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**THE DETERMINANTS AND CONSEQUENCES OF TOURIST SATISFACTION WITH
MOBILE TRAVEL APPS**

By

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**Thesis Submitted to Othman Yeop Abdullah Graduate School of Business,
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Doctor of Philosophy**



OTHMAN YEOP ABDULLAH GRADUATE SCHOOL OF BUSINESS
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ABSTRACT

Travel-related apps are aimed at tourists, millennials, travelers, and travel companies. These apps allow travelers to book accommodations, tours, and flights, regardless of the time of day. Tourists use mobile travel apps to make decisions about their trips. The development of information and communication technology (ICT) has made mobile applications a part of everyday life. However, there is a dearth of research on the continued use of mobile apps in developing countries like Pakistan. This study investigates the influence of service quality, system quality, information quality, perceived trust, perceived usefulness, and expectation confirmation on tourists' satisfaction with mobile travel apps in Pakistan. In addition, the moderating effect of compatibility on this relationship is also investigated. A quantitative research design with systematic probability sampling in a systematic intercept survey was employed. Data from 479 tourists visiting northern Pakistan were analyzed using partial least squares structural equation modeling (PLS-SEM) via Smart-PLS 3. The results reveal that system quality is the most important predictor of tourists' satisfaction with mobile apps. System quality, service quality, information quality, perceived trust, expectation confirmation, and perceived usefulness directly increase tourist satisfaction, which leads to a continued use intention of mobile travel apps. Furthermore, compatibility significantly moderates the relationship between system quality, perceived usefulness, and tourists' satisfaction with mobile travel apps. Travel app designers and travel managers should make decisions and design the app to take into account the aspects that tourists most value. In terms of theoretical implications, the present research applies the expectation confirmation theory and the information system success model in the proposed framework and discovers significant relationships between the variables. Another important discovery concerns the significant moderating effects of compatibility in these relationships.

Keywords: Mobile travel apps, system quality, service quality, information quality, perceived trust, perceived usefulness, perceived compatibility, expectation confirmation, tourist satisfaction, continued use intention.

ABSTRAK

Aplikasi berkaitan perjalanan difokuskan kepada pelancong, golongan milenial, pengembara, dan syarikat pelancongan. Aplikasi ini membolehkan pengembara menempah penginapan, lawatan dan penerbangan, tanpa mengira masa dalam sehari. Pelancong menggunakan aplikasi perjalanan mudah alih untuk membuat keputusan tentang perjalanan mereka. Perkembangan teknologi maklumat dan komunikasi (ICT) telah menjadikan aplikasi mudah alih sebagai sebahagian daripada kehidupan seharian. Walau bagaimanapun, terdapat kekurangan dalam penyelidikan mengenai penggunaan berterusan aplikasi mudah alih di negara membangun seperti Pakistan. Kajian ini menyiasat pengaruh kualiti perkhidmatan, kualiti sistem, kualiti maklumat, kepercayaan yang dirasakan, kebergunaan yang dirasakan, dan pengesahan jangkaan terhadap kepuasan pelancong dengan aplikasi perjalanan mudah alih di Pakistan. Di samping itu, kesan penyederhanaan keserasian pada hubungan ini juga disiasat. Reka bentuk penyelidikan kuantitatif dengan persampelan kebarangkalian sistematik dalam tinjauan pintasan sistematik telah digunakan. Data daripada 479 pelancong yang melawat utara Pakistan telah dianalisis menggunakan Model Persamaan Berstruktur Kuasa Dua Terkecil Separa (PLS-SEM) melalui Smart-PLS 3. Hasil mendapati bahawa kualiti sistem adalah peramal paling penting untuk kepuasan pelancong dengan aplikasi mudah alih. Kualiti sistem, kualiti perkhidmatan, kualiti maklumat, kepercayaan yang dilihat, pengesahan jangkaan dan kebergunaan yang dirasakan secara langsung meningkatkan kepuasan pelancong, yang membawa kepada niat penggunaan berterusan aplikasi perjalanan mudah alih. Tambahan pula, keserasian menyederhanakan dengan ketara perhubungan antara kualiti sistem, kebergunaan yang dirasakan dan kepuasan pelancong dengan aplikasi perjalanan mudah alih. Pereka bentuk aplikasi pelancongan dan pengurus perjalanan harus membuat keputusan dan mereka bentuk aplikasi untuk mengambil kira aspek yang paling dinilai oleh pelancong. Dari segi implikasi teori, kajian ini menggunakan teori pengesahan jangkaan dan model kejayaan sistem maklumat dalam rangka kerja yang dicadangkan dan menemui hubungan yang signifikan antara pembolehubah. Satu lagi penemuan penting adalah berkenaan dengan kesan penyederhanaan yang ketara dalam keserasian bagi perhubungan ini.

Kata kunci: Aplikasi perjalanan mudah alih, Kualiti sistem, Kualiti perkhidmatan, Kualiti maklumat, Kepuasan pelancong

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LIST OF ABBREVIATIONS

KPK	Khyber Pakhtunkhwa
App	Application
ICT	Information and Communication Technology
PT	Perceived trust
IS	Information System
IT	Information technology
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behavior
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
SYQ	System quality
IQ	Information quality
SQ	Service quality
PU	Perceived usefulness
TS	Tourist satisfaction
EC	Expectation Confirmation
CP	Compatibility
CUI	Continued Use Intention
SPSS	Statistical Package for the Social Sciences
PLS	Partial least squares
SEM	Structural Equation Model
CFA	Confirmatory factor analysis
AVE	Average variance extracted
PCE	Path Coefficient Estimation
CV	Convergent Validity
DV	Discriminant Validity
CR	Composite Reliability
VIF	Variance Inflated Factor
CMV	Common Method Bias

ISSM
ECM

Information System Success Model
Expectation Confirmation Model



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CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

The usage of mobile applications (apps), powered by the extensive use of mobile devices (i.e., Smartphones and tablets), has created dramatic changes in the structure of the travel industry, the way people travel, and how travel companies reach their customers (Bakar et al., 2020; Jamshidi, Rousta, & Shafei, 2023; Kim, Malthouse & Edward 2015; Lee, 2018). The rapid development of information and communication technology (ICT) has made software for technologies and mobile applications part of everyday life (Alalwan, 2020). The seventh most downloaded category of mobile apps worldwide is travel-based, which accounts for about 60% of mobile users who have been using travel apps while planning their trips (Ukpabi & Karjaluoto, 2017). This means that travel apps are among the most popular emerging apps.

Travel apps are travel-related and directed at tourists, millennials, voyagers, and travel companies (Lu, Mao, Wang, & Hu, 2015). These apps empower travelers to check and book accommodation, tour events, and flights, regardless of time (Linton & Kwortnik, 2015; Lu et al., 2015; Schaefer, 2016). Tourists travel with various mobile devices and rely on a range of travel applications (Starcevic, 2018), and throughout their decision-making journey, mobile apps are a constant reference tool (Jamshidi et al., 2023). Hence, such apps reach an extensive customer base (Chamboko-Mpotaringa, & Tichaawa, 2021), and have significantly influenced the travel industry, providing travelers with excellent online data accessibility (Kwon, Bae, & Blum, 2013; Wang,

Park, & Fesenmaier, 2012). In 2016, 65% of travelers used travel apps for room bookings and 70% for travel-related information (Ostdick, 2017). These usage rates suggest that app providers and advertisers should encourage users to use and continue using travel-related apps.

Obtaining and satisfying a new customer has been known to be more costly than maintaining a current one (Hill & Alexander, 2001), whereas satisfaction while using mobile travel apps leads to their continued use. Indeed, the satisfaction index for tourism indicates that happy app users are 59% more likely to reuse apps (Choi, Wang, & Sparks, 2019). Mobile travel apps vary in features, functionality and design, for example they may be Reservation-only vs. transactions, and information search vs. interaction, such variations can affect user experience and satisfaction (Wang, Xiang, Law, & Ki, 2016). In research conducted in 2018, the most common reason individuals gave for using mobile travel apps compared to travel websites was that the features they liked on apps, were not available on website browsers (Statista, 2020) as shown in Table 1.1, suggesting apps offer a better user experience than do travel websites.

Table 1.1: Reasons for Downloading Mobile Apps and Not Websites 2018

No.	Reasons for Using Mobile Travel Apps Over Websites	Share of Respondents
1	Features I like on mobile apps are not available on mobile websites	40%
2	I can receive notifications on relevant notifications/offers	32%
3	I can use it without being connected to the internet	31%
4	It stores my preferences to make bookings easy	28%
5	Speed	27%
6	Better look and feel	23%
7	Reward/Discount for downloading app	11%

Source: Statista (2020)

The facts and statistics mentioned earlier indicate that information technology plays a vital role in the growth and development of the tourism sector increasing the potential for success in the industry. Developing countries in particular can benefit from the application of such technology. Pakistan is one such country which has seen significant growth potential in this field since its diverse cultures, captivating landscapes, stunning beaches, and many charms and sites represent strong attractions to both domestic and international tourists. In fact, Pakistan can offer four types of tourism: spiritual, archaeological, adventure, and ecotourism (Arshad, Iqbal, & Shahbaz, 2018). However, in the Tourism Competitiveness Report of the World Economic Forum, Calderwood and Soshkin (2019) have highlighted that the nation faced several issues such as out of 136 countries, Pakistan ranked 133rd in terms of safety and protection, 101 in terms of health and hygiene, 134th in human resource and labor market and 122nd in terms of travel and tourism prioritization. Whereas, underdeveloped tourist service infrastructure is 125th out of 136 countries (2.7%) and low ICT use is 126 out of 136 (3%) being the most influential factors for decreased use of mobile travel apps (Arshad et al., 2018).

The Pakistani national trends in mobile phone usage show that 72% of the total population use smartphones, such as windows or iPhones, while 28% use other phones (Grappetite, 2019). Of this total population of mobile phone users, only 16% actually purchase mobile phone apps, whilst 84% rely on free mobile phone apps. Further statistics show that 90% of people use social networking apps, preferably Facebook, 72% use mobile phone apps related to games, 64% use photos and video-related mobile phone apps, 55% prefer music apps, and the remaining 55% like to use entertainment-related mobile phone apps (Grappetie, 2019). The statistics indicate a distinct lack of use of mobile travel apps, although a province in Pakistan (Khyber Pakhtunkhwa) has

launched an innovative mobile travel app for tourism. This app includes data regarding tour organizers, hotel and restaurant booking, tracking, tourist resorts, and weather in Khyber Pakhtunkhwa (KPK) to assist tourists in securing their required information (Dawn, 2018). Despite the efforts made by the government, however, this mobile phone app was only designed for one province leaving the rest without such a facility. Clearly, in order to successfully promote mobile travel app use in Pakistan, it is vital to understand the factors influencing tourists' perceptions towards mobile travel apps and their intention to continue using them.

1.1 Problem Statement

Past studies related to information systems have explored the adoption and influence of mobile technology in the context of the tourism experience and the hotel industry (Law, Chan, & Wang, 2018). While the tourism industry does require more exploration (Bakar et al., 2020), there is some limited research on mobile travel apps (Ismail, Hemdi, Sumarjan, Hanafiah, & Zulkifly, 2017; Magano & Cunha, 2019). Several researchers such as Izzah, Kusuma, Irawan, Cinderatama, and Nugroho (2021) have investigated an android-based city tour application; Ali, Nawi, Hamid, Jalil, and Hussain (2021) have also studied mobile apps for digitization facilities management; and Awwad (2021) has studied mobile location services. Additionally, the Scopus database confirms that Reuver, Haaker, Nikayin, and Kosman (2015), Fang, Zhao, Wen, and Wang (2017), Ho, Amin, Ryu, and Ali (2021a), Tian, Shi, and Cheng (2021), and Wu and Lee (2017) are the leading scholars on the issue of mobile travel apps.

Nonetheless, it is the case that previous research on mobile apps is limited to users' intentions and the initial adoption of a system (Akdim, Casaló, & Flavián, 2022; Iranmanesh, Min, Senali, Nikbin, & Foroughi, 2022). Some researchers (Kramer, Modsching, ten Hagen, & Gretzel, 2007; Wang, Ruenn-Lien, 2017) have explored the use of mobiles in the travel domain (Wang, Yang, Han, & Shi, 2017), mobile adoption during recreational tourism (Regan, 2015), and mobile app adoption while traveling to rural sites (Gupta, Dogra, & George, 2018; Lu et al., 2015). The reasons why tourists consult with different mobile apps have also been studied (Law et al., 2018).

The idea of continued use intention has been considered as an individual decision to keep using mobile technology, after making primary acceptance decisions as a part of routine activity in a habitualized manner (Bhattacharjee, 2001; Limayem et al., 2007). While Meng et al. (2015) argued that using mobile apps for daily tasks does not necessarily suggest use for travel. Because of the unique characteristics of the travel experience cycle, such as the need to use a travel app prior to, during, and after trips for specific travel-related purposes e.g., reservation, transaction, information search, reviews, ratings (Okazaki et al., 2015), travel app use patterns differ from those of general mobile app use patterns (e.g., banking, social, health apps) in everyday life. Therefore, tourists continued use of mobile travel apps is a complex phenomenon and such behavior needs to be understood thoroughly.

Though continued use intention and behavioral loyalty are considered as overlapping concepts, yet there is a slight difference in their concepts. Continued use intention mirrors the intensity of the user's willingness to use the information system again (Pang, Bao, Hao, Kim, & Gu, 2020).

Previous scholars consider continued use intention as the behavioral performance followed by the first use (Limayem, Hirt, & Cheung, 2007). The concept of continued use intention is based on satisfaction as well as expectations on the basis of past experiences (Dorsch, Grove, & Darden, 2000; Jung, & Shin, 2019). Whereas, behavioral loyalty is the continued purchase from the same provider, with the inclination to suggest to others, no matter the relationship continues or not (Jones, & Sasser, 1995). Thus, loyalty is user's feeling of use towards a service or the tendency of always staying loyal to use a specific service or a product in every choice, (Gilaninia, 2018; Kurniawan, Ardianto, & Hidayatullah, 2021). This study mainly focuses on the factors that lead to tourist satisfaction leading to continued use intention of mobile travel apps.

Scholars and researchers have not thoroughly investigated the relevant problems of mobile travel apps. Indeed, the aspects forming tourists' perceptions, intentions, and behavior towards using mobile apps are unknown (Alalwan, 2020), and tourists continued use of mobile travel apps shows a declining trend. A survey conducted to study the rate of retention of mobile app users over 30 days (Statista, 2018) showed that on day one, the retention rate of mobile travel app users was 20%, which declined to 6% on day 30, showing a drop in the intention for continued app use among users. Users rarely use downloaded mobile apps. Within 30 days after the initial download, fewer than 20% of users return to an app (Localytics, 2021). Hence, there is a need to study the post-adoption behavior (i.e., continued use intention) of tourists towards an information system in the context of travel and tourism in a developing country like Pakistan (Apostolou, Belanger, & Schaupp, 2017; Bakar, Nawi, Abdul, Rahim, Aziz, Ahmad, & Ghazali, 2020). In short, despite the increasing growth of mobile apps and their potential effect on the service industry, there is a lack

of research on the continued use of mobile apps in developing countries like Pakistan, as an efficient communication platform for visitors, and especially this relates to mobile travel apps.

Previous research on the continued usage of mobile technology has revealed that multiple factors influence behavioral intentions to use an information system (Li, Hsieh, & Rai, 2013; Wang, Yang, Zhu, & Yu, 2014; Zhang, Cho, Wang, & Ge, 2018). Some studies have provided insights into how quality affects continued intention but have not specified any quality dimension; and since an effective and efficient quality enhancement for continued use intentions involves understanding particular quality dimensions affecting continuance intention (Kim, Kim, Lee, & Kim, 2019), a knowledge gap exists in this respect.

Trust and privacy concerns over personal information are known to be substantial predictors of adoption and continued intention to use mobile technology for traveling (Law et al., 2018; Morosan & DeFranco, 2016). Tourists tend to adopt and intend to continually use mobile travel apps if the apps are beneficial and suitable for travel-related tasks, like information quest (Kim, Kim, & Park, 2013; Kim et al., 2017), booking and payment for services (Cang, Sun, & Li, 2017; Morosan & DeFranco, 2016; Morosan & Jeong, 2008; Ozturk, Bilgihan, Nusair, & Okumus, 2016), ordering food (Okumus & Bilgihan, 2014), and moving around a destination (Lu et al., 2015), and if they validate the practicality of achieving particular tasks, irrespective of the difficulty level involved (Morosan & DeFranco, 2016).

Tourist's continuous use intentions are also influenced by perceived trust. Initial trust is more important when consumers buy products or services than continuous trust, later one is more relevant to repeated individual activity which takes place over an extended period of time (Hoehle, Huff, & Goode, 2012). Past research has also revealed that individuals adjust their initial judgment about IS applications over time (Bhattacharjee, 2001). These adjustments could be triggered by positive or negative experiences with system usage and could influence individuals' decisions concerning continuing or discontinuing the use of particular applications (Venkatesh, 2010). Similarly, individuals' intentions to continue the use of these applications are influenced by their continuous trust as well which is shaped by past experience. For these reasons, continuous trust is considered the most appropriate construct to employ in an investigation of consumers' intentions to continue using an app (Hoehle et al, 2012). Individual's behavioral intentions are also determined by their perception of a service provider as being trusted, honest and concerned about protecting tourists' personal and credit card information etc. Therefore, travel app users' perception concerning their privacy protection and security influences their trust in using the travel app shaping their behavioral intentions to continue using mobile travel apps.

Existing studies have frequently used compatibility in information systems adoption literature as a factor of intention (Isaac, Abdullah, Ramayah, & Ahmed, 2017; Islam, 2016; Venkatesh, Morris, Davis, & Davis, 2003). However, the scholars involved have not taken compatibility as a moderator between overall quality, trust, perceived usefulness, expectation confirmation, and satisfaction in the mobile travel app context. There are some contradictory findings regarding ISSM. Some researchers found significant relationship between overall quality and satisfaction (Jazil, Hidayatullah, & Prasetya, 2022; Ariyanto, Rohadi, & Lestari, 2020; Beatrix, 2022; Tam &

Oliveria, 2016). On contrary other researchers found insignificance between these factors (Shim, & Jo, 2020; Pratama, Hidayatullah, Alvianna, Astuti, & Krisnanda, 2021; Aparicio et al, 2017; Chiu, Chao, Kao & Pu, 2016). Likewise, studies revealed that there is no direct impact of perceived trust on satisfaction (Juwaini et al, 2022; Szymanski & Hise, 2000). Previous researchers also found that perceived usefulness (Chen et al. 2013; Dalvi-Esfahani et al. 2018; Joo et al. 2016; Kim 2010; Mac Callum and Jeffrey 2013; Mac Callum and Jeffrey 2014; Oghuma et al. 2015; Sabah 2016) as well as satisfaction (Hong et al. 2006; Joo et al. 2016; Kim 2010; Oghuma et al. 2015; Wang and Du 2014) influence continuous use intention. On the other hand, Al-Emran, Arpaci, & Salloum, (2020) pointed out that these factors don not influence or lead towards continuous use intention. Therefore, these inconsistent findings might be explained by a moderating variable that strengthens or dampens the relationship between the constructs in the context of Pakistan. As Pakistan is an under developing country having low independence traits among individuals, where personal relationships and social influence is valued more, therefore in order to adopt new technology, it has to be compatible with individual's values, beliefs and their social norms.

Mobile apps are developed and designed to be downloaded and used via mobile phones or similar mobile platforms, such as iPads and tablets. All sectors, such as retail, media, travel, education, healthcare, finance, and social, have seen the explosion of mobile apps. In 2017, consumers downloaded 178.1 billion smartphone apps to their connected devices. This figure has increased to 258.2 billion app downloads in 2022 (Matlock, Rendell, Heath, & Swaid, 2018). Although mobile travel apps offer many benefits and are trendy, only a small percentage of traveler's book holidays and buy flight tickets using apps. Most tourists (above 50%) tend not to use apps (Bakar, Nawi, Abdul, Rahim, Aziz, Ahmad, Ghazali, 2020).

Pakistan is still the least competitive among other neighboring South Asian countries in attracting travel and tourism, The average international tourist arrival in South Asia from 2014-2018 is about 2.34 million, while Pakistan average international tourist arrival is 0.80 million only (Zulfiqar, Singh & Kampooale, 2022). It is ranked at 124 out of 136 countries in world travel and tourism competitiveness index in attracting international tourists (Arshad et al., 2018). Its tourism sector faces the problem of low or discontinued use of mobile technology by the travelers. Indeed, the statistics from the 2019 World Economic Forum show that Pakistan lags in terms of readiness to use ICT, such as mobile travel apps, with the percentage of ICT usage in Pakistan's tourism sector being only 3.0%. The government has introduced a new visa policy, which provides e-visas and visas to visitors upon entry and has removed the requirement for No-Objection Certificates (NOCs) previously needed to visit certain parts of the country to promote tourism. However, the government still has to address several remaining issues such as continued use of mobile technology for planning and booking trips, readiness for ICT usage, poor service infrastructure, and building trust in sharing personal information on mobile travel apps (Mahmood, 2020).

Despite the efforts made by the government to assist tourists in as many ways as possible, the problems prevail that the mobile travel app that has been designed is only applicable to one province of Pakistan, and that tourists are reluctant to install travel apps and use them after the first time. Consequently, there is an urgent need for government, travel app providers and the app designers to focus on encouraging travellers to adopt mobile technology and persuade them to continue using the apps by enhancing the overall quality of the systems, developing trust among the travelers, and making the apps useful for and compatible with their needs, which is the main

issue in the tourism industry leading to the urgent problem addressed by the study. Compounding this problem is the fact that there is relatively no or less information on the continued use of mobile apps.

In summary, the primary challenges of promoting the continued use of mobile travel apps are providing overall quality, building trust, confirming users' expectations, and ensuring app usefulness. Given these problems, it is beneficial to determine whether users are satisfied with the service quality, system quality, information quality of the travel apps and what other factors cause their satisfaction/dissatisfaction and hence, influence their continued use of mobile travel apps in Pakistan. The increasing use of mobile devices for accessing travel services by both travel organizers and tourists has raised the need to emphasize overall quality and address other concerns like trust, expectations, and the perceived usefulness of mobile travel apps. This study aims to identify the determinants of tourists' intention to continually use mobile travel apps, focusing on the effects of the overall system quality, trust in and expectations from the system, and system usefulness and compatibility. The study incorporates more than one theory and extends existing models to effectively examine the impact of mobile travel app dimensions on tourist behaviour (Dorcic, Komsic, & Markovic, 2019; Law, 2019; Liu, Li, Edu, & Negricea, 2020).

1.2 Research Questions

The research questions generated as a result of the foregoing discussion are as follows:

- RQ1. Do service quality, system quality, information quality, and perceived trust influence tourist satisfaction with mobile travel apps?
- RQ2. Do perceived usefulness and expectation confirmation influence tourist satisfaction with mobile travel apps?
- RQ3. Does expectation confirmation influence tourists' perceived usefulness of mobile travel apps?
- RQ4. Does tourist satisfaction with mobile travel apps influence tourists' continued use intention?
- RQ5. Does compatibility moderate the relationship between service quality, system quality, information quality, trust, perceived usefulness, and expectation confirmation with tourist satisfaction with mobile travel apps?

1.3 Research Objectives

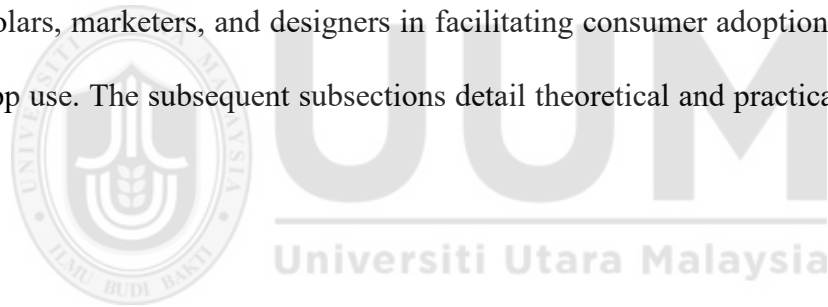
The objectives of the study are:

- RO1. To investigate the influence of service quality, system quality, information quality, and perceived trust on tourist satisfaction with mobile travel apps.
- RO2. To investigate the influence of perceived usefulness and expectation confirmation on tourist satisfaction with mobile travel apps.
- RO3. To investigate the influence of expectation confirmation on tourists' perceived usefulness of mobile travel apps.

- RO4. To investigate the influence of tourist satisfaction with mobile travel apps on tourists' continued use intention.
- RO5. To investigate the moderating role of compatibility on the relationship between service quality, system quality, information quality, perceived trust, perceived usefulness, expected confirmation, and tourist satisfaction with mobile travel apps.

1.4 Significance of the Study

The present research findings can provide a benchmark for travel and tourism managers, travel companies, scholars, marketers, and designers in facilitating consumer adoption and retention of mobile travel app use. The subsequent subsections detail theoretical and practical significance of this study.



1.4.1 Theoretical Significance

This research makes contributions to the theory and knowledge of mobile app services. Firstly, this research integrates two models: the information system success model (ISSM) and the expectation confirmation model (ECM) to enrich the understanding of continued use intention of mobile travel apps by identifying related determinants. No known research has integrated the two models when investigating continued use intentions of mobile travel apps among Pakistani users. Additionally, the study extends the ECM model by incorporating the effect of consumer trust on continued intention to use mobile travel apps.

Secondly, the country context of the present study is another significant contribution to the existing literature, Studies conducted in western settings form the basis of the current theoretical understanding of the continued use intention. This research provides evidence from a developing nation like Pakistan. Thirdly, previous research has not examined tourists' continued plans for using mobile travel applications. While most of the prior information system investigations have concentrated on initial acceptance, the current research captures the direct effects of continued intention to use mobile travel apps, which is the key to the long term survival of an information system (Bhattacharjee, 2001; Tam, Santos, & Oliveira, 2018).

Fourthly, this study is among the rare research that examines the moderating effect of compatibility on satisfaction with mobile travel apps. Previous studies often explored compatibility as a determinant of intention (Davis, Bagozzi, & Warshaw, 1989; Karahanna, Straub, & Chervany, 1999; Venkatesh, 2000), but as observed by Islam (2016), very limited attempts have been made to investigate compatibility as a moderator.

1.4.2 Practical Significance

This study has an inclusive model to help mobile app developers fully understand the determinants of continuance intention to use travel related mobile apps in Pakistan. It practically contributes by providing insights about the aspects that are most valued by the tourists. Such as,

- Providing off-line information to the tourists about the travel guides and maps.

- Providing a user-friendly system so that it does not require much effort for the travelers to adopt them, enabling them to learn how to use the system faster aiming to create continuous use.
- Implementing security measures to build trust among users.
- Providing travel apps that enhance tourists' performance by providing them backend support.

The study has practical implications for travel managers too.

- They encourage travelers to use mobile apps to manage their itineraries, reducing the need for paper documents.
- Travel app usage can reduce administrative work for travel managers.
- Mobile travel apps enable instant communication with travelers. Travel managers can send alerts, updates, and emergency notifications and inform travelers about the changes during the trip.
- improving efficiency, cost control, and safety within their travel programs.

Moreover, this study facilitates the tourists to perform activities such as hotel & flight booking, purchasing tickets etc. This function of the travel app is quite crucial to the tourists. According to a survey conducted by Statista 2019 across UK, USA and Asia, 67% of respondents said that booking via mobile travel app saves time, while 54% said that these apps give them more travel options and save money. They not only save cost but also provide convenience to the tourists that makes the app using experience worth it. Thus, mobile travel apps allow tourists to avoid extensive long-term planning which allow them to be independent that many travelers enjoy.

Therefore, existing research contributes to the knowledge available for travel and tourism industry and practitioners, like travel managers, investment decision-makers, mobile app developers and travel companies in order to identify areas that require improvements and offer maximum benefits for tourists, also facilitates the travelers. Additionally, travel companies can holistically enhance the continued use of mobile travel apps for a competitive advantage by providing travel discounts and last-minute travel deals. As the travel managers have always concentrated on the cybernetic business environment to capture profitable online business for competitive advantage (Anuar, Musa, & Khalid, 2014; Bai, Law, & Wen, 2008; Ismail et al., 2017).

1.5 Scope of the Study

This study focuses on the principal determinants that form tourists' behavioral intention towards continued use of mobile travel apps, with a concentration on the aspects of the overall quality, trust, expectations, perceived usefulness, tourist satisfaction, and continued intention to use mobile travel apps in the Pakistani context. It also examines tourists' continuous intention to use mobile travel apps as behavioral intention. The continued intention to use the information system is important for travel companies' competitiveness in the global market as it brings the potential for more business (Bhattacharjee, 2001). Indeed, the retention of users has become imperative for related industries, such as mobile services, where maintaining customers has become critical; and these organizations can benefit from learning how users create the intention to stay and then successfully provide new social app technologies to satisfy the needs of users (Albashrawi & Motiwalla, 2019; Hsiao, Chang, & Tang, 2016).

The research reflects on the continued use of mobile phone apps in the tourism industry of a developing country, Pakistan, which has been selected in view of that industry's substantial future contributions to the national economy. Northern Pakistan is chosen because of its high tourist inflow. Methodologically, the study adopts a quantitative approach, in which the intercept systematic sampling technique is used with self-administered questionnaires for data collection. The data is analyzed using PLS-SEM 3.2.7 software.

1.6 Definition of Key Terms

This section presents the operational and conceptual definitions of key terms used in the study.

1.6.1 Service Quality

- Service quality represents “the quality of the support received by the users from the IS department and IT support system” (Chatterjee, Kar, & Gupta, 2018, pg. 67).
- Service quality defined as: “Quality of the service or support that system users receive from the IS organization and IT support personnel in general or for a specific IS. For example; Responsiveness accuracy, reliability, technical competence, empathy of the personal staff” (Petter et al., 2013, P.11).

1.6.2 Information Quality

- Information quality refers to information technology, which “incorporates system characteristics like relevance, sufficiency, accuracy and timeliness” (Chatterjee et al., 2018, pg. 67).
- Information quality defined as “the desirable characteristics of the system outputs; that is, management reports and Web pages. For example, relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability “(Petter et al. ,2008 P.239).

1.6.3 System Quality

- System quality reflects “ease of use, response time, user interface and reliability and stability” (DeLone & McLean, 1992, p. 67).
- System quality is: “Desirable characteristics of an IS. Ease of use, system flexibility, system reliability, and ease of learning, as well as intuitiveness, sophistication, flexibility, response time” (Petter et al.,2013).

1.6.4 Perceived Trust

- Perceived trust refers to “the beliefs of users about benevolence, competence and integrity of the information system” (Bernard & Makienko, 2011, p. 99).

- Trust is, “a dynamic process and is built over a certain period of time contributing to satisfaction beyond the effects of the economic outcome” (Fam et al, 2004, p. 198).

1.6.5 Perceived Usefulness

- Perceived usefulness is considered to be “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p. 320).
- “People’s intention of using a new technology in which a people put a strong sense of belief that the new technology will improve their job performance” (Ozturk, 2016, p. 484).

1.6.6 Continued Use Intention

- Continued use intention refers to “post-adoption behavior in an information system domain” (Bhattacharjee, 2001, p. 194).
- Continued use intention is described as “Intention to Use Expected future consumption of an IS or its output” (Petter & McLean, 2009, p. 161).

1.6.7 Tourist Satisfaction

- Tourist satisfaction is defined as “the degree to which users have a positive affective orientation toward an information system; i.e., the extent to which they feel good about it” (McClean, 1992, p. 342).
- User satisfaction is the sum of feelings and attitudes in regards to distinct factors, which affect user’s satisfaction positively or negatively (Bailey et al, pp. 530-545)

1.6.8 Expectation Confirmation

- Expectation confirmation in the context of information systems is described as “users’ anticipated benefits gained through their experiences with the IT” (Lee, 2010, p. 9).
- It may be described as “consumers level of satisfaction with a service is determined by the consumers initial expectation on the service, as well as discrepancies between expectation and service performance” (Thong et al. 2006, p. 123).

1.6.9 Compatibility

- Compatibility represents “the degree to which an innovation is perceived as being consistent with the existing values, needs and past experiences of potential adopters” (Rogers, 1995, p. 32).

- “Compatibility is the extent to which an innovation is seen as being in line with the prevailing ideals, needs and previous experiences of prospective adopters” (Rogers, 1995, p. 5)

1.7 Organization of Thesis

The first chapter presents an overview of the research. The background and motivation of the study emphasize the need to improve the continued use intention of mobile travel apps. Thereafter, the problem statement, research questions and objectives, and research scope are presented before continuing with the research significance and contribution. Before ending the chapter, a definition of key terms and details of the organization of the thesis (i.e., the next four chapters) are given to help readers follow the discussion of the research journey. The next chapter (Chapter Two) presents a review of the literature relevant to the research questions and objectives. It focuses on all variables investigated in this research. The subsequent chapter (Chapter Three) explains the methodology for addressing the research questions and objectives. The fourth chapter reports the findings from the data analysis. The last chapter (Chapter Five) summarises and discusses the findings, implications, limitations, and suggestions for future research before the conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews the literature on mobile travel apps and the features influencing users to continue using them. It proceeds to consider the research gap, underlying theories, theoretical framework, and the research development model. Thereafter, the chapter discusses the relationships among the associated variables for hypothesis development before concluding with a summary.

