

Faculty Cognitive Sciences and Human Development

Measuring Visitors' Perceived Value with Ecotourism Smartphone Application

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Doctor of Philosophy

Measuring Visitors' Perceived Value with Ecotourism Smartphone Application

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A thesis submitted

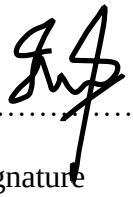
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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.



……

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ABSTRACT

Smartphone applications can significantly affect the visitor’s experience with the ever-rising numbers of consumers and greater incursion into people's lives. This research identifies the factors influencing the visitor’s experience of smartphone application usage for travelling purposes. There was a lack of focus on tourism applications that provide useful services for travelers and allow users to obtain information depending on their knowledge quickly. Improving the usability metrics for the developed ecotourism application was also critical. Therefore, this research examined the perceived value of visitors associated with Smartphone applications and their impact on visitor’s behavior. Furthermore, it also exploresthe impact of perceived value on visitors' experience in their pre, post, and during travel. Anonline sample size of 300 ecotourists from various countries was given a multi-questionnairewith a Likert-Scale between 1 and 5 used to collect the data. The collected data were used todetermine the visitors' perceived value associated with smartphones and its impact on their experience using smartphone applications during travel. To ensure the reliability and validityof the result from the data set, the sample size only includes visitors who have been using aSmartphone application for their travel. Descriptive statistics reveal that the perceived valueassociated with smartphone applications includes social value followed by the epistemic value. In terms of associations, it was discovered that visitors' perceived value associated with smartphone applications was highly associated with visitors’ behaviour, purchase attitude, meaningful experience, mobile application quality, and meaningful interaction. A significant and decisive association between perceived social value with tourist behaviour has been discovered. This study found that only perceived social value and epistemic value substantially influenced visitors’ experience. This was due to the overall perceived value correlated with smartphone applications and significantly impacts visitors' travel

involvement. Future studies should be based on various measurements and with a greater sample size to ensure higher validity and reliability of the findings.

Keywords: Smartphone application, application usability, perceived value, mobile application quality, meaningful experience

Mengukur Nilai Persepsi Pelawat dengan Aplikasi Telefon Pintar Ekopelancongan

ABSTRAK

Abstrak adalah ringkasan tesis, mengandungi pengenalan, kenyataan permasalahan, kaedah penyiasatan, keputusan dan kesimpulan umum. Abstrak hendaklah informatif dan jelas sebagai rujukan. Ianya mesti ditulis dalam satu perenggan dan maksimum mukasurat adalah dua mukasurat. Jenis fon adalah Times New Roman dan saiz fon adalah 12. Jarak baris adalah baris berganda dengan panjang maksimum dua mukasurat. Kata kunci sehingga 5 patah perkataan hendaklah diberikan. Bagi tesis yang ditulis di dalam Bahasa Inggeris, versi terjemahan dalam Bahasa Melayu hendaklah diberikan dan sebaliknya. Abstrak yang telah diterjemahkan mesti mengandungi tajuk tesisAplikasi telefon pintar mempunyai keupayaan untuk memberi kesan yang besar kepada pengalaman pelawat dengan bilangan pengguna yang semakin meningkat dan pencerobohan yang lebih besar ke dalam kehidupan orang ramai. Penyelidikan ini mengenal pasti faktor-faktor yang mempengaruhi pengalaman pelawat terhadap penggunaan aplikasi telefon pintar untuk tujuan perjalanan. Terdapat kekurangan tumpuan terhadap aplikasi pelancongan yang menyediakan perkhidmatan berguna untuk pengembara dan membolehkan pengguna mendapatkan maklumat bergantung kepada pengetahuan mereka dengan cepat dan ia juga penting untuk menambah baik metrik kebolehgunaan untuk aplikasi ekopelancongan yang dibangunkan. Oleh itu, penyelidikan ini mengkaji nilai yang dilihat melawat dengan aplikasi Telefon Pintar dan meneliti kesannya terhadap tingkah laku pelawat. Tambahan pula, ia juga meneroka kesan nilai yang dirasakan ke atas pengalaman pelawat dalam pra, pasca dan semasa perjalanan mereka. Saiz sampel dalam talian sebanyak 300 ekopelancong dari pelbagai negara telah -diberikan pelbagai dengan julat Skala Likert dari 1-5 telah digunakan untuk mengumpul data. Data yang dikumpul digunakan untuk menentukan nilai

persepsi pengunjung yang berkaitan dengan Telefon Pintar dan kesannya terhadap pengalaman pelawat menggunakan aplikasi telefon pintar semasa perjalanan mereka.Untuk memastikan kebolehpercayaan dan kesahihan keputusan daripada set data, saiz sampel sahaja termasuk pelawat yang telah menggunakan aplikasi Telefon Pintar untuk perjalanan mereka. Statistik deskriptif mendedahkan bahawa nilai persepsi yang dikaitkan dengan aplikasi Telefon Pintar adalah termasuk nilai sosial diikuti dengan nilai epistemik. sangat dikaitkan dengan tingkah laku pelawat, sikap membeli, pengalaman bermakna, kualiti aplikasi mudah alih dan interaksi yang bermakna.Perkaitan yang signifikan dan tegas antara persepsi nilai sosial dengan tingkah laku pelancong telah ditemui.Kajian ini mendapati hanya persepsi nilai sosial dan nilai epistemik mempunyai pengaruh yang besar terhadap pengunjung. pengalaman. Ini disebabkan oleh keseluruhan persepsi nilai yang dikaitkan dengan aplikasi telefon pintar dan mempunyai kesan yang signifikan terhadap penglibatan perjalanan pelawat. Kajian masa depan harus berdasarkan pelbagai ukuran dan dengan saiz sampel yang lebih besar untuk memastikan kesahan dan kebolehpercayaan penemuan yang lebih tinggi.

Kata kunci: *Aplikasi telefon pintar, kebolehgunaan aplikasi, nilai yang dirasakan, kualiti aplikasi mudah alih, pengalaman yang bermakna*

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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
BR	Brochure
CFA	Confirmatory factor analysis
CG	Control group
C.R	Composite reliability
C.V	Convergent validity
C.A	Cronbach's Alpha
ESAS	Ecotourism smartphone application scale
GES	General Experience Scale
HE	Heuristic Evaluation
HCI	Human-Computer Interaction
KMO	Kaiser-Meyer-Olkin
LE	Learning
MAQ	Mobile application quality
ME	Meaningful experience
MI	Meaningful Interaction
NAF	Niranur Agro Farm
NFI	Normed Fit Index
PV	Perceived value
PI	Purchase attitude
PCA	Principle component analysis
RFI	Relative Fit Index
RMSEA	Root Means Square Error of Approximation

SA	Smartphone application
SEM	Structural Equation Modelling
SPSS	Statistical Package for the Social Sciences
TB	Tourist behaviour
TLI	Tucker Lewis Index
UI	User Interface
UML	Unified Modelling Language
VAR	Variable
XML	eXtensible Markup Language

CHAPTER 1

INTRODUCTION

1.1 Background of Study

The International Ecotourism Society (2015) defined ecotourism as an environmentally accountable travel to the natural environment to preserve the environment, sustain the well-being of people in the vicinity, and educate tourists. The major goals of ecotourism were to promote long-term sustainable development, which includes natural resource conservation, economic income production, education, local engagement, and the promotion of social benefits such as local economic growth and infrastructure (Oladeji et al., 2021). According to Hussain (2022), ecotourism was more than a catchphrase for nature-loving travel and recreation, and was consecrated for preserving and sustaining the diversity of the world's natural and cultural environments. Alternately, Stronza et al., (2019) define ecotourism as any recreational activity explicitly involving the observation or extraction of living entities in nature, including some environmental education, has a low environmental impact and is aimed to be sustainable and, in some cases, supports local conservation efforts.

Although ecotourism has numerous explanations, they all share the common quality of mixing nature, conservation, education, and community development into the experience. Even though ecotourism has many different meanings, it was possible to undertake systematic and thoughtful evaluations of ecotourism impacts across different places. Determining the average impact across different places and populations was still possible. However, the phenomenon under ecotourism investigation must be carefully measured or operationalised as a causative variable to achieve this (Rai, 2020). Researchers risk further

confusing and confounding diverse activities and consequences on the environment by failing to clarify how ecotourism was defined, operationalised, and quantified.

Similarly, ecotourism combines theories, public participation, and perception. Many ecotourists believe long-term economic solutions can motivate people to preserve and foster our world's natural and cultural heritage. Since ecotourism can also increase local capacity building, job creation empowers people to fight against poverty and empowers women. Furthermore, ecotourism encourages cultural respect and environmental appreciation. According to Scheyvens and Biddulph (2018), ecotourism has been branded as an environmentally sustainable marketing tactic that can inspire people from advanced countries to fly to developing countries to explore 'pristine landscapes.'

However, Ceballos-Lascurain (2017) defined ecotourism as travelling and visiting a disruptive natural environment to enjoy, and appreciate its beauty, reduce the tourist effects, and increase local community participation. The local population views ecotourism as a commercial potential that provides better leverage for utilizing natural resources. For example, the number of trackers in Nepal increased by 45 % between 1983 and 1993, with approximately 80 % of them attracted by nature and wildlife (Esposito et al., 2020). Wu (2017) argues that economic interests and revenue drive the growth of Aboriginal people who engage in ecotourism. This was supported by Prasetyo et al., (2020), where ecotourism brings both positive and negative aspects to Aboriginals. It can also be argued that ecotourism-guided tours differ from region to region, and relying on tourism growth, the exploitation of natural resources, the demographics of the region, and industry accountability (Harrison, 2020; Rigatti, 2016).

Ecotourism should include all components, such as nature, interpretation/education, cultural impacts, and sustainability, to prevent misconceptions or miscommunications (McLeish, 2016). In addition, earning revenue establishes satisfaction, trust, attitude, and customer experience. It also operates as a supplier and a leading company by developing goods and services as artists and accommodation providers (Mariani et al., 2020).

In Malaysia, travelers were attracted by art, architecture, crafts, traditional costumes, music, and dance (Ismail et al., 2021). Malaysia mainly consists of Malay, Chinese, Indian, and other indigenous groups, including Orang Asli, Kadazan, Melanau, Iban, and others (Ting et al., 2014). Malaysia was one of the world's top tourism destinations in 2019, with 26.1 million visitors and RM86.14 billion in revenue, making it Malaysia's largest and most important economic sector (Tourism Malaysia 2022, February 25). It operates at the forefront of globalization, as Malaysian tourism accommodates tourists worldwide with culture, traditions, business people, and money. Tourism development involves fulfilling the fundamental needs and expanding to ecotourism to fulfil the ecotourists' wishes for a better life. The ecotourism principle accepts that the current state of infrastructure and social structure limits the capacity of the environment to fulfil current and potential needs. Nevertheless, the impact of technology was another platform for global tourism improvement (Buhalis & Amaranggana, 2014).

Mobile technologies were powerful tools for promoting the tourism industry. For example, the Internet has transformed how tourists obtain facts/information about tourism destinations (Angelica Bock et al., 2021; Ráthonyi, 2013; Buhalis & Amaranggana, 2015). According to Egger (2013), the consumption and impact of tourism services were linked to the expansion of mobile operating systems and software applications, which were already

conquering most sectors in the world. Tourism services demonstrate the evolution of technology, from mobile web users to tourism mobile application use. Mobile tourism applications are becoming increasingly important to provide tourists with information to assist them in planning their activities (Wörndl et al., 2020; Chanda et al., 2022; Anand et al., 2022).

Handheld technology devices such as laptops, tablets, and smartphones usage were an important part of the tourism industry (Murphy et al., 2016; Julsrud & Denstadli, 2017; Tussyadiah, 2015; Wang et al., 2013) due to these devices were now a part of daily life (Buhalis et al., 2019). However, the tourism sector faced a slew of new disputes due to the market and environmental shifts driven by these emerging developments (Buhalis & Amaranggana, 2015) (disputes and environment shift). As a result, the smartphone application was categorized as an end-use application for its technical features. Malaysia Communication and Multimedia Communication (MCMC) showed that 93.1% in 2018 and 2020, 97.2% of the population owned a smartphone. (Internet Users Survey, 2020, p.40), with interest in smartphone usage increasing by 4% in two years. The incredible growth in mobile usage has contributed to an increase in the number of applications used on their phones, which has resulted in consumers becoming more connected to their mobile phones and more comfortable using the app (Tussyadiah, 2014).

The tourism surveys indicate that mobile technology has been used by visitors in various ways, with the primary purpose being to find information about tour destinations before, during, and after the journey (Wang et al., 2013). Furthermore, many travelers consider a mobile device, whether a tablet computer or mobile phone, a must-have gadget

on the road (Wang et al., 2013). This was because these gadgets help tourists get information or services in hand.

1.2 Perceived Value

Perceived value is characterised as utilities extracted from tangible goods and intangible services; it includes benefits and costs received (Song et al., 2016; Lu & Chi, 2018; Terblanche & Taljaard, 2018). Eid (2015) defines perceived value as purchasing goods or services and the difference between the input and output. The benefit was attributed to the quality of service of the expense charged by the customer, for example, the gap between the customer's service and actual service demands. Researchers view the perceived value from two angles: one-dimensional and multi-dimensional. The one-dimensional measurements were functional, emotional, epistemic, and social (Cenci & Hussain, 2020), whilst the multi-dimensional system comprises consistency, price, and social dimensions (Scheyvens & Biddulph, 2018). The literature on hospitality and perceived value was also conceptualised as a personal appraisal of the characteristics of travel goods, such as the value of service, price, emotions, and social aspects (El-Adly, 2019). These factors determine whether the commodity’s value is worth consuming and impact visitors' happiness after their trip (Andrades et al., 2017). The social aspect of ecotourism demonstrates the value of the customer's overall opinion of the goods or services (Yi-sha et al., 2021). Finally, the cumulative assessment may consider various dimensions (Yildirim & Correia, 2015; El-Adly, 2019). The dimensions mentioned above were considered, and related ones were merged, and the literature review showed that social value and epistemic importance were used for this research.

1.3 Perceived Value with Ecotourism

In recent decades, businesses and academia have shown significant interest in perceived value (Tussyadiah, 2014). Consumers' perceived value was more likely to comment and buy back when they saw the high quality of the goods and services among businesses (Song et al., 2016). Despite significant interest in perceived value, the researchers have yet to find an agreement on identifying perceived value, particularly in tourism (Sánchez-Fernández, 2007). Most scholars agree on the perceived value as multi-dimensional rather than one-dimensional. However, while they discussed the same aspect, they used different terms. These inconsistencies present challenges in understanding the perceived meaning and adding value to tourism (Budeanu et al., 2016).

Previous studies have extensively explored the association between perceived value, whether one-dimensional or multi-dimensional and potential behavioural intent (Wu et al., 2017). The above study aimed to recall an attraction for travelers to use technologies. Furthermore, it will also investigate behavioural visitor satisfaction and meaningful experiences, which will lead to sustainable technology development in the tourism industry.

Strijbosch (2022) suggested that the quality of experience and emotions determined the significance of tourist pleasure in perceived value. The tourist experience quality in a specific perspective can be an important part of the tourist’s perceived value and satisfaction, stimulating tourist destination loyalty. Despite the significant role of the tourist experience, consisting of diverse interactions at a specific destination, there was scarce research that established the associations between the quality of the tourist experience and perceived price, as well as their influence on the satisfaction of tourists.

Generally speaking, perceived value can be divided into two categories: first, a functional value, which considers criteria such as the quality of the destination, the services received, or the value for money of the destination; and second, a symbolic value, which takes into consideration factors such as aesthetic, emotional, and social elements (Chen et al., 2010). From a long-term viewpoint, the perceived value was generated as an angular element to comprehend how satisfied visitors were (Lai et al., 2019) and how this contentment can contribute to their final loyalty (Chi et al., 2008).

