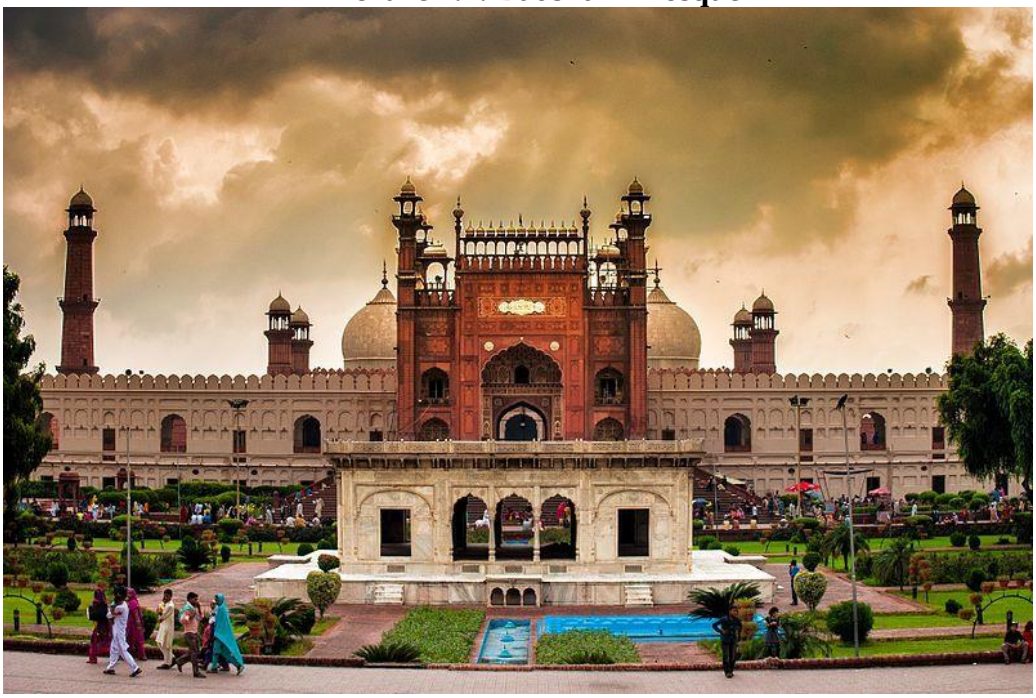
(Source: Trip Advisor, 2020).

Annexure 6.6: Lake View Park

(Source: Trip Advisor, 2020).