2.1 Mobile Traveling Apps

In this era, mobile phones have become a necessity. Mobile phone technologies are able to satisfy a wide range of user needs and desires including help with time management. They come with mobile applications (apps) that allow individuals to interact by touching the screen or clicking buttons. Such applications are referred to as ‘apps’ and are basically “application software designed to run on mobile phones” (Cheng, Chen, & Yen, 2015).

Travel-related mobile apps have transformed how people travel and how travel companies access their customers (Iskandar & Sia, 2020). Undeniably, they influence Generation Y, the adventurers or experimenters (Bakar et al., 2020), as they feature travel tips and tourist destinations for users, enabling those tourism companies that create them to gain a competitive advantage, increase

revenue, and improve productivity (Jamshidi et al., 2023). Travel related apps focus on providing higher content originality, communication and connectivity (Wang & Xiang, 2012).

Universal connectivity via the internet and travel-related mobile apps allows many travelers to experience a de-exoticized environment (Weaver et al., 2007). These apps give travelers new content about destinations, entice exploration, and ease the review of product and service quality. In today's business environment, travel-related mobile apps also help companies in the tourism field to provide exciting, fascinating, and innovative experiences for their travelers (Kuo, Huang, Nguyen, & Nguyen, 2019; Ukpabi & Karjaluoto, 2017). Essentially, mobile travel apps offer relevant information about destinations and attractions, as well as playing a vital role as travel agencies, social networks and tourist guides (Xiang & Fesenmaier, 2017).

Several models have been proposed in earlier research to study the distinct nature of mobile apps (see Table 2.1). Taking that into account, we aim to clarify the user's behavior in relation to mobile apps, analyzing a few examples of different approaches to what has been done in the research on mobile apps.

Table 2.1 - Research Related to Mobile Apps.

Authors	Context	Model/Theory	Dependent Variable	Sample Method	Findings
(Bellman et al. 2011)	The effects of using branded mobile phone applications.	Pre-test/Post-test experimental design.	Brand attitude and purchase intention	228 participants, 159 were in the South-western United States and 69 were in Western Australia, Analysis of variance (ANOVA).	Apps increase the favorability of brand attitude and purchase intention. The relevance of the product category made no difference to the effectiveness of a branded pp.
(Wang et al. 2013a)	The determinants of behavioral intention of app's users	Theory of consumption values.	Behavioral Intention to Use	282 mobile apps users, Structural equation modelling (SEM)	The base model accounted for 53% of the variance of behavioral intention
(Kang 2014)	Predict use of mobile apps.	Extended unified theory of acceptance and use of technology (UTAUT)	Continuance intention	788 users of apps, SEM	The analysis found that only gender moderated the relationship between effort expectancy and continuance intention, implying that women were more likely than men to prefer ease of use for continuance intention
(Song et al. 2014)	The satisfaction of uses in mobile apps store.	An environmental psychology perspective, using discoverability facilitators.	User satisfaction	278 respondents, 155 respondents were in US and 123 respondents were in South Korea, Partial least squares (PLS).	Model explains 49.2% of the variance in the user satisfaction for application discoverability.
(Kim et al. 2015)	The effects of adopting and	Difference-indifference-	Effects of app Adoption	10,776 users of apps and 5,127	Younger customers are

	using a brand's mobile apps on subsequent purchases.	indifference (DDD) model		nonusers of apps, the propensity score matching model(Pi), the normalized differences (NDs)	more likely to adopt than older customers, and the oldest customers are the least likely to adopt. Males are more likely to adopt than females.
(Xu et al. 2015)	Interpersonal recommendation to promote mobile apps.	Customer Value, Satisfaction and Loyalty Framework (VSL)	Intention to recommend	347 questionnaires to college students in the southwestern U.S., PLS	The model explained 44% of variance in recommendation and 34% of variance in intention to recommend.
(Hsu and Lin 2015)	Purchase intention for paid mobile apps.	Extending the expectation confirmation model (ECM)	User intention to purchase	507 responses, Taiwan, SEM.	The user's intention to purchase is determined by value-for money, satisfaction, and the availability of free alternatives, while that of potential users is determined by value-for-money, social value, app ratings, and free alternatives.
(Hoehle et al. 2015)	The continued intention to use social media mobile apps explained by a cultural perspective to understand.	Using Hofstede's five cultural values along with mobile apps usability	Continue intention to use	1,844 respondents of U.S., Germany, China, and India, PLS.	The results explained 38% of variance in continued intention to use
(Hsiao et al. 2016)	Investigating key determinants of users' continuance intention regarding social apps	Satisfaction, Continuance intention, Habit, and Customer value	Continuance e intention	407 questionnaires to college students from Taiwan, SEM and confirmatory factor analysis (CFA)	The model's explained variance of satisfaction, habit, and continuance intention accounted for 70%, 67%, and

(Harris et al. 2016)	Explore factors that influence consumer before installing a mobile app	the that a benefit and intent to install, and seven antecedents of trust and risk.	Perspective, perceived risk, trust, perceived benefit and intent to install, and seven antecedents of trust and risk.	Intention to Install	to 128 students, USA, PLS	71%, respectively. Model explains 50.5% of the variance in the intention to install an app.
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To conclude many theories and ways have been employed to study mobile apps. However, to the best of our knowledge there is no earlier research on mobile travel apps combining the ECM and ISSM to study tourist satisfaction leading to the continued use intention of mobile travel apps. Therefore, the present study contributes to the information systems discipline by integrating these two well established theories in a single theoretical framework.

2.2 Factors Influencing Continuous Usage of Mobile Travel Apps

2.2.1 Service Quality

Service quality represents the quality of the support which is received by the users from the IS department and IT support system which includes staff responsiveness, dependability, conciseness, technical capability, and compassion (Chatterjee et al., 2018; Delone & McLean, 2003; Petter, DeLone, & McLean, 2008; Sarmah, Kamboj, & Rahman, 2017; Veeramootoo et al., 2018). The diversity among customer expectations and service conception determines service quality. If performance exceeds expectations beyond satisfactory, the service provides customer satisfaction (Li, Lu, Hou, Cui, & Darbandi, 2021). Hence, there is a direct relationship between

customer satisfaction and service quality (Hussain, Nasser, & Hussain, 2015; Park, Lee, & Nicolau, 2020; Sezgen, Mason, & Mayer, 2019). Indeed, the service quality of a system is critical in satisfying travelers who are expecting accurate and timely travel information. The better the delivery and service quality, the more accurate, responsive and dependable the system (Li & Shang, 2020; Malik & Mubeen, 2009).

Regardless of the product involved, service quality is a significant measure of IS effectiveness (Pitt, Watson, & Kavan, 1995; Sharma & Sharma, 2019) as it indicates reliability, assurance, personalization, and responsiveness (Ighomereho, Ojo, Omoyele, & Olabode, 2022). Providing quality services signals the benevolence and aptness of providers. Customers appreciate such benevolence, forming perceptions of the service they receive and the provider. If there is synchronization between customer expectations of quality and the quality they experience, then customers are likely to be satisfied, remain loyal, and intentionally purchase the product or service of that specific brand in the future, and vice versa. A product or service of below-standard quality dissatisfies customers, who may refuse to re-use the product or service.

Service quality and responsiveness are the most critical factors in tourism (Maltz, 1998). The first factor (i.e., service quality) includes on-time delivery, time cycle, and availability of the inventory. The second factor (i.e., responsiveness) indicates the service provider's ability to serve customer needs beyond measures (Davis & Manrodt, 1996). Therefore, service quality measures the excellence of services being provided to customers in an effort to meet their expectations. Delivering quality services implies consistently meeting customer needs and expectations.

Service quality is critical for maintaining competitive advantages and long-term returns (Rahahleh et al., 2020; Zeithaml, 2000). Several researchers have discovered a positive link between service quality and consumer satisfaction. For example, Raza, Umer, Qureshi, and Dahri (2020) found that service quality influenced emotional reactions and satisfaction. Additionally, research has revealed that service quality affects customer satisfaction (Alrousan & Abuamoud, 2013; Bitner & Hubbert, 1994; Fornell, Johnson, Anderson, Cha, & Bryant, 1996; Mentzer, Flint, & Hult, 2001; Sivadas & Baker-Prewitt, 2000; Zeithaml, Berry, & Parasuraman, 1996). Other research findings have indicated that if tourists experience high-quality services, they will develop a higher level of satisfaction regarding those services (Delgado, Martín, & Maestro, 2020; Oliver, 2014). In contrast, if customers receive services below their expectations, their satisfaction levels will decrease.



2.2.2 System Quality

System quality depends upon the elasticity, consistency, accuracy, online response time, and ease of use of an IS (DeLone and McLean, 1992). Numerous researchers have discussed factors affecting the system quality, i.e., ease of use, response time, reliability, and stability of the system (DeLone & McLean, 1992; Dwivedi, Shareef, Simintiras, Lal, & Weerakkody, 2016; Petter et al., 2008; Sharma, Gaur, Saddikuti, & Rastogi, 2017; Sharma & Sharma, 2019; Wu & Wang, 2006; Zhou, 2013). System quality also describes the degree to which an IS successfully performs multiple functions while achieving the agreed deliverables for all of its stakeholders (Jeddi, Nabovati, Bigham, & Khajouei, 2020; Martins et al., 2019; Salam & Farooq, 2020; Hellens, 1997).

Based on the above-described variables, users can access the capabilities of service providers, the absence of which may reduce intention to use mobile applications (Jahanmir, Silva, Gomes, & Gonçalves, 2020). Clearly, the adoption of mobile applications is heavily influenced by system quality in information systems. Researchers have confirmed the need for app developers to produce basic and easy-to-use mobile apps (Bahaddad, AlGhamdi, Buhari, Alassafi, and Alzahrani, 2019; Niranjanamurthy, Kavyashree, Jagannath, and Chahar, 2013).

Furthermore, system performance can be judged by system quality as determined by consumer feedback (Petter et al., 2008); thus, mobile phone travel apps should match the needs of travelers. However, the backend must also have a quality system (Zhang & Dran, 2000), since the mobile traveling application is affected negatively if the quality of the system is not ensured to fulfill the needs of the customers. It is well understood that continuous use intention has a link to positive experiences with the performance of the system (Bhattacharjee, 2001; Lee, Sung, & Jeon, 2019). For mobile travel apps, system quality significantly affects customer satisfaction, which will increase with easy access to features and navigation (Bahaddad et al., 2019). A part of that system quality the degree to which the system supports users in performing relevant tasks is important (Zarlis, Wahyudi, Santoso, Sihotang, & Fitriani, 2021).

2.2.3 Information Quality

Many researchers have concluded that information quality includes elements such as feedback or response time, sufficiency, and correctness (Chatterjee et al., 2018; Dwivedi et al., 2016; Petter et al., 2013; Sharma et al., 2017; Veeramootoo et al., 2018; Zhou, 2013). And others (Delone &

McLean, 2003; Zaineldeen, Hongbo, Koffi, & Hassan, 2020; Lin & Lee, 2006) assert that response time, convenience, correctness, concurrence, relevance and utility, define information quality. Hence, information quality indicates consumers' judgement of whether information is reliable, valid, and timely (Teo, Srivastava, & Jiang, 2008). Moreover, the quality of information determines consumers' attitudes towards technology and its use (Mahadin, Akroush, & Bata, 2020).

The information represents the contents and services offered to customers (Chen & Cheng, 2009). The term 'content' in the context of mobile services refers to texts, images, and multimedia data delivered via a web server or mobile phone. Mobile application technology is widely available at cheap rates but does not directly interact with customers. Most customers rely on information quality to form their perceptions of mobile apps.

The earlier research studies have used various methods to access the success of an information system. These measures include user satisfaction (Gyampah & White, 1993; Bai et al., 2008; Ives, Olson, & Baroudi, 1983; Mukhopadhyay, Kekre, & Kalathur, 1995), improvement in quality and performance (Martin, 1982; Pearson & Shim, 1994; Rivard & Kaiser, 1990), anticipated benefits from IS (Davis et al., 1989; DeLone & McLean, 1992; King & Teo, 1996; Purvis & Sambamurthy, 1997), and the level of usage (Bai et al., 2008; DeLone, 1988).

Tourist satisfaction with information systems is a convenient measure of the successfulness and quality of an IS (Bai et al., 2008; Ives et al., 1983). Comprehensive information that serves the

customer needs brings satisfaction with the system whereas in contrast, systems that fail to meet user requirements result in customer dissatisfaction and the likelihood that customers may look for another system that has the potential to meet their needs (Lin, Lee, Siu, Lau, & Choy, 2020).

Information quality critically contributes to satisfaction (Urbach et al., 2010), and effects customer behavioral attitudes towards intention to continue using mobile travel apps (Xu, Benbasat, & Cenfetelli, 2013). Lack of IS effectiveness brings operational issues which significantly hamper users (Zhou, 2013). Customer satisfaction is likely to suffer if the system does not meet expectations for information quality.

2.2.4 Perceived Trust

Trust is referred to people's instincts to believe in the truthfulness and conviction of other persons with whom they are not familiar or who are beyond their control (Apostolou et al., 2017; Choi et al., 2019; McKnight & Chervany, 2001; Schoorman, Mayer, & Davis, 2007; Siau & Shen, 2003; Warkentin, Gefen, Pavlou, & Rose, 2002). The trust may also represent an expectation over words, promises, or written or verbal statements from other individuals on which a person depends (Petrocchi, Marciano, Annoni, & Camerini, 2020; Rotter, 1971).

Several researchers have utilized the theory of reasoned action to support the relationship between trust and user behavior (Apostolou et al., 2017; Gefen, Karahanna, & Straub, 2003; Jarvenpaa, Tractinsky, & Vitale, 2000; McKnight et al., 2002). Meanwhile, extensive research has been

conducted to investigate the impact of trust in IS in the e-commerce (Belanger, Hiller, & Smith, 2002; Gefen et al., 2003; Jarvenpaa et al., 2000; McKnight et al., 2002; Slyke, Bélanger, & Comunale, 2004), and e-government sectors (Bélanger & Carter, 2008; Carter & Bélanger, 2005; Soliman, Affisco, Belanger, & Hiller, 2006; Welch, Hinnant, & Moon, 2005).

Benevolence, competence and integrity are regarded as three foundation pillars of trust and can be used as indicators to measure it (McKnight et al., 2002; Runde, Parra, Nalda, & Perles, 2011). Benevolence is the degree to which a trusting party believes that the trusted party is motivated to do the right thing rather than maximize their revenue (Belanger et al., 2002). Competence is the ability of the party to protect users' privacy and personal information. Integrity is a sign of the honesty and sincerity of the other party (Belanger et al., 2002), which means that the trustee pledges allegiance, speaks the truth, acts ethically and keeps promises (McKnight et al., 2002).

Trust is contextual, and some academics have proposed that it can exist in an individual (Larzelere & Huston, 1980), or an organization (Shapiro, 1987). In an online environment, the trusted party is the entity that provides the services, and the controlling party is the device through which the service is provided (Apostolou et al., 2017; Tan, 2000). In this research, trust is the obligation of mobile travel app providers to ensure users' privacy and confidentiality to enable users to continue using the app. Security and privacy are at higher risk in monetary transactions through mobile phones because of the personal information stored on the phones (Chong (2013). Hence, consumers and service providers must develop a trust-based relationship to facilitate continuous

app use (Oliveira, Faria, Thomas, & Popovič, 2014; Shareef, Baabdullah, Dutta, Kumar, & Dwivedi, 2018; Slade, Dwivedi, Piercy, & Williams, 2015).

2.2.5 Expectation Confirmation

Confirmation of expectations represents the expected benefit gained from experience with IT (Lee, 2010). Users continually update their expectations of IT use as they obtain more experience with it. Clearly, with concrete and greater evidence in the post-adoption of IT, users' expectations might differ substantially from their early expectations (Bhattacharjee, 2001; Karahanna et al., 1999; Tam et al., 2018).

Previous research has asserted that expectations based on direct experiences primarily predict consumer satisfaction. A positive relationship between expectation confirmation and satisfaction with IS implies that the expected benefits are realized (Bhattacharjee, 2001), and if users acquire the expected benefits from IT, they will experience its usefulness and achieve satisfaction. Similarly, users who experience expectation confirmations from mobile apps can realize their usefulness.

2.2.6 Perceived Usefulness

Performance expectancy is the level of faith individuals have that a system will lift their performance (Chiu & Wang, 2008). The idea parallels perceived usefulness and relative advantage (Alwahaishi & Snásel, 2013). When the actual performance of the IS meets users' expectation,

users will observe its usefulness and obtain a high degree of satisfaction (Ayanso, Herath, & O'Brien, 2015; Oliver, 1980; Pang, Bao, Hao, Kim, & Gu, 2020). Expectation confirmation and perceived usefulness establish user satisfaction (Bhattacharjee, 2001; Tam et al. 2018).

The literature shows that perceived usefulness has a direct and positive impact on user satisfaction with a system and the desire to use it in the future (Nascimento et al., 2018; Oghuma et al., 2016). Satisfaction with an IS influences future usage intention (Tam, Santos, & Oliveira, 2020). When consumers see the usefulness of IS, they are more likely to utilize it on a regular basis. Perceived usefulness influences sustained use intention in the context of travel applications (Zhou et al., 2022). Users will be more satisfied with a mobile app if they view it to be useful. Similarly, perceived usefulness (in terms of utility, performance expectancy) has consistently been proven to be the strongest predictor of behavioral intention (Tam et al., 2018; Venkatesh et al., 2003; Yang & Lin, 2015).

2.2.7 Tourist Satisfaction

Service providers in every industry strive for user satisfaction because of its influence on their performance and profits (Ryu et al., 2012). User satisfaction has been frequently utilized as a measure in the field of IS because it is considered one of the primary markers when analyzing the effectiveness of new system adoption (DeLone & McLean, 2016; Montesdioca & Maçada, 2015). According to Xinli (2015), user satisfaction relates to how much a user finds a system useful and wants to use it again. Lin and Wang (2012) described it as system user satisfaction in terms of system speed, function quantity, quality, and format. In the context of human-computer

interactions, satisfaction has been shown to be a significant predictor of positive behavioral intentions such as repurchase intentions, eWOM, and long-term loyalty (Anderson & Srinivasan, 2003; Hsu et al., 2012). As a result, customer satisfaction is a well-studied notion, with various experts emphasizing the importance of understanding its determinants and effects (Ali, 2016).

In the tourism industry, “satisfaction is considered the cognitive–affective state of a tourist derived from their experience in the destination” (Del Bosque & San Martín, 2008, p. 3); alternatively, it can also be described as the overall satisfaction that captures a tourist's evaluation of their entire travel experience (Lou, Tian & Koh, 2017). More recent literature related to apps, define customer satisfaction as “the total consumption perception of consumers when using mobile apps” (Chang, 2015, p. 3). Satisfaction had been widely studied in the IS literature. The subsequent table summarizes recent systematic literature reviews on tourist satisfaction published between 2015 and 2022.

Table: 2.2 Tourist Satisfaction

Review	Framework	Drivers of Satisfaction	Measurement tools	Findings
Eugenio et al. (2022)	Push-Pull Model, Expectancy Disconfirmation Theory	Destination attributes (natural beauty, cultural experiences), service quality, value for money, personal factors (travel motives, expectations)	Tourist Satisfaction Index, questionnaires	Destination factors (authenticity, sustainability) and value for money have increased importance
Park et al. (2021)	Technology Acceptance Model, Service-Dominant Logic	Information quality, perceived ease of use, perceived usefulness of technology	Surveys, interviews	Technology plays a growing role in satisfaction, particularly for information access and booking.
Choi et al. (2020)	Expectancy Disconfirmation Theory, Service Quality Gap Mode	Service quality (dining, entertainment, staff interaction), pre-travel information, destination experiences	Satisfaction questionnaires, online reviews	Importance of exceeding expectations through personalization and authentic experiences.
Moscardo et al. (2019)	Sustainable Tourism Framework, Destination Management Theory	Environmental quality, cultural authenticity, local community engagement, tourist behavior	Tourism Satisfaction Surveys, qualitative research	Sustainability aspects and responsible tourism practices gaining importance
Jamal et al. (2018)	Tourist Experience Framework, Destination Satisfaction Model	Destination attributes (natural beauty, attractions), safety, infrastructure, cultural encounters	Tourist Satisfaction Surveys, scales	Importance of safety, security, and accessibility for diverse tourist segments.
Han et al. (2017)	Tourist Push-Pull Model, Service Quality Model	Cultural heritage resources, interpretation, visitor management, service quality (staff, facilities)	Visitor Satisfaction Surveys, observations	Effective interpretation and visitor management crucial for heritage site satisfaction
Ivanov & Pavlov (2015)	Tourist Experience Economy Framework, Customer Satisfaction Models	Emotions, engagement, sense of place, value co-creation	Qualitative research, interviews, surveys	Tourists seek more experiential, emotional, and personalized travel experiences.

This above table provides an overview and includes the prominent systematic literature reviews. Main focus is on theoretical frameworks, or aspects of tourist satisfaction, measurement tools and main findings.

2.2.8 Perceived Compatibility

Perceived compatibility is a concept derived from Diffusion of innovation (DOI) theory. It relates to the degree to which an innovation, is considered to be consistent with existing values, past experiences, and future consumers' demands (Rogers 2003). Perceived compatibility is regarded as one of the most crucial factors in the diffusion of innovation. Consumers will accept a new service, such as m-commerce, significantly more readily if they perceive it to be suitable with their lifestyle (Liebana-Cabanillas, Ramos de Luna, and Montoro-Rios 2015). Many mobile services, including m-commerce (Zhang, Zhu, and Liu 2012), mobile tourism shopping (Tan and Ooi 2018), and m-payments (Ooi and Tan 2016), have shown compatibility to be a major driver of adoption. Kang, Moon, and Johnson (2015) discovered that consumers who perceive the innovation compatible to their lifestyle, may have higher level of involvement towards it. Therefore, if the users perceive that their life style is compatible with the mobile technologies, such as mobile apps, they will be more willing to be engaged to the apps.

Perceived compatibility is often used in information systems adoption literature being a determinant of intention (Karahanna et al., 1999; Venkatesh et al., 2003) and perceived usefulness (Sun et al., 2009). Compatibility proved to have substantial influence on intentions (e.g. Chin and

Gopal, 1995; Taylor and Todd, 1995). Empirically, user adoption has been associated to other research that used other variables similar to perceived compatibility, for instance, job-relevance (Venkatesh and Davis, 2000), cognitive fit (Vessey, 1991), task-technology fit (Goodhue and Thompson, 1995), etc.

In this study it is argued that perceived compatibility as a moderator may influence beyond perceived usefulness and intentions, specially it can influence the relationship between the factors of continued use intention and tourist satisfaction. According to Goodhue and Thompson (1995), if the user's needs match the available technology, they will consider employing the technology in order to complete the tasks and increase their performance. Based on this argument if the tourists believe that the mobile travel apps they use, match their requirements, they will be more inclined towards the use of travel apps. Therefore, in the existing research perceived compatibility has been examined as a moderator in the context of travel related mobile apps.

2.3 Continued Use Intention of Mobile Travel Apps

The concept of intentional, continuous use regarding the different applications has been addressed in the IS literature (Bhattacharjee, 2001; Hong & Lee, 2005; Leung, Woo, & Ly, 2013; Thong et al., 2006), but very few researchers have attempted to study the continued use of travel apps (Ali, Terrah, et al., 2021; Zhou, Song, & Zhou, 2022). Intention is the most important factor in marketing and IS research (Davis, Bagozzi, & Warshaw, 1989; Hur, Kim, Karatepe, & Lee, 2017). Behavioral intention is a person's particular perspective towards the course of action (Ajzen & Fishbein, 1980). It indicates an individuals' readiness to perform a specific behavior (Yang, Liu,

& Yu, 2019). The intended continuous use of mobile apps disclosed reliance on the use of mobile apps rather than the concerned service staff regarding their delivery of services (Ajzen, 2002). Previous research indicated that intention acts as a significant determinant factor of behavior and there is considerable support in the literature for the relationship between behavioral intention and usage behavior in general (Gu, Lee, & Suh, 2009; Ji, Yang, Liu, & Yu, 2019; Venkatesh, 2000; Venkatesh et al., 2003).

There is a connection between satisfaction with the mobile app and re-use intention. A few studies display that mobile travel app users tend to have more positive experiences than users of mobile travel websites; 59% of travel app users express their intentions to re-use the apps (Choi, Wang, & Sparks, 2019, Albaom et al., 2022). A research study on hotel management and rating indicated that hotels that operate their business by using mobile applications show higher customer satisfaction and ratings (Choi, Wang, & Sparks, 2019; Dinçer, Yüksel, Canbolat, & Pınarbaşı, 2020). Consequently, the hotel business grows and meets customer expectations with the help of mobile app services as a means of creating excellent customer experiences (Choi et al., 2019).

One research study has indicated that mobile travel apps have different features affecting the user experience and level of satisfaction (Wang, Xiang, Law, & Ki, 2016). The level of satisfaction with mobile travel apps depends on their capability and efficiency in fulfilling the requirements of the consumer (Eriksson, 2014). According to Hort, Kechagia, Sarro, and Harman (2021), functional (i.e., Does the app operate as the user expects?) and non-functional (i.e., How does the app perform?) characteristics of apps primarily influence user satisfaction. Therefore, the factors

influencing the continued use intentions of mobile travel apps may differ from those of earlier studies.

2.4 Research Gap

Previous studies on mobile apps are limited to users' intentions and the initial adoption of a system only (Akdim, Casaló, & Flavián, 2022; Iranmanesh, Min, Senali, Nikbin, & Foroughi, 2022), Completely ignoring the complex phenomenon of continued use of mobile travel apps. Past studies have explored the adoption of mobile technology in the context of tourism experience and hotel industry (Law, Chan, & Wang, 2018), Android-based city tour applications (Izzah, Kusuma, Irawan, Cinderatama & Nugroho, 2021), mobile location services (Awwad, 2021). There are still limited studies on mobile technologies in the hospitality and tourism industry context (Ali et al., 2021; Wong et al., 2020). Particularly on the continued use of mobile travel apps (Choi et al., 2023; Ismail, Hemdi, Sumarjan, Hanafiah, & Zulkifly, 2017; Magano & Cunha, 2019). Therefore, this study responds to fill the research gap in this regard.

Preceding investigations have found mixed results, regarding the relationship between overall quality, perceived trust and tourist satisfaction (shodiq, Hidayatullah and Ardianto, 2018; Pratama et al., 2021; Aparicio et al., 2017; Tam & Oliveira, 2016; Jung, Chung, & Leue, 2015; Ramirez-Correa, Rondan-Cataluna, Arenas-Gaitan, & Alfaro-Perez, 2017). Thus, this study responds to the call for additional investigations on these factors as well as perceived usefulness and expectation confirmation to explain further the mixed results of the prior studies in hospitality and tourism context focusing on travel related mobile apps.

Moreover, Compatibility has been studied as a determinant of intention in previous studies related to IS (Foroughi et al., 2023). The role of compatibility as moderator has been just studied in the context of e-learning (Aldholay, Isaac, Abdullah, Alrajawy, & Nusari, 2018). Different variables have been studied as moderators in previous studies such as gender, age, and familiarity (Tong et al., 2022; Su et al., 2022; kang, 2014; kim et al., 2015). This study focuses on how compatibility moderates the relationship between determinants of mobile travel apps and tourist satisfaction.

The concept of continued use intention has been studied (Bhattacharjee, 2001; Soongeun Hong & Lee, 2005; SeJoon Hong, Thong, & Tam, 2006; Limayem, Hirt, & Cheung, 2007) in the context of developed countries ignoring the developing countries (Choi et al., 2019). Previous literature also showed that most of the empirical studies in this area were conducted in the Western countries and the result may not be generalizable in under developing countries like Pakistan due to cultural and contextual differences. Therefore, there is a need to conduct an empirical study that can be conducted in a non-Western country.

Many theories and models have been developed to predict user behavior with technology such as TAM, UTAUT, TRA, TPB (Choi et al., 2019; Gupta, Dogra, & George, 2018; Aldholay, Isaac, Abdullah, Alrajawy, & Nusari, 2018; Lai, 2015). There are no such previous studies on mobile travel apps integrating the ECM and D&M IS success model in order to explore the continuance intention. consequently, the current study bridges this gap by utilizing two ideas which are discussed in the following section.

2.5 Underpinning Theories

There are many different ways to approach the study of travel related mobile apps, using diverse theories that have been developed to predict user behavior with technology such as TAM, TPB, TRA, UTAUT (Choi et al., 2019; Gupta, Dogra, & George, 2018; Aldholay, Isaac, Abdullah, Alrajawy, & Nusari, 2018; Lai, 2015). However, to the best of researcher's knowledge there is no earlier research on mobile travel apps integrating the ECM and ISS model in order to study the continued use intention. Previous studies have not focused on the post adoption behavior and problems related to the continuous use of mobile travel apps or the aspects forming tourists' perceptions, intentions, and behavior (Alalwan, 2020). Rather above-mentioned theories only aim at the initial acceptance of an information system only. Information system success model focuses on user satisfaction where-as expectation confirmation model investigates the post adoption behavior of the users. Therefore, to study post-acceptance behavior at the individual level, the ECM has been adopted by several IS researchers (e.g. Bhattacharjee (2001b), Lin et al. (2005), Thong et al. (2006), Lee (2010), Albashrawi and Motiwalla (2017)). Bhattacharjee (2001b) adapted it to ECM in order to predict IS continued usage. This model is supported by three variables to predict and explain the individual's continuous intention of IT usage: satisfaction, confirmation of expectations, and perceived usefulness. Two primary variables to determine IS continuance intentions are confirmation and perceived usefulness, determined by the consumer's initial expectations. Both influence user's satisfaction. The satisfaction and perceived usefulness forecast the individual's continuance intention of IS. Consequently, based on the fact that other theories like UTAUT and TAM explain users' intentions of using an IS (Tam, Santos, & Oliveira,

2020) but they don't focus on the post adoption behavior i.e continued use behavior. Thus, based on this fact an integration of ECM and ISS model are considered most suited for this study. The two theoretical models used in this study are as follows

2.5.1 Information System Success Model (ISSM)

The ISSM has been extensively used to understand user adoption of different ISs (Zhou, 2013). The model has six factors: three qualities (system, information, and service), two impacts (individual and organizational), and consumer satisfaction, as illustrated in Figure 2.1 (DeLone & McLean, 1992; DeLone & McLean, 2003).

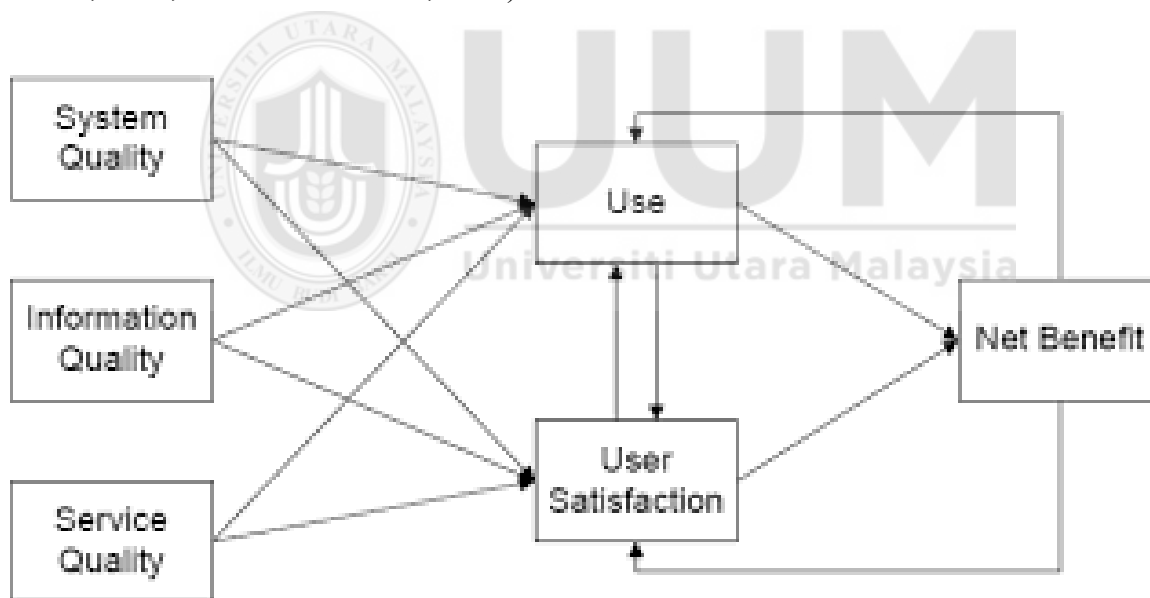


Figure 2.1: Information System Success Model

Early research predominantly employed the ISSM framework in various contexts (Tam & Oliveira, 2017). Among those contexts have been: knowledge management systems (Wu & Wang, 2006),

learning success systems (Lin, 2007), website success goals (Schaupp, Fan, & Belanger, 2006), enterprise resource planning implementation success (Tsai, Lee, Shen, & Lin, 2012), electronic health record evaluation (Bossen, Jensen, & Udsen, 2013), and employee portal success (Urbach, Smolnik, & Riempp, 2010). Additionally, other studies have imported the ISSM into different models and particularly they have examined: trust and satisfaction in mobile banking (Chung & Kwon, 2009; Lee & Chung, 2009), customers' intentional, continuous use of mobile-payment services (Zhou, 2013), and e-patient records explained by using the UTAUT (Maillet, Mathieu, & Sicotte, 2015).