1.4 Problem Statement

Ecotourism is one of the topics that can be accessed in tourism studies that has been philosophically explored, debated, and studied but has not made much progress in application and implementation (DelhaLucia et al., 2021; Huseynli, 2022). Over several decades, ecotourism has been promoted and studied alongside the evolution and impact of conventional tourism (Pleumarom, 2016). Ecotourism has been implemented as an alternative to mass tourism for economic, social, and environmental benefits. One of the major concerns for expanding ecotourism was its sustainability (Sobhani et al., 2022). Therefore, an ecotourism study was carried out for economic and social purposes. A mobile ecotourism application was developed to measure ease of use, application loyalty, utilitarian value, usability, and meaningful experience.

Nowadays, tourists may look for information everywhere and use various methods at any location due to the widespread use of smartphones in conjunction with other digital communication and communication transmission technologies (Lin et al., 2020). Moreover, increasing emphasis has been placed on combining technology and applications with travel

in recent years, steadily altering the travel model for modern travelers (Chuang, 2020). Therefore, several criteria for mobile application usability were reported in past ecotourism studies that depict various features, for instance, effectiveness (Coorey et al., 2018), efficiency (Hanna et al., 2018), satisfaction (Hanna et al., 2018; Cata & Martz, 2015), learnability (Stiles-Shields et al., 2018), memorability (Cata & Martz, 2015; Widodo, 2017) and engaging (Kim et al., 2016).

Furthermore, many mobile apps do not prioritise the application's main features and instead present its content ineffectively, negatively impacting user experiences (UX) (Forrester Study, 2011; Youens, 2011). The potential impact of mobile application features was sometimes overlooked when evaluating the availability of tourism applications (Smirnov et al., 2014). This makes evaluating the usability of tourism applications more difficult. According to the literature, the most difficult aspect of a mobile application was its interface, and some apps were tough to use due to their content and design (Zahra et al., 2017). Furthermore, it assesses mobile tourist applications but does not include variables such as time spent on each task, error capture, and task correctness (Nathan et al., 2020). So, when an error arises, the application should help the user use the app as intended. This was very important for a well-designed mobile application to prevent users from feeling ignorant while using the app.

In addition, past studies did not focus on tourism applications that provide useful services for travelers and allow users to obtain information depending on their knowledge quickly. Therefore, improving usability metrics (Hashim et al., 2019) was critical to guarantee that tourism application needs were met. However, this study went beyond Hashim et al. (2019) earlier work, which focused on identifying dimensions and requirements for mobile tourist applications studies possess theoretical components such as simplicity, speed,

broadcast receiver, and security above. As a result, this research aimed to provide two different scales, the first was by introducing a new scale for smartphone tourism applications, and the second will measure the visitors' general experience at ecotourism sites. The suggested scale can evaluate smartphone applications based on their ease of use, usability, loyalty, utilitarian value, and meaningful experience.

Most ecotourism apps evaluated in previous studies possess theoretical components such as simplicity, speed, broadcast receiver, and security (Stiles-Shields, 2018), whilst the rest of the app focused either on evaluating apps design and usability (Wang et al., 2017; Hermawati & Lawson, 2014; Silva et al., 2015) or on technical features (e.g., behavioural tracking). Theoretically constructed ecotourism was assessed with theory-based behavioural constructs in mind (Azhar et al., 2015) or behaviour change-promoting (Conroy et al., 2014) without evaluating functionality and usability. As a whole, there was a deficiency in detailed evaluations of the applications' quality and the relationship between quality and user behaviour. Therefore, the researcher describes the significance of app ease of use, app meaningful experience and app usability in mobile eco-tourism applications in this research. The quality of the application was measured by assessing functionality, information/content, engagement, and aesthetics to provide a complete evaluation of this ecotourism app.

In addition to the mobile application quality measurement, the applicability of mobile apps being developed to improve tourism was studied in previous research (Hashim et al., 2019; Li et al., 2018; Yoo et al., 2017) or m-app production for tourism (Nair & Bhattacharyya, 2018; Tan et al., 2017; Anacleto et al., 2014; Gavalas et al., 2017). Significantly, research on users' motivation to use mobile apps toward buying tourism goods and services appears to be overlooked (Kim et al., 2015). As a result, relevant motive app issues such as hotel bookings, timeshare, and airline ticketing became the primary focus of

attention (Rivera et al., 2016; Morosan & DeFranco, 2016; Wang et al., 2016). On the other hand, recent experiments were limited in quantity and were conducted in developed markets. Furthermore, the Malaysian tourism sector analysis has gone unnoticed (Kim et al., 2016). This study consequently investigates the dimensions of tourist behaviour in terms of satisfaction, loyalty, and social influence relating to emotional value and social value in measuring tourist behaviour and meaningful experience on intention to re-visit, word of mouth, and intention to pay in using mobile eco-tourism applications.

1.5 Research Aim

This study aimed to identify factors influencing visitors' experiences with the mobile ecotourism application. In the increasingly competitive and challenging tourism industry, understanding how to engage visitors' experiences with perceived value was critical.

Increased competition between new tourist destinations and increased charges have led the tourism industry to reconsider its competitiveness to survive in a competitive business world. This research investigates how the mobile ecotourism application impacts the visitors' experience at ecotourism sites with this competitive approach in mind. An elaborate model based on the Task Technology Fit (TTF) was used as a supporting theoretical framework to validate key factors and align technological resources. Tam and Oliveira (2016) state that TTF has been linked to consumer perceptions and actions toward IT models. According to the TTF, the purchase of mobile tourism services was positively connected between mobile technology and smart tourism (Lala, 2014). Furthermore, this model was used to identify the features that regulate their intention for perceived value with the ecotourism application, associated with its functionality, ease of use, and usefulness.

1.6 Research Objective

This study aimed to develop an instrument to measure visitors perceived value with an ecotourism smartphone application and validate the instrument. The objective of this study was as follows:

i. To identify measurement factors to measure visitors' experience with an ecotourism smartphone application
ii. To identify measurement factors to measure the general experience of eco-tourists.
iii. To compare the visitors' experience in ecotourism sites with and without smartphone applications.
iv. To measure the effect of perceived value on the Application Ease of Use (AEOU), Application Loyalty (ALO), Meaningful Experience (ME), Application Usability (AU), and Application Utilitarian Value (AUV) in smartphone ecotourism application.
v. To develop a model for visitors' experience at ecotourism sites with a smartphone application

1.7 Research Questions

The following research questions were developed to fulfil the study's objective:

i What were the primary constructs of visitors' experience using smartphone applications?
ii What were the constructs of the general ecotourism experience of visitors?
iii What were the differences in visitor experience with and without smartphone application guides?

iv What was the relationship between perceived Value, Application Ease of Use (AEOU), Application Loyalty (ALO), Meaningful Experience (ME), Application Usability (AU), and Application Utilitarian Value (AUV) when using a mobile ecotourism application?

v What constructs were identified to support the Ecotourism Smartphone Application Scale (ESAS) model?

1.8 Definition of Terms

While various terminologies were used in the literature, the following terms explain different concepts. Also, this will help readers to understand the different terms used. The conceptual definitions were used for the inductive and deductive approach, constructs, variables, scale development, instrument validity, and reliability.

Deductive and inductive approach: The deductive approach focuses on constructing and pre-formed conceptualisation to produce objects within its scope (Dhilla, 2016). The inductive approach starts with observations, and theories emerge because of those findings (Liu, 2016). The deductive and inductive definition of a construct was clear, and this method was valid, clear, and significant to create an initial pool item. On the other hand, with much ambiguity, an inductive approach should employ the construct's definition or dimensionality.

Construct: A clear conceptualisation was needed to develop a scale regardless of the scale design approach (Garaus et al., 2016). A construct's dimensionality can be understood as a single vector (unidimensional) or a set of subcomponent numbers (multi-dimensional) (Dhilla, 2016). Therefore, the construct validity was interpreted as unidimensional and multi-dimensional, and its dimension' structure must be appropriately defined.

Variable: A variable is a set of attributes that serve as the operationally represented value for further data analysis (Vasarhelyi et al., 2015). Data collection often uses a mixture of elements (organised in rows) and variables (organised in columns).

Instrument development was the data collection about translation, authenticity, reliability, or interpretability (Nikmard & Zenouzagh, 2020). It can include constructing an entirely new instrument, substantially altering an existing instrument, or combining two or more existing instruments into a new instrument (Goulder et al., 2020). A measuring instrument was designed typically connected to responsiveness, consistency, and significance.

Validity of instrument: Validity refers to both the dimensions and construct validity. The expert opinion that the value elements in the instrument signify the proposed sub-constructions and measurements of the instruments to be measured relates to the validity of the content's analysis (Lam et al., 2018). It was carried out by expert analysis. The instrument's validity was used to verify how closely the analytical outcome fits the results indicated by the chosen theory using confirmatory factor analysis (CFA) and Exploratory factor analysis (EFA) statistics (Knekta et al., 2019).

Reliability of Instrument: Reliability was the measure of the tools which constantly calculate items in the dimensions and sub-construction (Lam et al., 2018). These measures were investigated by inter-rater reliability (varied demographic response of the same instrument), test reliability (same individual answering at different times), reliability of inter-methods (same target, different instrument), and reliability of internal accuracy (regularity of outcomes across test items). The reliability of this analysis was estimated from the use of Cronbach's Alpha (Vaske et al., 2017).

Conceptual Framework This study used at least three viewpoints to explain the conceptual framework. The first interpretation by Chan et al., (2017) describes the conceptual framework as a visual description of the research organisation and its consistency with the theoretical fundamentals. According to this viewpoint, the structure of the conceptual framework was a figure, usually presented as a concept diagram, that summarises all the key details obtained from the study's literature review. The second point of view was provided by Antonenko (2015), who considers logical and theoretical systems to be the same. She further explained that the conceptual framework suggests that it entirely relies on interpreting the construct of the theory for this research. Finally, Papargyropoulou et al., (2016) provided another viewpoint of a conceptual framework as a way of aligning all the main components of the analysis process (researcher disposition, literature, hypothesis, methodology, and evaluation of findings) to provide a convincing case as to why the subject of the thesis was relevant and why it was reasonable to this study. Researchers see the conceptual frameworks for this study as personal assumptions, beliefs, experiential knowledge, and existing theories

Ravitch & Ringgan (2012) argued that vague concepts or conceptual/theoretical constructs in the context of hypotheses of “off-the-shelf” (existing) or "homegrown" (personal idea integration). Therefore, in this study, the conceptual framework was developed that incorporates the related concepts and ideas from the two hypotheses "off-the-shelf," which involves developing analytical analysis.

Maxwell (2005) defines the theory as a paradigm or system with several principles. How was the theory distinct from the logical framework? The terms "theoretical structure" and "conceptual framework" were sometimes used interchangeably, and literature reviews often merge conceptual frameworks (Marshall et al., 2014). Given the complexity of these

concepts, various researchers have explored hypotheses as part of a broader philosophical structure for this study. Huberman et al. (2002) propose that the philosophical foundations were systematic hypotheses, intuition, hunches, and personal desires. Chan et al. (2017) present three elements of conceptual frameworks: personal interests (beliefs, hypotheses, and experiential knowledge), topical analysis (concepts and patterns applicable to field studies), and theoretical context (formal ideas that have arisen from previous empirical work).

1.9 Thesis Organisation

This thesis was structured as follows:

Chapter 2 will focus on literature based on this study's conceptual framework and on three streams of research: 1) travel and tourism, 2) mobile technology, 3) the adoption of mobile applications in ecotourism and values in using mobile applications in ecotourism. A comprehensive literature review was also included in this chapter, which provides the basis for the problem statement and the research objective. Finally, the practical research flow of this study was highlighted.

Chapter 3 describes the research methodology used in the study. Next, the research design section provides details of the systematic literature approach, which details the research design followed by research sampling on the study area, sampling size and questionnaire development. This chapter concluded with an important idea highlighting the appropriateness of the research design and questionnaire.

Chapter 4 focused on developing instruments for this study which used the McKenzie (2011) scale development stage and validation steps to develop these instruments.

The initial measurement of values for smartphone eco-tourism applications in this study was divided into three different measurements, namely Application Ease of Use (AEOU), Application Loyalty (ALO), Meaningful Experience (ME), Application Utilitarian Value (AUV) and Application Usability (AU) in the use of smartphones eco-tourism applications. The instrument scale item was tested online, and scale items were finalised. After analysing the responses from the online questionnaire, the final measurements were created. Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA) were then used to determine the structure of a relatively large set of variables. This method was used to determine the underlying association among measured variables.

On the other hand, the CFA was accomplished by examining correlations (or covariance) between the experimental measures. The universal integrated approach recommends analysing the correlations of the association's structure between the items (values indicators) and fundamental dimensions and sub-constructs. The study focused on fit indexes such as the Tucker-Lewis Index (TLI), the Confirmatory Fix Index (CFI), and the root means square error (RMSEA). The researcher's statistical tests use the Statistical Package for Social Science (SPSS).

However, the following was a summary of the procedure, which was detailed in depth in **Chapter 3**:

i A substantial number of relevant statements (an initial pool of 500 statements) about visitors' responses to ecotourism tours and the use of technology in ecotourism tours were gathered, primarily from previous research, to form the basis of this study.

ii After analysis, these items were reduced to 55 non-overlapping statements; 16 for the General Experience Scale (GES) and 39 for the Ecotourism Smartphone Application Scale (ESAS).

iii This study was distributed widely on the email list and promoted on social media (for example, Facebook, Instagram, and WhatsApp groups) for approximately five months, and 343 respondents completed the questionnaire. The respondent rate their experience using the Likert Scale with intervals of "1" (strongly disagree), "2" (disagree), "3" (Neutral), "4" (agree), and "5" (strongly agree).

iv When determining which statements elicited comparable scores, a principal components analysis was used to narrow the list of statements to several distinct constructs.

Chapter 5 focused on the case study of ecotourism sites. This chapter describes the development of ecotourism smartphone applications using the Mobile Application Development Life Cycle (MADLC). The seven steps of MADLC were described in detail to develop the Niranur Agro Farm (NAF) smartphone Application in this chapter. Heuristic evaluation was also used to evaluate the NAF smartphone application. The Smartphone mobile application heuristic (SMART) proposed by Joyce and Lilley (2016) was used during

the HE. Results from HE was used to improve the NAF smartphone application, and subsequently, the updated version of NAF was designed and developed.

An experimental design study using a study-in-the-wild approach was used in the field to measure the visitors' experience at NAF, using both instruments General Experience Scale (GES) and Ecotourism Smartphone Application Scale (ESAS) and a control group without any guide. The experiment compared the visitors' experiences with and without the smartphone application. Visitors were divided into three groups in the experimental settings: (1) visitors using a smartphone application, (2) visitors without using any guide (control group), and (3) visitors using a paper-based brochure. The methods of these three different groups were discussed and analysed.

Chapter 6 discusses the theoretical implications for the outcome and potential study constraints and suggestions for future studies to be considered.

1.10 Summary

This chapter conferred the research’s context and how ecotourism smartphone application relationships with tourism in Malaysia can be formed and maintained. This chapter also addressed the perceived value of the ecotourism smartphone application in tourism and the important terms that have been defined. Following that comes the research objectives, questions, research areas and the importance of the study. The structure of the five chapters concluded the chapter. The next chapter discusses the literature review and underlying theory of this study

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A literature review is a report on the prior study on a certain topic that can serve a variety of objectives. A literature review can help researchers contextualize and inform the future study. Before conducting a new study, the researcher must identify a niche by determining what has already been done on the issue in question and then explore classification techniques to design instruments and materials that best answer his or her research questions. A researcher can also use a literature review to confirm or develop a theory by drawing on current information.