Annexure 7: Important Tourist Attractions of Lahore

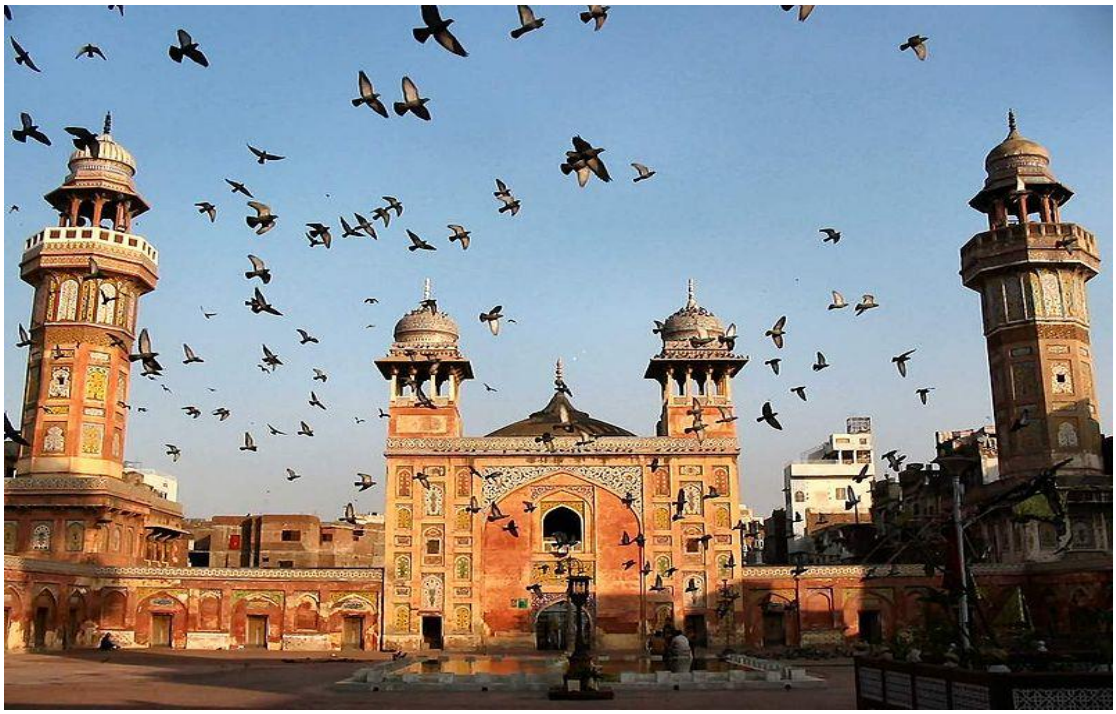
Annexure 7.1: Badshahi Mosque



Annexure 7.2: Lahore Fort

Annexure 7.3: Minar-e-Pakistan

Annexure 7.4: Masjid Wazir Khan



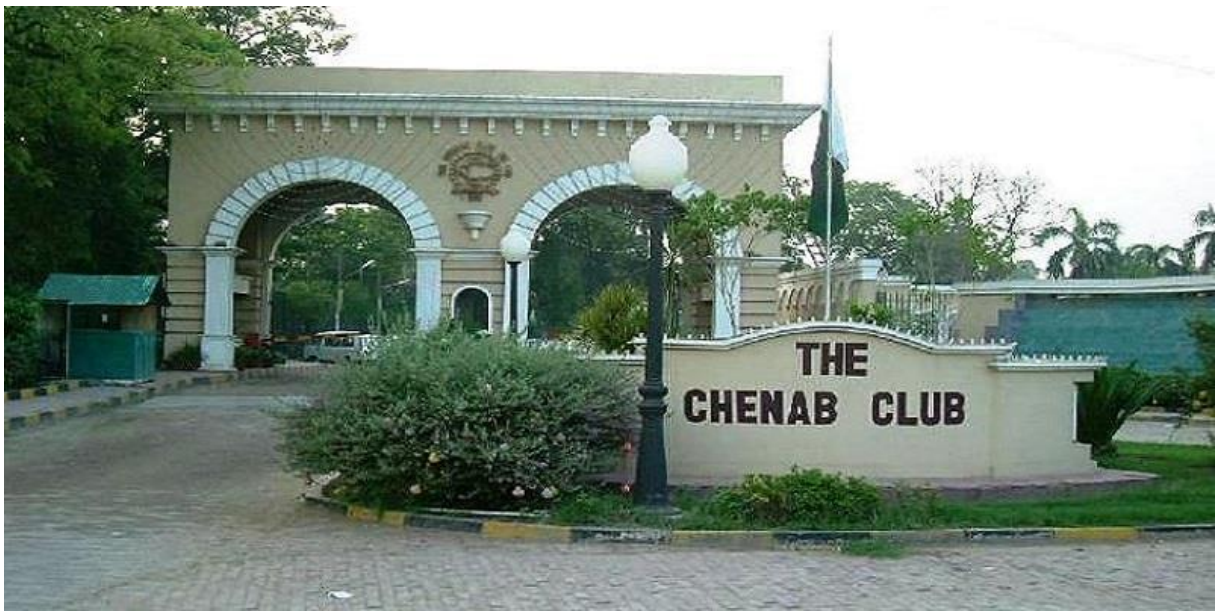
Annexure 7.5: Food Street of Lahore

Annexure 8: Important Tourist Attractions of Faisalabad

Annexure 8.1: Clock Tower of Faisalabad

Annexure 8.2: Jinnah Garden of Faisalabad

Annexure 8.3: The Chenab Club of Faisalabad



Annexure 8.4: The Chenab Chowk of Faisalabad

Annexure 8.5: Fun Dunya Amusement Park of Faisalabad

Questionnaire

Validation for the Indicators of Sustainable Tourism

Ethical consideration

This research is purely for the fulfillment of the PhD degree requirement. If you are agreeing to be part of this research after than you can fill questions accordingly. Your participation in this will be voluntarily. Your information will remain confidential.

This is the survey to be carried out from local residents, domestic tourists, and foreign tourists.

* Required

1. Name of Destination *

- ◯ Lahore
- ◯ Islamabad
- ◯ Faisalabad

2. Indicators of Economic Sustainability *

Economic Sustainability	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think, number of local people/local residents' employment in tourism is adequate	◯	◯	◯	◯	◯
2. I think, ratio of tourism employment to total employment is adequate	◯	◯	◯	◯	◯
3. I think, no. of tourism businesses owned by the local community is adequate	◯	◯	◯	◯	◯
4. I think, occupancy rates in accommodation establishments is satisfactory	◯	◯	◯	◯	◯
5. Total fees collected by community for access/use of community attractions is considerable	◯	◯	◯	◯	◯
6. I think, percentage increase in land	◯	◯	◯	◯	◯

and housing prices over time is not much					
7. I think, percentage increase in expenditures (groceries, transportations, leisure, etc.) is not much					
8. I think, tourism created job opportunities for local people					
9. I believe, tourism resulted in local economic diversification					
10. I believe tourism is a strong economic contributor to the community					
11. Tourism generates substantial tax revenues for the local government					
12. Tourism creates new markets for our local products					
13. Tourism development increased the community's quality of life					
14. Tourism attracts investment and spending for the tourism site					
15. I think, this site appears to be competitive with surrounding states in tourism development					