The current research employs the model with an additional aspect, that of trust which is presented as a new dimension to the ISSM based on extensive research and observations. In this respect, several studies have identified user trust as crucial in various IS adoptions (Wu, Chen, Chen, & Cheng, 2014; Zhou, 2014). However, this does not sufficiently apply to mobile travel apps (Chandra, Srivastava, & Theng, 2010) since it has been concluded by some researchers that consumers develop trust in mobile travel apps right from their first use (McKnight, Choudhury, & Kacmar, 2002; Zhou, 2014). Hence, the key issue is to maintain that initial trust (Gao & Waechter, 2017).

2.5.2 Expectation Confirmation Model (ECM)

A significant number of IS scholars have undertaken large studies using the ECM to identify the post-acceptance behavior of users (e.g., Albashrawi & Motiwalla, 2019; Bhattacharjee, 2001; Lin, Zito, & Taylor, 2005; Lee, 2010; Singh, 2020; Thong, Hong, & Tam, 2006). Indeed, Oliver's

(1980) Expectation-Confirmation Theory resulted in the ECM, the theory primarily describing user satisfaction and expectations after the purchase. The self-perception theory (Bem, 1972) also provides the basis of the ECM. Bhattacharjee (2001) noted that people continuously change and gain knowledge, altering their perceptions and expectations. Bhattacharjee (2001) improved the ECM to enhance the prediction of continuous IS usage. The model addresses three factors: satisfaction, perceived usefulness, and expectations, as illustrated in Figure 2.2.

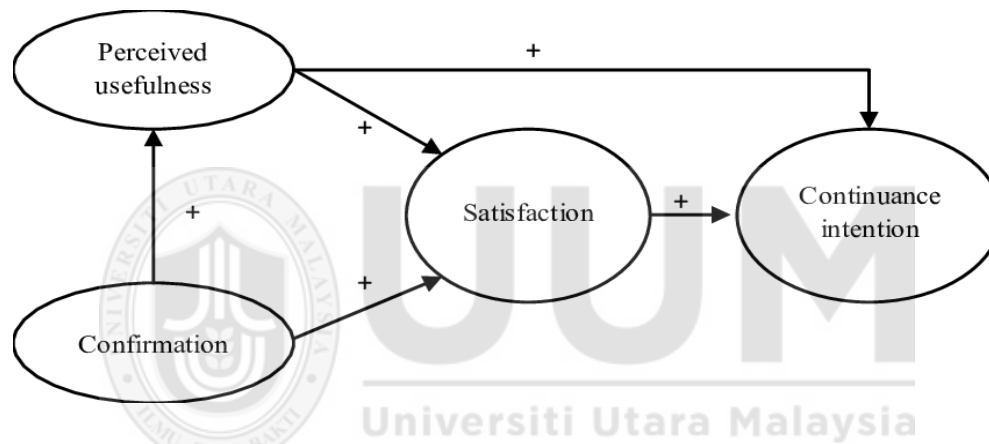


Figure 2.2: Expectation Confirmation Model

Early studies used the ECM to explore the intentional, continuous use of mobile ISs (Kim, Bae, & Jeon, 2019), since the model explicitly elucidates the elements that influence the intended continuous use of ISs on mobile travel apps (Choi, Wang, & Sparks, 2019; Choi, Wang, Sparks, & Choi, 2021; Tam et al., 2020). Various studies, especially on mobile app technology, have used it (Dhiman & Jamwal, 2023; Liu, Li, Edu, & Negricea, 2020; Tam et al., 2020).

Based on the ECM framework, the main determinants that influence the continued use intention are perceived ease of use, perceived value, and perceived satisfaction regarding the use of mobile applications (Cho, 2016; Hsiao et al., 2016; Hsu & Lin, 2015). Researchers in the field have uncovered various factors affecting the purchase and continued use intentions of mobile apps. Some conducted research studies on different mobile apps used in daily life, such as, social media applications (Hsiao et al., 2016), messaging applications (Oghuma et al., 2016), taxi booking applications (Weng, Zailani, Iranmanesh, & Hyun, 2017), and health applications (Cho, 2016).

Continuous use and repurchase by the consumer are parallel concepts with the initial use of either the product or the IS affecting both decisions. Bhattacharjee (2001) used a causal chain system to understand consumer behavior in respect of continued use after acceptance, clarifying that the early acceptance decision stimulated intentional continued use by consumers. Lee and Kwon (2011) acknowledged the research as a ‘benchmark research study’ that focuses on consumer behavior concerning the acceptance of the IS and the way the adoption of continuous use occurs.

Post-acceptance consumer behavior is clearly of key interest and different models have been used by scholars in their significant efforts to explain it. Minimal studies have directed attention to the continuous usage of mobile travel apps (Ali, Terrah, Wu, Ali, & Wu, 2021), which most users try first and purchase later because most service providers offer free trial versions. Consequently, users develop pre-expectations of mobile apps before using the original or paid services (Hsu & Lin, 2015). Once consumers gain real-world experience from mobile app use, they develop their perceptions of the performance of the apps, and those perceptions may confirm or disconfirm their

continuous use. In the event, confirmation indicates a high level of consumer satisfaction with the mobile travel app.

The current research builds upon the ECM because the behavior of app users is related to post-adoption behavior. It also refers to the works of Hsu and Lin (2015), Xu, Peak, and Prybutok (2015), and Hsiao et al. (2016), which incorporated the ECM into their research frameworks.

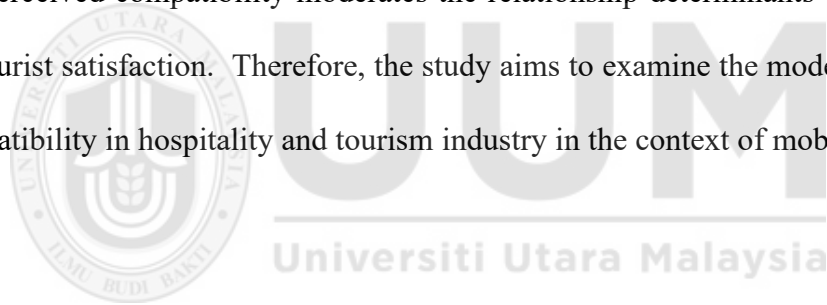
2.6. Proposed Theoretical Framework

This research is based on two well established theories, information system success (ISSM) and expectation confirmation model (ECM). The proposed variables of the research framework have been taken by these theories. The ECM is built on the expectation confirmation theory and technology acceptance model, explaining user satisfaction based on user's expectation confirmation and perceived usefulness leading to continued use of mobile travel apps (Bhattacharjee, 2001), while the ISSM is grounded on three dimensions: system quality, service quality and information quality leading to satisfaction and continued use intention (Delone & Mclean, 2003). Currently, evidence can be found in the literature on the usage of ECM and ISSM in an integrated approach to investigate mobile app continued use intention (Zhao et al., 2015), but there is a significant need for research on travel related mobile apps continued use intention in an integrated manner, as using more than one theory, and extending existing models, or building an advanced model by including more variables, are believed to be more effective in exploring the impact of mobile travel apps on tourist behavior (Doricic et al., 2019; Law et al., 2019). Therefore, refining to a more focused approach, this research intends to meticulously investigate mobile travel

apps continued use intention in case of Pakistani tourists by extending and integrating ECM and ISSM, while considering and exploring the impact of Perceived compatibility as a moderator in shaping tourist's behavior (Gao, 2009).

Considering the previous literature, it is not uncommon to expand the ISSM model by including other variables to investigate mobile app satisfaction and continued use intention (Liu, Li, Edu, & Negricea, 2023). Therefore, based on the integrated ECM and ISSM, this study introduces an additional variable: Perceived trust, and proposes a comprehensive model on mobile travel app leading to continued use intention. Trusting the destination services as well as the travel information provided by the travel app is crucial for tourist's buying decision (Amato, 2018). Trust in destination services can be built through travel websites (Chen, 2006). Henceforth, based on this perspective, the existing study incorporates travel related mobile app perceived trust in the research framework as it is believed to have an influence on tourist satisfaction further causing continued use intention of a system (Liu, Li, Edu, & Negricea, 2023). Satisfaction is believed to be a critical construct for information system researchers as it is proved to significantly affect user behavior and intentions (Jani, & Han, 2015; Koufaris, & Sosa, 2004). Therefore, the factors influencing satisfaction, like perceived trust, have been extensively examined in information system studies (Maqableh, Hmoud, & Jaradat, 2021). Thus, perceived trust is deemed to increase satisfaction which in turn positively influences reuse intentions. Perceived trust strongly relates to the dimensions of information system (IS) success models, and it plays a critical role in overall success of a system. Therefore, an additional yet crucial construct: perceived trust has been incorporated in the existing framework of the study to investigate how satisfaction leading to continued use intention of a system is influenced by perceived trust.

Perceived compatibility has been often used in information systems adoption literature as a determinant of intention (Karahanna et al., 1999; Venkatesh et al., 2003). In this research it is proposed that perceived compatibility may influence the relationship between over-all quality, perceived trust, perceived usefulness, expectation confirmation and tourist satisfaction. Goodhue and Thompson (1995) suggested that if the user requirement regarding a task match with the technology, then most likely, users will use the technology to perform the tasks. Based on this argument, if the tourists believe that the mobile travel app fits their needs, they will more inclined to use the app to plan and organize their trips leading to its continued usage. Consequently, it is proposed that perceived compatibility moderates the relationship determinants of continued use intention and tourist satisfaction. Therefore, the study aims to examine the moderating effects of perceived compatibility in hospitality and tourism industry in the context of mobile travel apps in Pakistan.



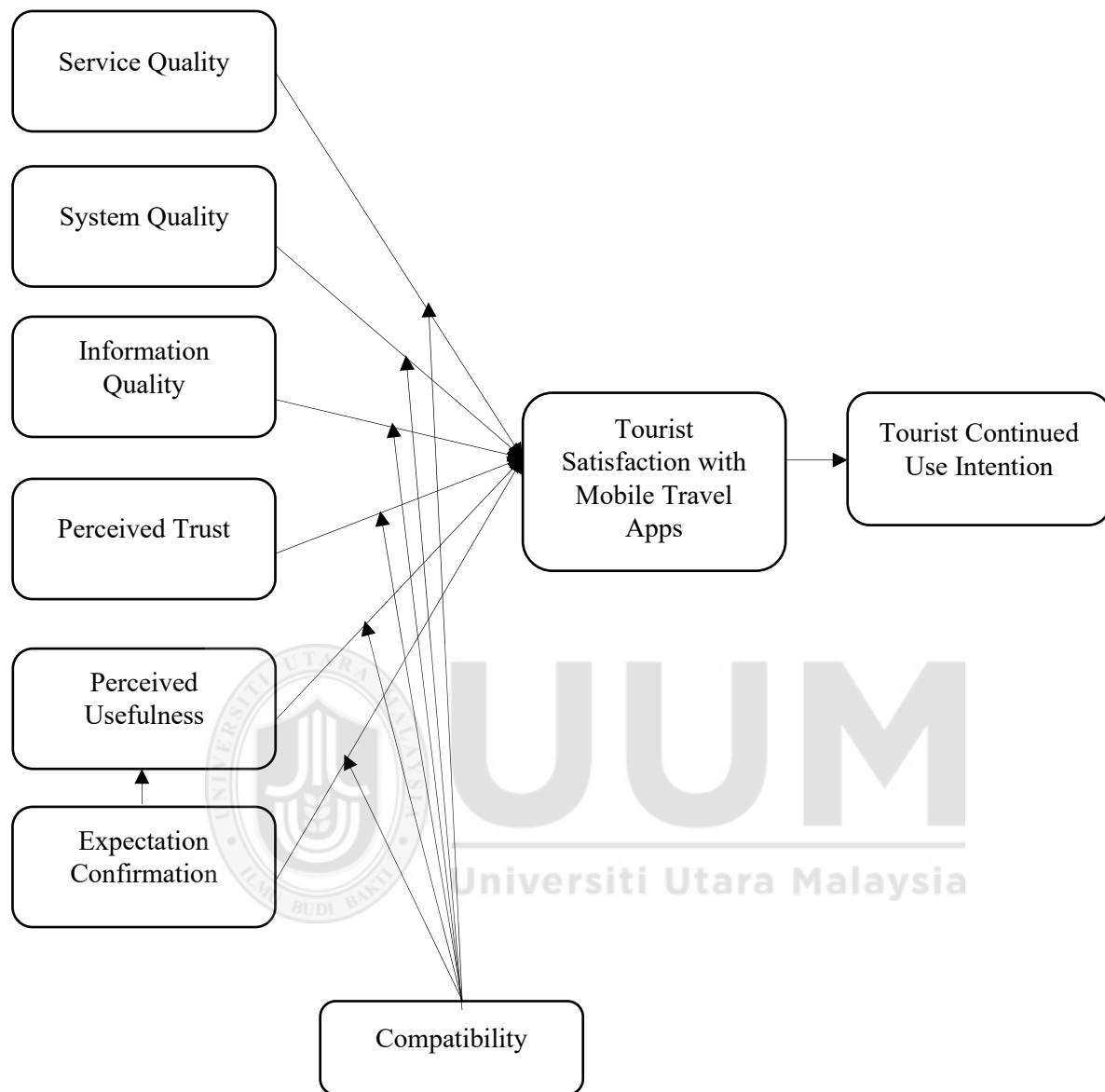


Figure 2.3: Proposed Theoretical Framework

The theoretical basis for the investigation is depicted in Figure 2.3 which asserts tourist satisfaction as being influenced by overall quality (three aspects), perceived trust, perceived utility, and expectation confirmation. These relationships are moderated by compatibility. Satisfaction influences the intention to use mobile travel applications in the future.

2.7 Relationships between Variables and Hypotheses Development

This section discusses the relationships between variables and the hypotheses based on previous research.

2.7.1 Service Quality and Tourist Satisfaction

Service quality and customer satisfaction are interdependent, and they critically influence the success of companies (Silvestri, Aquilani, & Ruggieri, 2017). One of the most important characteristics of services is that they represent a process rather than an object. Services are invisible; therefore, they are hard to unfold for suppliers and to measure for consumers (Ali, Terrah, et al., 2021a). In the tourism sector, these concepts are interrelated, due to customer consideration given to the quality of services and their time (Hutchinson, Lai, & Wang, 2009). Companies should have quality services and policies focusing on employee well-being and customer satisfaction (Quintela, Correia, & Antunes, 2010). Service quality can differentiate companies and develop strong brand recognition (Bertsch & Ostermann, 2011), and can attract and satisfy customers to build a positive image (Jyothis & Janardhanan, 2009).

Many studies have examined the relationship between service quality and customer satisfaction. For example, Ali, Saleh, et al. (2021) focused on the positive relationship between service quality and customer satisfaction in hospitality industry, and Nguyen, Pham, Tran, And Pham (2020) investigated this relationship for e-banking. Rita, Oliveira, and Farisa (2019) found the same relationship in online shopping service quality and customer satisfaction in the Greek retail industry (Gounaris & Dimitriadis, 2003). In the banking industry, service quality has been found to be an antecedent of customer satisfaction (Rantyanti, & Halim, 2020); likewise among non-vessel owners and shippers (Chen, Lee, Chen, & Huang, 2011). And a study on the hotel industry's customer satisfaction concluded that image and service quality have a link (Kandampully & Hu, 2007). The following table summarises the relationship between service quality and satisfaction, studied in recent years in various contexts along with the findings.

Table: 2.3 Service Quality and Satisfaction

Review	Service Sector	Theoretical Framework	Key dimensions of Service Quality	Measurement Tools	Main Findings
Wang et al. (2024)	Healthcare	SERVQUAL, Patient Satisfaction Theory	Medical expertise, responsiveness, reliability, tangibles, empathy, communication	Patient Satisfaction Surveys, clinical outcome data	Importance of empathy, communication, and patient-centered care for satisfaction.
Hassan et al. (2023)	Banking	Customer Satisfaction Model, Technology Acceptance Model	Service reliability, responsiveness, assurance, security, personalization, information quality	Customer Satisfaction Surveys, online reviews	Technology plays a growing role in service quality perceptions, impacting satisfaction and loyalty.
Kim et al. (2022)	Tourism & Hospitality	Tourist Experience Framework, Service-	Reliability, responsiveness, empathy, assurance,	Tourist Satisfaction Surveys, online reviews	Customization, co-creation, and authentic experiences

		Dominant Logic	tangibles, experience customization, value co-creation		increasingly impact satisfaction in tourism.
Liu et al. (2021)	Education	SERVQUAL, Student Satisfaction Model	Teaching quality, course content, learning environment, instructor support, responsiveness	Student Satisfaction Surveys, qualitative interviews	Personalized learning, active engagement, and supportive environment crucial for student satisfaction.
Ali et al. (2020)	Retail	Consumer Satisfaction Model, Expectancy Disconfirmation Theory	Reliability, responsiveness, product quality, store atmosphere, employee behavior	Customer Satisfaction Surveys, in-store observations	Importance of employee behavior and positive store atmosphere for retail satisfaction.
Yang et al. (2019)	Public Services	SERVQUAL, E-Government Mode	Efficiency, effectiveness, accessibility, courtesy, responsiveness, information quality	Citizen Satisfaction Surveys, online feedback	Efficiency, accessibility, and online service quality key for public service satisfaction.
Johnson et al. (2018)	Telecommunication	Customer Satisfaction Model, Technology Acceptance Model	Network reliability, call center service, internet speed, billing accuracy, customer support	Customer Satisfaction Surveys, network performance data	Reliability, technical support, and efficient billing processes critical for telecom satisfaction

To conclude, much previous research demonstrates that service quality directly affects customer satisfaction (Blut, Chowdhry, Mittal, & Brock, 2015; Gounaris, Dimitriadis, & Stathakopoulos, 2010; Kitapci, Akdogan, & Dortyol, 2014; Rita, Oliveira, & Farisa, 2019; Udo, Bagchi, & Kirs, 2010). In the south Asian tourism industry, several studies have focused on the relationship between the quality of travel services and tourist satisfaction (Al-Ababneh, 2013; Chin, Rahman,

Haque, Pang, & Connie, 2019; Corte, Sciarelli, Cascella, & Del Gaudio, 2015; Gupta & Srivastava, 2011; Khan, Yusoff, & Kakar, 2017; Le-Klähn, Roosen, Gerike, & Hall, 2015). Based on the previous research findings, the current research hypothesizes that

H1: Service quality has a positive effect on tourist satisfaction with mobile travel apps.

2.7.2 System Quality and Tourist Satisfaction

User satisfaction is the strongest predictor of success for an IS (Lin & Wang, 2006), and system quality positively effects user satisfaction (Delone & McLean, 2003). Much previous research has revealed a positive influence of system quality on system use and user satisfaction (Aparicio, Bacao, & Oliveira, 2017; Balaban & Divjak, 2013; Cidral, Oliveira, Felice, & Aparicio, 2018; Salam & Farooq, 2020). Various scholars have examined the effect of system quality in different contexts, such as enterprise information systems (Lee, Lee, & Kang, 2012), virtual communities (Hsiu-Fen Lin, 2008), e-commerce (Wang, 2008) student information systems (Rai, Lang, & Welker, 2002), accounting information systems (Pratiwi & Mujadilah, 2021), and the performance of tourism sector websites (Sopalatu, Hidayatullah, & Respati, 2021). In all these studies, the idea that system quality increases satisfaction was endorsed. While the following table highlights the recent studies conducted on the relationship between system quality and satisfaction specifically in tourism context.

Table: 2.4 System Quality and Satisfaction

Review	Theoretical Framework	Dimensions of System quality	Dimensions of Tourist Satisfaction	Tools	Findings
Kim et al. (2024)	Tourist Experience Framework, Technology Acceptance Model	Website usability, information accuracy, booking functionality, mobile app features, personalization	Convenience, efficiency, value for money, perceived reliability, enjoyment	Tourist Satisfaction Surveys, online reviews	Personalized recommendations , user-friendly booking interfaces, and mobile accessibility enhance satisfaction.
Park et al. (2023)	Technology Acceptance Model, Service-Dominant Logic	Information quality, perceived ease of use, perceived usefulness of technology, system reliability	Travel planning efficiency, information access, value co-creation, emotional engagement	Online surveys, interviews	Technology facilitates information access, travel planning, and co-creation of experiences, positively impacting satisfaction.
Eugenio et al. (2022)	Push-Pull Model, Expectancy Disconfirmation Theory	Website design, content accuracy, information updates, mobile app functionalities, personalization tools	Convenience, efficiency, trust, perceived value, pre-travel information accuracy	Tourist Satisfaction Surveys, online review	System quality influences expectations and their disconfirmation, impacting overall satisfaction and trust in the tourism provider.
Han et al. (2021)	Visitor Experience Framework, Tourist Behavior Model	Information displays, ticketing systems, visitor management tools, mobile guides, accessibility options	Knowledge acquisition, emotional engagement, sense of place, perceived control over experience	Visitor Satisfaction Surveys, observations	Quality information systems enhance knowledge acquisition, engagement, and control over the experience, leading to higher satisfaction
Ivanov & Pavlov (2020)	Tourist Experience Economy Framework, Customer Satisfaction Models	Information provision, booking platforms, personalized recommendations , virtual reality	Personalization , engagement, co-creation, sense of place, emotional experiences	Qualitative research, interviews, mixed-method surveys	Technology plays a role in creating more personalized, engaging, and emotional experiences,

Jamal et al. (2018)	Technology Acceptance Model, Sustainable Tourism Framework	tools, interactive features Information accessibility, booking convenience, mobile communication infrastructure, sustainability features	Efficiency, reliability, environmental awareness, cultural authenticity, safety	Tourist Satisfaction Surveys, online reviews	impacting tourist satisfaction. System quality influences travel planning and destination experience, impacting satisfaction with efficiency, reliability, and sustainability aspects High-quality systems can promote awareness of sustainability and local communities, contributing to satisfaction for responsible tourists
Moscardo et al. (2017)	Sustainable Tourism Framework, Tourist Push-Pull Model	Information on responsible practices, booking platforms with local options, communication tools for community engagement	Authenticity, cultural understanding, environmental awareness, positive community interactions	Qualitative research, focus groups, semi-structured interviews	

However, IS-related research has addressed system quality less than it has focused on information quality (Gorla, Somers, & Wong, 2010). Here it is important to appreciate that system quality does not refer to service quality or ease of use. Rather, it depicts perceived involvement with a system over time. In this regard, high-quality systems should be easy to use and have high utility and customer satisfaction. Access to information is mandatory for system quality (Phuong & Dai Trang, 2018), and the accessibility and reliability of an IS are comparable while discussing customer satisfaction (Song, Migliaccio, Wang, & Lu, 2017). System reliability refers to that system's trustworthiness, and availability of the system to provide suitable information. The system quality of a mobile travel app might represent its support for tourists' needs. Based on the above argument, this research proposes the following hypothesis:

H2: System quality has a positive effect on tourist satisfaction with mobile travel apps.

2.7.3 Information Quality and Tourist Satisfaction

Information quality is the most significant predictor when studying IS success and has proven to be a crucial ingredient of satisfaction (Koh & Kan, 2020). Some researchers conclude that the effect of information quality on customer satisfaction is highly positive (Al-Samarraie, Teng, Alzahrani, & Alalwan, 2018; Lin, 2007). Information quality is widely and effectively incorporated into e-commerce (Lee et al., 2019). In this connection, Delone and McLean (2003) posited that information individualization, completeness, relevance, ease of understanding, and security determine the success of e-commerce. In the tourism industry, travel-related information is a travel resource that streams from the operators as providers to visitors as consumers (Sarker et al., 2019).

Several studies have acknowledged the positive relationship between information quality and customer satisfaction. Pratama, Hidayatullah, Alvianna, Astuti, and Krisnanda (2021) examined the effects of information quality on tourist satisfaction, Ayyash (2017) on e-banking, Patma, Fienaningsih, Rahayu, and Artatanaya (2021) on food delivery application, Fadhillah, Zebua, and Prayoga (2021) on online shopping, and Andarwati, Zuhroh, and Amrullah (2020) on accounting information systems. These studies all confirmed the idea that information quality significantly affects customer satisfaction.

Information in the online environment must have the qualities of being comprehensive, accurate, and properly formatted (Salam & Farooq, 2020). Websites should provide accurate information to develop positive customer attitudes and encourage usage intentions (Aladwani & Palvia, 2002;

Lim & Ting, 2012). Relevance, usefulness, and currency of information are all measures of the quality of travel-related app information (Demoulin & Coussement, 2020). Users develop positive perceptions when they receive adequate information that meets their expectations for the decision-making process (Corbitt, Thanasankit, & Yi, 2003). Information with the right qualities eases customers' ability to assess products and make sophisticated experience-based decisions, enhancing customer satisfaction (Lee et al., 2019). A travel app acts as a medium for providing information to tourists and its perceived quality is highly likely to influence tourist satisfaction. Therefore, the formulated hypothesis is as follows:

H3: Information quality has a positive effect on tourist satisfaction with mobile travel apps.

2.7.4 Perceived Trust and Tourist Satisfaction

Trust is a belief, confidence, sentiment, or expectation about customer's intention or likely behavior (Wu, Cheng, & Ai, 2018). It has three components: competence, integrity, and benevolence (Oliveira, Alhinho, Rita, and Dhillon, 2017). If an IS provides low-quality information in the market and causes consumer distrust, it will reduce user satisfaction (Akter, Ray, & D'Ambra, 2013; Tseng, Chang, & Zhu, 2021). Lack of trust is a barrier to satisfaction, which leads to the non-adoption of a system (Chinomona & Sandada, 2013). Bricci, Fragata, and Antunes (2016) posited that trust has a positive and direct effect on satisfaction, and Tseng et al. (2021) assert that trust does indeed influence satisfaction. Customers with high trust have been found to exhibit high satisfaction and the intention to use a system (Rita, Oliveira, & Farisa, 2019).

Regarding mobile app research, perceived trust refers the perception that a mobile app is dependable and trustworthy, and is an important aspect affecting adoption (Siau & Shen, 2003). Perceived trust can reduce user's uncertainty (Wu, 2013), enabling them to participate more in online trading (McKnight et al., 2002). Lee and Chung (2009) established that information quality, service quality and system quality of an app influence perceived trust to varying degrees. At the same time, trust effects user's attitude (Zhou et al., 2010), their behavioral intention (Li et al., 2006) and even loyalty (Lee, 2009) toward the system or a mobile app. When tourists experience travel services and confirms expectations, it will impact the trust towards travel app. Chen (2006) confirms the important role of trust on travel websites, whereas Wu (2013) confirmed the substantial influence of perceived trust on tourist satisfaction. Therefore, perceived trust regarding travel related mobile apps lead towards tourist satisfaction.

However, earlier studies on the relationship between trust and satisfaction revealed mixed results. Previous research shows that even when service providers fail to provide quality service through their app, which may cause decline in satisfaction, they can still build trust by reducing the factor of risk for the tourists (DeWitt et al., 2008; Wang et al., 2014). Thus, in the tourism, context, buying a destination service involves certain risks for tourists for instance uncertainty and experience. Therefore, trust can alleviate these risks (Kim & Kim, 2020; Ameen, Cheah, Ali, Manstrly, & Kulyciute, 2023).

Furthermore, perceived trust was seen to be a key predictor of satisfaction (Damberg, Schwaiger, & Ringle, 2022; Fang et al., 2014), whereas satisfaction was critical for trust. Some other scholars found that satisfaction ultimately leads to trust (John & Reve, 1982; Johnson & Grayson, 2005;

Trif, 2013; Wang, Um, Wang, & Kang, 2022). These results deduced that satisfaction was the preliminary construct of trust.

In terms of the online environment, when consumers shop online, they tend to place trust in the shopping experience of others, taking their oral or written statements as reliable (Gefen, Karahanna, & Straub, 2003). Likewise, if tourists gain correct and effective travel information on a travel app over a long time, they will likely trust the platform. When tourists browse the travel apps for travel information, products, and services, they tend to trust other app users' experience-based information (Gefen et al., 2003; Gefen, Karahanna, & Straub, 2003; Shankar, Urban, & Sultan, 2002; Tseng et al., 2021).

A perceptive process of customer satisfaction identifies the relationship between expectations and perceptions of IS performance (Westbrook & Oliver, 1991). Research has revealed that levels of satisfaction potentially affected perceived trust (Grayson, Johnson, & Chen, 2008). It has also been identified that satisfaction with previous interactions significantly influences perceived and effective trust. In short, trust can develop user satisfaction and enhance the intention to continue using mobile travel apps. Thus, the formulated hypothesis is as follows:

H4: Perceived trust has a positive effect on tourist satisfaction with mobile travel apps.

2.7.5 Perceived Usefulness and Tourist Satisfaction

Perceived usefulness refers to the belief that when high performance is achieved by using a system the user's perception of the usefulness of that system is also high. Convenience and ease of use in the operation of mobile apps can trigger a perception of usefulness. A number of studies have affirmed that perceived usefulness tremendously impacts in a positive way on user attitudes, which subsequently have a substantial effect on user adoption and satisfaction with a system (Davis et al., 1989; Detlor, Hupfer, Ruhi, & Zhao, 2013; Hess, McNab, & Basoglu, 2014; Martins, Oliveira, & Popović, 2014; Morosan, 2012; Sarker et al., 2019). Perceived usefulness can fulfil customer expectations related to efficiency, productivity, and managing tasks; hence, customers will perceive a high level of app usefulness, making them feel satisfied and compelled to continue using the mobile app. The implication is that perceived usefulness positively influences user satisfaction.

Several studies have shown that perceived usefulness is a strong determinant of users' adoption of new ISs or Internet technology (Adams, Nelson, & Todd, 1992; Al-Gahtani & King, 1999; Davis et al., 1989; Dishaw & Strong, 1999; Kim & Lee, 2014; Mathieson, 1991; Wu, Lin, Li, & Lin, 2010). User satisfaction is useful in evaluating the impact of IS and Internet/Web systems, as well as in determining the willingness to utilize new technology (Negash, Ryan, & Igbaria, 2003; Yoon, Guimaraes, & O'Neal, 1995). A positive emotional response is felt by users if the system helps them increase their productivity or performance. Hence, perceived usefulness relates positively with user satisfaction (Bhattacharjee, 2001; Gelderman, 1998; Hsiu-Fen Lin, 2011). Seddon and Kiew (1994) claimed that perceived usefulness predicts user satisfaction, an assertion supported by Rai et al. (2002). User satisfaction with e-services has also been shown to be influenced by

perceived usefulness (Hsu, Chiu, & Ju, 2004; Kim & Lee, 2014); an several other studies with a focus on e-learning systems (Almahamid & Rub, 2011; Arunachalam, 2019), electronic textbooks (Daneji, Ayub, & Khambari, 2019), mobile banking (Yuan, Liu, Yao, & Liu, 2016), and mobile commerce (Luqman, Razak, Ismail, & Alwi, 2016), have found similar effects. Consequently, there is abundant evidence to confirm the positive correlation between perceived usefulness and user satisfaction with a system (Liu, Li, Edu, & Negricea, 2020). Hence, it can be confidently said that perceived usefulness predicts satisfaction when investigating the attitudes and variables that drive the continuing usage of services.

In terms of mobile travel related apps, the features and tools associated with them are considered as functionality, and this functionality verifies user satisfaction and usefulness. If users believe that using mobile apps is useful to them, they will feel satisfied and may choose to continue using them. Hence, the proposed hypothesis is:

H5: Perceived usefulness has a positive effect on tourist satisfaction with mobile travel apps.

2.7.6 Expectation Confirmation and Tourist Satisfaction

Expectation confirmation (fulfilment) has a significant influence on satisfaction. The higher the confirmation levels, the higher the satisfaction levels (Tam et al., 2020; Tontini, dos Santos Bento, Milbratz, Volles, & Ferrari, 2017). Spreng, MacKenzie, and Olshavsky (1996) revealed that confirmation significantly influenced products and overall satisfaction. Such confirmation

positively influences satisfaction with ISs because the expected benefits are actually realized (Bhattacharjee, 2001). Expectation confirmation occurs when users obtain the expected benefits from IS usage, which in turn promotes satisfaction and beliefs about perceived usefulness (Tam et al., 2020). In respect of mobile apps, users whose initial expectations are promptly realized swiftly recognize they are gaining all the hoped-for benefits. Satisfaction depends on confirmation that the experience matches expectations (Tam, Santos, & Oliveira, 2020).

Expectations are formed as a result of previous interactions with a product or service. Bhattacharjee (2001) proposed that user satisfaction was determined by expectation confirmation and perceived usefulness. As a result, if users believe that utilizing a travel-related mobile app is beneficial, they will be more satisfied with its use. In fact, perceived usefulness has been found to be the most powerful predictor of behavioral intention (Venkatesh et al., 2003; Yang and Lin, 2015; Santos, 2017). Consumers are known to continue to use mobile travel applications if they feel instinctively that the apps will provide beneficial results (Tam et al., 2020).

Customer expectations are therefore directly related to customer satisfaction (Sarker et al., 2019). Previous studies on IS continuation have indicated that confirmation has a substantial influence on perceived usefulness and satisfaction (Bhattacharjee & Lin, 2015; Hsu & Lin, 2015; Kim, Bae, et al., 2019; Sarker et al., 2019; Wu, Zhou, Wang, Huang, & Yuan, 2022; Zhou, 2013). In the present study, confirmation refers to the actualized predicted results or benefits. Meanwhile, disconfirmation indicates that the users' initial expectations were not met. As a result, the following possibilities are proposed

H6a: Expectation confirmation has a positive effect on tourists' perceived usefulness of mobile travel apps.