Figure 2.1 shows the process of doing a literature review divided into three phases: (1) plan review, (2) conduct a review and (3) document review. In the study's first phase, the researcher needs to specify the research questions. Therefore, it was essential to design a research question based on the research problem and develop it to validate the review protocol by outlining the possible keyword for this research. Next, the researcher used a manual search in the next conduct review phase by defining the search scope. Next, the researcher identifies what elements to extract from the paper based on the research questions. Finally, to cross-check the selection, the data for the literature review was structured based on the information gathered from the search. In the final phase of literature review writing, accurate evidence was cited with precise facts and information. More importantly, avoid vague statements, which means the statements should be clear and easy to understand.

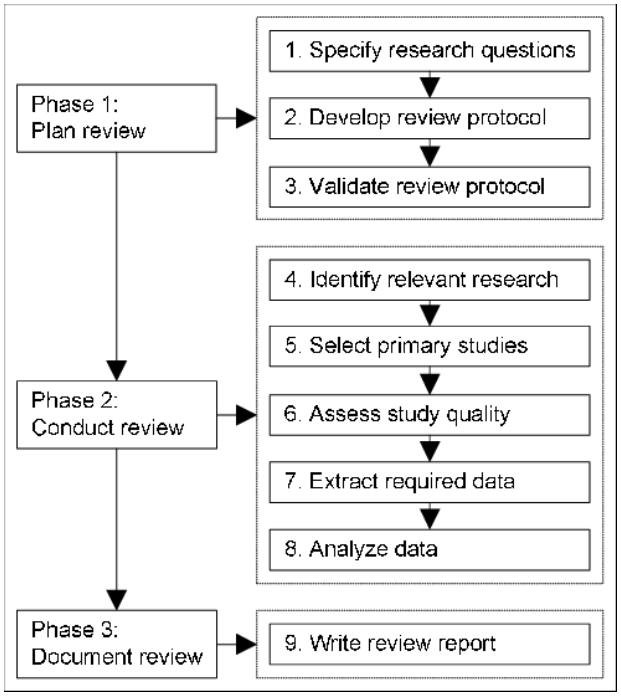


Figure 2.1: Literature review process (Adapted from Brereton et al., 2007)

The literature review for this research was presented in the subsequent section accordingly:

Section 2.3, This section was focused on smart tourism. Smart tourism was to demonstrate the idea of incorporating technology into tourism. Tourism growth uses the internet, social media, and smartphone technology. Section 2.4, This section explains the usage of smartphones and smartphone applications. The Smartphone application assists with large-scale travel, such as planning, scheduling, navigation, and much more. In this section, the smartphone application design was also briefly explained. Section 2.5, Explain the theoretical support for this research. In this section, three different types of theory were analysed. Section 2.6, demonstrates the theory's constructive learning about the different construct and their meaning. Apart from this, the construct was explained in detail. Section 2.7, Explain the summary of the visitor experience and the use of mobile devices and apps to get accurate information, plan routes to their destination, and change routes if necessary.

2.2 Tourism and Ecotourism

Tourism and travel include going overseas and visiting places within the home country of individuals, visiting museums, city vacations, business meeting journeys, sporting activities, and visiting friends and families (Kallmuenzer et al., 2018). In addition, individuals travelling to or permanently living outside their natural environment within the same country for more than one calendar year for reasons other than the practice of an activity compensated by the individual, the individual's employer, or the individual or employer's family were engaged in tourism (Khan et al., 2021).

According to Camilleri (2018), tourism and tourism concepts identify visitors based on various criteria. For example, the travel intention, the distance travelled, the amount of time spent, or the number of days spent were used for statistical or analytical purposes to distinguish tourism from other types of travel. A tourist is a person travelling or visiting a place for pleasure. Tourism was a broad definition that encompasses a diversity of activities. For example, travelers may be on business, spiritual tourism, pilgrims, or apprentices studying abroad. Business tourists can visit this location for a workshop, a conference, or more education, while private tourists can visit for adventure, recreation, education, religious trips, and other reasons (Robina et al., 2020).

Tourism and travel were misleading since no specific inputs, manufacturing processes, or supply chains (Camilleri, 2018). Therefore, it was vital to identify many trading areas and businesses that do not travel, and tourism organisations offer tourism products and services, such as insurance and guidebooks. According to Silm et al. (2020), tourism is temporary short-term travel of individuals to a destination where they enjoy their stay and

carry out activities in those locations, including movement for entire drives and day visits or day trips.

The concept of 'ecotourism' emerged in the late 1970s as a contrast to traditional mass tourism. As a result, not only were modes of transportation improved, making it easier to go to more remote regions, but the International Labour Organization also increased paid vacation time for the whole workforce from 7 days per year to a minimum of twenty-one days (Honey, 2019).

Ecological tourism (ecotourism) was low-impact and (generally) small-scale travel to fragile, pristine, and typically protected ecosystems. It contributes to traveller education, offers funds for conservation, directly promotes the economic development and political empowerment of local communities, and fosters respect for other cultures and human rights worldwide. The industry was at a fork in the road for ecotourism as a tangible idea. After enough time has been conceded, the second research has been done, and the notion has evolved. "Ecotourism was no longer a mere concept or subject of wishful thinking," says Ceballos-Lascurain (2017), the self-proclaimed inventor of the word. On the other hand, ecotourism has become a global reality" (Honey, 2019).

Honey (2019) states that genuine ecotourism operations were judged by shifting economic and political control to the local community. Authentic ecotourism contains seven traits: (1) go on a trip to a natural setting. (2) reduces the impact by choosing appropriate building materials, renewable energy sources, visitor management measures, monitoring tools, and conservation plans to reduce the impact of development and tourist activity. (3) promotes environmental consciousness. This includes providing tourists with educational and interpretive materials and guides by informing and educating the broader population with

educational training and the local community. (4) provides conservation with a direct financial gain. (5) gives residents financial benefits and empowerment. This involves hiring residents, utilising a multi-stakeholder approach to planning, management, and policy creation, and cultivating partnerships. (6) showed respect for the culture of the area. (7) Supports democratic and human rights initiatives. This approach was primarily applied to ecotourism projects in impoverished countries. It aimed to bring attention to the host nations' and people's political systems to create international awareness of "peace, prosperity, and universal respect for and observance of human rights and fundamental freedoms for all" (WTO, as cited in Honey, 2019).

2.3 Smart Tourism

The international conferences by the United Nations World Tourism Organization (UNWTO, 2017) focus on a few sustainable aspects of smart tourism. The World Tourism Organization first identified uncontaminated, green, ethical, and high-quality service to smart tourism. The idea continues to be demonstrated in 2015 by incorporating information and communication systems and the smart destination definition. According to UNTWO (2017) reports, smart tourism was the way to future tourism growth. Intelligent tourism destinations have been characterised as smart, healthy, and profitable. Studies have clarified the use of smart tourism using technology by restrictive it to the Internet, social media, and mobile devices (Wang et al., 2016; Brandt et al., 2017; Tan et al., 2017; Chung et al., 2017). Another critical aspect of the research was the need for intelligent tourism technologies to be portable. Therefore, the Internet and mobile apps' versatility was crucial. (Koo et al., 2016; Zacarias et al., 2017). Gretzel et al. (2016) describe a smart tourism ecology as a tourism system that emphasises information distribution and value creation, smart technology to build, maintain

or execute smart tourist services/experiences, and technology assessments (Gretzel et al., 2016).

“Ubiquitous tour information service which was combined cooperated with, optimised and improved upon during the tour activities in the form of ubiquitous processes, space and time, media, direction, terminals, and organisations to the individual tourists” (Li et al., 2018 p.293).

Though different conceptions of smart tourism exist in past studies, the term was not widely established and can be incorrectly applied (Gretzel et al., 2016; Yoo et al., 2017; Li et al., 2018). For instance, intelligent travel can be chaotic with e-tourism, as information and communication technology, information systems, and social media principles are also relevant to ecotourism in smart tourism. Smart tourism is a social phenomenon arising from the convergence of people's daily lives with business (Kim et al., 2016), tourism (Gretzel et al., 2016), and ecosystems. Networks of data and information flows and exchanges exist at smart cities and tourism levels. These flows and exchanges rely on interdependence, communicating with external networks (e.g., transport, health care, and payment systems) and maximising resource allocation. With the help of residential government strategies and systems integration, optimisation was attained through advanced ecosystem technologies (Kim et al., 2016; Gretzel et al., 2016). 'Smart' means 'smartness,' which means fast, reasonable, cheap, and intelligent for a tourist, and competitive, efficient, profitable, and innovative businesses that provide and consume tourism products and facilities through a network of cooperating companies. These businesses may work interoperably to share data and information seamlessly across business processes to achieve shared objectives with other companies or organisations.

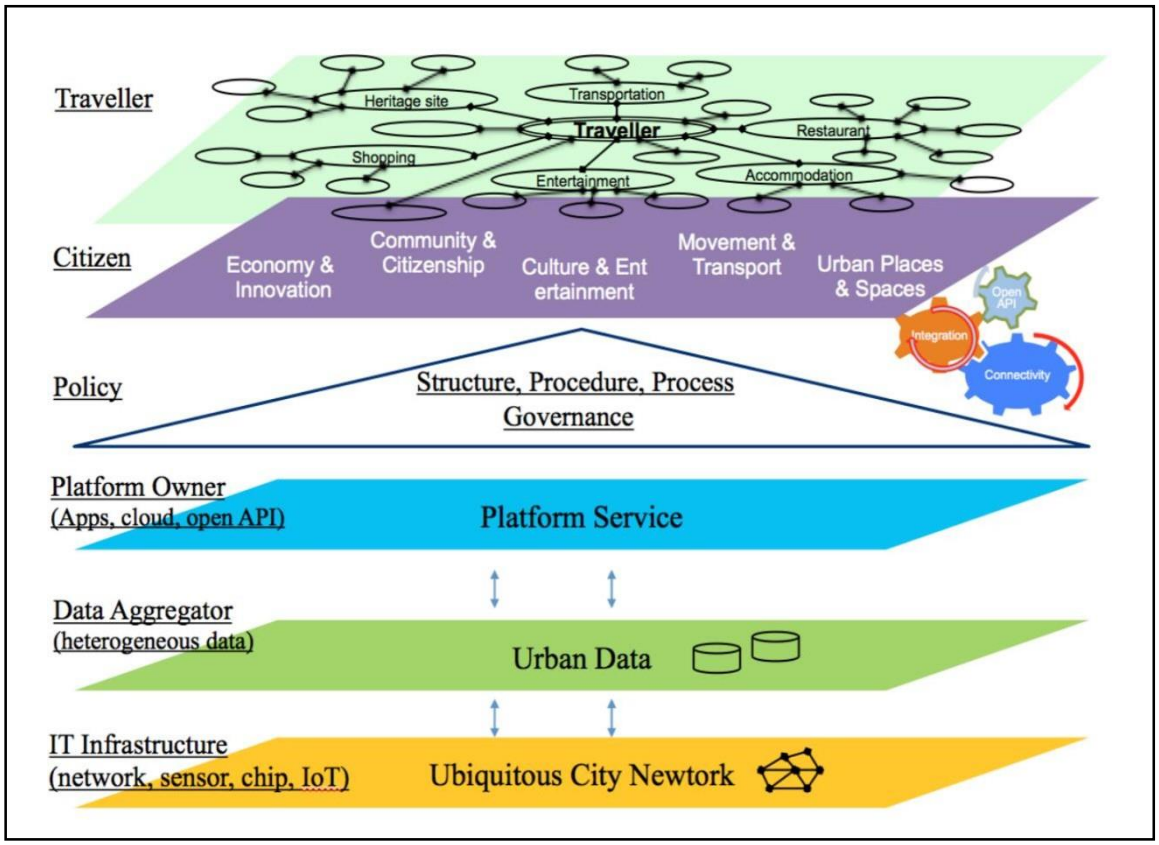


Figure 2.2: Smart Tourism Architecture (Jae-Nam Lee, 2017)

The Smart Tourism Architecture (STA) is depicted in Figure 2.2. The STA application proposed to be placed on a visitor's mobile phone. It includes basic tourist facilities such as scanning QR/NFC tags, selecting a preferred language, specifying location, mapping nearby attractions, and offering tourist feedback. The structure, technique, and process of the application that used the tagging services were all contained in the Policy. In addition, the platform owner service was linked to the Global Positioning System (GPS), which gives users information about their present and surrounding locations.

Furthermore, Wi-Fi/Mobile data connectivity was available to make Internet access more convenient. Data aggregator services were data placed on a certain location and comprise accessing the essential information through video streaming or textual information

about the desired area. The IT infrastructure service was in charge of responding to users' questions and supplying requested information in a specified format (e.g., video streaming or textual material) and allowing tourists to submit a response on their visit.

2.3.1 Smart Tourist

A "Smart tourist" is described as a challenging, well-informed tourist interested in travel and involved in the sustainability and responsibility of the destination (Khan, 2021). According to Gretzel et al. (2016), smart tourism gathers and incorporates facts about destinations and delivers visitors with rich on-site experiences, mobile technology support, and business benefits. In addition, individual mobile platforms currently serve as multiple points of contact for tourism businesses, allowing them to connect in real-time with data and information. As a result, mobile technology now showed a significant part in defining the type of tourism and the behaviour of tourism-connected businesses.

Li et al. (2018) described that smart tourism includes government policy prospects for promoting tourism as a basis of commercial development in the Chinese national context. Moreover, this type of tourism aims to gain a long-term strategic benefit for destination and travel-connected businesses by encouraging ubiquitous innovations. On the other hand, Gretzell et al. (2016) emphasised smart tourism as the collection, aggregation, and use of digital data from new information sources and the importance of different organisations' functions, such as physical networks, social relations, and governments. Therefore, it can be concluded that Gretzel et al. (2016) conceptualisation of smart tourism was materialised through the smart tourism ecosystem.

Furthermore, smart tourism was described as a structure that practices smart technology to develop, accomplish and distribute smart experiences that share commonalities, such as a mobile technology concentration and a mobile environment. As a

result, interactions can encourage visitors to converse, communicate, and engage more frequently during their journey. Visitors can make their trip memorable using technology that enhances the user experience. Tourism would result in more employment opportunities, economic development, and better quality of life for the local people.

Smart tourist has proliferated with the introduction of technology. Smart tourism heavily focuses on the active tourist viewpoint (Koo et al., 2016; Wang et al., 2016). The feat of smart tourism depends on the understanding of visitors and the degree of continuity in their hopes and behaviour (Martinis et al., 2019). Most study into tourists' perception of ICTs depends on the market classification. Redondo et al. (2016) differentiate between tourist 1.0 (Consumer), tourist 2.0 (Prosumer), and tourist 3.0 (Adprosumer) based on the degree of technology involvement. Gonzalez et al. (2020) describe five core features of the tourist: linked, suggested, aware, alternative, and influential. The models of tourist actions were continually altered by ICTs (Li et al., 2018). The visitor experience was improved by personalisation, context awareness, and real-time monitoring (Buhalis and Amaranggana, 2013).

2.3.2 Smart Tourism in Business

Integration of new content, devices, and services was expected to bring new forms of industry and innovation to smart tourism (Gretzel et al., 2016; Koo et al., 2016). Therefore, from a business standpoint, it was critical to effectively make knowledge and information accessible to all stakeholders, actively engaging them in innovation. Furthermore,developing a single technology was not enough, as interconnecting and synchronising various technologies will allow more important assistance to smart tourism (Hojer & Wangel,2015).

As a result, tourism industries were dynamically linked to information technology, enabling developers to develop, gather, and exchange data in real-time. This matter was critical to consider convergence technologies in tourism when evaluating how a specific mobile technology impacts tourism and how essential collaborative cooperation between customers is.