3. Indicators of Environmental Sustainability *

Environmental Sustainability	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think, Tourists doesn't cause pollution of environment considerably (water, soil, and air)					
2. I think, the number of visitors doesn't result in disturbance of plants and animals considerably					

3. I think, exhaustion of water and energy resources was not caused much by tourist activities					
4. I think, tourist needs are developed in harmony with natural and cultural environment					
5. I think, tourism development promotes positive environmental ethics among all parties that have a stake in tourism					
6. I think, the natural beauty of the site is well protected					
7. I think, tourism development for the said site takes into account the environmental protection					
8. Tourism activities don't contribute much to compilation of solid waste at the site					
9. I think, land use for tourism development activities don't result much in loss of empty land					
10. I think, the treatment of sewage waste from tourism premises is proper and doesn't affect the environment					
11. I think, smoke released by vehicles and open burning due to tourism activities insignificantly affect the health and environment					
12. The present air quality is not poor to affect tourism activities					
13. I think, visitors visiting the site protect the environment					
14. I think, percentage of energy consumption					

attributed to tourism is insignificant compared to overall consumption					

4. Indicators of Socio-Cultural Sustainability *

Socio-Cultural Sustainability	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think, tourism has not increased the level of criminality, alcoholism, and vandalism					
2. I think, tourism has not negatively influenced the norms and values in the area					
3. I think, local traditions are equally important in spite of tourism activities					
4. My quality of life has not deteriorated because of tourism					
5. I don't feel irritated because of tourism in the community					
6. I think, community recreational resources are not overused by tourists					
7. I think, my community is not overcrowded because of tourism development					
8. I think, tourists respect the values and culture of local residents					
9. I think, local residents are being treated fairly and equitably					
10. I think, tourism contributes to the conservation of traditional culture					
11. I think, there is adequate proportion of traditional events in tourism festivals					

12. Tourism operators inform visitors of site protocol					

5. Indicators of Infrastructural Sustainability *

Infrastructural Sustainability	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think, rural and small towns benefited from tourist activities and development due to improved infrastructure					
2. I think, the site has good long and wide roads with easy accessibility					
3. I think, the available hotels are adequate with well-managed facilities					
4. I think, the nearby restaurants are enough providing high standard food at reasonable prices					
5. I think, the restaurants also offer high quality and well-cooked traditional foods					
6. I think, the available and provided tourist information is complete and up-to-date					
7. I think, the trails, marks and signposts are enough and provide sufficient guidance					
8. I think, the available transport to reach the site/city is enough with good frequency					
9. The taxis are available to move around the site/city at affordable price					
10. The available local transport is enough and					

provides quality service with good frequency					
11. The site has the uninterrupted availability of electricity					

6. Indicators of Technological Sustainability *

Technological Sustainability	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I believe, the site has enough facilities like availability of cellular services with good signal strength and connectivity					
2. The site has free facility of Wi-Fi					
3. I think, there is the use of technology in the design and developmental aspects of destination facilities					
4. In my opinion, there is the use of technology for the protection, such as walk-through gates, metal detectors, weapons and bomb detection at the tourist site					
5. In my opinion, there is the use of technology for the protection, like observation through closed-circuit television cameras, addressable smoke detectors, and life-safety systems					
6. In my opinion, the use of technology is good for a more careful management of tourist numbers to reduce overcrowding at the tourist site					
7. The online facility to buy tickets, use of credit					

cards/debit cards for on spot buying is available at the tourist site					
8. The site has an active Facebook page to provide expeditious information and engage in conversation with consumers					
9. The site uses Twitter to have open discussions using hashtags and uploading media-rich content					

7. Kindly specify your gender*
   - Male
   - Female

8. Age of Respondents*
   - Below 20 Years
   - 21-35 Years
   - 36-45 Years
   - 46-60 Years
   - Above 60 Years

9. Educational Level of Respondents *
   - Matric and Below
   - F.A./F.Sc./I.Com/Diploma
   - Bachelor Degree
   - Master Degree
   - Ph.D.
   - Others

10. Occupational Status of Respondents *
    - Student
    - Private Employed
    - Government Employed
    - Others

11. Category of Respondents*

- [ ] Local Residents
- [ ] Domestic Tourists
- [ ] Foreign Tourists

12. Marital Status of Respondents *

- [ ] Single
- [ ] Married
- [ ] Divorce

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