H6b: Expectation confirmation has a positive effect on tourist satisfaction with mobile travel apps.

2.8 Tourist Satisfaction and Continued Use Intention

Cardozo (1965) used the contrast theory to explain how customer satisfaction can enhance repurchase or re-use intentions. Howard and Sheth (1969) primarily apply the concept of satisfaction to customer behavior theories. Customer satisfaction is a product or service assessment of customer needs and expectations (Oliver, 1980). A satisfied customer will repeat the purchase of the product and will tell other potential customers positive things (Estiri, Hosseini, Yazdani, & Nejad, 2011).

Hence, satisfaction is an antecedent of intentions (Cronin & Taylor, 1992; Estiri, Hosseini, Yazdani, & Nejad, 2011). Several researchers have attempted to comprehend its background and outcomes (Anderson & Mittal, 2000; Kurdi, Alshurideh, & Alnaser, 2020; Nam & Seong, 2021; Rita, Oliveira, & Farisa, 2019), and marketing scholars in particular have been interested in conceptualizing and measuring customer satisfaction (Bai et al., 2008; Parasuraman & Grewal, 2000). The interactions between users and service providers generate satisfaction (Oliver, 1980). The ISSM claimed that user satisfaction comes with use in an informal way (Delone & McLean, 2003), in which a positive experience with the usage triggers user satisfaction.

Numerous researchers have projected satisfaction as a critical determinant of continuous usage (Kim, Shin, & Lee, 2009; Kuo, Cheng, Chang, & Chuang, 2018; Liu & Sun, 2011). Indeed, system users are found not to use mobile apps if they experience dissatisfaction (Zhou, Wang, and Wang, 2019). User satisfaction determines the continued intention to use (Au, Ngai, and Cheng, 2008). There is a positive relationship between these two phenomena (Tam & Oliveira, 2016; Wang, Ou, & Chen, 2019), shown also by Sharma and Sharma (2019) who found that the quality provided by service providers resulted in user satisfaction with mobile apps.

Bhattacharjee (2001) asserts that the evaluation of the initial service experience may result in satisfaction (positive feeling) or dissatisfaction (negative feeling). The ECM claims that the prime motivation for continued use is satisfaction with a product or a service (Oliver, 1980). Bhattacharjee (2001) verified that the direct relationship between satisfaction and continued use intention is the basis of the empirically authenticated IS continuance model. Several studies have ascertained that users with high levels of satisfaction with apps have a strong intent to continue using them (Bhattacharjee, 2001; Idemudia, Raisinghani, & Samuel-Ojo, 2018; Tam et al., 2018; Wani, Raghavan, Abraham, & Kleist, 2017). Shankar, Smith, and Rangaswamy (2003) found that customer satisfaction in the travel industry were similar in virtual and physical contexts, concluding that customers only pay attention to what they receive from the service, regardless of the delivery contexts.

When measuring satisfaction there are two dimensions to consider, the single and the multiple (Szymanski & Henard, 2001). The single dimension evaluates customer satisfaction to understand

attitudes toward products or services, whereas the multiple dimension assesses a user's feeling regarding earlier usage (Bhattacharjee, 2001). Together these dimensions allow a customer to reflect on overall satisfaction. In the case of mobile travel apps, it can be confidently asserted that if users are satisfied with them, they will continue in their use. This study therefore postulates the following:

H7: Tourist satisfaction with mobile travel apps has a positive effect on continued use intention.

2.9 Moderating Effects of Compatibility

Compatibility means the degree to which an information system is perceived as consistent with the values, needs and expectations of the users (Moore & Benbasat, 1991). It is one of the central antecedents of the adoption of new technology or an IS application (Chan, Hsu, & Baum, 2015; Mutahar, Daud, Ramayah, Putit, & Isaac, 2017; Ozturk et al., 2016). Yoon, Lim, and Park (2020) and Premkumar (2003) endorsed compatibility as critical in IS innovation adoption. And other studies on IS adoption have also highlighted that compatibility is a determinant of intention (Karahanna et al., 1999; Venkatesh, 2000) and perceived usefulness (Sun, Bhattacharjee, & Ma, 2009). Compatibility is significant in determining user behavior toward an IS and its subsequent adoption (Mutahar et al., 2017; Jen-Her Wu & Shu-Ching Wang, 2005).

Previous studies (Al-Ajam, 2013; Schierz, Schilke, & Wirtz, 2010) have affirmed the significant influence of compatibility on users intention to use different apps for instance in e-learning and mobile health services. And according to certain research studies (Isaac et al., 2017; Karjaluoto,

Koenig-Lewis, Palmer, & Moll, 2010) compatibility has a considerable effect on mobile banking also. The research studies on technology adoption propose that high compatibility indicates that adoption of a mobile system will follow (Choudrie, Pheeraphuttrangkoon, & Davari, 2020; Humbani & Wiese, 2019; Jen-Her Wu & Shu-Ching Wang, 2005). In the current research, compatibility represents the degree to which the information system fits the values, beliefs, and lifestyle of travelers in the context of Pakistan (Aldholay, Isaac, Abdullah, Alrajawy, & Nusari, 2018; Ozturk et al., 2016). It moderates the relationships between overall quality, perceived trust, perceived usefulness, expectation confirmation, and satisfaction. Since Pakistan has people with low independence characteristics and readiness for new technology acceptance, but strong social influence, mobile travel apps should be compatible with user values, belief systems and social norms.

Preceding studies by Ramírez-Correa, Rondan-Cataluña, Arenas-Gaitán, and Alfaro-Perez (2017), Beatrix (2022), Pratama et al. (2021), Jung, Chung, and Leue (2015), Nuryanti, Hutagalung, Nadeak, Abadiyah, and Novitasari (2021) and Tam and Oliveira (2016) have all demonstrated that system quality, information quality and service quality, substantially influence user satisfaction and user opinion regarding the continued use of a system. On the contrary, other researchers have reported insignificant relationships between overall quality and satisfaction (Aparicio et al., 2017; Chiu, Chao, Kao, & Pu, 2016; Dağhan & Akkoyunlu, 2016; Jing & Yoo, 2013). Shodiq, Hidayatullah, and Ardianto (2018) and Chiu et al. (2016) also reported an insignificant relationship between information quality and satisfaction. Similarly, Pratama et al. (2021) stated an insignificant link between system quality and customer satisfaction. Following table shows a

selection of studies showcasing contradiction in relationship between overall quality and satisfaction.

Table 2.5 Contradictory Relationship Between Overall Quality and Satisfaction

Study	Sector	Theoretical Framework	Findings	Contradiction
Lee et al. (2024)	Online healthcare	Technology Acceptance Model, Service-Dominant Logic	High service quality with impersonal interaction can decrease satisfaction	High quality $\neq$ High satisfaction
Kim & Park (2023)	E-commerce platforms	Expectation Disconfirmation Theory, Customer Satisfaction Mode	Highly efficient systems can create feelings of pressure and stress	Efficiency $\neq$ Satisfaction
Li et al. (2022)	Airline booking websites	UTAUT2, Information Quality Model	Excessive customization options can lead to decision fatigue and confusion	User choice $\neq$ Satisfaction
Yang & Chen (2021)	Public services	Technology Acceptance Model, E-Government Model	Overreliance on technology can hinder trust and human interaction	Technology $\neq$ Satisfaction
Khan et al. (2020)	Retail stores	Service Quality Model, SERVQUAL	Excessive service efforts can feel intrusive and pressure customers	Helpfulness $\neq$ Satisfaction
Chen & Wang (2019)	Customer support chatbots	Technology Acceptance Model, Trust Model	Constant chatbot availability can decrease perceived human assistance and empathy	Availability $\neq$ Satisfaction

Several previous research studies have confirmed that user trust positively influences satisfaction (Ai et al., 2022; Hamzah, Purwati, Jamal, & Rizki, 2021; Lin & Shih, 2008). Diputra and Yasa (2021) found positive and significant effects of trust on customer satisfaction. And from an analysis of 140 studies related to the ISSM, Petter et al. (2013) found that trust is often associated with behavioral intention and user satisfaction. Studies on e-commerce support the notion that trust is a significant factor in user satisfaction (Apostolou et al., 2017). In contrast, some studies have revealed no direct influence of trust on satisfaction. For example, Juwaini et al. (2022) reported that trust has an insignificant relationship with online satisfaction. Szymanski and Hise (2000) concluded that online satisfaction might not be stable in all contexts involving trust. They also found that trust and satisfaction were not significantly correlated.

The assessment of user expectations followed by actual use is known as a confirmation of expectation. According to the ECM, confirmation is connected to customer satisfaction (Bhattacharjee, 2001). Previous studies have found a link between user confirmation of expectations and satisfaction (Gupta, Dhiman, Yousaf, & Arora, 2021). And Ambalov (2018) verified the association between expectation confirmation and satisfaction in a meta-analysis of the associated literature. Such relationships have been identified in a variety of contexts comprising mobile shopping (Shang & Wu, 2017); mobile banking (Yuan, Liu, Yao, & Liu, 2016); mobile applications (Tam et al., 2018); smartphone banking services (Susanto, Chang, & Ha, 2016); carbon footprint calculator (Lin, 2017); and smartwatches (Ogbanufe & Gerhart, 2018).

Besides being associated with satisfaction, user confirmation also has a positive relationship with perceived usefulness (Bhattacharjee, 2001; Wu, Chiu, & Chen, 2020). If users can confirm their expectations after their use of the travel-related mobile app, they feel satisfied and perceive that app to be useful. Previous studies have also claimed perceived usefulness to be a vital factor influencing user satisfaction in an online context (Lin et al., 2005; Roca, Chiu, & Martínez, 2006). Rahi, Khan, and Alghizzawi (2020) and Hoehle, Huff, and Goode (2012) demonstrated that verified expectation confirmation fostered a positive attitude among Internet users, improving user satisfaction. Similarly, Foroughi and Iranmanesh (2019) validated the relationship between expectation confirmation and perceived usefulness.

Technology adoption is empirically associated with different variables parallel to perceived compatibility, for instance, job relevance (Venkatesh & Davis, 2000), cognitive fit (Vessey, 1991), and task technology fit (Goodhue & Thompson, 1995). Studies on Internet use still need to focus on this important variable (Chang, Cheung, & Lai, 2005). Compatibility has a significant impact on user intentions (Islam, 2016). The literature has established the definite influence of user expectation confirmation and perceived usefulness on the continuing the use of technology (Albuhisi & Abdallah, 2018; Bhattacharjee, 2001; Foroughi & Iranmanesh, 2019; Hoehle et al., 2012; Liao, Toya, Lepak, & Hong, 2009; Rahi et al., 2020; Zhou et al., 2018). Additionally, past marketing and information systems research has also found that perceived usefulness has a positive impact on satisfaction and continuing intention (Wu et al., 2020). And specifically in the context of users' continued use of websites, research by Zhang, Lu, Gupta, and Gao (2015) discovered that confirmation had a significant influence on user satisfaction. According to a study by Zhou, Tsiga,

Li, Zheng, and Jiang (2018), expectation confirmation had a substantial impact on customer satisfaction and encouraged them to continue using e-finance.

Earlier research on technology applications concluded that high compatibility leads to the desirable adoption of a mobile system (Jen-Her Wu and Shu-Ching Wang, 2005). Islam and Azad (2015) observed that compatibility significantly affected satisfaction, whereas a significant relationship existed between compatibility and the use of mobile learning as well, referring that compatibility influences the use and acceptance of an information system in different settings like mobile learning system in higher education (Almaiah, Alamri, & Al-Rahmi, 2019). Meanwhile, Aldholay et al. (2018) and Islam and Azad (2015) examined the moderating role of compatibility in e-learning. The following table summarizes a selection of studies from 2019-2024 focusing on moderating role of compatibility.

Table 2.6 Moderating Effects of Perceived Compatibility

Study	Service	Theoretical Framework	Moderating Effect	Findings
Chen et al. (2024)	Mobile learning app	TAM, Expectation Disconfirmation Theory	Trust & EC: High compatibility strengthens both trust & EC in app.	Users with apps aligned with needs trusted the app more, leading to positive EC & increased PU.
Zhang et al. (2024)	Online healthcare services	TAM, Service Quality Model	Moderates SQ-Satisfaction: High compatibility strengthens, low compatibility weakens	High compatibility with user needs & skills led to higher satisfaction with quality features.
Lee et al. (2023)	Online healthcare platform	Technology Acceptance Model, Service-Dominant Logic	Trust: Compatibility directly strengthens trust in platform. EC: Compatibility	Compatibility with user requirements fostered trust,

				moderates' impact of service quality on EC.	while also amplifying the positive impact of high-quality service on EC.
Kim & Oh (2022)	Social media platform	Uses and Gratifications Theory, Trust Model	PU: Compatibility directly enhances PU of platform features. Trust: Mediating effect of PU on compatibility-trust relationship.		Alignment with user goals & values increased PU, which then further strengthened trust in the platform.
Wang et al. (2022)	Mobile banking app	User-Centered Design, Customer Satisfaction Model	Moderates IQ-Knowledge acquisition: Compatibility increases learning from accurate & relevant information.		User-friendly interface & information aligned with goals facilitated understanding.
Li & Wang (2021)	E-government services	UTAUT2, Expectation-Confirmation Theory	EC: Compatibility moderates' impact of system quality on EC.		User-friendly interface & relevant information amplified the positive impact of high-quality systems on EC, leading to higher PU
Khan et al. (2020)	E-commerce platform	Technology Acceptance Model, Trust Model	Trust: Compatibility directly strengthens trust in platform		Alignment with user preferences increased trust, leading to higher PU through trust enhancement.
Yang et al. (2019)	Online learning platform	Technology Acceptance Model, Expectancy Disconfirmation Theory	EC: Compatibility strengthens EC of learning experience.		Alignment with user learning styles & knowledge gaps amplified positive EC, leading to higher PU.

Some contradictory findings on the direct relationships between the independent variables and user satisfaction leading to continued use intentions suggest a possible moderator. The current research

proposes that compatibility may moderate those relationships and hence, the following hypotheses are formulated:

H8a: Compatibility positively moderates the relationship between service quality and tourist satisfaction with mobile travel apps.

H8b: Compatibility positively moderates the relationship between system quality and tourist satisfaction with mobile travel apps.

H8c: Compatibility positively moderates the relationship between information quality and tourist satisfaction with mobile travel apps.

H8d: Compatibility positively moderates the relationship between trust and tourist satisfaction with mobile travel apps.

H8e: Compatibility positively moderates the relationship between perceived usefulness and tourist satisfaction with mobile travel apps.

H8f: Compatibility positively moderates the relationship between confirmation and tourist satisfaction with mobile travel apps.

2.10 Summary of Hypotheses

Based on the research framework illustrated in Figure 2.1, the following hypotheses were formulated:

H1: Service quality has a positive effect on tourist satisfaction with mobile travel apps.

H2: System quality has a positive effect on tourist satisfaction with mobile travel apps.

- H3:** Information quality has a positive effect on tourist satisfaction with mobile travel apps.
- H4:** Perceived trust has a positive effect on tourist satisfaction with mobile travel apps.
- H5:** Perceived usefulness has a positive effect on tourist satisfaction with mobile travel apps.
- H6a:** Expectation confirmation has a positive effect on tourist perceived usefulness towards mobile travel apps.
- H6b:** Expectation confirmation has a positive effect on tourist satisfaction with mobile travel apps.
- H7:** Tourist satisfaction with mobile travel apps has a positive effect on continued use intention.
- H8a:** Compatibility positively moderates the relationship between service quality and tourist satisfaction with mobile travel apps.
- H8b:** Compatibility positively moderates the relationship between system quality and tourist satisfaction with mobile travel apps.
- H8c:** Compatibility positively moderates the relationship between information quality and tourist satisfaction with mobile travel apps.
- H8d:** Compatibility positively moderates the relationship between trust and tourist satisfaction with mobile apps.
- H8e:** Compatibility positively moderates the relationship between perceived usefulness and tourist satisfaction with mobile travel apps.
- H8f:** Compatibility positively moderates the relationship between confirmation and tourist satisfaction with mobile travel apps.

2.11 Chapter Summary

This chapter has presented a review of literature that focuses on the determinants of continued use intention of mobile travel apps. The chapter described the core concepts, the research gap, and the underlying theories to develop the theoretical framework. Then, the chapter discussed the relationships of all variables based on previous research as a means of formulating the hypotheses. The next chapter will explain the methodology adopted to address the research questions and objectives.



CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter describes the research methodology chosen to address the research questions and objectives. The chapter starts with the research philosophy, paradigm, and design. It describes the operationalization and measurement of constructs, questionnaire design, research population and sample, and a pilot study. It also specifies data collection procedures and analysis.

3.1 Research Philosophy and Paradigm

A research paradigm is an established belief that guides how research should be carried out (Creswell, 2014). It is a whole system and way of thinking and also a complete organization of the framework for research that contains the basic assumptions, main issues, questions, models used within the research, and approaches for finding the answers to the questions put forward (Neuman, 2014). Essentially, a paradigm is a set of basic assumptions and in the context of research, these assumptions are founded on the ideas of how to develop that research – the collection, analysis and interpretation of the data that is required by the field of study. In other words, a paradigm is a belief system held by a researcher that often leads the researcher to opt for a qualitative, quantitative, or mixed-methods approach (Creswell, 2014). This paradigm also acts as the

worldview that guides investigators in their choice not only of a method but also in the ontological and epistemological aspects (Guba & Lincoln, 1994), methodology, axiology and rhetoric assumptions.

Philosophical assumptions are a combination of ontology, epistemology, methodology, axiology, and then rhetoric. Ontology is the philosophy of reality or the study of what exists or the philosophical study of what can be said to exist (Sekaran & Bougie, 2016). Epistemology refers to the best approach to analyze the nature of the world. It is the nature of knowledge, or how we come to know, or how to get the knowledge (Sekaran & Bougie, 2016). Axiology addresses the nature of ethical behavior. In research, axiology refers to what the researcher believes is valuable and ethical (Killam, 2013). The methodology is a process of research (Creswell, 2014), or how to get the data. Rhetoric is a research language distinct from quantitative and qualitative approaches. Choosing an applicable research method depends on the research paradigm. The core approaches of the research paradigm are positivism, interpretivism, and critical social science.

Positivism is a planned method of integrating deductive logic and exact empirical explanations of human behaviours to determine and verify a set of probabilistic causal laws for predicting patterns of human activity (Neuman, 2014). It is the most extensively used approach (Neuman, 2014). Positivists consider the ontological assumption to be one that holds reality as singular and objective (Neuman, 2014). They emphasize that language uses quantitative words with set definitions, an impersonal voice, and a deductive process. Deductive reasoning is a process that starts with a

general theory and confirms a specific case (Sekaran & Bougie, 2016). In other words, this research takes all its constructs from theories. Figure 3.1 illustrates the process of deductive reasoning.

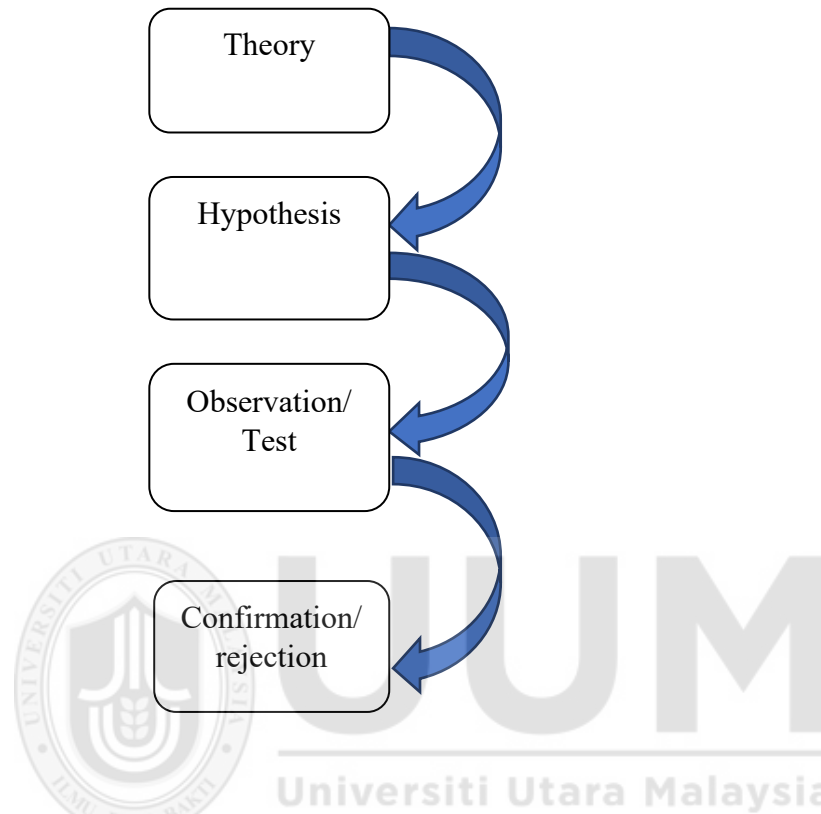


Figure 3.1: Deductive Reasoning (Rahim, 2016)

Positivism retains deductive laws, quantitative methods (Sekaran & Bougie, 2016), empirical observation, cause and effect relationships. Researchers often use experiments, surveys, and statistics as quantitative methods (Neuman, 2014) to collect data and analyze the numbers carefully to confirm the degree of support for hypotheses. Sekaran and Bougie (2016) defined a hypothesis as an uncertain and testable statement that forecasts what researchers assume to seek in their empirical data. In this research, the ECM and ISSM help the researcher deduce variables affecting the continued use intentions of mobile travel apps. The research has eight hypotheses on the relationships between variables (i.e., service quality, system quality, information quality, trust,

perceived usefulness, and expectation confirmation) and satisfaction, as well as satisfaction and the continued use intention of mobile travel apps, with compatibility as a moderator. The nature of this research is correlational, involving hypothesis testing through various statistical techniques.

3.2 Research Design

Research is a systematic procedure that proposes a greater understanding of a problem or an issue via the collection, analysis, and acquisition of information (Asenahabi, 2019; Goertzen, 2017; Matthews & Ross, 2010). The research design contains a complete methodological technique to guarantee that the acquired data can correctly answer the research questions. According to Sekaran, Foster, Lucas, and Hankins (2003), using the correct technique considerably enhances the value of a study's outcomes.

Chisnall (2003) defined three types of research design based on the study objectives: exploratory, descriptive, and causal. Exploratory research collects initial data that can be used to discover problems and offer hypotheses. It is appropriate when just a few or no previous research studies have been conducted and hence references are inaccessible as references but the researcher has found something that requires further investigation. Descriptive research, on the other hand, is undertaken to gather more detailed information and to explain what is happening in depth. Causal research explains the relationship between variables. A causal link, according to Hair, Hollingsworth, Randolph, and Chong (2017), is one that is seen when a change in one event causes a commensurate change in another event. Hence, causality indicates that a change in x (the cause) causes a change in y (the consequence). The research model proposed by Sekaran and Bougie

(2016) defines variables with causal linkages, in which independent variables are the causes and dependent variables reflect the positive or negative directions of the effects. According to Hair, Bush, and Ortinau (2011), whilst quantitative research methods can often be descriptive, causal, or explanatory in nature, they are seldom exploratory. And, according to Zikmund-Fisher, Fagerlin, and Ubel (2010), a quantitative investigator creates and evaluates a model based on accessible research.

The current study is a causal one that investigates the cause-and-effect relationship between variables based on the research goals. Its objective is to establish what causes people to want to use travel-related mobile phone apps in the tourist industry, using compatibility as a moderator. This cross-sectional study uses the survey approach for time and cost reasons (Bougie & Sekaran, 2019; Malhotra, Patil, & Kim, 2007; Sekaran & Bougie, 2016).

3.3 Study Population and Sample

Cooper and Schindler (2003) described sampling as the technique by which some aspects of a given population are representative of the entire population. It is less expensive than involving the whole population and can yield high accuracy, faster statistics compilation, and promise broad accessibility to the intended target population (Cooper and Schindler, 2003). The research sample is therefore, a subset of the target population in the area of interest. The sampling method provides detailed information in tiny units of numbers (Sekaran & Bougie, 2010). To acquire accurate and essential information and achieve responsiveness, researchers must focus on a single group of

respondents rather than several respondents, and this is an acceptable strategy since some characteristics of the sample population can be extrapolated to the entire population.

Since the current study is about the use intentions of mobile travel-related apps, it considers tourists as frequent users of those apps (Ho, Amin, Ryu, & Ali, 2021) and they form the unit of analysis. In this study, the research population comprises tourists aged 25 years and above living in Pakistan who have used mobile travel apps. People in this age group enjoy traveling and have the resources to satisfy their travel interests. And especially those with high disposable income are known to plan their tours independently using travel-related mobile apps. Based on this argument, according to the Pakistan labor force survey (2020-2021), the following table shows the average income of individuals in Pakistan based on their age group and gender. The table clearly depicts that the tourists who range between the age of 25 and 65, can easily afford to plan and organize their trips independently.

Table3.1: Average Monthly Wages of Employees According to Age and Gender (2020-2021)

Age Group	Male	Female	Total
10-14	10319	8828	9999
15-24	17357	13807	16895
25-34	24137	23788	24087
35-44	27784	20779	26788
45-54	31868	23206	30698
55-64	34047	23657	33075
65 & above	21860	12294	21027

Source: Pakistan Labor Force Survey 2020-2021

The age group provides a sufficient sample size (Saunders, Lewis, & Thornhill, 2003). Specifically, tourists who visited nine tourism sites (Altit Fort, Baltit Fort, Attabad Lake, Hunza Valley, Khunjab National Park, K-2 Base Camp, Lake saif ul Malook, Shogran and Siri Pye) in four major cities of northern Pakistan, namely, Naran, Kaghan, Gilgit and Hunza were targeted.

These sites are representative of the major tourism sites in Pakistan (water-based, mountain-based, and forest-based), having a high annual inflow of tourists (around 1033852 tourists), according to the Gilgit Baltistan Tourism Department, from different parts of the country (Saqib et al., 2019). Subsequent table shows a clear picture of inflow of domestic as well as foreign tourists in Gilgit Baltistan during five years from 2015 to 2020 (Qasim, 2022).

Table 3.2 Inflow of Domestic and Foreign Tourists (2015-2020)

Years	Domestic Tourists	Foreign Tourists
2015	200651	4082
2016	439685	4773
2017	781224	6212
2018	1391628	9027
2019	1023023	10829
2020	633246	1098

The table depicts that the influx of tourists in Pakistan perked up significantly till 2019 but during COVID – 19 pandemic caused major disruption in arrival of tourists. Consequently, a sample from these four major cities is able to represent the total population.

Roscoe (1975) stated that a sample size greater than 30 and less than 500 is suitable for most research. Additionally, some experts from the field of statistics have suggested a data range between 5-10 times the number of items used in a scale (Hair, Anderson, Babin, & Black, 2010), and that the number of respondents or sample size should be 10 times the number of items in the instrument (i.e., 41 questions x 10 = 410 questionnaires). In this study, the questionnaire (research instrument) was distributed to 600 tourists, thereby surpassing the expected sample size. Every eligible tourist was briefed on the purpose of the research and was requested to participate in it.

3.4 Operationalization and Measurement of Constructs

An operational definition is the denotation or interpretation of variables that allows them to be measured and validated. The present research adopted and modified variable definitions from previous studies. To guarantee uniformity, all items were scored on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

3.4.1 Service Quality

The service quality of mobile travel apps refers to the extent to which overall support is given to the tourists while using the mobile travel apps, the items were adapted from Urbach et al. (2010). User's interaction with the responsible service personnel can be evaluated through the backend support provided to the users. Such as, change in the itinerary or the travel plan, offering refunds, last minute ticket cancellation e-c-t. Mobile travel app service quality is a complex and subjective concept evaluated by users based on their experience with its functionality, content, booking process, customer service, and overall value. Delone and McLean (2003) defined service quality as complete support provided by the service providers. Therefore, the existing study operationalized service quality as complete backend support provided to the system users while using the mobile travel app by the service providers. This variable consists of four (4) items on a 5-point Likert scale, as presented in Table 3.1.

Table 3.3: Items to Measure Service Quality

N	Original Items (Cronbach's alpha =0.942)	Adapted Items
1	The responsible service personnel are always highly willing to help whenever I need support with the employee.	The responsible service personnel are always highly willing to help whenever I need support while using mobile travel apps.
2	The responsible service personnel provide personal attention when I experience problems with the employee.	The responsible service personnel provide personal attention when I experience problems while using mobile travel apps.
3	The responsible service personnel provide services related to the employee portal at the promised time.	The responsible service personnel provide services related to the mobile travel apps at the promised time.
4	The responsible service personnel have sufficient knowledge to answer my questions in respect of the employee portal.	The responsible service personnel have sufficient knowledge to answer my questions regarding the use of mobile travel apps.

Scale: 1= "Strongly Disagree" to 5= "Strongly Agree"

3.4.2 System Quality

System quality refers to the system features or characteristics that users expect while using a system (Delone & McLean, 2003). The features include ease of use, flexibility, dependability, and response time. Hong, Thong, and Tam (2006) posited that system quality is the most appropriate determinant for designing post-adoption behaviors based on the perception of system success. Wu and Wang (2006) also pointed out that the positive relationship between an IS quality and users perceived benefits. The current research operationalized system quality as the extent to which users perceive mobile travel apps as being easy to use and interact with. The variable is measured using five items adopted from Urbach, Smolnik, and Riempp (2010), as indicated in Table 3.2.

Table 3.4: Items to Measure System Quality

N	Original Items (Cronbach's alpha =0.920)	Adapted Items
1	Our employee portal is easy to navigate	Mobile travel apps are easy to navigate.
2	Our employee portal allows me to easily find the information I am looking for.	Mobile travel apps allow me to easily find the information I am looking for.
3	Our employee portal is well structured	Mobile travel apps are well structured
4	Our employee portal is easy to use.	Mobile travel apps are easy to use.
5	Our employee portal offers appropriate functionality.	Mobile travel apps offer appropriate functionality

Scale: 1= "Strongly Disagree" to 5= "Strongly Agree"

3.4.3 Information Quality

The desire to obtain quality information quality is one of the main reasons prompting the use of any IS (Chavez, Yu, Gimenez, Fynes, and Wiengarten, 2015). Information quality is therefore of paramount importance, relating to the quality, accuracy, level of readability and interpretation, and significance of an IS output (Gable, Sedera, & Chan, 2008). The current study operationalized information quality as the extent to which a user perceives that the information within the mobile travel app is accurate, relevant, complete, and in the format needed for speedy and efficient use. The construct is measured using six items adopted from Urbach et al. (2010), as specified in Table 3.5.

Table 3.5: Items to Measure Information Quality

N	Original Items (Cronbach's alpha =0.909)	Adapted Items
1	The information provided by our employee portal is useful.	The information provided by mobile travel apps is useful.
2	The information provided by our employee portal is understandable.	The information provided by mobile travel apps is understandable.
3	The information provided by our employee portal is interesting	The information provided by mobile travel apps is interesting.
4	The information provided by our employee portal is reliable.	The information provided by mobile travel apps is reliable
5	The information provided by our employee portal is complete.	The information provided by mobile travel apps is complete.
6	The information provided by our employee portal is up-to-date.	The information provided by mobile travel apps is up-to-date.

Scale: 1= "Strongly Disagree" to 5= "Strongly Agree"

3.4.4 Perceived Trust

Perceived trust represents the belief by mobile travel app users that the app is reliable and will protect their privacy when conducting travel activities via that mobile app (Chong, 2013). This trust also extends to encompass a mutual level of confidence that none of the partners in the process will exploit the susceptibilities of the other (Barney & Hansen, 1994). Trust is known to be a vital determinant of the adoption and continued use of electronic-shopping (Grabosky & Duffield, 2001; Ha & Stoel, 2009), social networking websites (Sledgianowski & Kulviwat, 2009), mobile shopping and payments (Chong, 2013; Wang, Lin, & Luarn, 2006). It is demonstrate to affect online buying intentions (Ponte, Carvajal-Trujillo, & Escobar-Rodríguez, 2015; Wen, 2009; Xie, Batra, & Peng, 2015) and repeat buying (Chiu, Huang, & Yen, 2010).

Trust is typically measured based on three characteristics: benevolence, competence and integrity (Mayer et al., 1995; McKnight and Chervany, 2002). Benevolence is described as the degree to which the users believes that the app provider wants to do things the right way (do good) rather than focusing on just maximizing their profit (Bélanger et al., 2002). Competence is referred as the capability of the app provider to deliver what is promised to the user, ensuring the privacy of their personal information. Whereas perceived integrity is indication of app provider's honesty and sincerity towards the users (Bélanger et al., 2002), that means the app provider makes good faith agreements, tells the truth, acts ethically and fulfills the promises (McKnight and Chervany, 2002). Trust is context specific. This study is conducted in the context of mobile travel apps and these characteristics relate quite well to the existing study. The constructs have been adopted from McKnight et al. (2002), as listed in Table 3.4. Clearly highlighting the incorporation of these characteristics. Therefore, in this research study, perceived trust represents the level of tourist trust in the mobile travel app and the belief that adequate protection is offered whilst using it. as listed in Table 3.6.