The intelligent part of the tourism business was under research (Wang et al., 2018), but more studies were concentrated on implementing and evaluating explicit technology by engaging environmental objectives like funding technology support programmes and other schemes for tourism corporations.

The tourist industry should move from service-based to experience-based tourism (Singh et al., 2022). Since ICTs have progressed from being experienced mediators to their core composition (Batat, 2021), the traveller experience was diverse offline and online (Batat, 2021; Liburd et al., 2017). Moreover, most of the latest information communication technology is growing today (Hughes & Moscardo, 2019): all business fields were influenced by the web, open data, cloud computing, geo-positioning structures, artificial intelligence, self-learning machines, or cognitive computing.

According to Mandic and Garbin (2019), smart tourism provides enough interest data to all businesses in the tourism chain: hotels, restaurants, transportation, and intermediaries. Therefore, smart tourism and the tourism chain business, better data, and mainly its customization have given rise to the tourism experience (Armstrong et al., 2021; Batat, 2021). Nevertheless, the real-world condition of smart tourism has a very different impact on the equilibrium between its participants. ICT advancements were also restricted in allowing mutual information to build synergies. (Koo et al., 2016).

The destinations were visible at all stages of tourist travel, particularly during the holiday season when the importance of the visitor experience was enhanced. However, even in the post-trip era, when the tourist's Electronic Word of Mouth feature was critical, the tourist's technological inference appears to be much higher. Meanwhile, tourist businesses seem trapped in the pre-travel process, characterised by using ICTs for publicising and promotion (Khatri, 2019).

As a result, smart tourism's actual stage was way behind its theoretical ideals. The elements were autonomous or in an equivalent position. People were increasing their use of technology in response to the traditional way of delivering technology (Wang et al., 2016). Mobile devices have become an integral part of individuals' daily lives, with increasingly advanced technologies being used with them (Yildirim et al., 2015).

2.3.3 Smart Tourism by Destination

Smart attractions were focused on scenario-based integration based on seamless connections through sensors, smart devices, and big-data management in a specific geographic area concerning information technology and basic infrastructure (Gretzel et al., 2016; Werthner et al., 2015). Meanwhile, the tourism sector was one of the compatible areas where IT was commonly used from both a corporate and individual perspective, and it was not shocking that the notion of smart tourism destinations has evolved very rapidly.

Istanto and Djamhur (2021) divided their tourists' movement into five distinctive spatial designs, single destination design, en-route design, base camp design, regional tour design, and trip connection pattern. The single destination concept entailed travel to a single destination and was the least selected by travelers.

Stand-alone attractions were rare since few locations have other facilities (Wall-Reinius et al., 2019). Instead, the visitors visit several important attractions/sites and destinations

sequentially before returning to their hotel. This trend showed that the proliferation of many travel attractions was a driving force behind ICT growth, as it increases the necessity for ICT and inspires the creation of smart destinations. This travel trend takes visitors to various attractions, places, and destinations. Since ICT growth and smart destinations have increased with the popularity of multi-destination travel, ICT for smart destinations primarily focused on connecting multiple channels and attractions, places, or destinations (Gretzel et al., 2016; Werthner et al., 2015).

ICT technologies that enable the dissemination and navigation of information were rapidly promoting the multi-attraction travel experience. In this sense, an attraction that focuses on a single major attraction will find it difficult to contend with attractions that use the corresponding potencies of various attractions (Wisudawati et al., 2020). On the other hand, a smart tourism attraction offers exceptional customized experiences resulting from a real-time database on ICT integration and the current situation, so even at a similar attraction, every visitor can have a different experience (Lamsfus et al., 2015).

The smart conception of tourism will improve its strategic advantage and meet visitors' needs. In the past, some academics and institutions have directly and/or indirectly explained smart tourism by using the terms of a smart tourism destination (Jovicic, 2017; Lamsfus et al., 2015; Buhalis & Amaranggana, 2013) and have emphasized the provision of high-quality facilities in a clean, green and ethical manner (UNWTO), internet networking and the experience of perceiving the origin of smart tourism, smart tourism destinations (Lamsfus et al., 2015).

2.3.4 Smart Tourism with Technology

Smart tourism denotes phenomena associated with the use of smart technology across various tourism-related events and experiences, and it has also made its way into tourism in

application fields (Gretzel et al., 2016; Koo et al., 2016). Smart tourism was most thoroughly discussed and examined in smart tourism attractions due to its close relationship with smart city ideas. Related studies were focused on realistic cases of various aspects of smart tourism destinations, concentrating on customised services in smart tourism attractions (Boes et al., 2016). Buhalis (2019) discuss overall experiences in smart tourism attractions, whilst Boes et al. (2016) and Lamsfus et al. (2015) include samples of smart tourism attractions from the perspective of mobile and cloud computing technologies. However, the current literature does not discuss how smart technology contributes to a destination's attractiveness. Azzopardi and Nash (2017) coined the term "destination competition," which refers to a destination's ability to afford tourists higher-quality travel experiences than other destinations. Some scholars expanded the original destination attractiveness conceptual model (Azzopardi & Nash, 2017; Khoo et al., 2016), and other scholars proved the model empirically (Luo, 2018) because the value of destination competitiveness was recognized both academically and practically. Such academic approaches contribute specifically to Destination Management Organizations (DMOs) to identify their destinations' competitive resources, assess their current situation, and boost the attractiveness of their destinations (Nadalipour et al., 2019).

In addition, other stakeholders were closely involved, such as tourism businesses, ICT corporations, and the government, as this study can be rationally relevant for these stakeholders (Boes et al., 2016). Travel agencies, for example, would gain a new competitive advantage and boost their existing competitiveness because of their increased understanding of the benefits of smart tourism. As a result, they can expand their business in the information technology (IT) industry. In the case of governments, they can transform their country into a desirable and alternative destination, even if it is not a viable tourism destination due to a

lack of natural resources (Boes et al., 2016). In this regard, modelling destinations' competitiveness can be seen as an important tool for the growth of tourism destinations. However, the current model was ideal for smart tourism destinations because Azzopardi and Nash (2017) mention that the model did not consider ICT, which was not understood and used in the tourism industry at the time. Furthermore, ICT and smart technologies, such as mobile devices and cloud services, were key components of smart tourism implementation (Buhalis Lamsfus et al., 2015). Therefore, these models need to be revised urgently, considering the ineptness of smart technology and the emergence of smart tourism destinations.

The tourism industry effectively uses smartphones to help visitors navigate their everyday needs, familiarise themselves with different cultures, and explore new landscapes (Šimková & Holzner, 2014). According to TripAdvisor (2019) survey, 42 per centof travelers used their mobile devices to book or schedule a trip, and restaurant analysis (72 per cent), finding things to do (67 per cent) and reading feedback (64 per cent) the most common use of the tourism-based mobile application. The research by Google also points out the value of mobile networks and offers similar outcomes (Vandeviver, 2014). For example, the findings indicate that 78 per cent of business travelers and 67 per cent of leisuretravelers use smartphones during a trip, and both groups concentrate on inspiring and researching the use of smartphones. Users also need navigation, directions, points of interest,and route-specific information during their tourism operations. Furthermore, visitors taking vacations and walking around towns and hiking, biking, or kayaking were still interested in new environments, whether in cities or outdoors.

2.4 Smartphone and Smartphone Application

A smartphone is a cell phone and wireless device that combines mobile phone functionality with components similar to workstations (Kanchi et al., 2018). The origins of this device can be traced back to the personal digital assistant (PDA). Smartphones usually provide internet access, electronic mail, and a personal organiser. Since applications can be loaded into such devices via plug-and-play, the device's use of such features was critical. There was usually a set of applications, but users could also have sports, chat programmes, and other stuff (Kanchi et al., 2018).

If a user wants a transparent or hidden keyboard, choose a touchscreen or a hidden alphanumeric keyboard (also known as QWERTY). A data storage pair of memory slots, Bluetooth networking, and Wi-Fi were the main features of these phones. In addition to these features, a smartphone should have a processor, memory, high-resolution screen, wireless networking (instant web access), operating system, software, camera, and video.

Smartphone applications can now assist with large-scale travel, such as planning, scheduling, navigation, and much more, such as finding gas stations. Still, they can also help with many other micro-moments, such as waiting time for routes, calculating travel time, costs, and so on (Wang et al., 2013). Therefore, the basic knowledge of travelers can be met during the travel period at any stage, including the anticipatory, experiential, and reflective phases (Taylor et al., 2019). Furthermore, smartphones allow access to location-related services (i.e., "destination guides" apps) during the experiential process (i.e., during the trip), which identifies the current location of tourists. As a result, it provides suitable recommendations for tourist inquiries, such as restaurants, souvenir shops, fuel stations, and even public toilets. As a result, travelers can redirect and initiate unplanned activities from their current route. Some entertainment applications also enable travelers to immediately

outline images on a map after taking pictures and uploading them to all users' social media accounts. It also allows travelers to keep their contact information up to date and read reviews about their current and recent travel experiences. This feature showed that smartphones promote people's digital lives in tourism in unique ways. To put it another way, smartphones allow tourists to create the "mediated gaze" (Tan, 2017) and build the hope of future tourists by sharing travel experiences (Cetin & Bilgihan, 2016).

A Smartphone application is a software application installed in a mobile computer (mobile phone, notebook, electronic reader, or additional mobile device). Different operating systems support it and can link to wireless networks (Al-Turjman, 2018). Therefore, the mobile phone's system state (operating system) should be considered before downloading the smartphone application. For example, Android OS, Apple IOS, Blackberry OS, Nokia Symbian, Hewlett-Packard WebOS (formerly Palm OS), and Microsoft Windows Phone OS were five different mobile operating systems.

The following definition can be used to explain the main elements of the Mobile Application store in this section: Application was a software application that was used in small, portable computing devices like smartphones, tablets, or laptops. The applications were designed to consider specialised capabilities. Mobile applications were divided into three distinct categories: web apps, native apps, and hybrid apps.

Application Store was an online platform where users could download application software. Apple, Google, BlackBerry, and Microsoft were the major operating systems with their app stores. With the growth of smartphones and tablets, the app store concept was widespread. There were two types of attributes related to mobile applications. For example, technical attribute refers to the functions that only emerge from applications, whilst non-

technical attributes refer to a set of functions that were not easy to achieve from software alone.

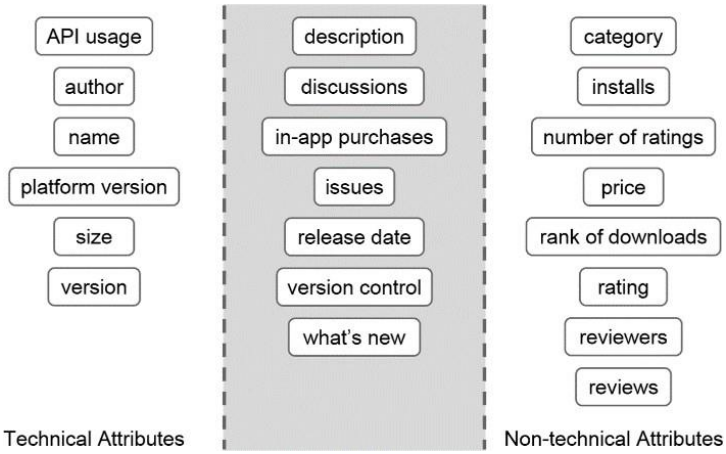


Figure 2.3: Attributes in technical, non-technical and mobile application attributes (Martin et al., 2016)

Figure 2.3 depicts examples of attributes, which were divided into technical and non-technical categories. For example, the one in the grey box can be technical or non-technical. Technical attributes were only available from software developers, not the app store, while non-technical attributes were only available from the app store.

A smartphone application is a personalised computer program that runs on most desktops, laptops, smartphones, and other mobile devices (Widarti et al., 2020). It was made so that they were simple to use and regarded as valuable because they adequately represent the needs of their intended users (Mehraliyev et al., 2019). Another reason for the growth of mobile device developments was that it allows developers to minimise the cost of developing mobile apps (Genc-Nayebi & Abran, 2017; El-Kassas et al., 2017) while meeting the needs of users across a wide range of mobile devices (Royston et al., 2015; Dalmasso et al., 2013).

Furthermore, as stated in the previous section, the advantages of having smartphone apps would make it easier for visitors to travel and be accessed anytime and anywhere.

Finally, Smart services tourism, or smart travel for travelers and the rest of the world, was provided by the Smart services tourism app community. This service would be integrated with tourism stakeholders and visitors, attracting tourism applications with smart services. ICT-based services such as interactive Smart Tourism Online, information display content such as app tours list, culinary registration, smart tourism app for handicrafts, performing arts areas, tourist villages, and interactive and informative tours were featured services that help other tours.

2.4.1 Smartphone Application Design

The design aspect involves an elegant visual arrangement of service and modern equipment to simplify service (Strengers & Nicholls, 2017). The architecture of a technology-based service should be aesthetic. The design of application design should consider a few dimensions to perceive a good quality mobile application design, such as design, functionality, and fulfilment dimensions.

The design dimension was tangible in the mobile application. Therefore, the application specification should also have the following attributes. (1) Aesthetically pleasing design (Wang & Li, 2017; Li, 2018) (2) Well-structured user interface appearance (Sharma et al., 2017; Zeidler et al., 2017). (3) Efficiency in downloading/uploading (Tang et al., 2020) and (4) Consistent and standardised navigation (Coutrot et al., 2019; Reyes et al., 2018). The mobile application functionality consists of less secure, effective, and error performance in technology functions. All service process functions must work properly and contribute to effective service performance.

2.4.2 Smartphone Applications and the Tourism Sector

Mobile device software was a small package of code designed and built for use on a small computer. It improves this device's entertainment capabilities by providing additional services and applications; they mark the gadgets as more important because they offer games, interfaces, and mobile widgets tailored for smartphones. It increases the entertainment capabilities of this device by providing additional services and applications; they mark the gadgets as more important because it offers games, interfaces, and mobile widgets tailored for use on smartphones. Thousands of applications were available for the phone; they were not excessively expensive, and installing one would make users' smartphones unique and enhance their capabilities.

"M-Learning offers modern ways to support the learning process through mobile devices, such as handheld and tablet computers, MP3 players, smartphones and mobile phones" (Thakran and Gill, 2021, p. 1). A mobile application is software that can operate a mobile device such as a smartphone or MP3 player, enabling the device to perform specific tasks generally limited to PCs, according to Farley et al. (2015). Apps can be downloaded via smartphones, PDAs, and MP3 players. Therefore, it was essential to have Internet connectivity to upload applications to a smartphone and then connect to an app store. In addition, web browsers were widely used software enabling users to access the Internet from their computer, games, and social media sites like Facebook. In recent years, the demand for mobile applications has expanded to accommodate users' busy lifestyles.

The introduction of mobile phones and the evolution of third-generation to fifth-generation wireless networks aided the growth of the mobile phone generation. Users can now access the World Wide Web on their mobile devices (mobile devices), also known as mobile apps (mobile apps), via stand-alone software (Hoehle & Venkatesh, 2015). Mobile

applications were described by Mohamed et al. (2017) as an "end-user configuration program optimised for the operating system of a mobile device that extends the device's capabilities by allowing consumers to achieve specific tasks". Mobile apps allow users to retrieve various services and inputs without opening a web browser. Mobile applications that allow access to several domains using mobile phones and tablets comprise social networking, news, email, weather, sports, and podcasts (Gasaymeh et al., 2019).

Kim et al. (2015) suggested that mobile apps were also used as additional sources of the path to purchase. According to Tan et al. (2017), the profits from the apps industry were expected to grow to $36.7 billion by 2020. The figure specifies that mobile applications have a bright future ahead of them.

Mobile application favour was an alternative online shopping method to the standard mobile browser (mobile browser). Furthermore, since mobile apps can be optimised for mobile devices, they overcome the challenge of navigating websites not designed for mobile use (Tan et al., 2017). Also, users can use mobile applications to compare prices, receive markdowns, perform advanced product and service analysis, locate shops, access timeline data, restaurants, transportation, and local events, and share social network information, among other things (Turow, 2017). From a business standpoint, mobile applications contribute to consumer loyalty as they increase the efficacy of advertisements and provide a way to connect more directly with mobile purchasers at any time and place (Cameron et al., 2012).

Although mobile apps offer enormous potential for users and are vital to an organisation’s achievement, the study of the tourism sector persists incomplete. Some previous research tends to emphasise the importance of mobile apps in increasing tourism

participation (Richards, 2018; Dorcic et al., 2019) or the development of mobile applications for tourism (Tan et al., 2017; Anacleto et al., 2014; Gavalas et al., 2014). However, remarkably, a report on customer intention to use mobile apps to buy travel-connected products and services remains a neglected field of study (Gupta et al., 2018). Instead, the emphasis was on hotel reservations, time-sharing, and airline tickets (Rivera et al., 2016; Morosan & DeFranco, 2016; Murphy et al., 2019).

The food and beverage industry, transportation, hotels, travel agents, guides, festivals and occasions, theme parks, leisure activities, and other reservation facility events all be included in obtaining tourism-related products and services (Hew et al., 2015; Kim et al., 2015). Although current research took a broader view of purchasing tourism goods through mobile applications to afford a comprehensive view (Kim et al., 2015), the number of studies was insufficient, and they were conducted from the viewpoint of established marketplaces. Surprisingly, mobile application research remains unnoticed in Malaysia's tourism industry. Since the Apple App Store and Apple App Store have a variety of applications (Gómez, 2017) and the high cost of the Google Android Market (renamed Google Play Store), the development of mobile apps, which can range from £ 5,000 to £ 250000 (Tan et al., 2017), users' inspiration to embrace mobile apps as a means of purchasing products was considered. Tourism-related services and products remain important and should be examined further. There were many explanations for why the analysis focused on a developing market like Malaysia. Mobile phones have changed Malaysian communication with people around them (Balachandran et al., 2022). Rodríguez-Rangel et al., (2021) described using a mobile device as comparability more than a wired phone among Malaysian citizens. Statistical data have also disclosed that Malaysia's mobile infiltration rate of 140 per cent was ranked second in Southeast Asia (Wong et al., 2020; Forest Interactive, 2013). According to Lin (2020),

countless Malaysians refuse to shop online using mobile devices. The same sentiment was expressed by Hew et al. (2015), who concentrated on the rise in an average of 69.79 per cent of shopping cart abandonment rates in Malaysia. According to Ghazali et al. (2018), developed countries like Malaysia offer massive growth chance for mobile commerce. Malaysia's half a million small and medium-sized businesses (SMEs) were chosen to register and use the e-commerce platform. About 75 per cent of retail businesses and 80 per cent of manufacturers will be involved in e-commerce by 2020 (MDEC, 2018).

According to Handphone User Survey (HPUS) 2018, smartphone users rose from 75.9 per cent in 2017 to 78.0 per cent in 2018. This study showed that if the software were well built from the users' point of view, m-apps would have a better chance of remaining. Therefore, the present study explores the factors influencing a visitor from Malaysia who was comfortable using travel services relevant to their vacation in an app via their mobile devices.

2.4.3 Factors Persuading the Receipt and Use of Smartphone Application

Much of the recent mobile application literature has concentrated on the factors that affect users' reception and usage of smartphone technology (Shang et al., 2022; Yazdanparast et al., 2021). According to Roy (2017), users' acceptability and perceived utility, users' adoption of mobile applications, data protection issues and mobile app exploration in the market were the most significant factors. They further explained that data protection for users and the exploration of smartphone applications were daily problems for marketers because they can become inhibitors and have detrimental effects on user adoption and use. In addition, various research agrees with Roy (2017) that consumers' perceived utility and usefulness significantly affect users (Hahn et al., 2014; Verkasalo et al., 2010).

Wang et al. (2013) disagree with Chiem et al. (2010) and stipulate that novelty has anticipated fun, and curiosity was the strongest influence on behavioural intention to use the mobile application. Also, it was further emphasised that the condition of use was also a significant factor.

Verkasalo et al. (2010) state that the user's receptivity to the mobile application is important. However, in their study of users with no experience with mobile applications and users with mobile application experience, the authors discover that using smartphones does not necessarily imply using mobile devices. Moreover, researchers added the user input for the application and perceived enjoyment as an important factor in using the applications. Peng et al. (2017) and Ryan and Jones (2012) consistently accept that a decisive factor was a demand for user control. "Consumers now tend to be in charge, determine what they desire and how they need it to be distributed" (Ryan & Jones, 2012). Peng et al. (2017) also examine the impact of consumers' perceived enjoyment, especially when they perceive a mobile application as exciting.

Davis et al. (2011) examined adoption, mobile marketing, and trust. The authors discovered that trust affects consumers' perceptions, especially institutional trust, due to its top impact variables, such as systemic assurance, privacy, and third-party assurance. In addition, some elements of "calculative trust", such as the retailer's credibility and knowledge-based trust, such as perceived ease of use, were often well thought out to impact attitudes significantly. Jayawardhena et al. (2008) also mentioned that the customers' perceptions significantly affected the visitors. Research on the impact of social networks on app usage found that "social interactions played an important role in the diffusion of this technology" (Taylor et al., 2011, pp.78). The study also emphasised that it was not a word-of-mouth effect, in which influencers direct an individual to a specific app; instead, it was a

more broad-based effect. Bhave et al. (2013) recently showed that the social environment was highly influential. The authors clarified that "recommendations from friends were critical when deciding which app to download" (Bhave et al., 2013). The study, however, focused on Generation Y (individuals born between the 1980s and early 2000s), and it does not apply to the entire population. Also, Kim and Young (2013) have emphasised the impact of the social climate on customers. The researchers stressed the value of peer comments or ratings, stating that reviews were an exciting way to overcome barriers to the hyper-competitive market for smartphone applications in assisting customers' evaluation. However, Yang (2013) suggests that accepting the social climate has a minor impact. Indeed, his research confirmed customers' adoption of smartphone applications for their different utilities rather than voicing their personalities and influencing their friends (Yang, 2013).

Similarly, Verkasalo et al. (2010) could not demonstrate a connection between the social environment of customers and the impact of mobile apps. In this respect, some mobile app research has demonstrated the positive impact on loyalty to a retailer as a company/brand of app-related factors, such as value-in-use, app engagement, attitude towards an app and even the customer experience with the retail app. However, it was not associated with rational elements, thought and mental absorption; affective experience was linked to moods, feelings and emotions; relational experience was connected to customer identification, their social context and their relationships with the company and other customers; and the sensorial experience was linked to the senses and aesthetics.

Another crucial issue in the acceptability of mobile apps was the users' perceived ease of use (Adhami, 2013; Kim & Yoon, 2013; Yang, 2013). Because of user privacy concerns and app details, consumers' perceived ease of use may often be a perceived technological barrier to consumers based on their concerns, posing an additional problem for

dealers (Verkasalo et al., 2010). Furthermore, age was strictly linked to this element. Persaud and Azhar (2012) and Roach (2009) investigated age at a broader level and discovered that it significantly affected mobile marketing acceptance. It has been established that new generations were more prone to accept technology owing to previous exposure to familiarity and knowledge of such technologies (Roach, 2009).

Furthermore, this study focused on user attitudes toward mobile app use and identified an impediment in the form of unfavourable customer attitudes, which make it challenging to achieve this type of relationship between companies unless they approve of each other and collaborate (Tsang et al., 2004; Al-alak & Anawas, 2010). Zagreanu (2012) identified price as a major factor influencing consumer expectations and adoption, adding that "free access was another aspect that makes it easier to download a smartphone application to a mobile phone" (Zagreanu, 2012).

However, Kim and Yoon (2013) found no connection between price and app use and acceptance, which was the specificity of the app price (Kim & Yoon, 2013). Various issues may positively or negatively affect customers' reception and use of mobile apps. Where mobiles apps include convenience, easy communication with customers, and online usage, differing from these mobile apps, also include difficulty to create, the cost to create them, the cost to make them available to people, and the need for updates and support. Chen et al. (2012) emphasised that this idea remains central to mobile app performance, explaining that a successful mobile application is one in which the users' perceived advantages outweigh the perceived sacrifices or barriers of consumers. The key to the successful execution of a smartphone application, as Ryan and Jones (2012) demonstrated, appears to be giving users roughly that adds value or contribution to a degree.

2.4.4 Influenced of Smartphone Applications on Travel and Tourist Behavior

The effect of mobile devices on tourism service habits and behaviours was another research topic from the viewpoint of travellers. However, this topic has gotten little scholarly attention, with just 17 publications. According to these studies, mobile application changes travel from pre-travel planning to on-site interactions, utilisation, and post-travel sharing and feedback. Furthermore, the instantaneous existence of a mobile application during the pre- and post-travel phases combines visitors' efforts during travel. (Wang et al., 2014).

Pre-travel planning stage: Visitors will spend less time preparing for tours because the information is easily available on mobile devices as long as the user has internet access. (Wang et al., 2014). As a result, tablets and smartphones were more commonly employed in the search for information than other devices (Murphy et al., 2019).

Experience stage during the travel: Mobile technology allows tourists to change their itineraries effectively and plans due to unforeseen events that arise throughout their journey (Lamsfus et al., 2015; Wang et al., 2013; Wang et al., 2016). Visitors were often prepared to experience a destination more imaginatively and discover unique attractions rather than a commonly accessed "hermeneutic circle" (Wang et al., 2012). Tourists are more likely to involve in the value-creation procedure with service providers during the consumption of services if visitors often use a mobile phone to access services or perform tasks (Morosan & DeFranco, 2016). Tourists find these service experiences particularly beneficial, as mobile devices reduce the time and effort required for tourists to travel to information centres (Lin et al., 2020).

Users mainly utilise mobile technologies for contact, social media, entertainment, and information browsing (Wang et al., 2016). Mobile technologies have a different impact on tourist experiences based on the purpose of use. Mobile technologies used for connectivity

help visitors feel more at ease because they are automatically connected to their family and friends. (Wang et al., 2016). Mobile entertainment technologies give tourists to have fun while travelling. However, according to Kirillova & Wang (2016), typical interaction for in-service-related purposes via smartphone can uplift travel functions, assuming that the users are perceived as kind and emotive. According to Dickinson et al., (2014), mobile technologies effectively improve social aid among campers, quickly requesting or providing tour assistance in various ways. The advent of mobile technology transformed travelers into "flashpackers", who often use mobile devices and internet connections during travel (Paris, 2015). The so-called 'flashpackers' were more self-sufficient than backpackers and appreciated mobile technologies' increased flexibility and options.

Post-travel sharing stage: Tourists prefer to post their eventful tourism happenings online rather than with their service provider or personal friends (Wang et al., 2014; Zhang et al., 2018). Also, as tourists use mobile technologies in their travels, storing and retrieving their memories has become more accessible.

2.5 Theoretical Support or Keystones

Several theoretical models have been built over the last 20 years to understand new Information Technology (IT) and information system (IS) adoption behaviour. Several theoretical models, including the technology acceptance model (TAM) (Davis, 1989) and the unified theory of acceptance and use of technology (UTAUT), have been suggested in recent decades to predict and explain technology adoption and usage (Venkatesh et al., 2003). However, only a few researchers have used these frameworks to study ICT usage among older individuals thus far (Magsamen-Conrad et al., 2015). Furthermore, the appropriateness of existing models employed in this field has not been thoroughly investigated. Furthermore, these technology acceptance theories were designed/implemented to be used in

workplace/organizational contexts, and, likely, using these frameworks to anticipate consumers' behavioural intentions and actual use of ICT will necessitate additional adaption. For example, the UTAUT framework (2003) was recently updated better to anticipate ICT usage in the context of consumers, resulting in the expanded UTAUT2 (Venkatesh et al., 2012). Furthermore, no known empirical study has yet validated the usefulness of this hypothesis in understanding ICT acceptance and use among older persons.

Researchers focused primarily on the Technology Adoption Model (TAM), Reason Action Theory (TRA), Theory of Planned Behavior (TPB) and Innovation Diffusion (i.e., Davis, 1989; Fishbein and Ajzen, 1975; Rogers, 1995). However, given their weaknesses, some of the models have been criticized. For example, most structures do not clarify predictive capabilities and have been produced with little empirical evidence (Hew et al., 2015; Chaudhry et al., 2006). This study consequently agreed to follow the Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2) as the basic model (Venkatesh et al., 2003), as it was found to be excellent to existing frameworks (Venkatesh & Zhang, 2010). More analysis in the field has resulted in complex and changing partnerships between service providers and clients. It was in line with many scholars who say there was already a lack of studies seeking to resolve the application of relationship marketing in organisations (Jayawardhena et al., 2001). In general, diverse ideas can be extended to describe travellers' experiences using mobile tourism apps and their relationships. There were various tourist experience components, including behavioural relationships, meaningful interaction, and experience. This research was focused on the Theory of Reasoned Action (TRA), the Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2), and the Theory of Planned Behavior (TPB) to consider travellers' perspectives on the use of mobile device services.

2.5.1 Theory of Reasoned Action (TRA)

The TRA was first proposed by Fishbein in 1967 but evolved further by Ajzen and Fishbein in 1975. Ajzen and Fishbein (1980) tried to expand their earlier work on behaviour relationships in several experiments. The behavioural study was applied in many fields and was useful for observing, interpreting, and foreseeing human behaviour (Bennett-Levy et al., 2004). Behaviour purpose depends on two factors: behaviour pattern and customer's attitude. These beliefs underlie our attitudes towards a specific action or object. For example, an individual who expects positive or negative effects will have a favourable or unfavourable perspective (Ajzen & Fishbein, 1980).

Human behaviour was influenced and applied by learning inclination that influenced natural behaviour (Sharma et al., 2018). It was the ultimate assessment of practising the behaviour visitor wishes to promote (Qazi et al., 2016). Behavioural intent describes a person's thoughts or feelings about engaging in a particular behaviour. The behavioural purpose was natural and practised behaviour converted into actual behaviour at the appropriate time. The behavioural purpose was often used for individual proxy behaviours (Buchan, 2005). Behaviour aim may be anticipated, clarified, or affected by attitude and subjective norms (Qazi et al., 2016). Subjective norm refers to an entity's understanding of social pressure (Ajzen, 2020). The social influence may come from relatives, friends, and colleagues.

This study was based on the issues impacting business patron loyalty in hotel service outsourcing and acting as their suppliers. This aspect helps strengthen and add strength to marital and family relationships. This study adopted the theory of reasoned behaviour based on a model developed on customer loyalty by Ajzen and Fishbein (1975) and Ajzen and Fishbein (1980). Relational norms and switching costs were known to be attitudinal

constructs. Relational norms and high switching costs will increase administrators' trust, engagement, and satisfaction, increasing consumer loyalty to the hotel. Values can be viewed from various viewpoints, such as social, emotional, price, quality, and image. The managers may use values to determine the quality of their relationship with the service providers.

However, the effectiveness of individual standards in influencing behaviour was mixed (Ajzen & Fishbein, 2005). Subjective norms do not significantly correlate to behavioural intention (Fassnacht & Kose, 2007). The attitudinal constructs influenced the behavioural purpose constructs (e.g., relationship quality) that can further impact intentions to perform (e.g., customer loyalty) in conjunction with TRA. The appliance of TRA correlates to the relationship between attitude-intention-behaviour. It was not precisely developed for businesses, and this model could adapt to an outsourcing partnership study in which the behaviour of business customers in certain circumstances influenced their decision-making process. According to Chuchinprakarn (2005), the concept anticipates connections between associations, focusing on relationship coherence.