Table 3.6: Items to Measure Perceived Trust

N	Original Items (Cronbach's alpha =0.96)	Adapted Items
1	I believe that LegalAdvice.com would act in my best interest	. The mobile travel app acts in my best interest.
2	If I required help, LegalAdvice.com would do its best to help me	If I require help (for organizing trips) the mobile travel app would do its best to help me.
3	LegalAdvice.com is interested in my well-being, not just its own	The mobile travel app is concerned about my wellbeing not just its own.
4	LegalAdvice.com is truthful in its dealings with me	The mobile travel ap is truthful in its dealings with me.
5	I would characterize LegalAdvice.com as honest.	I would characterize the mobile travel app as honest.
6	LegalAdvice.com is sincere and genuine	The mobile travel app is genuine.
7	LegalAdvice.com would keep its commitments	The mobile travel app keeps its commitments.

Scale: 1= "Strongly Disagree" to 5= "Strongly Agree"

3.4.5 Perceived Usefulness

Perceived usefulness is the extent to which individuals have faith that using a specific system will enhance their job performance (Davis et al., 1989). This research operationalized perceived usefulness as the extent to which a person has faith that using the mobile travel app will assist him/her in accomplishing his/her goals. The measure for the construct has four items adapted from Rai et al. (2002), as presented in Table 3.7.

Table 3.7: Items to Measure Perceived Usefulness

N	Original Items (Cronbach's alpha =0.96)	Adapted Items
1	I find SIS useful on my job	I found mobile travel apps to be useful.
2	Using SIS enables me to accomplish student-related tasks more quickly	Using mobile travel apps enables me to accomplish my tasks more quickly
3	Using SIS in my job increases my productivity.	Using mobile travel apps increases my productivity.
4	When I use SIS it increases my chances of accomplishing my tasks.	When I use mobile travel apps it increases my chances of accomplishing my tasks.

Scale: 1= "Strongly Disagree" to 5= "Strongly Agree"

3.4.6 Expectation Confirmation

Expectation confirmation is the degree to which a person perceives his/her early expectations of a product or system to be confirmed during actual use (Bhattacharjee, 2001). In this study, expectation confirmation refers to whether or not mobile travel apps fulfil user expectations. Table 3.8 presents the three items use to measure the construct, adapted from Turel, Serenko, and Bontis (2007).

Table 3.8: Items to Measure Expectation Confirmation

N	Original Items (Cronbach's alpha =0.936)	Adapted Items
1	My experience with using apps was better than I expected.	My experience with using the mobile travel app was better than I expected
2	The service level or function provided by apps was better than I expected.	The functions provided by the mobile travel app were better than I expected.
3	Overall, most of my expectations from using apps were confirmed.	Overall, most of my expectations from using the mobile travel app were confirmed.

Scale: 1= "Strongly Disagree" to 5= "Strongly Agree"

3.4.7 Tourist Satisfaction with Mobile Travel Apps

Tourist satisfaction with an ICT refers to the positive relationship established between the user and the IS while using it (Cenfetelli, Benbasat, & Al-Natour, 2008). The established relationships can be observed in the level of satisfaction with the technology (Park & Kim, 2014) and the intention to continue to use it (Hsiao et al., 2016). Bhattacharjee (2001) defined satisfaction as a positive sentimental state that results from an overall assessment of performance based on previous experience of using an app.

The current research study defines tourist satisfaction with mobile travel apps as the extent to which the tourist achieves satisfaction while using those apps. Zhou (2013) inferred that users might not continue to use mobile travel apps if they do not reach an appropriate level of satisfaction. Therefore, decisions to continue using a system depend on the degree of user satisfaction with the system. Table 3.9 indicates the five items used to measure tourist satisfaction with mobile travel apps. These are adopted from Anderson and Srinivasan (2003); Wang, Tseng, Wang, Shih, and Chan (2019); Lee and Chung (2009).

Table 3.9: Items to Measure Tourist Satisfaction

N	Original Items (Cronbach's alpha =0.942)	Adapted Items
1	I am generally pleased with mobile food order apps.	I am generally pleased with the mobile travel apps.
2	I am very satisfied with mobile food order apps.	I am very satisfied with the mobile travel apps.
3	I am happy with mobile food order apps.	I am happy with the mobile travel apps.
4	I am satisfied with the way that mobile food order apps have carried out transactions.	I am satisfied with the way mobile travel apps organize the trip.
5	Overall, I was satisfied with mobile food order apps.	Overall, I am satisfied with the mobile travel apps.

Scale: 1= "Strongly Disagree" to 5= "Strongly Agree"

3.4.8 Continued Use Intention

Continued use intention represents individuals' intention to continue using a travel app for future travel activities following the initial adoption decision (Bhattacharjee, 2001). The current research operationalized this construct as an extension of the adoption of a mobile travel app after its first use. The measure for continued use intention has four items adapted from Larsen, Sørenbø, and Sørenbø (2009), as specified in Table 3.10.

Table 3.10: Items to Measure Continued Use Intention

N	Original Items (Cronbach's alpha =0.837)	Adapted Items
1	I intend to continue using e-learning rather than discontinue its use	I intend to continue using the mobile travel app rather than discontinue its use.
2	My intentions are to continue using e-learning rather than use any alternative means	My intentions are to continue using the mobile travel app rather than use any alternative means.
3	My intentions are to continue using e-learning in the future, at least as active as today	My intentions are to continue using the mobile travel app in the future, at least as active as today.

4	If I could, I would like to discontinue my use of e-learning	If I could, I would like to discontinue my use of the mobile travel app.
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Scale: 1= “Strongly Disagree” to 5= “Strongly Agree”

3.4.9 Compatibility

Rogers (1995) defines compatibility as the extent to which an innovation is considered as being consistent with the existing values, needs and previous experiences of possible adopters. In this research, compatibility refers to the extent to which mobile travel apps are in harmony with the living styles and existing desires of consumers. The measure for compatibility as a moderator has three items adapted from Maditinos, Tsairidis, and Grigoriadis (2009), as listed in Table 3.11.

Table 3.11: Items to Measure Compatibility

N	Original Items (Cronbach’s alpha =0.863)	Adapted Items
1	Internet Banking is compatible with my lifestyle	The mobile travel app is compatible with my lifestyle.
2	Using Internet Banking fits well with the way I like to manage my finances	Using the mobile travel app fits well with the way I like to manage my travel.
3	Using Internet Banking to conduct banking transactions fits into my work profile	Using the mobile travel app for traveling fits to my travel profile.

Scale: 1= “Strongly Disagree” to 5= “Strongly Agree”

3.5 Questionnaire Design

The questionnaire used for data collection has two sections. Section A gathers information on the respondent’s education, gender, age, and mobile travel app use (i.e., experience, frequency, motivation, purpose, length, and most-used features). Section B contains nine sub-sections with items related to the constructs, as shown in Table 3.10. To keep the questionnaire at a reasonable length, closed questions were used. On a 5-point Likert scale (1 = “strongly disagree” to 5 =

“strongly agree”), each item requires respondents to indicate their levels of agreement with each statement.

Likert scale is the most frequently used psychometric scale among psychological measurements that require self-reporting. This scale is based on the assumption that if the psychological distance between categories is equal, the scale will provide exact measurements of the psychological trait being assessed. This assumption of the psychological distance between categories is the most vital factor in the Likert scale. However, no conclusion has been drawn regarding the influence of a different number of options on the Likert scale, and no previous research has examined the impact of the number of options on the psychological distance between the options. The number of options has been a central issue for researchers in extracting information from participants. Green and Rao (1970) reported that six or seven categories were appropriate. In contrast, Schuts and Rucker (1975) suggested that the number of options might not affect participants' responses.

Most Likert scales include four to seven categories. An odd number of options is used when researchers need a neutral anchor, such as “Neither agree nor disagree,” whereas an even number of options is used when researchers intend to elicit participants' opinions or attitudes through answers such as “Agree” or “Disagree.” (Wakita, Ueshima, & Noguchi, 2012).

Previous research also investigated the appropriate number of options from the perspective of statistical reliability. Lissitz and Green (1975) and Boote (1981) suggested that a 5-point scale was reliable. Oaster (1989) indicated that a 7-point scale showed the highest test–retest reliability.

However, other studies have indicated that reliability is independent of the number of options (Bendig, 1953, 1954; Brown, Wilding, & Coulter, 1991; Komorita, 1963; Matell & Jacoby, 1971). The number of options has also been examined from the perspective of how participants feel when considering the appropriate option. Preston and Colman (2000) examined the following questions with the same participants: (a) ease of rating, (b) time required to select an answer, and (c) participants' satisfaction with their ability to express their feelings. Their results suggested that 5 to 10 categories were easy to rate. In addition, 5 categories were evaluated as being short enough to select an answer quickly and adequate for most scales. Therefore, based on this argument, the current study employed 5-point Likert scale as it offers a balance of simplicity, reliability and efficiency, making it a popular and effective tool for measuring attitudes and opinions in various research contexts.



Table 3.12: Questionnaire Design

Section	Variable	Number of Items	Code	Scale	Source
A	Demographics	6	-		
B1	Service Quality	4	SQ1	5-Points Likert Scale	Urbach et al. (2010)
B2	System Quality	5	SQ2	5-Points Likert Scale	Urbach et al. (2010)
B3	Information Quality	6	IQ	5-Points Likert Scale	Urbach et al. (2010)
B4	Perceived Trust	7	TR	5-Points Likert Scale	McKnight et al. (2002)
B5	Perceived Usefulness	4	UF	5-Points Likert Scale	Rai et al, (2002)
B6	Expected Confirmation	3	EC	5-Points Likert Scale	Turel et al., (2007)
B7	Compatibility	3	CP	5-Points Likert Scale	Maditinos, Tsairidis, & Grigoriadis(2009)
B8	Continued use Intention	4	CUI	5-Points Likert Scale	Larsen, Sørebo&Sørebo (2009)
B9	Tourist satisfaction with mobile travel apps	5	TS	5-Points Likert Scale	Anderson and Srinivasan (2003); Wang, Tseng et al. (2019); Lee and Chung (2009)

3.6 Pilot Study

A pilot study is a small scale study that seeks to examine the feasibility as well as the practicality of the method to be used in a more comprehensive and subsequent larger investigation (Flynn, Sakakibara, Schroeder, Bates, & Flynn, 1990). It also tests the sample recruitment strategy, data collection instruments, and other research-related techniques. Additionally, a pilot study helps to identify potential problem areas and shortcomings of the instrument (Saunders, Lewis, & Thornhill, 2007), and provides proxy data in the case of probability sampling (Cooper, Schindler, & Sun, 2006).

Before conducting a pilot study, however, it is essential to check the content validity of the instrument to be used to evaluate how well it represents the constructs it is designed to measure and to satisfy this requirement, two professors from local universities and a practitioner who is an expert in the tourism industry were given the questionnaire and asked to review and comment on the appropriateness of the tool. These three individuals all agreed that the instrument was appropriate and suitable to measure what was supposed to be measured.

Unlike the real study, a pilot study does not seek to generalize; its main focus is on establishing the clarity of the format and scale of the measurement used, the questions, and the items (Cooper & Schindler, 2003). Primarily, a pilot study evaluates the validity and reliability of the questionnaire (Sekaran & Bougie, 2016), simultaneously ensuring that respondents can understand the questions and give feedback. Such feedback significantly helps researchers to fine-tune instruments to ensure they stand a good chance of obtaining the desired information from the target population (Neuman, 2014).

In this research, the pilot study was undertaken to detect deficiencies in the interpretation and understanding of each questionnaire item, assess the time needed by respondents to complete the questionnaire, and obtain feedback for improvement of the instrument. Hertzog (2008) suggested that 10% of the projected sample is acceptable for a pilot and recommended that the this range between 10 and 40. Consequently, the pilot study sampled 30 tourists in Rawalpindi, Pakistan, which was not part of the sample for the study. SPSS 26 was used for data analysis and Cronbach's alpha values were used, whereby if the value of Cronbach Alpha was 0.70 or more, no further

editing or adjustment was made to the questionnaire. The values of Cronbach's alpha for all variables appear in Table 3.13.

Table 3.13: Construct Validity

Constructs	No of Items	Cronbach's Alpha Values
System Quality	5	0.835
Service Quality	4	0.804
Information Quality	6	0.828
Perceived Trust	7	0.838
Perceived Usefulness	4	0.735
Expectation Confirmation	3	0.778
Compatibility	3	0.844
Continued Use Intention	4	0.738
Tourist Satisfaction	5	0.933

3.7 Data Collection Procedure

The current study employs a systematic probability sampling technique in a systematic intercept survey. The intercept method is extensively used in marketing research (Kang, Solomon, Gates, & Schaeffer, 1982) since timely and effective data collection depends upon the technique (Rice & Hancock, 2005), which works on the assumption that respondents concentrate and provide meaningful responses when they are in a contextualized environment.

The estimated population of Naran and Kaghan in 2017 was 12,754 whereas Gilgit Baltistan's estimated population was 1,249,000 according to Pakistan Bureau of Statistics, 2017 (<https://www.pbs.gov.pk/content/population-census>). Official censuses in Pakistan are typically conducted every 10 years, with the most recent one being in 2017. A self-administered questionnaire was distributed (Veal, 2006) at nine tourist sites (Altit Fort, Baltit Fort, Attabad

Lake, Hunza Valley, Khunjab National Park, K-2 Base Camp, Lake saif ul Malook, Shogran and Siri Pye) in the four major cities of northern Pakistan (Naran, Kaghan, Gilgit and Hunza), of which six sites from Gilgit and three sites from Naran & Kaghan were selected. Thus, 400 questionnaires were distributed at Gilgit and 200 questionnaires were distributed at Naran, bringing a total of 600. These particular sites have a good mix of local and international tourists, and a heavy tourist inflow. Furthermore, most local and foreign tourists use mobile travel apps to enable their visits to this region. The data was collected from tourists as they were entering the sites.

A systematic sample of 479 tourists using mobile travel apps was intercepted in the morning, afternoon and evening hours on weekdays and weekends for seven days from January 2021 to June 2021. The respondents were asked to screen questions about whether they were already using mobile travel apps previously, prior to completing the questionnaire. Only those who provided positive answer to the screening question were chosen as respondents in this study. Pursuing the process of systematic sampling (Hardon, Hodgkin, & Fresle, 2004), the researcher approached every fifth tourist at the entrance of the tourist sites. At the start of the data collection procedure, a description of travel apps with illustrations was given to participants because it reminds respondents of existing travel apps which helps them think actively about travel planning and app usage aiming at response accuracy. It may also help the respondents focus as well as tailor their responses towards those apps, reducing confusion and improving the data quality. Whereas, visually presenting travel apps through illustrations can trigger memories and facilitate accurate recall of past usage experiences which may be valuable for assessing app usage pattern and generating interest and engagements.

Travel apps were defined as mobile apps that serve the requirements of tourists at different stages of travel, from pre-travel to post-travel. Examples of mobile apps include widespread travel apps in Pakistan such as Creem, Uber, Airbnb, Booking .com, PIA app, Google Maps etc. Once the participants were sufficiently familiar with the concept of travel apps, the researcher requested them to complete a questionnaire which was accompanied by a cover letter assuring complete secrecy and requesting a swift response. All of the respondents were given sufficient time to complete and return the questionnaires to the researcher on the spot to maximize the response rate.

3.8 Technique of Data Analysis

Structural Equation Modeling (SEM) is a combination of statistical modeling that examines the relationships among latent constructs (Hair et al., 2010). It is one of the methods suitable for research on issues related to the social and behavioral sciences (Baumgartner & Homburg, 1996). SEM has two prime roles. The first is as a measure of how the reliability and validity of conditions are fulfilled, what is required to be measured, and how to measure it. The second is to describe the causal relationship among constructs and the complexity of unobserved constructs (Hair, Babin, & Anderson, 2010). SEM is useful in investigating the complexity of the moderating effects. Furthermore, it is employed to examine the causal relationships among latent variables that explain the varying effects of independent variables on dependent variables.

3.8.1 Descriptive Analysis

Data analysis included descriptive and inferential statistics using SPSS version 26. The analysis presented profiles of respondents and various frequencies of outcomes (Agresti & Finlay, 2009). SEM offers some advantages for inferential analysis. Firstly, it simultaneously inspects all equations and identifies the degree and direction of variable relationships. Secondly, it takes into account, the measurement errors. Thirdly, it allows the modelling of complex models. And finally, it has the highest precision to date (Hair, Babin, & Anderson, 2010). The current research used variance-based SEM through SmartPLS 3.3 software developed by Ringle, Wende, and Will (2005) for inferential analysis. SmartPLS 3.3 can easily analyze various kinds of measures without any assumptions.

3.8.2 Partial Least Squares-Structural Equation Modelling (PLS-SEM)

SEM is considered a confirmatory technique rather than an exploratory one. The primary aim of SEM is to simultaneously explain the inter-linked dependent interactions between latent (unobserved) variables, using observed variables to measure each interaction (Hair et al., 2010; Schumacker & Lomax, 2016). According to Schumacker and Lomax (2016), SEM employs various models to elucidate relationships among observed variables and quantitatively test a hypothesized theoretical model.

The rationales for using PLS is that, it has the advantage of simultaneously estimating the relationships between constructs (structural model) and relationships between indicators and their

corresponding latent construct (measurement model) (Duarte & Raposo, 2010). In addition, The PLS SEM approach is one of the powerful statistical tools in social and behavioral sciences that simultaneously test several relationships (Tabachnick & Fidell., 2007). Furthermore, PLS places minimal limitations on distributional characteristics of the data and sample size (Ringle et al., 2005). One of the most fundamental issues in PLS-SEM is that of minimum sample size estimation. A widely used minimum sample size estimation method in PLS-SEM is the '10-times rule' method (Hair et al., 2011), which builds on the assumption that the sample size should be greater than 10 times the maximum number of inner or outer model links pointing at any latent variable in the model. This method's simplicity of application makes it a favorite among PLS-SEM users (Kock, & Hadaya, 2018). Given the proposed study investigates the moderating effect of perceived compatibility on the relationship between service quality, system quality, information quality, perceived trust, expectation confirmation, perceived usefulness and tourist satisfaction, the test of the hypothesized relationships is more appropriate using PLS-SEM.

SEM also aims to facilitate other sorts of investigation, which comprise variance and covariance estimation, linear regression, hypothesis testing, and confirmatory factor analysis (CFA) (Jöreskog & Sörbom, 1996). Further, Hair, Babin, and Anderson (2010) and Kline (2010) asserted that SEM can measure uni-dimensionality and simultaneously measure reliability and validity. SEM provides a complete assessment of model fitness while testing the individual parameters. It has two different approaches, namely covariance-based SEM (CBSEM) and variance-based SEM (VBSEM) (Chin, 1998), as presented in Table 3.14.

Table 3.14: Covariance-based SEM versus Variance-based SEM

Criterion	Covariance-based SEM	Variance-based SEM (PLS)
Objective	Parameter-oriented	Prediction-oriented
Approach	Covariance	Variance
Assumption	Parametric	Non-parametric
Implication	Optimal for parameter estimation	Optimal for prediction
Parameter estimates	Indeterminate	Explicitly estimated
Model complexity	Small to moderate complexity	Large complexity
Sample size	200–800	Minimum 20–100

Source: Chin (1998)

The PLS-SEM approach has two stages: the measurement model and the structural model. The measurement model stage assesses the validity and reliability of variable items. The structural model stage evaluates the relationships among latent variables to test the hypotheses. Smart-PLS can only use “.csv” files extracted from SPSS after the completion of the descriptive analysis. The following subsections discuss convergent and discriminant validity and the PLS model.

3.8.2.1 Convergent Validity

Convergent validity describes the correlation between the measures within the same variable compared to other variables (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). The assessment of the measurement model comprises factor loading, composite reliability, and average variance extracted (AVE) (Hair et al., 2014). Moreover, Fornell and Larcker (1981) specified that item loadings greater than 0.70 are considered adequate. Hair et al. (2014) suggested that items with loadings under 0.40 are not acceptable, while loadings above 0.70 are. Deleting items with loadings between 0.40 and 0.70 can increase reliability and AVE.

AVE measures the variance captured by the construct relative to variance due to measurement errors (Fornell & Larcker, 1981). The AVE values should be greater than or equal to 0.50, indicating that on average, the construct explained half of the variance of its indicators (Hair et al., 2014). Barclay, Higgins, and Thompson (1995) posited that an AVE value of at least 0.50 has an adequate convergence in measuring a construct.

3.8.2.2 Discriminant Validity

Discriminant validity describes the extent to which a variable is actually unlike other variables by empirical standards (Hair et al., 2014). The Fornell-Larcker method and cross-loading help to assess discriminant validity. The square root of the AVE values and the latent variable correlations are compared (Hair et al., 2014) by placing the square root of their AVE values at the diagonal elements of the correlation matrix. Cross-loading requires the loadings of indicators to be higher on their variable than other variables.

The outer model's discriminant validity is confirmed when the diagonal elements are higher as compared to other elements of the row and column in which they are positioned. It is assumed that findings related to the hypotheses testing must be valid and reliable by establishing the outer model's construct validity. Discriminant validity exists when the diagonal elements are higher than other elements in the row and column of their positions. By establishing the construct validity of the outer model, the results of hypothesis testing are assumed to be valid and reliable.

3.8.2.3 Path Coefficient Estimation

In the context of PLS-SEM, a PLS path model consists of two models: measurement and structural, also known as the outer and inner model (Hair et al., 2014). The measurement model connects the manifest variables (MVs) to their latent variables (LVs), demonstrating the link between constructs and the indicator variables. The structural model connects endogenous latent variables to other latent variables, illustrating the link between the constructs. The standardized path coefficient indicates the results of testing hypothesized relationships.

3.8.2.4 Structural Path Significance in Bootstrapping

PLS-SEM depends on a non-parametric bootstrap technique to evaluate the significance of path coefficient (Hair et al., 2014). T-statistics test the significance of the inner and outer models. Subsamples retrieved from the original sample with replacement (Hair et al., 2014) are used to produce bootstrapping standard errors that generate approximate t-values. This research used bootstrapping to deduce whether the path coefficients were statistically significant. The bootstrapping used 5,000 subsamples and generated t-values supplementing each path coefficient, followed by the p-values, calculated using a function of TDIST (t-value; df; tails) in Microsoft Excel.

3.8.2.5 Prediction Relevance of the Model

In multivariate data analysis, the R^2 values of endogenous variables account for the variance explained by the predictor variables, while Stone-Geisser's Q^2 value indicates the predictive

accuracy (Hair et al., 2014; Geisser, 1974; Stone, 1974). Blindfolding, a sample reuse approach that removes particular data points assumed to be missing values and estimates the parameters, can give the Q^2 value. The estimated parameters help to reconstruct the assumed missing raw data.

The cross-validated redundancy approach to calculating Q^2 values flawlessly fits the PLS-SEM approach (Hair et al., 2014), whereby PLS-SEM estimates the structural and measurement model for data prediction. A model is supposed to have predictive validity if the Q^2 values are higher than 0 (Hair et al., 2014). On contrary, if the Q^2 values are equal to or lower than 0, the model's predictive relevance of a model is inconclusive (Hair et al., 2014). The estimated Q^2 values represent a measure of how well the path model predicts the originally observed value (Hair et al., 2014).

3.9 Ethical Considerations

Ethical considerations play a vital role in research. They facilitate activities to achieve research objectives (Homan, 2001). Such considerations must be given to the entire research project since it is essential to ensure that all aspects of the research are conducted with objectivity, concreteness, and honesty and that the research methods and practices are suitable (Cohen & Manion, 2007). The matter of ethics within a research study is sensitive in nature (Douglas, 1976), as it deals with the rights of people involved, the truth of what is discovered, and what is right, good and appropriate for everybody involved in any situation that may arise in the project. This means that research ethics are of primary concern while collecting the basic data, constructing the research instrument (questionnaire in this study), contacting respondents, considering the confidentiality of the respondents, and how/what questions are asked of them. New and sometimes unexpected

information may arise when researchers ask questions of respondents, and researchers are ethically bound to maintain the confidentiality of the gathered information and the anonymity of the providers (Cohen and Manion, 2007). In the current study, the researcher fulfilled all ethical obligations by maintaining objectivity, precision, and neutrality of findings. The questionnaire did not contain questions or statements that may have seemed inappropriate to the respondents, and respondents' confidentiality was maintained when communicating with them and distributing the questionnaire.

3.10 Chapter Summary

This chapter has detailed the research methodology used to address the research questions. It has explained the research philosophy guiding the research design. Additionally, it has specified the operational definitions and measurements, data collection and sampling procedures, questionnaire design, arrangements for the pilot study, data analysis techniques, and ethical considerations.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.0 Introduction

The prime goal of this chapter is to present the findings based on the analysis of data collected among tourists who use mobile travel apps in Pakistan. The chapter presents the response rate to the questionnaire survey, respondent demographics, and initial data screening. It proceeds to discuss the measurement and structural models and assess the moderating effects.

4.1 Response Rate

Between January and June 2021, the researcher distributed 600 questionnaires to tourists who were travel app users in Pakistan. Of these 600 questionnaires, a total of 512 were returned, 33 were returned but excluded due to the incomplete responses. Whereas 479 questionnaires were usable representing 80% response rate, as shown in Table 4.1.

Table 4.1: Response Rate of Questionnaire

Response	Frequency/Rate
No. of questionnaire administered	600
Questionnaires returned	512
Returned and usable questionnaires	479
Returned and excluded questionnaires	33
Questionnaires not returned	88
Response Rate	80%

4.2 Data Screening

In multivariate analysis, particularly Smart PLS, data screening helps identify violations of assumptions (Hair et al., 2010; Tabachnick & Fidell, 2013). The current research used SPSS version 26 for the initial analysis. The analysis includes (a) missing value analysis, (b) assessment of outliers, (c) normality and common method bias tests, (d) multicollinearity test, (e) common method variance, and (f) response bias test (Hair, Babin, Anderson, 2010; Tabachnick & Fidell, 2013).

4.2.1 Data Coding

All the items of the variables from the questionnaire were coded using two or more letters to ease identification in SPSS and PLS. Specifically, the codes are as follows: Compatibility (CP1-CP3), Tourist satisfaction with Mobile Travel Apps (TS1-TS5), Expectation Confirmation (EC1-EC3), Information Quality (IQ1-IQ6), Service Quality (SQ1-SQ4), System Quality (SYQ1-SYQ5), Perceived Usefulness (PU1-PU4), Tourist's Continued Use Intention (CUI1-CUI4), and Perceived Trust (PT1-PT7).

4.2.2 Missing Values Analysis

A missing data event occurs when a respondent fails to respond to one or more questions in a survey (Hair, Black, Babin, Anderson, & Tatham, 2006). It is of great concern to various researchers and may influence the outcomes of empirical research in a negative way (Cavana,

Delahaye, & Sekeran, 2001). A 5% or less missing value is non-significant (Tabachnick, Fidell, & Ullman, 2007).

The descriptive statistics revealed 168 (78%) missing values out of 31,525 data points (see Table 4.2). Several variables had missing values (CP = 18; CUI = 19; EC = 16; IQ = 39, and PT = 29; PU = 9; SQ = 9; SYQ = 17; TS = 12). Hair, Ringle, and Sarstedt (2013) recommended that when the missing values are less than 5% per item, mean replacement can substitute them. Thus, in current study missing value is not a problem.

Table 4.2: Missing Value Analysis

Constructs	No of Missing values
Compatibility	18
Tourist's Continued Use Intention	19
Expectation Confirmation	16
Information Quality	39
Perceived Trust	29
Perceived Usefulness	9
Service Quality	9
System Quality	17
Tourist Satisfaction	12
168 out of 31,525 points (0.52%)	
Total Percentage	(0.52%)

Note: Percentage of missing values is arrived at by dividing the total number of missing values for the entire data set by total number of data points multiplied by 100.

4.2.3 Assessment of Outliers

According to Hair et al. (2010) outliers are observations that are significantly different from other observations. These are cases with notably different scores from others in a given dataset (Byrne & Van de Vijver, 2010). Detecting and treating outliers in multivariate analysis is mandatory (Hair et al., 2010). Outliers can mislead the estimates of regression coefficients, rendering the results

unreliable (Verardi & Croux, 2009). Assessing outliers will help identify cases that might affect findings (Hair et al., 2010).

Based on the suggestion by Tabachnick and Fidell (2013), the current study uses Mahalanobis' (1948) distance (D2) method to identify and treat multivariate outliers. Tabachnick et al. (2007) defined D2 as "the distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all the variables" (p. 74). The researcher calculated D2 using linear regression and compared it with the Chi-square values. The analysis used 41 items (N); thus, $(N-1) = (41-1) = 40$ items represented the degree of freedom in the Chi-square table with $p < 0.001$, resulting in the standard 78.75. Tabachnick and Fidell (2013) asserted that researchers must remove a multivariate outlier with a value falling within the standard D2 and higher. The current research did not detect any outliers since the highest D2 was 69.23. Thus, the final dataset remained at 479.

4.2.4 Multicollinearity Test

Multicollinearity occurs when two or more exogenous latent constructs become highly correlated, and it affects the estimates of regression coefficients and statistical significance (Chatterjee & Yilmaz, 1992; Hair et al., 2006). In SEM, multicollinearity happens when inter-correlations among the predictor variables are too high (Hair, Ringle, & Sarstedt, 2011; Hair et al., 2010). Multicollinearity increases the standard errors of coefficients and weakens analyses (Tabachnick et al., 2007).

This study used two methods of assessing multicollinearity (Chatterjee & Yilmaz, 1992; Peng & Lai, 2012). The first method evaluated multicollinearity using regression results from SPSS to obtain the tolerance value and variance-inflated factor (VIF). Hair, Ringle, and Sarstedt (2011) asserted that multicollinearity is a concern if the tolerance value is less than 0.20 and the VIF value is higher than 5. Table 4.3 shows the VIF values and tolerance values. The tolerance values ranged from 0.263 to 0.421, exceeding 0.20, while the VIF values were between 2.373 and 3.418, below the threshold of 5.

Table 4.3: Tolerance and Variance Inflated Factor (VIF)

Constructs	Collinearity Statistics	
	Tolerance	VIF
Expectation Confirmation (EC)	0.407	2.456
Information Quality (IQ)	0.331	3.026
Perceived Trust (PT)	0.263	3.806
Perceived Usefulness (PU)	0.354	2.828
Service Quality (SQ)	0.308	3.250
System Quality (SYQ)	0.293	3.418
Tourist satisfaction with Mobile Travel Apps (TS)	0.317	3.154
Compatibility (CP)	0.421	2.373

The second method evaluated the correlation matrix for the exogenous constructs. A correlation coefficient of 0.90 and above shows multicollinearity among exogenous constructs (Hair et al., 2010). Table 4.4 presents the correlation matrix for all exogenous constructs. The correlations among the exogenous constructs in this study were below 0.90, suggesting the independence of the exogenous constructs and that they were not highly correlated.

Table 4.4: Correlation among Latent Constructs

Variable	CP	IQ	EC	PU	SQ	TS	SYQ	PT
CP	1.000							
IQ	0.081	1.000						
EC	0.178	0.093	1.000					
PU	-0.089	0.109	0.169	1.000				
SQ	0.044	0.154	0.002	-0.022	1.000			
TS	0.068	0.127	0.199	-0.132	0.117	1.000		
SYQ	-0.034	0.323	0.031	0.060	-0.343	0.219	1.000	
PT	-0.098	0.290	0.110	0.283	0.191	0.145	0.010	1.000

4.2.5 Normality Test

Hair et al. (2014) and Henseler, Ringle, and Sinkovics (2009) highlighted that PLS-SEM has lenient data normality assumptions, is non-parametric, and does not necessitate a normal distribution. In respect of the distribution, it is imperative to assess whether the data is too far from normal and hence, researchers should carefully examine the results for substantial deviations from the normal distribution. Extremely non-normal data may expand the standard errors in bootstrapping (Hair et al., 2014).

Tabachnick and Fidell (2013) recommended either a statistical or graphical method to assess the normality of constructs. They added that if the sample is above 200, researchers should evaluate the shape of the distribution instead of using inference tests. Statistical tests are less sensitive in small sample sizes and more sensitive in large sample sizes; thus, both graphical plots and statistical tests should assess the actual degree of deviation from normality (Hair et al., 2010). The current research employed graphical methods (histogram and Q-Q plot), and statistical methods

(skewness and kurtosis) to test data normality (Hair et al., 2010; Kline, 2018; Tabachnick & Fidell, 2013).

Figure 4.1 shows that the data had a normal distribution, with all the bars on the histogram close to a normal distribution and most of the data concentrated on the straight line of P-P plot. Kline (2018) recommended that the Skewness absolute value be less than 3, and the Kurtosis value be less than 10. However, Skewness and Kurtosis values should be less than 2 and 7, respectively, according to Curran, West, and Finch (1996). Table 4.5 shows that the absolute values of the Skewness and Kurtosis of all the constructs were within the acceptable ranges of <2 and <7 , indicating no violations of normality assumptions.

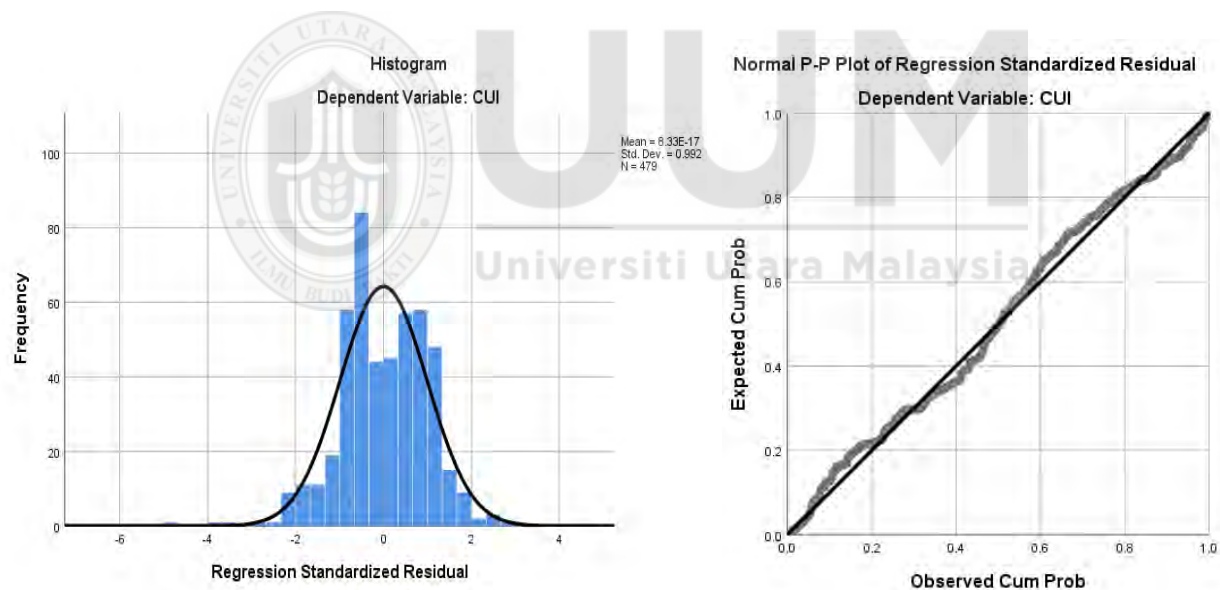


Figure 4.1: Histogram and Normal P-P Plot

Table 4.5: Values of Skewness and Kurtosis

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
CUI	-.805	.112	-.091	.223
EC	-.330	.112	-.061	.223
IQ	.395	.112	.079	.223
PT	-1.061	.112	2.132	.223
PU	-1.332	.112	2.734	.223
SQ	-.341	.112	.103	.223
SYQ	-.664	.112	.636	.223
TS	-.575	.112	.468	.223
CP	-.476	.112	.300	.223

Note: CUI - Tourist's Continued Use Intention, EC - Expectation Confirmation, IQ - Information Quality, PT – Perceived Trust, PU - Perceived Usefulness, SQ – Service Quality, SYQ – System Quality, TS - Tourist satisfaction with Mobile Travel Apps, CP - Compatibility

Table 4.6 shows multivariate normality results calculated using Mardia's (1970) coefficient procedure. Both skewness and kurtosis had a p-value less than 0.05, while their b-values were way above the cut-off values (skewness >2; kurtosis >7), indicating non-normality. Thus, the current research used the bootstrapping procedure to assess measurement and structural models. The researcher used the non-parametric Smart-PLS 3.3 version (Ringle, 2005), which does not require normal data distribution (Chin, Marcolin, & Newsted, 2003; Hair, Risher, Sarstedt, & Ringle, 2019).

Table 4.6: Mardia's Multivariate Skewness and Kurtosis

	B	Z	p-value
Skewness	10.9766	876.2984	0.00
Kurtosis	149.0750	38.9427	0.00

4.3 Test of Non-Response Bias

Non-response bias occurs when researchers underestimate the non-response of target respondents (Clottey & Grawe, 2014). Bias may cause ambiguous and imprecise predictions (Beuckelaer & Wagner, 2012; Wagner & Kemmerling, 2010). The appropriate method to test for non-response bias in this study is to compare the early responses 352 (59%) and late responses 127 (22%) on the frame and survey variables (Armstrong & Overton, 1977). As shown in Table 4.7, the means and standard deviations for early and late responses are not very diverse. Levene's test for equality of variance shows no significant difference between early and late responses. Therefore, in this research, non-response bias is not an issue.



Table 4.7: Results of Independent Sample T-test

s Statistics						Equality of Variances	
	Response Time	N	Mean	SD	Std. Error Mean	F	Sig.
CUI	Early Responses	352	4.2599	.88870	.04737	1.219	.270
	Late Responses	127	4.0394	.93139	.08265		
EC	Early Responses	352	3.7623	.83680	.04460	.127	.722
	Late Responses	127	3.6903	.86494	.07675		
IQ	Early Responses	352	2.1539	.68959	.03676	.032	.858
	Late Responses	127	2.2336	.66510	.05902		
PT	Early Responses	352	3.4554	.53287	.02840	.000	.993
	Late Responses	127	3.3915	.51294	.04552		
PU	Early Responses	352	3.6172	.56103	.02990	.619	.432
	Late Responses	127	3.4724	.59614	.05290		
SQ	Early Responses	352	3.8146	.74074	.03948	.003	.954
	Late Responses	127	3.7697	.73841	.06552		
SYQ	Early Responses	352	3.9869	.71160	.03793	.178	.673
	Late Responses	127	3.9197	.72254	.06412		
TS	Early Responses	352	3.8324	.83865	.04470	.079	.779
	Late Responses	127	3.6866	.78985	.07009		
CP	Early Responses	352	3.7860	.79187	.04221	3.949	.047
	Late Responses	127	3.6693	.91768	.08143		

Note: CUI - Tourist's Continued Use Intention, EC - Expectation Confirmation, IQ - Information Quality, PT – Perceived Trust, PU - Perceived Usefulness, SQ – Service Quality, SYQ – System Quality, TS - Tourist satisfaction with Mobile Travel Apps, CP - Compatibility

4.4 Common Method Bias Test

Common method variance (CMV) refers to variance that is attributable to the measurement method rather than to the construct of interest (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Researchers agree that CMV is a major concern when using self-report surveys (MacKenzie & Podsakoff, 2012; Podsakoff et al., 2003) and also when there is a single-source data collection (MacKenzie & Podsakoff, 2012) since relationships between variables measured by self-report can be inflated (Conway & Lance, 2010). Consequently, scholars should use procedural and statistical remedies to reduce the CMV effect in research (Podsakoff et al., 2003).

Given that the present study analyzed self-reported data from tourists who used mobile phone travel apps in Pakistan, there was the possibility for CMV (Podsakoff, MacKenzie, & Podsakoff, 2012) to occur, and hence it was important to examine its effect (Bagozzi, Yi, & Phillips, 1991). To do this, the researcher firstly solicited expert opinions to establish content validity (Podsakoff et al., 2003). The confidentiality of all the answers provided by the respondents was ensured, and participants were also told that their answers should be as honest as possible and that there were in effect no right or wrong answers (Podsakoff et al., 2003). Secondly, the researcher conducted Harman's single-factor test and un-rotated factor analysis with 41 items. The results revealed that no single factor accounted for more than 50% of the variance (refer to Table 4.8). Only a single factor explained 44.45% of the cumulative variance, which is less than 50%, indicating the absence of common method bias in this study (Podsakoff et al., 2012).



Table 4.8: Common Method Variance

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	18.225	44.451	44.451	18.225	44.451	44.451
2	2.761	6.734	51.185	2.761	6.734	51.185
3	1.747	4.260	55.446	1.747	4.260	55.446
4	1.394	3.399	58.845	1.394	3.399	58.845
5	1.262	3.078	61.923	1.262	3.078	61.923
6	1.152	2.809	64.732	1.152	2.809	64.732
7	1.105	2.695	67.427	1.105	2.695	67.427
8	.948	2.313	69.740			
9	.887	2.164	71.904			
10	.841	2.051	73.956			
11	.731	1.784	75.739			
12	.709	1.730	77.469			
13	.637	1.554	79.023			
14	.619	1.509	80.532			
15	.582	1.419	81.951			
16	.551	1.344	83.295			
17	.534	1.303	84.598			
18	.508	1.239	85.837			
19	.503	1.227	87.064			
20	.465	1.135	88.198			
21	.432	1.054	89.252			
22	.425	1.037	90.289			
23	.404	.985	91.274			
24	.388	.946	92.220			
25	.365	.889	93.109			
26	.339	.827	93.936			
27	.332	.809	94.745			
28	.299	.729	95.474			
29	.293	.715	96.188			
30	.270	.659	96.847			
31	.266	.649	97.496			
32	.241	.588	98.085			
33	.223	.544	98.628			
34	.207	.506	99.134			
35	.129	.316	99.449			
36	.081	.198	99.647			
37	.059	.144	99.791			
38	.034	.082	99.874			
39	.024	.058	99.931			
40	.020	.048	99.979			
41	.009	.021	100.000			

Extraction Method: Principal Component Analysis.

4.5 Descriptive Statistics of the Respondents' Demographic Characteristics

This section details the profile of the respondents. Table 4.9 shows the frequencies and percentages of respondents by socio-demographic characteristics. Of the 479 respondents, 58% were male and 42% female. Individuals aged 26 to 45 years participated the most in this study (56%), followed by 36% aged 25 years or below, and 7% aged 46-55 years old, while only 1% were 56 years old or older. Most respondents (51%) had a master's degree, followed by those with a bachelor's degree (36%). PhD holders represented only 10%, while only 3% were diploma graduates. Though the individuals in the sample pool are educated and use different mobile apps. Their behaviour towards mobile travel apps is not consistent, they don't tend to use travel apps continuously. This study is focused towards the factors that contribute to the continued use behaviour of users towards mobile travel app. Both single (50.3%) and married (49.7%) individuals almost equally participated in the research.

Table 4.9: Socio-demographic Profile of Respondents

Characteristics	Frequency	Percentage
Gender		
Male	277	57.8
Female	202	42.2
Age		
<=25	173	36.1
26-45	270	56.4
46-55	34	7.1
>=56	2	0.4
Education		
Diploma	15	3.1
Bachelor	172	35.9
Masters	244	50.9
PhD	48	10.0
Marital Status		
Married	238	49.7
Single	241	50.3
Travel Apps Usage (times)		
1-2	301	62.8
3-4	90	18.8
5-6	39	8.1
>=7	49	10.2
Motivation Using Travel Apps		

Friends & Family	375	78.3
Hotel Web	76	15.9
Travel Agent	28	5.8
Purpose Using Travel Apps		
Booking Flight	59	12.3
Hotel Booking	69	14.4
Travel Activities	169	35.3
Travel Destination	182	38.0
No. of Purchase Travel Apps		
1-2 apps	359	74.9
3-4 apps	69	14.4
5-6 apps	27	5.6
>=7 apps	24	5.0
Features Travel Apps		
Booking Services	173	36.1
Geo Tracking	121	25.3
Itinerary Generator	84	17.5
Trip Reviews	101	21.1
Session Length Using Travel Apps		
5 Min	188	39.2
8 Min	73	15.2
10 Min	79	16.5
>10 Min	139	29.0

The travel app usage frequency among respondents was highly represented by 1-2 times (63%), followed by 3-4 times (19%), 7 times and above (10%), and 5–6 times (8%). The Friends & Family motivated the most respondents (78%), followed by hotel websites (6%) and the travel agent (6%). Of all respondents, 38% used the apps for a travel destination, followed by 35% for travel activities, 14.4% for booking a hotel, and 12.3% for flight booking. In terms of the purchase of travel apps, 75% respondents purchased 1-2 apps, 14% purchased 3–4 apps, 6% purchased 5–6 travel apps, and 5% purchased seven or more travel apps. In terms of app features, 36% respondents preferred the booking service, followed by 25% geo-tracking, 21% trip reviews, and 18% itinerary generators. Finally, 39% respondents opted for a 5-minute session on travel apps, followed by those who exceeded 10 minutes (29%). But those who spent 10 minutes were 17% while 15% were 8 minutes long.

4.6 Descriptive Statistics of all Latent Constructs

This section presents the descriptive statistics of all latent variables. Based on a 5-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree, Table 4.10 shows means and standard deviations for all variables. The means of all variables except IQ were close to 4.0, indicating that the variables were vital to the respondents, as they agreed with all the statements. CUI had the highest mean (4.202); SYQ was the second-most critical variable. High levels of agreement from the respondents indicate that they consider these aspects vital. IQ was rated the least important (mean 2.175). Standard deviations clustered closely around the means and were more reliable.

Table 4.10: Descriptive Statistics of Latent Variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
CUI	479	1.00	5.00	4.202	.905
EC	479	1.00	5.00	3.743	.844
IQ	479	1.00	4.00	2.175	.683
PT	479	1.00	4.00	3.438	.528
PU	479	1.00	4.00	3.579	.573
SQ	479	1.00	5.00	3.803	.740
SYQ	479	1.00	5.00	3.969	.714
TS	479	1.00	5.00	3.794	.828
CP	479	1.00	5.00	3.755	.828

Note: CP - Compatibility, TS - Tourist satisfaction with Mobile Travel Apps, EC - Expectation Confirmation, IQ - Information Quality, SQ – Service Quality, SYQ – System Quality, PU - Perceived Usefulness, CUI - Tourist’s Continued Use Intention, PT – Perceived Trust

4.7 PLS-SEM Path Model Evaluation

This section reports the results of PLS-SEM based on the two-step process conceived by Henseler et al. (2009). The first step is the evaluation of the suitability of the measurement model and the estimation of the structural model (Hair et al., 2014). This assessment includes path coefficients,

effect sizes, predictive accuracy and relevance, and moderating effects. The second step assesses the measurement model to examine its validity and reliability.

4.7.1 Measurement (Outer) Model Assessment

The measurement model assesses the input of each item representing its construct and measures how well the set of items symbolizes the construct (Hair et al., 2014; Hair, Ringle, & Sarstedt, 2011). Researchers often evaluate the measurement model by determining measurement reliability and validity, i.e., individual item reliability, internal consistency reliability, convergent validity; and discriminant validity (Hair et al., 2014; Hair, Ringle, & Sarstedt, 2011; Henseler et al., 2009). If the specified measurement (or outer) model does not possess minimum required properties of acceptable reliability and validity, then the structural (inner) model estimates become meaningless (Henseler, Hubona, & Ray, 2016) .

4.7.1.1 Individual Item Reliability

The factor loadings of each item indicate item reliability (Hair et al., 2017). Loading values less than 0.70 infer that constructs explain more than 50% of the variance (Henseler et al., 2009). Researchers often remove items with loadings below 0.70 to increase reliability. Hair, Sarstedt, Matthews, and Ringle (2016) posited that researchers should retain items with loadings below 0.7 but above 0.4 for content validity if removing them does not significantly improve reliability. In this study, items with loadings below 0.4 were removed to increase composite reliability and AVE

values (Hair et al., 2014), as shown in Table 4.11 and Figure 4.2. The researcher deleted two items (PU3 and IQ2) out of 41 items because their loadings were below the threshold and retained 39 items with loadings above 0.40 in the model.

Table 4.11: Convergent Validity

Constructs	Items	Loadings	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
CP	CP1	0.712	0.760	0.805	0.859	0.671
	CP2	0.888				
	CP3	0.848				
CUI	CUI1	0.777	0.870	0.872	0.912	0.724
	CUI2	0.919				
	CUI3	0.789				
	CUI4	0.907				
EC	EC1	0.831	0.872	0.876	0.922	0.798
	EC2	0.933				
	EC3	0.912				
IQ	IQ1	0.794	0.860	0.861	0.899	0.640
	IQ3	0.773				
	IQ4	0.799				
	IQ5	0.817				
	IQ6	0.817				
PT	PT1	0.809	0.849	0.867	0.891	0.620
	PT2	0.798				
	PT3	0.743				
	PT4	0.770				
	PT5	0.815				
PU	PU1	0.827	0.828	0.832	0.897	0.745
	PU2	0.889				
	PU4	0.872				
SQ	SQ1	0.765	0.776	0.834	0.848	0.583
	SQ2	0.799				
	SQ3	0.705				
	SQ4	0.781				
SYQ	SYQ1	0.677	0.817	0.863	0.868	0.568
	SYQ2	0.771				
	SYQ3	0.791				
	SYQ4	0.783				
	SYQ5	0.742				
TS	TS1	0.845	0.915	0.916	0.937	0.747
	TS2	0.913				

TS3	0.850
TS4	0.872
TS5	0.840

Note: CP - Compatibility, TS - Tourist satisfaction with Mobile Travel Apps, EC - Expectation Confirmation, IQ - Information Quality, SQ – Service Quality, SYQ – System Quality, PU - Perceived Usefulness, CUI - Tourist’s Continued Use Intention, PT – Perceived Trust



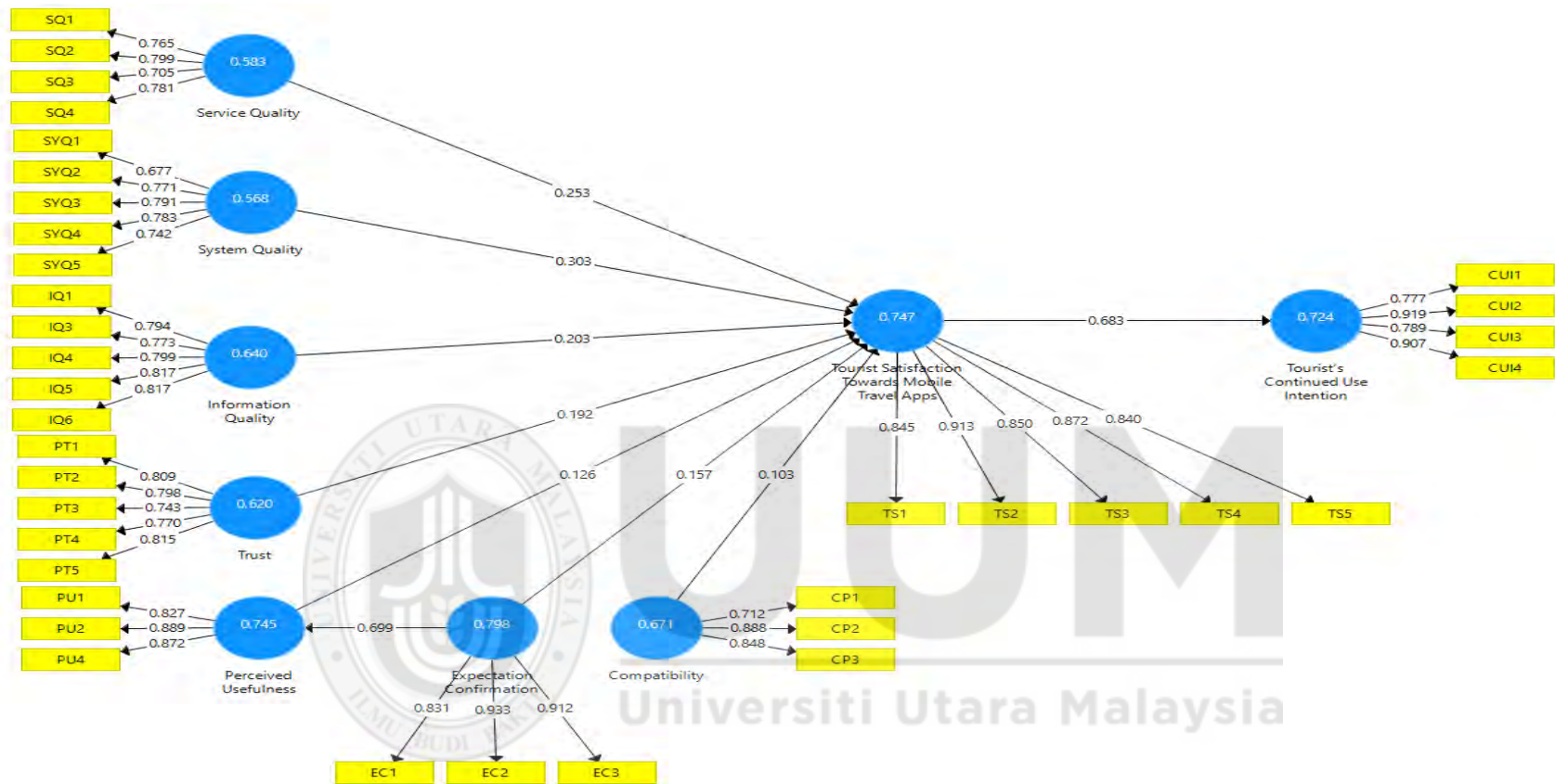


Figure 4.2: Measurement Model

4.7.1.2 Internal Consistency Reliability

Researchers can assess the internal consistency reliability of constructs using Composite reliability (CR), Cronbach's alpha (CA) (Peterson & Kim, 2013), and rho-A (Dijkstra & Henseler, 2015). The values from these measures should be at least 0.70 (Bagozzi & Yi, 1988; Dijkstra & Henseler, 2015; Hair et al. , 2014). CA has been criticized for undermining the true reliability (Hair et al., 2019) by taking tau equivalence into account (Hair et al. (2014). According to Hair et al. (2010; 2014) and Henseler et al. (2009), CR is more suitable for PLS-SEM. Table 4.11 displays the CR, CA, and rho-A values of all constructs, which show that the acceptable minimum level of 0.70 has been surpassed in all cases, thereby indicating satisfactory internal consistency reliability of the measurement.

4.7.1.3 Convergent Validity

Convergent validity is the extent to which indicators symbolize the intended construct and correlate (Hair et al., 2009). The assessment uses the average variance extracted (AVE). The values describe the average variance shared between a construct and its indicators (Fornell & Larcker, 1981). Typically, if the values of AVE are 0.5 or more, they indicate adequate convergent validity (Ali, Rasoolimanesh, Sarstedt, Ringle, & Ryu, 2018; Bagozzi & Yi, 1988; Chin, 1998). As presented in Table 4.11, the AVE values ranged from 0.568 to 0.798, indicating that all the constructs had satisfactory levels of convergent validity.

4.7.1.4 Discriminant Validity

Discriminant validity evaluates to what extent a construct differs from other constructs (Byrne & Vijver, 2010; Duarte & Raposo, 2010; Hair et al., 2010). In this study, the square root of the AVE (Fornell & Larcker, 1981), loadings and cross-loadings (Chin, 1998), and the heterotrait-monotrait ratio (HTMT) of Henseler et al. (2016) were indicators of differences. Table 4.12 shows that the square root of the AVE values (in bold) was higher than the correlations of the constructs, indicating sufficient discriminant validity.

Table 4.12: Fornell and Larcker Criterion

Constructs	CP	CUI	EC	IQ	PT	PU	SQ	SYQ	TS
CP	0.819								
CUI	0.636	0.851							
EC	0.646	0.576	0.893						
IQ	0.601	0.503	0.621	0.800					
PT	0.687	0.619	0.711	0.727	0.788				
PU	0.643	0.577	0.699	0.692	0.674	0.863			
SQ	0.643	0.630	0.639	0.709	0.664	0.692	0.763		
SYQ	0.633	0.607	0.646	0.738	0.649	0.699	0.734	0.754	
TS	0.651	0.683	0.680	0.596	0.635	0.698	0.723	0.713	0.864

Note¹: CP - Compatibility, TS - Tourist satisfaction with Mobile Travel Apps, EC - Expectation Confirmation, IQ - Information Quality, SQ – Service Quality, SYQ – System Quality, PU - Perceived Usefulness, CUI - Tourist's Continued Use Intention, PT – Perceived Trust

Note². Diagonals (**in bold**) represent the square root of the average variance extracted (AVE) while the off-diagonals are correlations among constructs. Diagonal elements should be larger than off-diagonal elements in order to establish discriminant validity

Chin's (1998) standard also helps to determine discriminant validity by comparing the loadings of the items with other items in the cross-loadings (see Table 4.13). The cross-loadings (item-level discriminant validity) can substantiate discriminant validity (Henseler et al., 2016) when each measurement item correlates weakly with all other constructs except for the one to which it is

theoretically associated (Gefen and Straub, 2005). In this study, cross-loadings provide support for discriminant validity.

Table 4.13: Loadings and Cross-loadings

Constructs		CP	CUI	EC	IQ	PT	PU	SQ	SYQ	TS
CP	CP1	0.712	0.329	0.355	0.345	0.391	0.368	0.367	0.360	0.353
	CP2	0.888	0.558	0.568	0.545	0.624	0.589	0.583	0.573	0.563
	CP3	0.848	0.616	0.613	0.545	0.626	0.578	0.585	0.579	0.627
CUI	CUI1	0.539	0.777	0.413	0.417	0.527	0.472	0.520	0.493	0.541
	CUI2	0.566	0.919	0.512	0.424	0.511	0.470	0.538	0.527	0.593
	CUI3	0.493	0.789	0.503	0.434	0.555	0.536	0.541	0.507	0.598
	CUI4	0.564	0.907	0.525	0.433	0.511	0.479	0.541	0.533	0.585
EC	EC1	0.589	0.534	0.831	0.577	0.651	0.640	0.578	0.581	0.568
	EC2	0.602	0.529	0.933	0.577	0.669	0.658	0.596	0.606	0.658
	EC3	0.537	0.479	0.912	0.505	0.580	0.568	0.536	0.540	0.591
IQ	IQ1	0.452	0.433	0.495	0.794	0.593	0.587	0.584	0.621	0.494
	IQ3	0.466	0.398	0.466	0.773	0.591	0.516	0.551	0.569	0.494
	IQ4	0.502	0.411	0.466	0.799	0.607	0.504	0.564	0.586	0.447
	IQ5	0.486	0.365	0.562	0.817	0.647	0.556	0.532	0.560	0.436
	IQ6	0.499	0.403	0.498	0.817	0.668	0.600	0.600	0.609	0.506
	PT1	0.540	0.494	0.573	0.674	0.809	0.614	0.600	0.582	0.549
PT	PT2	0.538	0.483	0.555	0.657	0.798	0.597	0.588	0.597	0.502
	PT3	0.435	0.317	0.464	0.531	0.743	0.564	0.527	0.474	0.443
	PT4	0.601	0.607	0.599	0.554	0.770	0.607	0.651	0.660	0.557
	PT5	0.549	0.460	0.574	0.652	0.815	0.657	0.608	0.586	0.544
	PU1	0.540	0.477	0.569	0.579	0.654	0.827	0.574	0.612	0.566
PU	PU2	0.550	0.486	0.574	0.584	0.656	0.889	0.569	0.585	0.598
	PU4	0.571	0.527	0.660	0.627	0.691	0.872	0.645	0.611	0.638
	SQ1	0.444	0.460	0.424	0.552	0.547	0.483	0.765	0.594	0.456
SQ	SQ2	0.567	0.574	0.558	0.505	0.620	0.581	0.799	0.566	0.615
	SQ3	0.442	0.356	0.425	0.541	0.563	0.480	0.705	0.508	0.404
	SQ4	0.467	0.468	0.503	0.616	0.596	0.544	0.781	0.591	0.480
	SYQ1	0.386	0.377	0.405	0.501	0.456	0.434	0.459	0.677	0.419
SYQ	SYQ2	0.455	0.433	0.416	0.567	0.529	0.491	0.552	0.771	0.467
	SYQ3	0.448	0.428	0.462	0.615	0.582	0.538	0.606	0.791	0.477
	SYQ4	0.567	0.575	0.578	0.512	0.624	0.597	0.584	0.783	0.430
	SYQ5	0.468	0.396	0.508	0.627	0.591	0.527	0.625	0.742	0.496
	TS1	0.571	0.603	0.602	0.508	0.617	0.597	0.633	0.632	0.845
TS	TS2	0.597	0.607	0.617	0.549	0.680	0.654	0.664	0.654	0.913
	TS3	0.512	0.590	0.562	0.507	0.612	0.558	0.592	0.632	0.850
	TS4	0.548	0.560	0.574	0.487	0.628	0.593	0.602	0.579	0.872
	TS5	0.578	0.590	0.582	0.521	0.637	0.608	0.588	0.586	0.840

Note: CP - Compatibility, TS - Tourist satisfaction with Mobile Travel Apps, EC - Expectation Confirmation, IQ - Information Quality, SQ – Service Quality, SYQ – System Quality, PU - Perceived Usefulness, CUI - Tourist's Continued Use Intention, PT – Perceived Trust

Previous studies have suggested that assessing discriminant validity using the HTMT ratio is more reliable (Ali et al., 2018; Hair et al., 2019; Henseler et al., 2014; Henseler et al., 2016). Table 4.14 shows that the highest correlation (0.840) is below the conventional yardstick of 0.850 (Henseler et al., 2016), indicating satisfactory discriminant validity.

Table 4.14: HTMT

Constructs	CP	CUI	EC	IQ	PT	PU	SQ	SYQ	TS
CP									
CUI	0.751								
EC	0.764	0.660							
IQ	0.720	0.581	0.717						
PT	0.813	0.696	0.812	0.809					
PU	0.784	0.678	0.818	0.817	0.817				
SQ	0.783	0.732	0.750	0.835	0.819	0.840			
SYQ	0.752	0.690	0.739	0.816	0.826	0.829	0.832		
TS	0.749	0.765	0.760	0.669	0.802	0.798	0.824	0.816	

Note: CP - Compatibility, TS - Tourist satisfaction with Mobile Travel Apps, EC - Expectation Confirmation, IQ - Information Quality, SQ – Service Quality, SYQ – System Quality, PU - Perceived Usefulness, CUI - Tourist's Continued Use Intention, PT – Perceived Trust

4.7.2 Structural Model Assessment

After assessing and fulfilling the measurement model requirements (reliability and validity), the next phase was to appraise the structural model (inner model). The standards in PLS-SEM for evaluating the inner model are the significance of the path coefficients, the effect size (f^2), the coefficient of determination (R^2), predictive relevance (Q^2) and PLS predict. The inner model of the current study was the main effect model. It assessed the direct relationships between variables and the moderating influence of compatibility in the relationships. Figure 4.3 shows the full inner model (main and moderating effect). In the current study, beta values represent all the relationships. The tests for the direct and moderating effects had a set level of significance ($p < 0.01$; 1-tailed, 0.05).

4.7.2.1 Hypotheses of the Direct Effects

The evaluation of the structural model commenced with assessing the main effect, i.e., the link between the exogenous variable and the endogenous variable. The PLS algorithm gave the magnitude of the beta coefficient. The Smart-PLS bootstrapping procedure (see Figure 4.3) highlighted the significance of the relationships (beta coefficients). The bootstrapping used 5,000 sub-samples (Hair, Ringle, & Sarstedt, 2012, 2013; Hair, Ringle, Sarstedt, & Practice, 2011; Henseler et al., 2009).



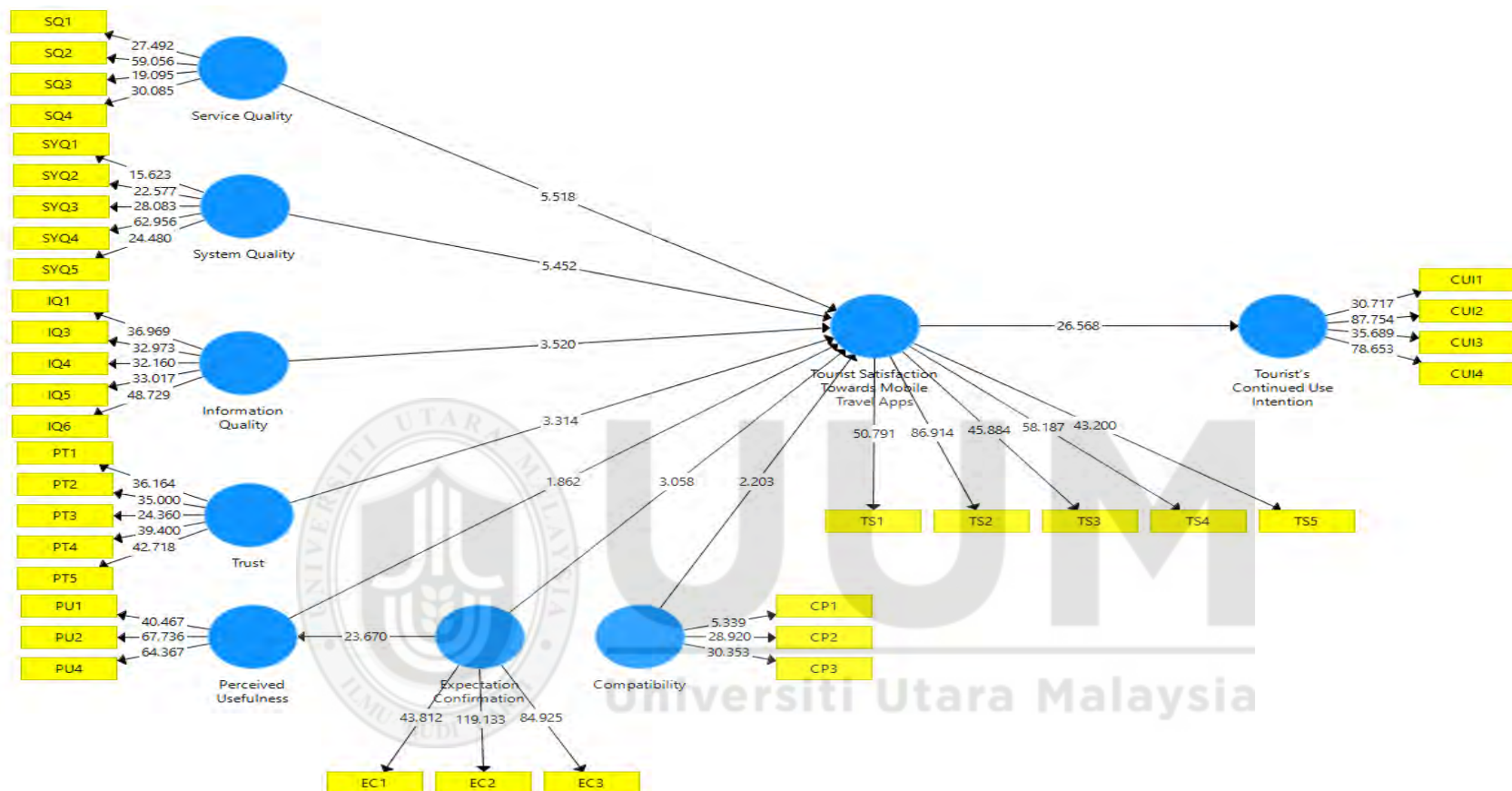


Figure 4.3: Structural Model (Direct Effect)

Table 4.15 shows the significance of the path coefficient of the relationship between the exogenous and the endogenous variable. The results of the bootstrapping revealed that the relationships between the exogenous and endogenous variables were significant at $p < 0.01$, and $p < 0.05$, respectively. Table 4.15 also displays the beta coefficients, t-values, and confidence intervals.