As a result, this concept was valuable for providing a foundation for exploring the impact of perceived interest, relational norms, and switching costs on customers' behavioural intent to remain loyal to their service provider, as illustrated in Figure 2.4.

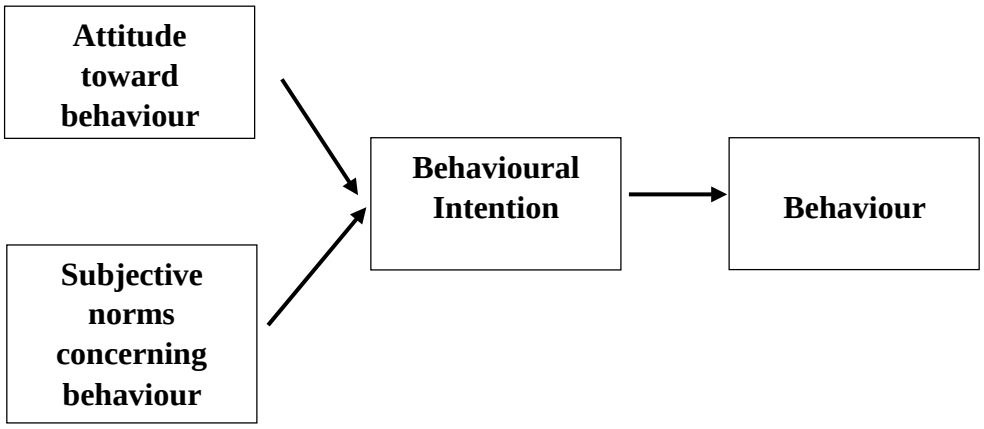


Figure 2.4: Model of Theory of Reasoned Action

(Source: Ajzen and Fishbein (1975); Azjen and Fishbein (1980))

2.5.2 Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2)

The current study aimed to close this gap by evaluating the suitability of the revised version of UTAUT (Venkatesh et al., 2016) for use with older individuals. Compared to other technology acceptance models, the UTAUT 2 was chosen because of its inclusiveness and exceptional descriptive power (Verdegem & De Mwerez, 2011; Pan & Marsh, 2010). Furthermore, besides being holistic and integrative, UTAUT 2 has an individual orientation, which was found appropriate for the current study - explaining older individuals' behavioural intentions and usage of ICTs. However, such statements must be supported by additional evidence. Furthermore, a growing body of evidence suggests that, as a result of rapidly changing technological trends and increased exposure of older persons to technology, we may be dealing with a "second-order divide" (Kania-Lundholm & Torres, 2018) or a "grey divide" that requires further investigation. The current study relies on this growing argument to see if UTAUT 2 was useful in addressing older individuals' acceptance of technology.

This research aimed to improve our understanding of UTAUT 2's predictive relevance in assessing ICT intention behaviour and definite use among older persons. In

addition, this research looks at the links between the UTAUT 2 constructs to better understand how this group used ICT. The empirical study was carried out in a country in southern Europe, which helps to broaden the geographical breadth of previous research on the subject. The following was how the rest of the article was structured. The following section overviews the mainstream literature on ICT use by older individuals. A review of antecedent theory and examination of technology acceptance frameworks that lead to hypothesis formation was also provided. Next, the approach was outlined, and the findings were reported in the following sections. Finally, a discussion and conclusion section conclude the study's findings, identifying contributions and suggesting possible forthcoming research topics.

2.5.3 Theory of Planned Behaviour (TPB)

The Planned Behavior Theory (TPB) was an attitude-intention-behaviour (Ajzen, 2020) paradigm that evolved from the TRA to compensate for the TRA's lack of predictability of any deliberate behaviour. The TPB provides perceived behavioural control (PBC) as a precedent of intent and actions to fill this possible void. PBC was related to presumed self-efficacy (Kiriakidis, 2017), which applies to understanding people's capacity to execute a specific action (Molenberghs et al., 2016).

PBC was typically defined as assumptions about one's power over the decision to take a specific action. Internal and external influences can influence behavioural management on a continuum ranging from total control (no limits or obstacles) to complete loss of control (implementation may require a lack of resources or skills). Internal influences include talents, capacities, experience, feelings, circumstances, and environmental characteristics. Control beliefs can either help or hinder the success of behaviour (Molenberghs et al., 2016). According to the TPB, attitude is formed by one's assumptions (expectations) that an action

will result in a specific outcome (its subjective probability) and one's interpretation of that outcome (its personal use according to the expectation-value model). Subjective expectations, such as perceived behavioural control (PBC), were central feedback in behavioural acts relating to perceived social motivation to engage or refrain from engaging in an activity. According to Ajzen (2020), each conviction correlates actions with a specific attribute, and the arbitrary sum of these attributes (interacting with the frequency of the associations) results in an attitude. Although Ajzen (2020) further argued that an individual could have multiple beliefs about an action, it was believed that only outstanding or readily available beliefs influenced attitudes at any given moment. Thus, the attitude was now widely accepted as a "summary assessment of a psychological object captured in dimensions of attributes such as good-bad, harmful-beneficial, unpleasant, unpleasant, and unpleasant-unpleasant" (Bosnjak et al., 2020, p.352). For this analysis, the attitude was defined as an evaluative tendency toward any entity based on cognitions, affective responses, and behavioural intentions (Prayag et al., 2018; Kock et al., 2016).

In other words, the attitude was an educated predisposition to respond with three components: values, emotions, and action preparation (Estrada et al., 2018). In other words, the attitude was a well-informed predisposition to respond. This attitude model refers to the tripartite or three-component theory, and these three aspects have been identified as separable attitude components on numerous occasions (Weitzl, 2017).

2.6 Constructive Learning from the Theory

Constructive learning (Bada et al., 2015) is a learning technique that encourages people to build their knowledge. The learning experience strategy focused on the learner providing meaning and structure to knowledge by establishing a link between previous involvements and new knowledge. Teaching, cognition, information, and the learning

process have all been linked to the constructivist approach to education (Mohammed et al., 2020). As a result, it was the responsibility of instructors who used this approach to establish an atmosphere and chances for people to build meaning and construct a scale-development design.

Scales manifest latent constructs; they evaluate actions, attitudes, and hypothetical scenarios that we assume exist due to our theoretical understanding of the universe but cannot directly examine (1). Scales were commonly used to describe a behaviour, a sensation, or an action that cannot be expressed in a single variable or item. Using many items to test a single latent construct allows for the accounting and isolation of item-specific measurement errors, which results in more accurate study outcomes.

2.6.1 Meaningful Experience

In practice, the terms "user experience" and "user interface" are used almost interchangeably, but they refer to two distinct but related phenomena (Albert & Tullis, 2013). Evaluation approaches comparable to one another were used to assess user experience (Sauro et al., 2016). Knez et al. (2021) define the growing influence of smartphone applications and the rapid growth in smart smartphone users, which has shifted the focus of tourism and conventional businesses away from their traditional locations and toward mobile-based services. Several smartphone apps can provide a virtual experience through oral and animated immersive experiences to a wide range of consumers using different smartphone types (Knez et al., 2021; Hutchison, 2018). A series of observational and analytical studies have been undertaken recently to better understand how visitors' views and actions were influenced by mobile technology, cell phones, and other factors (Tussyadiah, 2014).

Furthermore, Yu and Kong (2016) suggest that mobile technology, such as smartphones, significantly impacts the user experience. The tourist's motivation, experience,

knowledge, and perceived value were important factors in predicting their propensity to return to creative tourism destinations. Their favourable experience mostly impacts the willingness of visitors to return on their first visit to the destination (Reitsamer et al., 2017).

Researchers have also considered the impact of various mobile technologies on other aspects of the tourism industry. With the exponential rise of smart smartphone users and the introduction a wide range of new technologies, we were changing our perspective on tourism and traditional connectivity services via mobile services (Buhalis et al., 2019; Yoo et al., 2017; Dickinson et al., 2014). Shahi et al. (2019) proposed that mobile and digital technology will dramatically shape city visits and that Internet-based-location via mobile devices was an important tool for multi-layer analysis and distribution to unique tourist groups. Digital experience has shown that many smartphone apps influenced groups varying from 3D digital life with immersive animated experiences (Degli Innocenti et al., 2019) and mobile handheld technology, which was used often to determine the appeal of various menu labelling formats in the context of the restaurant (DiPietro, 2017). Researchers have conducted several observational and analytical studies on the impact of mobile technology and smartphones on visitor perceptions and actions. Some have stated that mobile devices, including smartphones, impact our consumer experience by resolving various knowledge needs, which has implications for the growth of mobile applications in tourism (Buhalis et al., 2019; Wang et al., 2013).

Visitors' inspiration, knowledge, and perceived importance were statistically significant in forecasting their intention to visit artistic tourism attractions. Furthermore, the effects on visitor return intentions indicate that the meaningful, motivating experience has significantly impacted the desire to return (Antón et al., 2017).

2.6.2 Application Usability

Usability was described as a combination of strategies meant to make web pages, computers, software, and, in the context of this study, mobile applications as easy to use as feasible (Martin et al., 2022). This case's design considerations include a visually appealing graphic design and high-tech facilities to improve service operation efficiency (Patel et al., 2020). The goal should be aesthetically pleasant and exciting in terms of how they were used when designing services that rely on technological infrastructure. There were several aspects to consider when designing a technology-based service, all of which provide the perception of a high-quality mobile application design in the eyes of the public. It was separated into three dimensions: the design dimension, the functionality dimension, and the fulfilment dimension (in that order).

As recently highlighted by current research, the usability, utility, and usage behaviour of mobile applications were the focus of various studies aimed at exploring the effects of services offered on personal devices on the visitors' experience to improve the visitors' overall experience (Adipat & Zhang, 2011; Miluniec & Swacha, 2020). For outdoor recreational tourism, usability has been evaluated particularly for mobile services andapplications that enable task flows and content grouping, as well as for components of the UIthat were difficult to perceive and processes that need to be streamlined (Swierenga et al., 2014). For usability researchers working on a mobile application evaluation, the evaluation of mobile applications includes unique functions such as Augmented Reality (Korkut et al., 2023; Stangl et al., 2020) or Virtual Reality (Korkut et al., 2023), raises a new set of questions. For example, the correctness of the service pledges, the availability of the items, and the delivery of the products within the stipulated time frame all contribute to the success of the mobile application (Stair & Reynolds, 2020).

2.6.3 Application Utilitarian Value

Utility value (UV) was a term used to describe how users evaluate mobile applications' functional advantages. It was used in mobile apps to describe how consumers assess the app's functional advantages (Overby et al., 2006). Furthermore, it was associated with achieving a specific goal, such as travel features like convenience, ease, and efficiency improve one's ability to achieve one's tour objectives while away from home (Azcárate, 2020). Regarding mobile network services, the UV is a functional term that describes what users do to achieve task-related objectives while using mobile network services.

According to Lin et al. (2020) and Smith et al. (2017), utilitarian items have material and objective attributes instead of pleasure-based and subjective characteristics. Therefore, the principal benefit derived from the products was the utilitarian benefit. According to Lin et al. (2020), Utilitarian value is an economic notion having a functional benefit. Lin et al. (2020) expressed that a user's functional assessment after utilizing a product or service was defined as a comparison of benefits and costs, and this could include determining whether social networking would improve the user's social capability or convenience after utilizing a product or service, among other things. According to Ho et al. (2021), a product or service's utilitarian value impacts whether or not consumers intend to utilize that product or service in the first place.

Researchers discovered that evaluating factors such as location, time-saving convenience, efficiency, and efficiency was called application utility under utilitarian advantages. The application's quality in terms of utilitarian advantages was determined by its simplicity of navigation and the accuracy of the information it offers when used. Application quality in terms of utilitarian advantages was determined by the application's simplicity and accuracy of the information it offers while in use.

In addition, consumers would find it beneficial if they perceive that a mobile device (such as a smartwatch) can suit their demands in utilizing the gadget, and Ukpabi et al. (2018) discovered that UV exposure has an impact on users' intention to utilize computer software. Finally, in their Utilitarian/Hedonic value investigation, Lee et al. (2018) refers to Satisfaction and Loyalty.

2.6.4 Application Loyalty

Regarding loyalty toward tourism apps, customer behavioural loyalty depends on continuing use and referral (Castañeda et al., 2019). Specifically, customer experience refers to the services given by service providers in order to promote favourable attitudes (satisfaction) and behaviours (purchases and loyalty) among customers by altering their whole customer experience. Loyalty studies were the most widely used approach to understanding how individuals use technology nowadays. However, according to Ashraf et al., (2020), this was often regarded as the relatively limited meaning of consistent use of a product or service or the more general sense of regular use. Furthermore, integrating artificial intelligence services into service quality perception and assessment has not yet been done to determine the influence of artificial intelligence services on customer satisfaction and loyalty (Castañeda et al., 2019).

Extensive research on customer satisfaction and loyalty can be captured with travel experience. Social networking sites have revealed that habit predicts behavioural intent to support customer loyalty (Herrero & San Martin, 2017). Past research has revealed that customer customs significantly impact the purpose and practical application of behaviours (Hsiao et al., 2016; Järvinen et al., 2016; Chen et al., 2015; Escobar-Rodríguez & Carvajal-Trujillo, 2014;). Their intention to adopt mobile travel technology has an impact on customer

behaviour. For example, high costs were added, followed by low costs to implement mobile technology (Morosan & DeFranco, 2014).

Nonetheless, researchers need to agree on the recommended recycling impact of the frequent use of mobile technology in the travel industry. For example, Wang et al. (2013) suggest that users regularly use smartphones to travel. It is why smartphones have become their routine, which induces a sense of connection to their social stays.

On the other hand, Meng et al. (2015) disagreed and demonstrated that having a smartphone application does not imply travel use for daily activities. On the other hand, users' technical and travel experiences influenced their decision to use mobile devices. In addition, travelers frequently understand mobile technology usage and have a more profound desire to implement mobile technology (Wang et al., 2013). However, mass media has a negative impact on the use of emerging mobile devices, including personal computers (Oberst et al., 2017).

According to past research, social impacts on the loyalty of an application were a good indicator of compliance in many situations, including transferring payments (Slade et al., 2015; Tan et al., 2017); m-commerce (Chong et al., 2013); and social exchange (Akman & Mishra, 2017).

2.6.5 Application Ease of Use

The effortlessness and convenience with which a given technology may be used are referred to as "Ease of Use" (Lanlan et al., 2019; Lai, 2017). Regarding mobile technologies, perceived ease of use predicts attitude and intention to use and can contribute to the adoption of mobile technologies, such as apps, by consumers (Natarajan et al., 2017; Kim et al., 2016). Furthermore, based on health-related apps (some branded), their simplicity and utility can

motivate individuals to use them more frequently, resulting in greater app effectiveness and improved clinical decision-making in the long run.

In addition to the simplicity of use of the application, the design factor includes the service's appealing graphic design and high-tech facilities to promote the service's operation (Dehghani et al., 2018). In addition, the architecture of the service, dependent on technology, should be aesthetically appealing and exciting to those who will use the service. Therefore, the design of a technology-based service should consider a few dimensions for the perception of an excellent quality mobile application design. The dimensions were the design dimension, the functionality dimension, and the fulfilment dimension.