Table 4.15: Results of Direct Effects

Relationships	Std. Beta	Std. Dev.	t-values	p-values	Confidence Intervals		Decision
					5.00%	95.00%	
SQ ---> TS	0.253	0.046	5.518**	0.000	0.167	0.313	Supported
SYQ ---> TS	0.303	0.056	5.452**	0.000	0.207	0.396	Supported
IQ ---> TS	0.203	0.058	3.520**	0.000	0.113	0.315	Supported
PT ---> TS	0.192	0.058	3.314**	0.001	0.105	0.275	Supported
PU ---> TS	0.126	0.068	1.862*	0.033	0.004	0.224	Supported
EC ---> TS	0.157	0.051	3.058**	0.001	0.078	0.241	Supported
EC ---> PU	0.699	0.030	23.670**	0.000	0.643	0.736	Supported
TS ---> CUI	0.683	0.026	26.568**	0.000	0.649	0.729	Supported

Note: CP - Compatibility, TS - Tourist Satisfaction Towards Mobile Travel Apps, EC- Expectation Confirmation, IQ - Information Quality, SQ – System Quality, PU - Perceived Usefulness, CUI - Tourist's Continued Use Intention, PT – Perceived Trust, * $p < 0.05$

The PLS-SEM results showed that all direct relationships were significant, that is, service quality ($\beta = 0.253$, $t = 5.518$, $p = 0.000$), system quality ($\beta = 0.303$, $t = 5.452$, $p = 0.000$), information quality ($\beta = 0.203$, $t = 3.520$, $p = 0.000$) perceived trust ($\beta = 0.192$, $t = 3.314$, $p = 0.001$) perceived usefulness ($\beta = 0.126$, $t = 1.862$, $p = 0.033$) and expectation confirmation ($\beta = 0.157$, $t = 3.058$, $p = 0.001$) influenced tourist satisfaction, supporting H1, H2, H3, H4, H5, and H6b. The relationships between expectation confirmation and perceived usefulness ($\beta = 0.699$, $t = 23.670$, $p = 0.000$) and between tourist satisfaction and continued use intention ($\beta = 0.683$, $t = 26.568$, $p = 0.000$) were also significant, supporting H6a and H7.

4.7.2.2 Evaluation of Variance Explained

One of the criteria for assessing the appropriateness of the inner model in PLS-SEM is R^2 (Hair, Ringle, & Sarstedt, 2011; Hair et al., 2012; Hair et al., 2019; Henseler et al., 2009). The R^2 value is the proportion of variation in the endogenous variables explained by the predictor variables (Hair, Babin., Anderson, 2010). According to Falk and Miller (1992), the lowest acceptable value of R^2 is 0.10. Cohen (1988) categorized the value of R^2 of 0.02 as weak, 0.13 as moderate and 0.26 as substantial, while Chin (1998) posited similar categories with different R^2 values of 0.19, 0.33 and 0.67, respectively. Both scholars suggest the value of R^2 is between 0 and 1, but offer no general agreement on its precise value. According to Hair et al. (2010), the context determines the R^2 value, i.e., the value depends on the research context. Table 4.16 shows that the variances in the continued use intention (0.467), perceived usefulness (0.488), and tourist satisfaction (0.707) with mobile travel apps explained the model. Based on Cohen's (1988) categories, the R^2 values were substantial.

Table 4.16: Coefficient of Determination (R^2)

Latent Variables	R^2 (Variance Explained)	R^2 Percentage
CUI	0.467	47%
PU	0.488	49%
TS	0.707	71%

Note: CUI - Tourist's Continued Use Intention, PU - Perceived Usefulness, TS - Tourist satisfaction with Mobile Travel Apps

4.7.2.3 Effect Size (f^2) Assessment

Effect size (f^2) comparatively elucidates the effect of a particular exogenous variable on an endogenous variable by means of changes in the R^2 (Chin, 1998). Cohen (1988:9) defined f^2 as “the degree to which the phenomenon is present in the population or the null hypothesis is false” using the following formula:

$$\text{Effect size: } f^2 = \frac{R^2 \text{ included} - R^2 \text{ Excluded}}{1 - R^2 \text{ Included}}$$

Whereas:

f^2 = effect sizes

R^2 included = R-square included

R^2 excluded = R-square excluded

1 = constant

R-squared excluded is the value of R^2 value of the endogenous variable when a particular exogenous variable is excluded from the model. R-squared included is the value of R^2 of the endogenous variable when a particular exogenous variable is included. Cohen (1988) prescribed f^2 values of 0.35 as large, 0.15 as medium and 0.02 as small.

Table 4.17 presents the effect sizes for the six predictors of tourist satisfaction with mobile travel apps, ranging from 0.02 to 0.08 for compatibility ($f^2 = 0.02$), expectation confirmation ($f^2 = 0.03$), information quality ($f^2 = 0.05$), perceived trust ($f^2 = 0.03$), perceived usefulness ($f^2 = 0.02$), service quality ($f^2 = 0.06$) and system quality ($f^2 = 0.08$). Based on Cohen's (1988) rule of thumb, all relationships had small effect sizes. Expectation confirmation in predicting perceived usefulness ($f^2 = 0.95$) and tourist satisfaction with mobile travel apps in predicting tourists' continued use intention ($f^2 = 0.87$) had high effect sizes. Regardless of the effect sizes, all effects were significant

(Limayem, Hirt, & Chin, 2001), demonstrating the contribution of each exogenous variable to the R^2 value.

Table 4.17: Effect Size (f^2)

Constructs	TS	Size
CP	0.02	Small
EC	0.03	Small
IQ	0.05	Small
PT	0.03	Small
PU	0.02	Small
SQ	0.06	Small
SYQ	0.08	Small

Constructs	PU	Size
EC	0.95	Large

Constructs	CUI	Size
TS	0.87	Large

Note: CP - Compatibility, TS - Tourist satisfaction with Mobile Travel Apps, EC - Expectation Confirmation, IQ - Information Quality, SQ – System Quality, PU - Perceived Usefulness, CUI - Tourist's Continued Use Intention, PT – Perceived Trust

4.7.2.4 Construct Cross-Validated Redundancy (Predictive Relevance)

The current study used the blindfolding procedure to observe the predictive relevance (Q^2) of the model (Geisser, 1974; Stone, 1974). The procedure only applies to endogenous latent variables that have a reflective measurement model operationalization (Sattler, Völckner, Riediger, & Ringle, 2010). The Smart-PLS 3.3 calculates Q^2 with an omission distance of 7 (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). If the Q^2 value of an endogenous construct for a particular dependent latent variable is higher than zero, the explanatory latent variable indicates predictive relevance (Chin, 1998). In Table 4.18, the column labeled 1-SSE/SSO displays that the results of the Q^2 test for all endogenous latent constructs were above zero for tourists' continued use intention

($Q^2=0.332$), perceived usefulness ($Q^2=0.358$), and tourist satisfaction with mobile travel apps ($Q^2=0.517$), indicating predictive relevance of the model (Chin, 1998; Henseler et al., 2009).

Table 4.18: Predictive Relevance of the Model (Construct Cross-Validated Redundancy)

Constructs	SSO	SSE	$Q^2 (=1-SSE/SSO)$
CUI	1916	1279.035	0.332
PU	1437	922.455	0.358
TS	2395	1155.616	0.517

4.7.2.5 PLS Predict

PLS-Predict employs multiple randomly chosen holdout samples to calculate out-of-sample predictive power (Hair , Howard, & Nitzl, 2020). Nitzl (2018) suggests that researchers utilizing PLS-SEM should consistently report the scores for the PLS-predict technique. PLS-predict calculates case-level predictions at item and at construct levels. It evaluates out-of-sample predictions for a specific theoretical model (Shmueli et al., 2019).

Based on PLS-predict estimation in Table 4.19, the findings demonstrated that the values produced by the PLS estimation are greater than those generated by the LM model, thus establishing the predictive ability of the model. The guidelines of Shmueli et al. (2019) can condense the predictive results into those items of the endogenous variables in the PLS model, producing a lower predictive error than the LM model and resulting in low predictive power.

Table 4.19: PLS-Predict

Focal Constructs	PLS			LM			PLS-LM		
	RMSE	MAE	Q ² predict	RMSE	MAE	Q ² predict	RMSE	MAE	Q ² predict
CUI1	0.897	0.751	0.293	0.879	0.704	0.321	0.018	0.047	-0.028
CUI2	0.850	0.706	0.353	0.853	0.670	0.348	-0.003	0.036	0.005
CUI3	0.899	0.75	0.325	0.920	0.728	0.294	-0.021	0.022	0.031
CUI4	0.846	0.705	0.356	0.844	0.665	0.358	0.002	0.040	-0.002
PU2	0.757	0.566	0.324	0.735	0.530	0.362	0.022	0.036	-0.038
PU1	0.746	0.57	0.321	0.703	0.504	0.397	0.043	0.066	-0.076
PU4	0.714	0.519	0.430	0.695	0.483	0.460	0.019	0.036	-0.030
TS2	0.674	0.491	0.530	0.671	0.480	0.535	0.003	0.011	-0.005
TS1	0.667	0.490	0.487	0.749	0.496	0.354	-0.082	-0.006	0.133
TS3	0.705	0.510	0.439	0.677	0.483	0.482	0.028	0.027	-0.043
TS5	0.572	0.416	0.628	0.133	0.042	0.980	0.439	0.374	-0.352
TS4	0.748	0.545	0.439	0.757	0.540	0.425	-0.009	0.005	0.014

4.8 Testing Moderating Effect

This research used a two-stage approach to create interaction effects (Hair et al., 2014) between variables. These interaction effects predict the influence of the moderator on the dependent variable. Figure 4.4 and Table 4.20 show two statistically significant moderating effects (SYQ*CP ---> TS: $\beta = 0.109$, $t = 1.891$, $p = 0.031$; PU*CP ---> TS: $\beta = 0.115$, $t = 1.801$, $p = 0.037$), supporting H8a and H8d. The other four hypothesized moderating effects (H8b, H8c, H8e, and H8f) had no support. The reason that H8a and H8f were not being supported is that the hypothesis is directional, though the relationship between the variables is significant but its negative as shown by beta values ($\beta = -0.113$, $p = 0.030$, $\beta = -0.074$, $p = 0.043$) in table 4.20. consequently, the hypothesis was not supported, indicating that compatibility negatively moderates the relationship between service quality and tourist satisfaction as well as expectation confirmation and tourist satisfaction. To conclude, it is inferred from the results that two out of six moderating relationships were only supported (system quality and perceived usefulness). Whereas, rest of the four relationships, service quality, information quality, perceived trust, expectation confirmation and tourist satisfaction, were negatively moderated by perceived compatibility. Which further indicated that

the higher level of perceived compatibility weakens or reduces the relationship between these variables and tourist satisfaction.



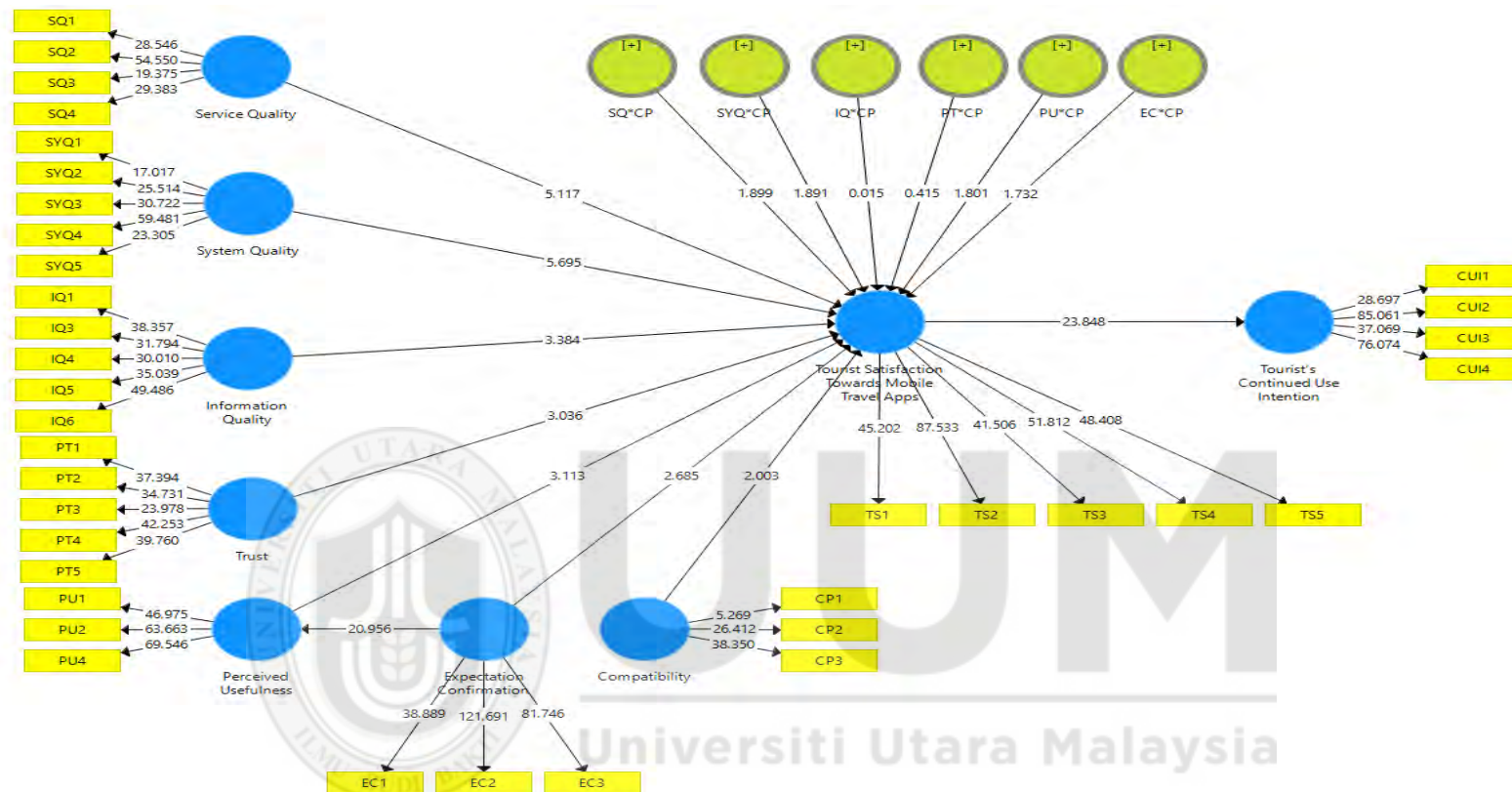


Figure 4.4: Structural Model (Moderating Effect)

Table 4.20: Results (Moderating Effect)

Relationships	Std. Beta	Std. Dev.	t-values	p-values	Confidence Intervals		Decision
					5.00%	95.00%	
SQ*CP ---> TS	-0.113	0.060	1.899	0.030	-0.201	-0.005	Not Supported
SYQ*CP ---> TS	0.109	0.058	1.891	0.031	0.023	0.208	Supported
IQ*CP ---> TS	-0.001	0.056	0.015	0.494	-0.084	0.089	Not Supported
PT*CP ---> TS	-0.032	0.078	0.415	0.340	-0.201	0.057	Not Supported
PU*CP ---> TS	0.115	0.064	1.801	0.037	0.034	0.224	Supported
EC*CP ---> TS	-0.074	0.043	1.732	0.043	-0.150	-0.014	Not Supported

Note: CP - Compatibility, TS - Tourist Satisfaction with Mobile Travel Apps, EC - Expectation Confirmation, IQ - Information Quality, SQ – System Quality, PU - Perceived Usefulness, CUI - Tourist's Continued Use Intention, PT – Perceived Trust

In this study, the path coefficients (β) of moderated relationships were plotted using two-way interaction, as per the recommendation of Abramson, Dawson, and Stevens (2015). As illustrated in Figures 4.5 and 4.6, the line of compatibility at +1 SD had a steeper gradient than compatibility at -1 SD, signifying that compatibility impacted the relationships greatly. In other words, the relationships between system quality and tourist satisfaction and between perceived usefulness and tourist satisfaction are more significant for those with high compatibility than for users with low compatibility.

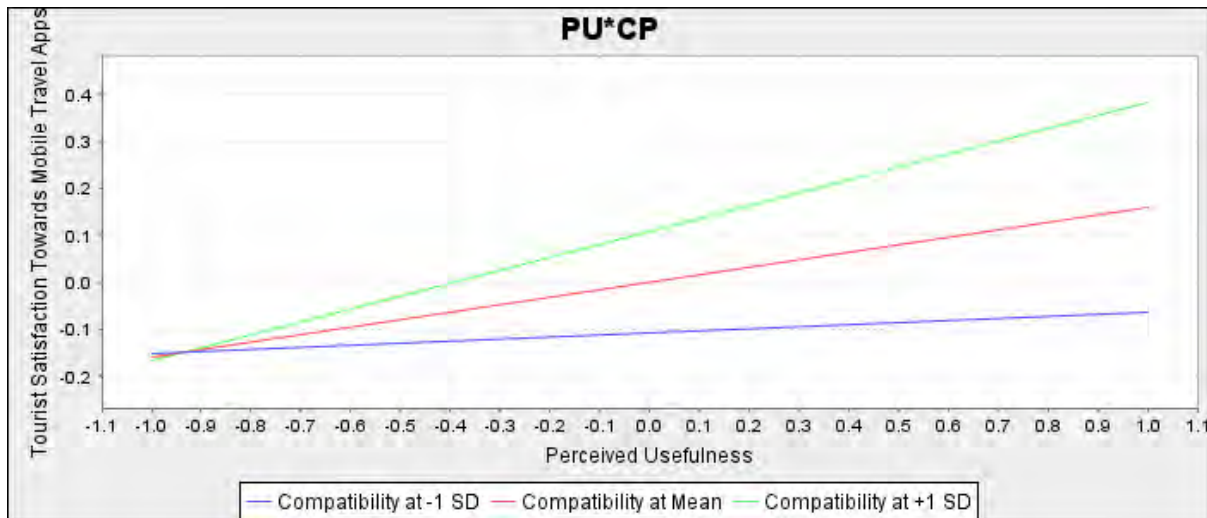


Figure 4.5: Moderating Effect on Perceived Usefulness and Satisfaction

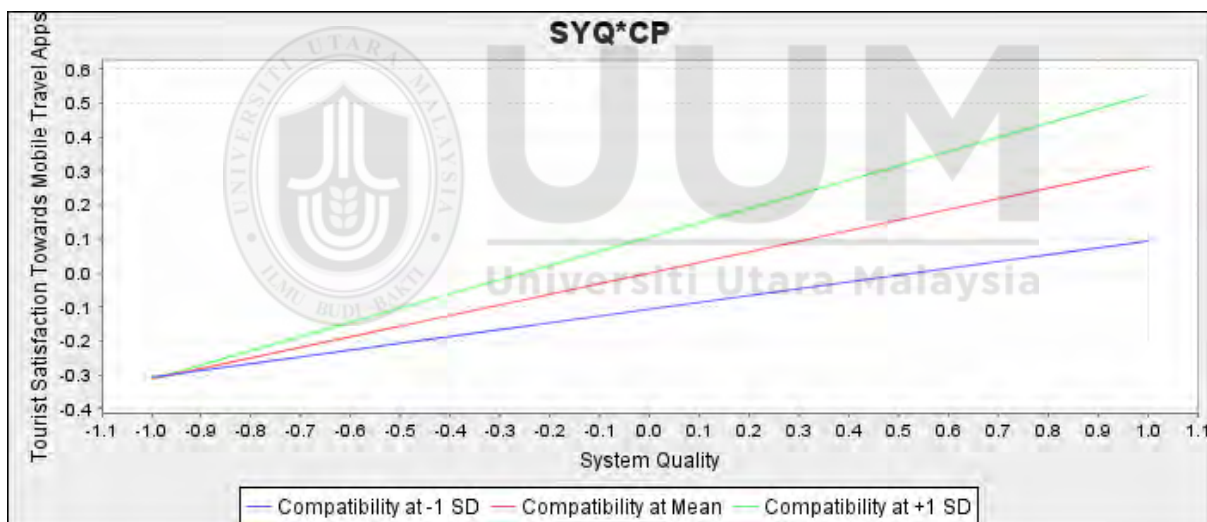


Figure 4.6: Moderating Effect on System Quality and Satisfaction

4.9 Summary of Findings

Table 4.21 presents the summary of the findings for all the hypotheses.

Table 4.21: Summary of the Hypotheses Testing

Hypothesis	Relationships	Decision
H1	Service Quality ---> Tourist Satisfaction	Supported
H2	System Quality ---> Tourist Satisfaction	Supported
H3	Information Quality ---> Tourist Satisfaction	Supported
H4	Perceived Trust ---> Tourist Satisfaction	Supported
H5	Perceived Usefulness ---> Tourist Satisfaction	Supported
H6a	Expectation Confirmation ---> Perceived Usefulness	Supported
H6b	Expectation Confirmation ---> Tourist Satisfaction	Supported
H7	Tourists' Satisfaction ---> Continued Use Intention	Supported
H8a	Service Quality *Compatibility ---> Tourist Satisfaction	Not Supported
H8b	System Quality *Compatibility ---> Tourist Satisfaction	Supported
H8c	Information Quality *Compatibility ---> Tourist Satisfaction	Not Supported
H8d	Perceived Trust *Compatibility ---> Tourist Satisfaction	Not Supported
H8e	Perceived Usefulness *Compatibility ---> Tourist Satisfaction	Supported
H8f	Expectation Confirmation *Compatibility ---> Tourist Satisfaction	Not Supported

4.10 Chapter Summary

This chapter has presented the direct and moderating factors affecting the intention to continue using mobile travel apps in Pakistan. The model evaluation suggests adequate reliability and validity of the constructs. All seven hypothesized direct relationships tested had support. Out of the six moderating hypotheses, the results supported only two. The next chapter discusses the findings, implications, limitations, future research suggestions, and conclusion.



CHAPTER FIVE

DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.0 Introduction

This chapter discusses the research findings that address the research objectives and answer the research questions. The chapter has seven sections, the first of which introduces the chapter. The next revisits the findings already reported, and the following one discusses those findings in the light of the outcomes of previous studies. The fourth section highlights the theoretical and practical contributions made by the study, and the fifth considers the limitations of the research. In the final section, some suggestions are offered for future research and a conclusion is drawn.

5.1 Recapitulation of the Study's Findings

The study has investigated factors influencing tourist intentions to continue using mobile travel apps in Pakistan. Specifically, the research has examined the influence of three quality dimensions (i.e., service quality, system quality, and information quality), trust, perceived usefulness, and expectation confirmation on tourist satisfaction, leading to the continued use intention of mobile travel apps. Additionally, the study has assessed the moderating role of compatibility in these relationships. To provide a framework for the investigation the study integrated two models: the ISSM and the ECM model, and a trust construct was added to the ISSM. The findings obtained are helpful in enhancing researchers' understanding of the antecedents of tourist satisfaction for the continued use intention of mobile travel apps.

A quantitative research method utilizing questionnaires for data collection was employed, and a systematic intercept survey was conducted to gather that data from tourists using travel-related mobile apps in Pakistan. Nine tourist sites (Altit Fort, Baltit Fort, Attabad Lake, Hunza Valley, Khunjab National Park, K-2 Base Camp, Lake Saif ul Malook, Shogran, and Siri Pye) in four major cities of northern Pakistan (Naran, Kaghan, Gilgit, and Hunza) were selected. The structured questionnaire was distributed to every fifth tourist entering the gates of each site, and a response rate of around 80% was obtained, which was considered satisfactory.

The findings supported all the hypothesized direct relationships. The results from PLS path modeling revealed that all three quality dimensions (i.e., service quality, system quality, and information quality), trust, perceived usefulness, and expectation confirmation were positively and significantly related to tourist satisfaction. The results also indicated that tourist satisfaction had a positive and significant relationship with the continued use intention of mobile travel apps. Additionally, it was demonstrated that tourist satisfaction had a positive and significant relationship with the continued use intention of mobile travel apps.

Regarding the influence of the moderating variable (i.e., compatibility) on tourist satisfaction, the findings established empirical support for two hypotheses. Particularly, compatibility moderated the relationship between perceived usefulness and tourist satisfaction and also between system quality and tourist satisfaction. In contrast, compatibility did not moderate the relationship between other variables (i.e., the two dimensions of quality, trust, and expectation confirmation) and tourist

satisfaction. In other words, H1, H2, H3, H4, H5a, H5b, H6, H7, H8b and H8e were supported but H8a, H8c, H8d and H8f were not.

The subsequent section discusses the significance of the findings and compares them with previous research outcomes.

5.2 Discussion of Findings

This section discusses the relationship between independent variables (i.e., quality dimensions, trust, perceived usefulness, and expectation confirmation) and tourist satisfaction that influence the continued use intention of mobile travel applications in Pakistan. The following subsections discuss the findings and compare them to those of previous research.

5.2.1 Service Quality and Tourist Satisfaction

The result (H1) revealed a positive relationship between service quality and tourist satisfaction. Service quality had a significant direct relationship with tourist satisfaction, which is consistent with the preceding research. Previous researchers have identified that service quality is a vital determinant of customer satisfaction (Alnawas & Brown, 2019; Kitapci, Dortyol, Yaman, & Gulmez, 2013; Muskat, Hörtnagl, Prayag, & Wagner, 2019; Nunkoo, Teeroovengadum, Ringle, & Sunnassee, 2020; Prayag, Hassibi, & Nunkoo, 2019; Slack, Singh, & Sharma, 2020).

Several empirical studies have also established that service quality has a direct positive effect on customer satisfaction (Ali & Raza, 2017; Alzahrani, Mahmud, Ramayah, Alfarraj, & Alalwan, 2019; Cronin, Brady, & Hult, 2000; Kim & Kim, 2016; Lemy, Goh, & Ferry, 2019; Nunkoo, Teeroovengadum, Ringle, & Sunnassee, 2020b; Shahid Iqbal & Habibah, 2018; Slack et al., 2020; Yadav, Rai, & Srivastava, 2014; Zhong & Moon, 2020). Likewise, studies in the context of the tourism industry have concluded that service quality is an antecedent of tourist satisfaction and that there exists a positive correlation between them (Hallak, Assaker, & El-Haddad, 2018; Mohamad, Nasir, Ghani, & Afthanorhan, 2019; Silvestri, Aquilani, & Ruggieri, 2017). Similarly, a study by Ali et al. (2021) reported a positive and significant impact of service quality on customer satisfaction in hospitality and tourism industry.

A plausible reason for above outcome is that if the mobile travel apps are more accurate, responsive and empathetic towards tourist needs, tourists will be more satisfied and inclined towards their use for activities ranging from accommodation booking, ticket booking, tracking the location, obtaining information about the travel destination and much more. These results infer that the higher level of service quality provided by a service provider increases the level of satisfaction and use intention, and a belief in the relevance of the services. Previous studies on IS (Chatterjee et al., 2018; DeLone, 2002; Gefen, 2002; Gupta, Singh, Mathiyazhagan, Suri, & Dwivedi, 2022; Petter, DeLone, & McLean, 2008; Slack et al., 2020; Veeramootoo, Nunkoo, & Dwivedi, 2018) also support this inference. Hence, IS providers should keep customers' interests at heart. For example, a company should directly approach consumers and introduce them to the benefits offered under its loyalty program when using IS. This gesture will demonstrate that consumer interests have priority, leading to high satisfaction.

In short, the quality of service determines the success or failure of an IS. A system must be responsive, accurate, and prompt to attain high customer satisfaction. If the IS responds promptly to queries, it will result in customer satisfaction. However, a non-responsive system or delayed service to users will lead to dissatisfaction (Delone & McLean, 2003). An absence of good back-end operational support also causes dissatisfaction among users. Thus, travel app designers and service providers should pay more attention to the service quality that enhances the continued use of travel-related mobile apps.

5.2.2 System Quality and Tourist Satisfaction

The finding (H2) revealed a significant positive relationship between system quality and tourist satisfaction. This direct relationship demonstrates that system quality influences tourist satisfaction levels with mobile travel apps. The finding parallels outcomes gained in previous research, validating the importance of system quality and placing it among the main factors responsible for customer satisfaction. The literature shows a positive and direct relationship between system quality and customer satisfaction (Alzahrani et al., 2019; Chen, Yen, Pornpriphet, & Widjaja, 2015; Lwoga & Sife, 2018; Rana, Dwivedi, Williams, & Weerakkody, 2015; Razak, 2021). Tourist satisfaction increases when a mobile travel app is more usable, available, reliable, responsive in time and adaptable (Delone & McLean, 2003; Trivedi & Trivedi, 2018).

The ease of using travel apps promotes the significant and positive relationship between quality and tourist satisfaction (Trivedi & Trivedi, 2018). If a travel app is user-friendly and has a simple

layout and content, tourists will be more satisfied and encouraged to use it. Similarly, navigation and accessibility affect tourist satisfaction. When tourists can locate the required information on a travel app with just a few clicks while going back and forth between the pages, they consider the app to be compatible with their needs, which further leads to satisfaction. Likewise, the responsiveness of travel apps in terms of time also contributes to building a positive relationship between system quality and tourist satisfaction (Phuong & Dai Trang, 2018). Thus, the research concludes that system quality positively influences tourist satisfaction.

5.2.3 Information Quality and Tourist Satisfaction

The third hypothesis (H3) asserts that information quality has a positive effect on tourist satisfaction with mobile travel apps. The results demonstrated the existence of a significant and positive relation between information quality and tourist satisfaction with the mobile travel app. This outcome is also substantiated by the theory and has been extensively explored (Sharma & Sharma, 2019), with prior studies revealing the positive relationship between information quality and tourist satisfaction. Information quality is a crucial factor that affects the attitude of users towards an IS (D'Ambra, Wilson, & Akter, 2020). Indeed, it can be considered as the main construct promoting satisfaction (Normelindasari & Solichin, 2020; Pramawati & Ariyanto, 2018; Pratama et al., 2021; Sharma & Sharma, 2019; Urbach et al., 2010a).

The reason for the finding in this connection is likely to be that service providers who supply up-to-date, easy-to-understand, and complete information, stimulate tourists' intentions to use the mobile travel app. This outcome is consistent with several previous IS studies (Akter et al., 2013;

Algharabat, Alalwan, Rana, & Dwivedi, 2017; Algharabat, Alalwan, & Dwivedi, 2017; Alzahrani et al., 2019; Amritesh, Misra, & Chatterjee, 2018; Kim, Wang, & Roh, 2021; Sharma & Sharma, 2019; Veeramootoo et al., 2018; Zhou, 2013). Hence, the findings supported the third hypothesis of the present study. Another reason for the significant and positive relationship between information quality and tourist satisfaction is the adequacy, usefulness, and specific description of information provided by the mobile travel app (Phuong & Dai Trang, 2018). When the travel app contains adequate information for tourists and supplements this with certain instructions and is more specific in terms of a service description such as, the current location of a driver, pick-up locations and time etc. it prompts user satisfaction. In conclusion, information quality is imperative in enhancing tourist satisfaction, which confirms and supports the ISSM.

5.2.4 Perceived Trust and Tourist Satisfaction

The results of H4 testing showed a direct positive relationship between perceived trust and tourist satisfaction with mobile travel apps. The finding is consistent with the underlying theory and congruent with previous studies. Petter, DeLone, and McLean (2013) established that trust is linked to user satisfaction and behavioral intentions. Preceding research in the field of e-commerce has also supported the notion that trust positively influences customer satisfaction and is a key determinant of user satisfaction (Apostolou et al., 2017; Geebren, Jabbar, & Luo, 2021; Guo, Bao, Stuart, & Nguyen, 2018; Lin, Wang, & Hajli, 2019; Nguyen & Pervan, 2020; Oliveira et al., 2017; Sharma & Sharma, 2019).

This significant outcome suggests that when a travel app is trustworthy, tourists start planning their tour based on the content of the app. They will likely use travel itinerary generators, tracking services, climate forecasting services, language translators, and currency rate converters. When the tourists feel that the content is reliable, they achieve higher satisfaction levels (Tseng, Chang, & Zhu, 2021).

Another plausible explanation for this relationship is that trust reduces uncertainty and results in satisfaction, which leads to continued use intention (Falcao et al., 2019; E. Wang & Lin, 2017). Tourists build their trust in travel apps if they experience the usefulness of the information, the ease of its transactional functions, and the reliability of the services, minimizing uncertainty in their decision-making processes (Choi et al., 2019).

The positive relationship between trust and satisfaction also indicates a sense of being protected and secure when sharing personal information, such as credit card details. When travel app users are sure that their personal details and financial information are safe, they develop trust towards the travel app, which also contributes to the level of user satisfaction experienced. Wang and Lin (2017) also suggest that the primary reason why mobile app users refuse to provide personal and credit card information to a service provider is a fundamental lack of trust, which affects their satisfaction level (Choi, Wang, Sparks, & Choi, 2021).