The service's design dimension was similar to the product's tangibility dimension. As a result, the app design should include the following characteristics: (1) an aesthetically pleasing design; (2) a well-organized appearance of the user interface (Pitale & Bhumgara, 2019); (3) download/upload efficiency; and (4) consistent and standardised navigation (Visen-Singh, 2019). The Functionality dimension for mobile applications consists of effective, efficient, and error-free performance in technology-based services. Functionality denotes the proper operation of all the functions of the service process, and each function contributes to the effective performance of the service. Functionality is a performance dimension in Internet services and represents system availability in electronic services (Hallikainen et al., 2016). The mobile app functionality should contain the following attributes to allow consumers to use the mobile app: (1) Technically sound features, (2) Sufficient Functions schemes, (3) Ease in transactions, (4) Compatibility with all types of smartphones, (5) Efficiency in transactions.

The service commitments' accuracy determines the mobile application’s success, the product's availability, and its timely delivery (Lanlan et a., 2019; Hallikainen et al., 2016). The company must adhere to the timeframes set forth by customers for the service delivery process. Customers will appreciate the mobile app that lives up to the company’s promises. The following attributes were suggested under the mobile app fulfilment dimension: (1) Consistency on agreed order fulfilment and product availability (Lee et al., 2018), (2) Genuine schemes and deals (Hallikainen et al., 2016), (3) Adequate turnaround time (Imran et al., 2020), (4) Flexibility to adjust and/or delay the time without obligation (Eriksen, 2020).

2.6.6 Learning and Satisfaction

Tourists who have had a positive experience at a particular tourist destination were more likely to return or to be positively inclined, whereas tourists who have had a negative experience were more likely to not only not return but also to have a negative impact on the image of the tourist destination (Drotár & Kozma 2021; Dehoorne et al., 2019). In other words, customer happiness was critical in determining the long-term viability of the connection between tourists as consumers and suppliers. The enhancement of tourist satisfaction was a practical way to sell and promote tourist attractions, and it was also significant in that it can help to assure future demand for those attractions (Newsome, 2020; Truong et al., 2018).

Meanwhile, it was discovered that both Learning ability and Novelty had no significant impact on overall satisfaction. Furthermore, historicity has not demonstrated the effect of Satisfaction significantly.

According to Wirtz and Zeithaml (2018), customer satisfaction is critical to a company's performance and serves as the foundation for evaluating the quality of services a

company has delivered to consumers. According to the research, customer satisfaction and service quality were two distinct ideas that were closely related. Customer satisfaction was regarded as a result, while service quality was seen as a reason; satisfaction was foreseeable, and service quality was an ideal benchmark. According to Wirtz and Zeithaml (2018), many factors influence consumer pleasure, including product quality, service quality, costs, situational situations, and personal factors. The learning effectiveness of direct experiences was greater than indirect experiences; in other words, on-site wildlife tourism experiences may contribute to environmental education. Previous studies have introduced the concept of responsible ecotourism behaviour, which benefits locals and offers satisfying learning experiences. Responsible ecotourism may promote sustainable wildlife tourism (Lee et al., 2018). One of the main issues in the effective delivery of environmental education in sustainable wildlife tourism was tourists' perceptions of the quality of the interpretation services the destination administration offers (Smith et al., 2017). The materials, skills, and communication media used to provide interpretation services and the number of tourists who use them influenced their effectiveness in improving environmental attitudes and ecotourism behaviour (Smith et al., 2017).

However, the latest literature suggests that research on tourist satisfaction should address travellers' emotional state while on their trips (Sthapit et al., 2022; Garling et al., 2020; Chuah et al., 2017). Furthermore, others argue that understanding nature and how our lives are intertwined with it requires guarding the environment against destructive people's actions (Mayer et al., 2004). The method respondents refer to the environment as knowledge in their comments reflects the human-centric perspective of nature. They have confirmed that ecotourism was a good learning environment for encouraging individual growth, interpersonal interactions, and community development.

2.6.7 Perceived Value

The perceived value represents the customer's opinion or emotional appraisal of the value rendered to them by a good or service. The importance of the perceived values of tourists regarding their happiness with tourism destinations has been explained in recent studies (Lee et al., 2018). Wirtz and Zeithaml (2018) emphasised the following concepts of perceived value: (1) value was defined as a low price, (2) value was defined as whatever the customer requires in a commodity, (3) value was defined as the quality that the consumer receives for the price charged, and (4) value was defined as what a consumer receives for what a consumer offers. Although a multidimensional approach has been stated elsewhere, these concepts were consistent with a one-dimensional approach to perceived value (Kunkel et al., 2017; Schweiker et al., 2017).

How visitors view the importance of a tourist destination impacts their happiness, the decision to revisit the destination, advice to their peers, and contributes to more sustainable future growth (Pandža Bajs, 2015). Various researchers have attempted to explain the origins of visitors' perceived ideas about a destination. According to Kamdi et al. (2018), perceived value functions as a tourist's feelings and attitudes toward a good or service bought. Thus, perceived value considers the price of a good or service and psychological considerations such as perceived quality and emotional reaction (Kim & Park, 2017).

Jamal et al. (2011) created five categories of perceived value in Malaysia through community-based research: functional (establishment), functional (pricing), experimental (host-guest interaction), experiential (activity, culture, and knowledge), and emotional. Kim and Park (2017) investigated community ecotourism in South Korea using twelve factors and discovered four categories of perceived value: economic, functional, emotional, and social. Furthermore, they found that utilitarian, social, and emotional values favourably impact

overall happiness. Kim and Thapa (2018) discovered four perceived values on Jeju Island in South Korea in another ecotourism study: quality, emotional, price, and social. According to the authors, perceived quality and emotional and social values all influence the flow of experience and pleasure. Furthermore, the flow experience was linked to enjoyment, ecologically responsible behaviour, and destination loyalty in a significant and favourable way.

2.6.7.1 Concepts and Dimensions of Perceived Value

The literature review showed that "profits-sacrifices" and "trade-offs" were used to discuss conventional approaches for conceptualization and dimensionality of perceived value. The first approach of perceived value as a one-dimensional factor yields two parts: (1) profits gained (economic, social, and emotional) and (2) consumer sacrifices (value, moment, commitment, possibility, and accessibility). Perceived value was defined as assessing a visitor's perceived advantages and disadvantages. It is generated when visitor perceives that the advantages of purchasing products or services outweigh the sacrifices. This approach was used by Kim et al. (2017) to describe perceived value. However, scholars such as Jamrozy and Lawonk (2017) argue that the unidimensional construct implies that clients have the same understanding or common value sense, which is false.

Furthermore, the outcomes of various research experiments were difficult to compare, and the perceived value construct evaluation was uncertain (Moise et al., 2018). Athina et al. (2018) have criticised the perception of value for profit-sacrifices as superficial and part of the presumed package of benefits and sacrifices. Instead, it wishes to offer a comprehensive package of benefits and trade-offs (e.g., monetary and non-monetary characteristics).

Another approach was a conceptualised value as a multidimensional construct (Slack et al., 2020). This strategy gained attention to its potential to transcend the conventional

benefit-sacrifice approach's overemphasis on economic utility (Palos-Sanchez et al., 2021). A multidimensional scale also solves the validity problem by dividing perceived value into many factors (He et al., 2018). According to Palos-Sanchez et al. (2021), this method repeated the most recent scientific trend in consumer behaviour relating to emotions in purchasing and consuming habits.

Scaglione and Mendola (2017) discussed a wide theoretical framework to quantify perceived value, proposing the five value dimensions from the consumer viewpoint. The aspects were social, emotional, functional, epistemic, and conditional. Although this aspect was connected, not all dimensions have the same meaning. Gummerus et al. (2019) concluded that value was dependent on four dimensions in an investigation that focused on internet-based payment systems: (1) the technological dimension (referring to the outcome of service interaction), (2) the functional dimension (referring to the mechanism by which facility collaboration occurs), (3) the time-based dimension (referring to consumer perceives the sequential versatility associated with service interaction process).

Although perceived value can be evaluated differently, this research employed the multidimensional frameworks developed by Slack et al. (2020) to quantify perceived value. Gummerus et al. (2019) interpreted four dimensions of value: performance/quality, emotional, money value, and social for the durable goods environment. On the contrary, Kunkel et al. (2017) defined five dimensions of perceived value in the service context: service quality, emotional responses to the service, service credibility based on the service provider's image, and numerical and non-monetary/behavioural price. As a result, this study combined Gummerus et al. (2019) and Kunkel et al. (2017) measurements of perceived value, yielding five dimensions: perceived service benefits, emotional value, social value, value for money (monetary and behavioural price combination), and image. According to Whitaker et al.

(2017), service advantages were linked to the perceived performance or usefulness of goods or services (e.g., the willingness of service suppliers to meet client companies' expectations for the services provided). Emotional value contributes to the benefits derived from a commodity's ability to elicit emotions and affect states. Finally, personal and group collaboration benefits were referred to as social value.

Value of capital attributed to the expense, time, and commitment spent to sustain partnerships with business partners. Previous research, for example, has useful perceived worth as a multi-dimensional vector in different circumstances in the professional services telecommunication industry, business-to-business partnerships, and the tourism sector (Moliner et al., 2017). Woo and Kim (2019) introduced items assessing the five dimensions of perceived value (perceived service advantages, emotional value, social value, value for money, and image) because these writers have frequently used items in various industries. Since perceived value was considered in various types of interactions and severalcategories of facilities, major variations in their conceptualization may be posed by consumervaluation of perceived benefits and costs. In addition, the literature indicates that various goods or services require distinct points of perceived value components, which can have a negative impact on consumer perceptions.

2.6.7.2 Perceived Value by Tourist

Perceived value is defined as how people judge the value as they interpret it based on their expectations of how much they are willing to pay and what they get in return (Wu et al., 2017). In tourism, the perceived value was linked to the personal appraisal of travel goods, such as expense, results, emotions and social factors (Chiu et al., 2014). The effects of perceived value on various facets of tourist activity, such as happiness and behavioural intentions (Bajs, 2015) and commitment to the destination (Kim & Thapa, 2018), have been

studied by several authors. In multiple destinations, the positive effect of perceived value on satisfaction has been verified (Al-Ansi & Han, 2019; Chiu et al., 2014, Kim et al., 2015).

The value of experience can be characterized as "a constant flow of thoughts and feelings during moments of consciousness that occur through very complex psychological, sociological and cognitive interaction processes" (Trevarthen, 2017, p.48) during moments of consciousness that emerge as a result of a complex set of circumstances psychological, sociological, and cognitive interaction processes, and the quality of service was linked to a set of qualities. Both influenced the experience and engagement with a single destination (Altunel et al., 2017), intending to revisit a destination as the most widely used indicator of tourist loyalty (Zhang et al., 2018). Castellanos-Verdugo et al. (2016) reported that visitors have strongly rated the various facets of travel and destination in the Dominican Republic, validating the important relationship between these visitor scores and their satisfaction.

2.6.7.3 Perceived Value with Ecotourism

The perceived meaning was the fundamental structure for assessing visitor perceptions of ecotourism. The customer experience appraisal relies on how precious the content is (Eid, 2015). Perceived value offers an axis for attracting conscious visitors to express shared value; thus, the term has real repercussions for tourist eco-travel marketing (Kim & Park, 2017). Chiu et al. (2014) examined how visitors' emotional image and perceived meaning influenced their environmentally friendly activities of the destination; they found that the emotional image of the destination of ecotourism, mediated by emotional images and perceived values, had improved the environmental responsibility.

However, people involved in tourism and society must be aware of this obligation to ensure sustainable environmental practices and protect tourist heritage (Buckley, 2018; Campón-Cerro et al., 2017; Kim & Thapa, 2018). Several scholars have claimed that

although awareness was one-dimensional, dependent on the quantity of objective (actual) and subjective (perceived) knowledge about the environmental conditions of protected areas, environmental knowledge was multi-dimensional (Larson et al., 2015), and it must be segmented into two constructs. Therefore, environmental responsibility in tourists refers to travellers who make responsible journeys to and through certain natural protected areas of conservation (Wolf et al., 2017). Recent studies investigate the potential and zoning for ecotourism, nature conservation, sustainable tourism engagement, and residents' attitudes to protected areas and ecotourism (Balist et al., 2019; Carvache-Franco et al., 2018; Jojić et al., 2018). Different modes of tourism, such as ecotourism, green tourism, or nature tourism, have increased the demand for and popularity of nature-related tourism in recent decades. They distinguish themselves by being linked to leisure activities that promote a healthy lifestyle, posing a challenge to many locations to preserve resource sustainability, maximise the experience, offer value, and satisfy their tourists (Kim & Thapa, 2018). As a result, all the elements contributing to creating meaningful experiences for visitors affect cognition and love, increasing value. Therefore, when the variables that allow for tourism satisfaction and environmental interaction are shared, the value of the experience increases.

2.6.7.4 Perceived Value with Emotional Value

There was also little significant emotion in tourism, observational research to establish emotional relationships or imply tourists' attraction to destinations (Sharma & Nayak, 2018). According to Liu et al. (2020), tourists' emotions were related to their perceptions of their places, psychological cognition, and love. They can bring those memories after they return home. This experience affects travellers' perceptions and feelings, contributing to environmentally responsible behaviour (Su & Swanson, 2017). The researchers found that tourists' changing behaviour was connected to their cognition and

affinity for travel destinations. As a result, their travel experience encourages them to consider their ecotourism approach.

Thus, the attitude consists of awareness, affection, and actions, and there were interrelated and hierarchical implications. This study used the idea of value-attitude-behaviour. From the perspective of this research, the cognitive component of happiness with the eco-travel experience of travel was the affective element of attitude, emotional meaning, and engagement in actions to investigate the nature of environmentally sustainable behaviour. Several studies see participation as a precedent predictor and integrate it with the social factors of leisure to investigate their associations with an emotional meaning, such as visitor loyalty (Luo et al., 2020).

Perceived value was also a significant indicator of satisfaction, as Sharma and Nayak (2018) have discovered. In this context, satisfaction with eco-travel refers to travel qualities and an essential dimension of love. Several studies also contend that visitors' satisfaction influenced their evaluation of those encounters. Finally, satisfaction can be defined as a reaction to customer compliance and contributing to posterior purchasing decisions.

Several product and service reports have shown a direct link between perceived value and consumer loyalty (El-Adly, 2019; Keshavarz & Jamshidi, 2018). Customer happiness was believed to result from perceived value (Liu et al., 2020). This perspective was also supported by Pham et al. (2018), who argue for the importance of the relationship between perceived value and consumer satisfaction. The literature on value disconfirmation confirms the relationship between consumer-perceived value and consumer loyalty (Keshavarz & Jamshidi, 2018).

2.6.7.5 Perceived Value with Social Value

Social value was the perceived utility of a product or service to produce or improve personal images such as credibility, social status, ethnic identity, and personal characteristics obtained from the ability. The most powerful marketing methods towards environmental education and promotion were the two strategies used by ecotourism operators to raise awareness among visitors and promote ecotourism. by utilizing social media such as Facebook and Twitter (Sarkar et al., 2016). Social media have been considered to uphold environmental values and protect and maintain the sustainability of internet capital (Karmini, 2020). Social media was also used to reflect the core qualities of ecotourism (Xiang et al., 2017).

Using the Internet as a promotional medium for explaining ecotourism and its elements only describes conceptual descriptions of ecotourism provided by operators (Massi & Nisco, 2018). Most ecotourism operators overlook local community engagement, education, and biodiversity issues (Wondirad, 2019) because they do not have experience in meeting any of the core ecotourism concepts (Lv, 2018), and they also need to improve their marketing concept to encourage ecotourism successfully (Dimitriou, 2017). Um and Yoon (2020) discovered functional, affective, and social values, which were similar to our "functional" and "social and emotional" values. Price, quality, emotional, and social perceived values were also discovered by Kim and Thapa (2018), which corresponded to the functional, economic, social, and emotional characteristics.