In short, previous studies have emphasized the role of trust in building user satisfaction. The more tourists trust mobile apps, the greater satisfaction they feel. Thus, the current study concludes that trust is a predictor of tourist satisfaction with travel-related mobile apps

5.2.5 Perceived Usefulness and Tourist Satisfaction

The current study proposed a positive relationship between perceived usefulness and customer satisfaction (H5), and the results supporting this as they demonstrated that perceived usefulness does have a significantly positive relationship with tourist satisfaction. In the case of an IS, perceived usefulness is the perception of the expected benefits from its use and performance (Abdullah, Jayaraman, Shariff, Bahari, & Nor, 2017; Bhattacharjee & Premkumar, 2004; Venkatesh, Thong, Chan, Hu, & Brown, 2011). Perceived usefulness also positively influenced user satisfaction (Kurniasari, Hamid, & Qinghui, 2020). The result obtained is consistent with previous studies, which revealed that perceived usefulness was the primary motivator of IS acceptance, affecting satisfaction (Bhattacharjee, 2001).

The result suggests that the perceived usefulness and benefits of IS are directly proportional to users' confidence, which has a positive impact on satisfaction. Several researchers (Osatuyi, Qin, Osatuyi, & Turel, 2020; Wijaya, Rai, & Hariguna, 2019) have asserted that perceived usefulness determines the use process of a system. An empirical study on online learning systems also validated the notion that satisfaction and continuance intention is affected by perceived usefulness (Ariffin, Rahman, Muhammad, & Zhang, 2021; Wijaya, Rai, & Hariguna, 2019). And previous studies have confirmed the significant effect of perceived usefulness on user satisfaction in the

context of an IS (Daneji, Ayub, & Khambari, 2019; Fleischmann, Amirpur, Grupp, Benlian, & Hess, 2016; Halilovic & Cicic, 2013; Hsu & Lin, 2015; Sarker et al., 2019; Zhou, 2011). Perceived usefulness significantly affected satisfaction and continued use intention (Bhattacharjee, 2001). Some researchers of mobile apps have also confirmed the relationship (Li & Fang, 2019; Yuan et al., 2016a), affirming that if tourists perceive that mobile travel apps ease their booking of a flight or accommodation or their search for tourist sites, they will experience high satisfaction and continue using them.

5.2.6 Expectation Confirmation and Perceived Usefulness

The current research predicted that when tourists are able to confirm their expectations of travel apps on their mobile phones, they consider the apps to be more beneficial (H6a). The finding revealed that expectation confirmation had a positive and direct relationship with perceived usefulness. This further implies that when tourists experience using mobile apps that meet their initial expectations, they tend to perceive them as useful, leading to their continued use.

This research finding, in conjunction with preceding studies, has established that the expectation confirmation has a substantial as well as positive impact on the perceived usefulness (Bhattacharjee & Lin, 2015; Daneji et al., 2019; Kim, Bae, et al., 2019; Sarker et al., 2019; Wu & Huang, 2015; Zhou, 2013). In fact, user expectations of ISs and their effects on the user's perceived usefulness and satisfaction has interested IS research since the 1990s (Bawack & Ahmad, 2021) and is still current with such systems' application to various contexts being explored.. Chiu, Cho, and Chi (2020) for instance investigated health and fitness apps using the ECM, confirming the

significant impact of expectation confirmation on perceived usefulness; and Bawack and Ahmad (2021) also examined how business analytics' expectations affected the perceived usefulness and continuous use of an IS using ECM.

A probable reason for this significant outcome is that the user's cognitive belief (i.e., perceived usefulness) influences the intention to use an IS. The user's level of expectation confirmation influences the cognitive belief or the post-acceptance of the perceived usefulness of an IS. In the travel and tourism scenario, when tourists confirm their initial expectations from a travel app, they perceive it as relevant and useful for them and feel more satisfied (Alshurideh, Kurdi, & Salloum, 2019). Tourists' initial expectations from mobile travel apps encompass advantages such as them being fast, accessible, easy-to-use, effective, and able to provide customized offers, and travel recommendations. In the context of this study, this particular finding indicates the existence of a positive and significant relationship between tourist expectation confirmation and the perceived usefulness of mobile travel apps in Pakistan.

5.2.7 Expectation Confirmation and Tourist Satisfaction

The study also examined the relationship between expectation confirmation and tourist satisfaction (H6b). The ECM posits that user satisfaction with an IS determines the intention to continue using it. However, the user confirmation of before-use expectations also affects satisfaction with an IS (Bawack & Ahmad, 2021). The finding revealed that expectation confirmation has a significant direct and positive effect on tourist satisfaction with mobile travel apps. Hence, if a travel app

fulfilled tourists' expectations, tourists found it relevant in satisfying their needs. User satisfaction has a positive link with the continued use intention of a system (Rabaa & AlMaati, 2021).

The current research, in line with preceding studies, found that expectation confirmation being a core construct of ECM, functions as a significant determinant of satisfaction (Cheng, 2014; Hossain & Quaddus, 2012; Lin, Tsai, & Chiu, 2009). The positive effect of expectation confirmation on satisfaction infers the realization of the expected benefits of using an IS (Bhattacharjee, 2001). In other words, users are satisfied, when an IS meets the expectations which they have of the system (Foroughi & Iranmanesh, 2019).

Previous studies have verified the significant relationship between expectation confirmation and satisfaction (e.g., Alraimi, Zo, & Ciganek, 2015; Cheng, 2020; Darmawan, Siahaan, Susanto, Umam, & Bakir, 2020; Foroughi & Iranmanesh, 2019; Fu, Zhang, & Chan, 2018; Gupta, Yousaf, & Mishra, 2020). Users' confirmation of expectations suggests that they attain the expected benefits of their information technology usage, which positively affects their satisfaction level. Tourist satisfaction with mobile travel apps depends on the confirmation expectation being met during their experience of using those apps (Chiu et al., 2020; Tam et al., 2020).

A plausible reason for this relationship is that prior to using travel apps, users form expectations about the apps based on the descriptions and reviews provided by other users. And after using the apps for a period of time, users evaluate the actual performance of them and come to a decision with either confirms or disconfirms their expectations (Hsu and Lin, 2015; Tam et al., 2020).

Confirmation of the expectations results in satisfaction and an intention to continue to use the app whereas if expectations are not met, users fail to perceive the usefulness of the app and discontinue its use. In short, user satisfaction determines the intention to continue using the apps, a conclusion supported by a meta-analysis conducted by Ambalov (2018).

5.2.8 Tourist Satisfaction and Continued Use Intention.

Hypothesis 7 proposed a direct relationship between tourist satisfaction with mobile travel apps and their continued use intention; and the study findings supported this proposition. The finding emphasizes the importance of tourist satisfaction in manifesting the continued use intentions of mobile travel apps. The result is consistent with the previous research on the relationship between user satisfaction and continued use intention of an IS. In this respect, Zhang, Xiao, and Zhou (2020) found that user satisfaction with green behavior mobile apps promotes continued use intentions; and Nascimento et al. (2018) achieved the same outcome in relation to the use of a smartwatch, while Li and Fang (2019) focused on branded mobile apps finding the same result, and Wang, Tseng, et al. (2019) considered user adoption of a mobile catering app (Alalwan, 2020). Other researchers like Taghizadeh, Rahman, Nikbin, Alam, and Alexa (2021), Islam, Hollebeek, Rahman, Khan, and Rasool (2019), and Kim, Park, and Choi (2016) have also confirmed the effect of user satisfaction leading to positive behavioral intentions (Alalwan, 2020; Kim et al., 2013; Melo Pereira, Ramos, & Gouvêa, 2015).

Hence, it can be said from this study's results that if a mobile travel app matches or exceeds expectations, tourists are more likely to be satisfied with their experience and thus feel the

motivation to continue to use the app (Alalwan, 2020), Users of any new system generally approach their evaluation cognitively, comparing the actual outcomes with expected ones, and degrees of satisfaction derived from experience strongly influence the future intention to use an IS. Their prior experiences and interactions shape their perceptions and attitudes, influencing their intentions and actual behaviors. Users pleased with their experience with travel-related apps are motivated to continue using them. Indeed, the positive relationship between the two variables concurs with previous research findings. The result reiterates that tourist satisfaction is vital in enhancing user intentions to continue to use mobile apps.

5.2.9 The Moderating Effect of Compatibility

Another main objective of this current research was to investigate the moderating effect of compatibility on the relationship between the determinants of tourist satisfaction that leads to continued use intention (i.e., H8a, H8b, H8c, H8d, H8e and H8f). The findings supported the moderating effects of compatibility on the relationship between system quality and satisfaction and perceived usefulness and satisfaction. These findings indicate that the moderating effects are higher for users with high compatibility than for those with low compatibility (Şahin, Doğan, İlic, & Şahin, 2021; Ursavas, 2014).

This result coincides with findings obtained in previous research (Najmul Islam, 2016; Jung et al., 2015; Rahmi, Birgoren, & Aktepe, 2018; Ramirez-Correa, Rondan-Cataluña, Arenas-Gaitan, & Alfaro-Perez, 2017; Şahin et al., 2021; Tam & Oliveira, 2016). System quality is an antecedent for technology use and user satisfaction (Aldholay et al., 2018). Hossain (2016) asserted that system

quality considerably affects user satisfaction, while Abrego Almazán (2017) reported that it influences actual usage (Aldholay et al., 2018). Incompatibility between the system and the norms, needs or preferences of system users causes dissatisfaction leading to the failure of technology usage. Prieto, García, Peñalvo, Peláez, and Migueláñez (2019) reported that the incompatibility between the use of information technology in the field of education and the preferred teaching methods is the main obstacle to the use of technology in education. Studies related to technology applications have found that high compatibility promotes the adoption of a mobile system (Isaac, Abdullah, Ramayah, & Mutahar, 2018; Mutahar, Daud, Ramayah, Putit, & Isaac, 2017; Wu & Wang, 2005). Other studies have also supported the idea that compatibility significantly affects perceived usefulness (Chakiso, 2019; Isaac et al., 2018), which is a dominant factor influencing users' acceptance and continuous use of technology (Al-Gahtani, 2016; Binyamin, Rutter, Smith, & Alshehri, 2019; Ekşioğlu & Ural, 2022; Faqih, 2020). Thus, compatibility has strengthened the relationships between system quality and tourist satisfaction and perceived usefulness and tourist satisfaction.

On the contrary, Hypothesis H8a, H8c, H8d, and H8f were not supported. The findings indicated that compatibility did not moderate the relationship between service quality, information quality, perceived trust and expectation confirmation, and tourist satisfaction sufficiently to promote the continued use intention of mobile travel apps. Only if the technology is compatible and aligned with users' values and lifestyles then users will be more driven towards adopting it and remaining loyal in its use (Faqih, 2020). However, it has been revealed in several studies that an IS may not be beneficial in all situations (Shih, 2008) and that benefit is in the eye of the beholder only being reaped when that system is compatible with users' needs, in the case of tourists, their needs and

travel style (Najmul Islam, 2016). Tourists generally choose a system to suit their lifestyle and needs because traveling itself can take up much time and resources. Consequently, developing close relations between tourists and the traveling process is essential to provide the level of compatibility required to make any travel experience more comfortable, enjoyable and fulfilling.

Hence, the present study argues that tourists will be satisfied if the quality of services is compatible with the promised standards. When the service provided to the tourists is responsive to tourists' desires, personalized according to their needs, and reliable, those users are satisfied (Chatterjee et al., 2018). Similarly, if tourists find that the information provided is timely, accurate and sufficient, they are also satisfied. In contrast, however, tourist dissatisfaction results from: inaccurate information provided before or during the journey, incompleteness of that information, failure to provide information in a suitable timeframe, issues of connectivity (disconnection of the internet), and incompatibility with tourists' lifestyles. In Pakistan, tourists depend more on the travel agents to plan their tours. They have less tendency to use the mobile travel apps, which means they are less familiar or have little experience of using the mobile travel apps, resulting in dissatisfaction towards the IS or the travel app.

The satisfaction experienced with a system is strongly dependent upon on the factor of compatibility. Ozturk et al. (2016) and Wu and Wang (2005) found that high compatibility leads to the adoption and continuous usage of mobile systems (Aldholay et al., 2018), and Sunny, Patrick, and Rob (2019) and Hofstede (2011), as discussed by Vajjhala (2015), also indicated that

in order for a person to adopt new technology and use it continuously, it has to be compatible with that individual's values, beliefs and social norms.

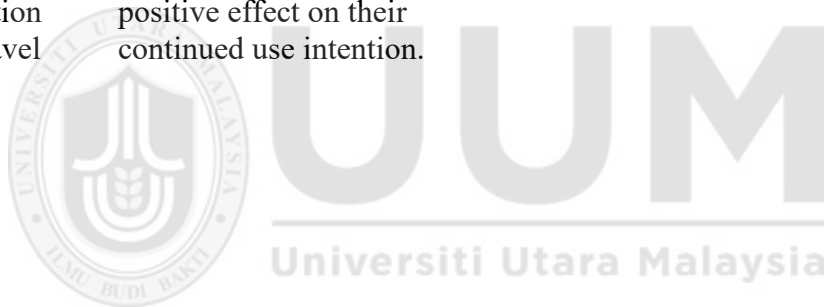
In respect of H8d, compatibility was not found to moderate the relationship between trust and tourist satisfaction. Results revealed that perceived compatibility negatively moderates perceived trust and tourist satisfaction, which infers that higher the level of perceived compatibility, lower will be the relationship between perceived trust and tourist satisfaction. However, the former directly links with the latter. When system users are uncomfortable, uncertain and ambiguous about a system, they tend to stay away from it (Gaver, Beaver, & Benford, 2003). Once users have experienced negative consequences in their use of mobile travel apps, any prevailing satisfaction declines and they discontinue their usage in order to avoid more undesirable outcomes (Seo & Lee, 2021). In contrast, if tourists have good experience with travel-related apps, they develop trust in their efficiency and effectiveness, which in turn brings satisfaction and the inclination to continue to use them. Trust enhances user beliefs in the value of travel-related apps and associates strongly with satisfaction (Seo & Lee, 2021). In this connection it is important to note that in Pakistan, tourists are highly concerned about and sensitive towards the maintenance of their privacy. Consequently, any satisfaction they experience with mobile apps is predicated by their need to truly believe that their security and confidentiality of the personal information stored on their mobile devices are totally ensured and that no personal information is accessed or used without their consent (Chong, 2013).

Similarly, expectation confirmation also has a positive and direct effect on satisfaction. If tourists derive the expected benefits after using a particular system, they will be satisfied. Whereas, compatibility does not moderate the relationship between expectation confirmation and tourist satisfaction with respect to the continued use intention of mobile travel apps in Pakistan. The results of the study show that perceived compatibility negatively moderates the relationship between these variables as depicted in table 4.20, higher level of perceived compatibility will weaken the relationship between expectation confirmation and tourist satisfaction. The study findings are in line with those of previous studies (Aparicio et al., 2017; Chang, Liang, & Chiu, 2020; Chiu et al., 2016; Dağhan & Akkoyunlu, 2016; Sinha & Singh, 2022; Szymanski & Hise, 2000) as it has emerged that compatibility does not play a role as a moderator in the relationship between service quality, information quality, trust, expectation confirmation, and satisfaction. Accordingly, Table 5.1 presents the results of the research in light of the research objectives.

Table 5.1 Research objectives, hypothesis, result and outcome

Research Objective	Research Hypothesis	Results	Outcome
RO1. To investigate the influence of service quality, system quality, information quality, and perceived trust on tourist satisfaction with mobile travel apps.	H1: Service quality has a positive effect on tourist satisfaction with mobile travel apps.	Supported	Research objective attained
	H2: System quality has a positive effect on tourist satisfaction with mobile travel apps.	Supported	
	H3: Information quality has a positive effect on tourist satisfaction with mobile travel apps.	Supported	
	H4: Trust has a positive effect on tourist satisfaction with mobile travel apps.	Supported	

RO2. To investigate the influence of perceived usefulness and expectation confirmation on tourist satisfaction with mobile travel apps.	H5b: Expectation confirmation has a positive effect on tourist satisfaction with mobile travel apps.	Supported	Research objective attained
	H6: Perceived usefulness has a positive effect on tourist satisfaction with mobile travel apps.	Supported	
RO3. To investigate the influence of expectation confirmation on tourists perceived usefulness of mobile travel apps.	H5a: Expectation confirmation has a positive effect on tourist perceived usefulness towards mobile travel apps.	Supported	Research objective attained
RO4. To investigate the influence of tourist satisfaction with mobile travel apps on their continued use intention.	H7: Tourist satisfaction with mobile travel apps has a positive effect on their continued use intention.	Supported	Research objective attained



RO5. To investigate the moderating role of compatibility on the relationship between service quality, system quality, information quality, perceived trust, perceived usefulness, expected confirmation, and tourist satisfaction with mobile travel apps.	H8a: Compatibility positively moderates the relationship between service quality and tourist satisfaction with mobile travel apps.	Not supported	Research objective attained
	H8b: Compatibility positively moderates the relationship between system quality and tourist satisfaction with mobile travel apps.	Supported	
	H8c: Compatibility positively moderates the relationship between information quality and tourist satisfaction with mobile travel apps.	Not Supported	
	H8d: Compatibility positively moderates the relationship between trust and tourist satisfaction with mobile apps.	Not supported	
	H8e: Compatibility positively moderates the relationship between perceived usefulness and tourist satisfaction with mobile travel apps.	Supported	
	H8f: Compatibility positively moderates the relationship between confirmation and tourist satisfaction with mobile travel apps.	Not Supported	

5.3 Implications of the Research

The present research study has theoretical and practical implications, discussed in detail in the following subsections.

5.3.1 Theoretical Implications

The study has made several valuable contributions to theory. Firstly, it aims at uncovering the determinants of continued use intention of mobile travel apps in Pakistan by integrating two well-established theoretical models, i.e., the ISSM model (Bhattacharjee, 2001) and the ECM model (DeLone & McLean, 1992). The study proposed that travel app quality dimensions (i.e., system quality, information quality, and service quality) prescribed by the ISSM, are significant determinants of continued use intention of mobile travel apps. The ECM theorizes that perceived usefulness and expectation confirmation are determinants of the continued use intention of mobile travel apps. The research argues these determinants are antecedents of satisfaction leading to behavioral intentions. The integrated model has helped to develop an augmented understanding of the continued use intention of mobile travel apps through identifying its related determinants for satisfaction. The empirical evaluation establishes the validity of this integrated model in the context of mobile travel apps. This research study is known to be the first to integrate the ECM and the ISSM to examine continued use intention in the context of mobile travel apps.

Secondly, the research has contributed to introduce an additional construct, perceived trust into the ISSM, as a factor of influencing tourist satisfaction leading to the continued use intention of mobile travel apps. Trust has been a fundamental concept discussed in the literature due to its significant role in reducing uncertainties and risks but whilst it has been discussed in many different contexts, there has been no consideration of it in relation to the use of mobile travel apps. Hence, the study contributes to be a pioneer in understanding the relationships between trust, tourist satisfaction and behavioral intentions in tourism sector. Thirdly, this research contributes to the body of marketing

literature which has not yet attempted to deal with the tourist intention to be loyal to mobile travel apps after their initial acceptance. Whilst most IS studies to date have indeed investigated initial acceptance, they do fall short in discussing users' behavioral intentions and or post-acceptance behaviours. Therefore, the current study is critical in explaining how tourists' behavioral intentions towards the use of mobile travel app are shaped and maintained, and thus the intelligence it brings forward is crucial for developers as it provides insights into what is required for the long-term survival of an IS.

A fourth contribution to the literature is the information the study brings for countries and regions outside of the Western world since it is contextualized in Pakistan where there is no theoretical understanding of behavioral intentions in respect of mobile travel apps.

Furthermore, few studies have examined the moderating effect of compatibility on tourist satisfaction with mobile travel apps. It is true that there has been frequent examination of compatibility as a determinant of behavioral intention (Davis et al., 1989; Karahanna et al., 1999; Venkatesh, 2000), but limited efforts have been put into investigation of it as a moderator (Najmul Islam, 2016). Moreover, studies on compatibility have revealed mixed results (Aparicio et al., 2017; Chiu et al., 2016; Dağhan & Akkoyunlu, 2016; Jung et al., 2015; Ramírez-Correa et al., 2017; Szymanski & Hise, 2000; Tam & Oliveira, 2016). Frazier, Tix, and Barron (2004), argued that moderator variables are typically introduced when there is an unexpectedly weak or inconsistent relation between a predictor and a criterion variable. The current research findings contribute to indicate that perceived compatibility substantially moderated the relationship

between system quality and perceived usefulness meaning that higher the compatibility higher will be the relationship between system quality and tourist satisfaction and perceived usefulness and tourist satisfaction that further leads to the continuous use intention of mobile travel apps. Whereas, the perceived compatibility doesn't moderate the relationship between service quality, information quality, perceived trust, expectation confirmation and tourist satisfaction. The study inferred that compatibility does not strengthen the relationship between these variables and tourist satisfaction which means, higher the level of compatibility lower or weaker will be the tourist satisfaction leading to continued use intention.

In conclusion, the theoretical contributions to relevant research streams in an emerging market like Pakistan, are significant. Pakistan is amongst the south Asian countries with a slower pace of technology penetration. One of the most influential factors affecting the adoption of mobile travel apps in Pakistan is the low use of ICT, at just 3.0% (Arshad et al., 2018). The country requires more effort to obtain sufficient support from technology to promote the usage of mobile travel apps. Research on motivating citizens to use technology while extending the body of knowledge on marketing is essential. This research has strengthened the current understanding of determinants of continued use intention of mobile travel apps among tourists in Pakistan while confirming the vital role of perceived trust, incorporated as an additional variable in the research framework in Pakistani context. Furthermore, the proposed model added to the present state of knowledge regarding the positive influence of perceived compatibility as a moderator on the relationship between system quality, perceived usefulness and satisfaction towards continued intention to use travel related mobile apps.

5.3.2 Practical Implications

In terms of practical implications, the current research contributes to provide guide line for mobile app developers, travel companies, and travel managers. The intention to use is a critical aspect of IS adoption and the results obtained contribute to explain the most important aspects of quality: system, information, and service should be focused if they wish to elicit continuous usage. Additionally, system quality turned out to be the strongest predictor. The findings also contributed to indicate that travel-related mobile apps should ensure ease of use, have simplified content and layout, and be user-friendly to facilitate connectivity across the pre-, during and post-travel stages. Since perceived usefulness is also a strong predictor, travel managers and companies should incorporate the substantial presence of expected benefits from using travel-related mobile apps, such as discounted rates, no cancellation charges, and others.

Moreover, the existing study also contributes to explain the importance for a system to be compatible in order to achieve higher satisfaction. To explain further, it is inferred that a well-designed system would generally lead towards higher tourist satisfaction. However, if the system is incompatible with users' needs and expectations, its positive impact on satisfaction may be reduced or even negated. For example, a complex booking system designed might frustrate less tech-adept tourists, lowering their level of satisfaction. Similarly, When the app is highly compatible with the tourist, expectation confirmation has a stronger positive impact on tourist satisfaction. The tourists easily navigate the app, find relevant information, and feel empowered to plan their trip effectively. This enhances their overall travel experience and satisfaction.

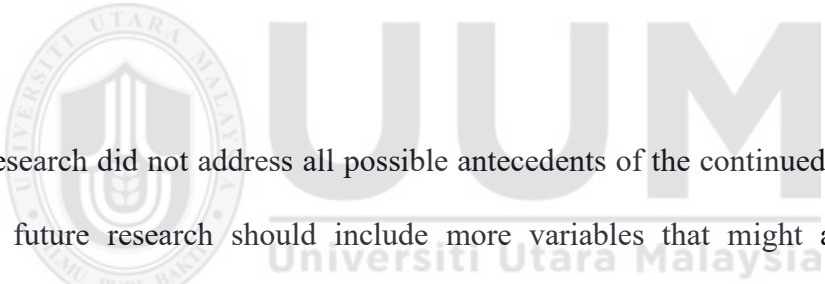
Travel companies can capitalize upon the prevalent usage of mobile travel apps as a way of providing real-time interaction and customer service, which will lead to continued use of travel-related mobile apps. However, they must understand customers' objectives when they decide to use mobile apps and pay attention to the provision of up-to-date, accurate, reliable, and relevant information which is what tourists want to obtain. Any difficulties experienced by tourists' in trying to achieve these objectives are likely to cause agitation leading to dissatisfaction and the abandonment of the travel app use.

Finally, travel related mobile app developers should emphasize aesthetics while designing mobile apps since as noted by Kim and Baek (2018), the element of aesthetics within apps is important in fostering a strong connection between those apps and individual users. Moreover, as the study contributes to focus on the important aspect of usefulness and ease of use, which is associated with well-designed aesthetic guide the users intuitively through the app, promoting efficient navigation and task completion. Based on this argument, a clear menu, well-placed buttons, and organized information minimize user's frustration and increase app usability. With this consideration taken into account, travel companies can create positive behaviors in app users.

5.4 Limitations and Future Directions

The research has some limitations that future research can explore. Firstly, the research context, Pakistan, limits the potential for generalization of the findings to other nations since Pakistan is affected by the level of IT penetration, its culture, and overall infrastructure development. To assist

the possibilities for generalization, future studies should use a similar model/approach in different countries with a larger sample. Secondly, the present research used a cross-sectional quantitative design and collected data via a questionnaire at a particular time to test the hypotheses. Future research efforts should consider a longitudinal design to expand the findings beyond behavioral intentions and include actual post-adoption behaviors. Thirdly, future research should include other tourist locations in different areas to better understand tourist behaviors in Pakistan. A fourth recommendation is that as the quantitative nature of the data analysis in this study presents causal explanations based on the underpinning theories and established variables, it would be valuable if future research could employ a qualitative method to identify more determinants or use mixed methods of data collection to develop or improve measurement scales for post-adoption behaviors.



As the current research did not address all possible antecedents of the continued use intention of the technology, future research should include more variables that might affect continued technology usage behaviors. Researchers may extend the model by including Confucian values as independent variables, thereby incorporating constructs such as benevolence, righteousness, wisdom, and trustworthiness within their theoretical model (Gao, Zhang, Zhou, & Cao, 2021; Sun, Garrett, & Kim, 2016), to measure their impact on satisfaction and continued use intention. Furthermore, although the current research incorporated compatibility as a moderator in the relationships between determinants and satisfaction and continued use intention, the picture is still vague. Future research should investigate other potential moderating variables such as education, age, trust, and gender (Islam, Hoque, & Sorwar, 2016). Lastly, the research did not examine the possible mediating role of satisfaction in the relationships between the determinants and continued use intention. Future studies should consider this aspect.

5.5 Conclusion

This research has concentrated on the use of information technology (IT) in the tourism sector. IT has been efficient in changing the way tourists travel, providing reliable solutions for the tourism challenges in countries like Pakistan which are characterized by weak service infrastructure, low quality of the system, and limited information. The chapter has revisited the research findings gained and interpreted in light of the comprehensively integrated ISSM model and ECM model which has allowed for the focus on the continued use intention of travel-related mobile apps. It has discussed the research findings indicating a significant positive direct effect of the predictors of tourist satisfaction with mobile travel apps and of satisfaction on continued use intention, consistent with those of previous research.

The moderating effects of compatibility in the relationship between independent variables and satisfaction were only present in the relationships between two independent variables (system quality and perceived usefulness) and satisfaction, supporting the previous research findings. The chapter has also highlighted the theoretical and practical contributions, the research limitations and the future research recommendations. In conclusion, the research has successfully addressed the research questions, accomplished the research objectives, significantly added to the knowledge of continued use intention towards mobile travel apps and provided guides to travel managers and app designers in enhancing the use of mobile travel apps.



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Appendix 1

Survey Questionnaire

Dear Respondent,

I am a PhD Candidate at Othman Yeop Abdullah Graduate School of Business (OYA) School at Universiti Utara Malaysia and I am conducting **a study to examine the factors of Continued use intention of mobile travel apps**. You are invited to participate in this study by completing the attached questionnaire and you need to respond as a “*Tourist*”.

I hope you will take a few minutes to complete this questionnaire. Without the help of people like you, research on this topic could not be conducted. Thank you for taking the time to assist me in my educational endeavors. I value your cooperation very highly. The survey comprises different kinds of questions. There is no right and wrong answer to the question. We are interested in your personal opinions. Your responses will be treated in strict confidence and will only be used for research purposes.

The data collected will provide useful information regarding the factors affecting the continued use intention of mobile travel apps in the tourism sector. Your participation is voluntary and there is no penalty if you do not participate. If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me at (+60) 17-5155401 / (+92) 324-4272489 or at humera_int@yahoo.com

Thanking you in advance.

Regards,

Humera Imtiaz

PhD Candidate

Othman Yeop Abdullah Graduate School of Business

Universiti Utara Malaysia

Determinants of Continued Use Intention of Mobile Travel Apps in Pakistan. The Moderating Effects of Compatibility.

SECTION A

Please indicate your responses regarding your socio-demographic aspects.

1. Gender ☐ Male ☐ Female 2. Age (years old) ☐ ≤ 25 ☐ 26-45 ☐ 46-55 ☐ ≥ 56 3. Highest Education Level ☐ Diploma ☐ Bachelor ☐ Masters ☐ PhD 4. Marital Status ☐ Single ☐ Married 5. Frequency of using mobile travel apps in the past month ☐ 1-2 times ☐ 3-4 times ☐ 5-6 times ☐ >7 times	6. Main source that motivate using mobile travel app ☐ Friend and Family ☐ Hotel Website ☐ Travel agent 7. What is the length of your use session of a mobile travel app ☐ 5 min ☐ 8 min ☐ 10 min ☐ More than 10 min 8. What is your purpose of using the mobile travel apps ☐ Hotel booking ☐ Planning travel activities ☐ Booking flights ☐ To find the travel destination 9. What features of the mobile travel app do you use the most ☐ Travel itinerary generator ☐ Geo tracking service ☐ Booking services ☐ Trip reviews from other travelers 10. How many times have you purchased on the mobile travel apps in last six months ☐ 1-2 times ☐ 3-4 times ☐ 5-6 times ☐ >7 times
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SECTION B

Please rate your responses on each of the statements below regarding determinants of tourist's continued use intention of mobile travel apps in Pakistan with the moderating effects of compatibility according to the following scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Label No.	Statements	1 SD	2 D	3 N	4 A	5 SA
SYQ	System Quality					
1	Mobile travel apps are easy to navigate.					
2	Mobile travel apps allow me to easily find the information I am looking for.					
3	Mobile travel apps are well structured.					
4	Mobile travel apps are easy to use.					
5	Mobile travel apps offer appropriate functionality.					
SQ	Service Quality					
1	The responsible service personnel are always highly willing to help whenever I need support while using mobile travel app.					
2	The responsible service personnel provide personal attention when I experience problems while using mobile travel app.					
3	The responsible service personnel provide services related to the mobile travel app at the promised time.					
4	The responsible service personnel have sufficient knowledge to answer my questions regarding the use of mobile travel app.					
IQ	Information Quality					
1	The information provided by mobile travel app is useful.					
2	The information provided by mobile travel app is understandable.					
3	The information provided by mobile travel app is interesting.				IQPT	
4	The information provided by mobile travel app is reliable.					
5	The information provided by mobile travel app is complete.					
6	The information provided by mobile travel app is up-to-date.					

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Label No.	Statements	1 SD	2 D	3 N	4 A	5 SA
PT	Perceived Trust					
1	Mobile travel app acts in my best interest.					
2	If I require help (for organizing trips) mobile travel app would do its best to help me.					
3	Mobile travel app is concerned about my wellbeing not just its own.					
4	Mobile travel app is truthful in its dealings with me.					
5	I would characterize mobile travel app as honest.					
6	Mobile travel app is genuine.					
7	Mobile travel app keeps its commitments.					
PU	Perceived Usefulness					
1	I found mobile travel app to be useful.					
2	Using mobile travel app enables me to accomplish my tasks more quickly.					
3	Using mobile travel app increases my productivity					
4	When I use mobile travel app it increases my chances of accomplishing my tasks.					
EC	Expected Confirmation					
1	My experience with using the mobile travel app was better than I expected.					
2	The functions provided by the mobile travel app were better than I expected.					
3	Overall, most of my expectations from using mobile travel app were confirmed.					
CP	Compatibility					
1	Mobile travel app is compatible with my lifestyle.					
2	Using mobile travel app fits well with the way I like to manage my travel.					
3	Using mobile travel app for traveling fits to my travel profile.					

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Label No.	Statements	1 SD	2 D	3 N	4 A	5 SA
CUI	Continued Use intention					
1	I intend to continue using mobile travel app rather than discontinue its use.					
2	My intentions are to continue using mobile travel app rather than use any alternative means.					
3	My intentions are to continue using mobile travel app in the future, at least as active as today.					
4	If I could, I would like to discontinue my use of mobile travel app.					
TS	Tourist Satisfaction					
1	I am generally pleased with the mobile travel apps.					
2	I am very satisfied wit the mobile travel apps.					
3	I am happy with the mobile travel apps.					
4	I am satisfied with the way mobile travel app organizes the trip.					
5	Overall, I am satisfied with the mobile travel apps.					

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Thank you for your kind co-operation.

Appendix 2

Publication

1. Imtiaz, H., & Suki, N. M. (2022). Mobile Travel Apps Engagement: Measuring Tourists' Perception. *International Journal of Interactive Mobile Technologies*, 17(14).