Hence, in ecotourism, social values greatly impact flow experience and contentment. Furthermore, the flow experience was linked to satisfaction, ecologically responsible behaviour, and destination loyalty in a meaningful way.

2.6.7.6 Perceived Value with Perceived Sacrifice

Perceived sacrifice was given up to obtain a good or service (Hsu et al., 2018; Kim et al., 2017). Researchers indicate that perceived sacrifice consists of monetary elements such as expense (Hsu et al., 2018) and non-monetary elements such as time, cost of the quest, and physical effort (Küster & Pascual, 2021). Perceived sacrifice was presented through three distinct lines, offering a different perspective: intention to revisit, word of mouth, and intention to pay. They identified tourist efforts as the willingness to revisit or pay for the service and reflect the tourist's meaningful experience. Shaw and Sergueeva (2019) stated that consumers' perception of value was based on a trade-off between the characteristics they perceive in the product and the sacrifice they perceive by paying the price. The other factor influencing perceived value concerning perceived sacrifice was a non-monetary sacrifice, including time, search costs, and physical effort (Küster & Pascual, 2021;Hsu et al., 2018). Therefore, the sacrifice was calculated based on price, effort, and time (Hsuet al., 2018). Therefore, regarding the relationship between perceived value and intention topurchase, perceived sacrifice on a non-monetary price (time and energy) appears to be a significantly weighted variable (time and energy).

2.6.7.7 Perceived Value with Experiential Value

Ahn et al. (2019) described experiential value in the service encounter as customer evaluations of service quality, excellence, aesthetics, and playfulness. The actual memory can be faded, but it would be more difficult to forget the experiential value (Tsai et al., 2017). Zhang et al. (2018) argued that the perception of consumption was integral to customers' decision-making. Gentile (2017) also held the same conclusion and asserted that substance and experiential values could be generated by absorbing knowledge.

Aesthetic principles were often used in the design of personal information exchange, entertainment, and technical goods (Toufani et al., 2017; Bacerra, 2016). However, the aesthetic elements of such products were unclear, as was whether and how an appreciation of the product's aesthetics can lead to the intent of purchasing by personal (rather than business) consumers. In Human-Computer Interaction (HCI), the significance of visual aesthetics has to be understood, and the aesthetics of user interfaces have become a major concern. Although research has been conducted on the factors influencing a product's aesthetic appeal (Le Hoang, 2020), few studies have focused on how aesthetics influences purchasing decisions (Ayodele et al., 2016).

The interaction of hedonic appeal and utility was best understood by looking at possible relationships between aesthetics and purchasing intention, especially in terms of the types of perceived values that can be evoked and their relative significance, which can contribute to better product and advertisement strategies that were better suited with these perceived values. Although perceived value has been measured using unidimensional or multidimensional scales (Woo & Kim, 2019; Kunkel et al., 2017), the multidimensional approach was more suited for measuring customer buying patterns (Bezerra et al., 2016). The socio-psychological aspects of the consumption of hedonic and social can be as critical as the utilitarian regarding the visual attractiveness of goods and functional aspects. Perceived value is a significant precedent that affects the desire of customers to buy (Seol et al., 2016). The greater the expected value is, the greater the purpose of buying is likely to be (Osivnik et al., 2020).

Jain et al. (2017) suggest that consumer loyalty is connected to three major themes: (1) mental state, which includes successful and continuous cognitive processing; (2) instrumental and experiential value assurance; and (3) emotional bonding, enjoyment, and

happiness. Ponsignon et al. (2017) made similar suggestions concerning the conceptualisation of customer experience. They further explained three potential methods of approaching consumer involvement: a process, a behavioural manifestation, and a psychological condition. Therefore, the interpretation of engagement can vary depending on the participants, i.e., subjects (e.g., employers, pupils, employees), and artefacts (e.g., brand, service, course, smartphone application) of interaction.

2.6.7.8 Perceived Value with Functional Value

Functional value involves the utilitarian features and resources that a commodity can provide. The value is also manifested by the composite qualities of a commodity, such as attributes or attributes that can give perceptions of utilitarian success (Lin, 2020). According to Fritze et al. (2019), functional value refers to the capacity of a commodity to serve its functional, utilitarian, or physical intent. Although it depends on some salient physical characteristics, price is sometimes the most significant functional value.

Smartphone apps have been described as "end-user device apps that were optimised for the operating system of a mobile phone and expand the phone's functionality by allowing users to perform unique tasks" (Talal et al., 2019, p.285). On the one hand, this concept explicitly represents the smartphone's association with a network and mobile applications as the software makes the computer beneficial to users by delivering content.

Therefore, the device's functionality, accuracy, and responsiveness influence a user's experience. It was not about a catastrophic crash; something that restricts the user experience or prevents the programme from fully achieving its intended goal may be considered a flaw.

2.7 Conceptual Framework of Ecotourism Smartphone Application Scale (ESAS)

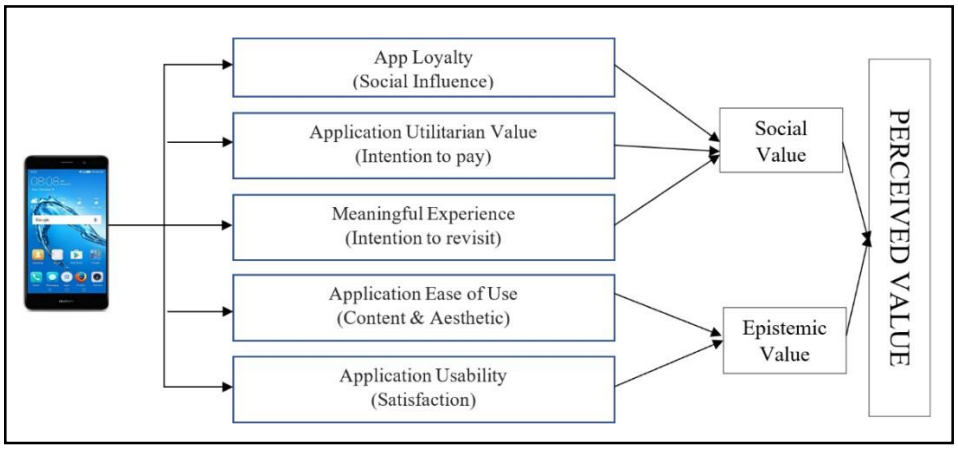


Figure 2.5: Measurement Model of Ecotourism Smartphone Application

The conceptual framework model of this research asserted that the visitors intended to use the smartphone application to determine the social and emotional value. The visitor's perceived value attracted significant attention from a technological perspective. Earlier research categorises perceived value as a multi-dimensional construct. It encompasses a broad series of issues, such as identifying different dimensions of perceived value with different backgrounds of perceived value and the values that affect the relationship between perceived value constructs. Former studies have provided a rich range of dimensions from which this study will choose several dimensions of the conceptual framework development to signify a value proposition for mobile application use.

In addition, social value and satisfaction have mediated the perceived value effects of convictions (i.e., emotional value and social value) on generating feelings and emotional changes in reputation, social status, ethnic identity, and personal characteristics. Therefore, the perceived value was identified as a potential measure of mobile technology use (Hsu et al., 2015; Chang, 2015). In addition, the quality of apps also plays a significant part in the

app's perceived value. As a result, perceived value, with experiential and functional value, was proposed as an inspiration for application use.

Furthermore, user experience using the mobile app influences perceived sacrifice on what the user pays. For example, monetary, time, and perceived risks determine users' objectives for using the apps and purchasing their apps. In addition, the value dimensions in the combined dimensions approach contained the application's ease of use, meaningful experience, application utilitarian value, application loyalty and the application's usability. Next, the values reflected from this framework reflect the perceived value. Finally, the perceived value beliefs were reflected in social and epistemic values.

The factors that unified the study and the lens of value perspectives incorporated into this study were the customer behaviour in the purchase, and uptake, whilst abandonment of tourist facilities was tourist behaviour. Services were known to be intangible, which made them harder to market. In addition, they often have an added complicating factor since they are typically situated away from customer behaviour.

Social influence was a definite indicator of mobile ads in mobile communication (Peng et al., 2017). Social impact has positively predicted the adoption of 3G mobile technology (Ghazali et al., 2018) and was perceived to indicate intent to use the mobile application. Users can download mobile applications for entertainment, valuable services, or communication. In past research, instrumental usage, connection, passing the time, communications, and entertainment were primary motives in previous studies on the use and rewards of developing communication technologies (Kang, 2014; Kim et al., 2017). Findings on encouragement for cell phone use emphasise entertainment and usefulness (Schmitz et al., 2016). Users may take advantage of being educated, amused, and engaging with companions

for contact, providing the devices' versatility and app usability. Motivational variables explicitly precede contextual variables that affect the purpose of usage. However, this conceptual linkage has not been tested in a mobile app. Therefore, the current study incorporates social influences in the context of motivational, functional, and contextual variables that predict the meaning of using ecotourism mobile apps, as mobile apps can meet basic human needs.

Souiden and Jabeur (2015) described purchase attitude as “the intentions of an individual”, whilst Belch and Belch (2003) suggested that when there was a match between purchasing attitude and brand features, buying intentions were established. “Buying power naturally involves a choice between different brands in a given category of products” (Xie & Lee 2015, p.204); thus, advertisement helps to build favourable attitudes towards the brand to improve intention to pay.

Kumar and Mukherjee (2013) analysed the attitudes of smartphone users towards shopping and their smartphone purchasing attitude and discovered that mobile shopping does not often initiate buyers to buy the device. Furthermore, findings show that attitudes towards technology affected users' expectations towards mobile shopping, influencing users' attitudes towards it and purchasing attitudes. The researchers suggest that personality traits affect consumers' perceptions and attitudes towards mobile application purchases.

Several studies have examined the association between meaningful experience with the purpose of buying and found they have a profound impact on changing the purchasing intentions of customers (Pappas et al., 2017; Ko et al., 2017). Kim and Ammeter (2018) found that the purchase of the application greatly influenced buying intentions for both accustomed and unaccustomed mobile applications. The buying intent on the branded applications effects

was examined on the understanding and experiential of the app (Kim et al., 2016). The branded apps had a constructive impact on the mindset but a smaller effect on purchasing intentions.

Relevant content and easy-to-access applications generated meaningful experiences by resonating and encouraging visitors to engage with the mobile tourism application. The meaningful experience of tourists using a mobile app was understanding the content of their travel information and staying entertained by the user. Information security and confidentiality will be paramount in the availability of the technology and customers' feel. As a result, customers were more comfortable buying and allowing consumers to get the most out of a mobile application.

There was a link between meaningful experience and the intention to re-visit the application that provides the tourist with the decision-making process (Tan et al., 2016). Information technology, such as mobile apps, greatly influenced the travel and tourism industry. Studies have investigated the connections between technology and tourism due to meaningful travel experiences and behavioural influences (Liu et al., 2017). Visitors in tourism will express their positive or negative opinions towards mobile application usage. However, developing meaningful tourism mobile applications for future travelers to re-visit the mobile tourism app was an important incentive for tourist travel.

The users support the mobile application when the users obtain a unique and optimised mobile application experience. Users approve applications when they download them, to be more specific. The increase in mobile apps indicates that those who use apps outnumber those who do not.

Application ease of use was defined as the value of the application's design regarding usability and user comprehension. It was crucial because when a design was correctly interpreted, users felt more relaxed, which increased their desire to use the application. These variables have already been investigated in the study of Magrath and McCormick (2013) and Al-Qeisi et al. (2014).

Consumers were more drawn to the app, increasing their productivity through content awareness and keeping them more aware of the content than others. Researchers confirmed that when users embrace technologies leading to continuous use of the app and resulting to this, it influences the user's satisfaction with the mobile application quality (Murphy et al., 2019; Wang et al., 2016). Many implications of the findings indicate positive emotion during navigation and provide secure, high-quality, and attractive content. Marketers can also develop applications for various devices, such as tablets and mobile phones, to improve the user experience and knowledge.

Aesthetics was the context in most Information System (IS) or Information Technology (IT) literature that has been under-studied and needs further attention. The aesthetic is the function of any technology that connects to the design, animation, or visual components and grabs the consumer's mind in one go, and it is more connected to the mobile app's utilitarian qualities (Hew et al., 2015). Mobile apps capture user attention based on good visuals and graphics.

Content plays a critical part in mobile app design. A mobile application has become increasingly critical and was known to captivate the user's attention on the mobile device as the trend of mobile devices increases. Language, visual aids, and graphics were considered the content in mobile application development to engage the user.

“Readers can understand short, simple text content on mobile devices just as well as on computers, but they slow down when reading difficult content on mobile.” Nielson Norman Group (2015).

Customer loyalty and satisfaction are two factors that should be considered when developing a mobile app. Past purchase, purchase rates, and frequency affect consumer loyalty's perceived value. In addition, customer loyalty infers psychological involvement, favouritism, and a positive attitude toward a specific mobile application (Chang, 2015). Over time, customers' loyalty can be integrated with positive word of mouth (WOM). According to Solimun and Fernandes (2018), maintaining and strengthening the loyalty of current customers was critical to achieving a competitive advantage for mobile service providers. Large wireless service providers have concentrated on a continual influx of pitches, including free phones, updates, and free pitches, in response to a rising rate of user defection. In addition, this study explores visitor loyalty and the behavioural intention to use mobile applications with their existing service providers frequently and their desire to suggest mobile apps to others.

"Customer satisfaction can be defined as the "psychological instantaneous state that results when the immediate emotion disconfirmed opportunities were coupled with the previous feelings of the consumer about the knowledge of consumption" (Sun et al., 2017, p.727). In the online context, as opposed to their interactions with conventional retail stores, Quan et al. (2020) and Vasić et al. (2019) defined satisfaction as customers, judgment regarding their Internet trade experience. Mclean et al. (2018) concluded that satisfaction with mobile commerce was the complete response to the mobile commerce environment’s shopping experiences. As an outcome of this study, satisfaction was understood as consumer insight into consumption using mobile applications.

2.8 Summary

This chapter describes and covers the accessibility of smartphone apps and mobile applications. Customer interface factors that affect the long-term use of a tourism application were also clarified. The literature research identified these application qualities, tourist behaviour, tourist experience, and emotional aspects. The usability of smartphone apps in ecotourism was also linked to smart tourism from a different perspective. The literature review undertaken in this chapter has revealed four dimensions of visitor perceivedvalue: social, functional, sacrifice, experiential, and emotional.

Different studies in various contexts have looked at functional, social, and emotional aspects and were further defined as further research was needed. A functional value was linked to the degree to which desirable functions, reliability, consistency of performance, usefulness, and useful service, irrespective of its attributes. Social value was defined by relational or network advantages, networking, personal engagement, building trust or dedication, and responsiveness; self-image may also be included. Emotional value is the degree to which a product produces suitable sensations and feelings for the user (e.g., aesthetics, happiness, pleasure, excitement, adventure, etc.). As identified in the literature, the social value was interpreted as a mobile environment. Finally, perceived sacrificial value addresses.

Smartphone technology provides users with different tourist knowledge and helps with real-time decision-making. Visitors use mobile devices and apps to get accurate information, plan routes to their destinations, and change routes if necessary. Using mobile technology, visitors can capitalise on opportunities and create value. Destinations may use sensor-based data collection technology and big data analytics technology to monitor and respond to potentially adverse environmental effects in advance. Companies, as suppliers,

can generate economic value by providing individuals with optimized information derived from context-aware data centred on consumers' lifestyles and positions.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Chapter 3 emphasises the detailed flow of this research, justifies the method related to the literature review, and describes the data collection process. This study has a set of steps to follow, and this systematic approach begins with the research design, which should be integrated into the data collection process. This section elaborates on the main study methods, research instruments, and sampling methods. In addition, the method of scale development and the findings were addressed in the second part of this chapter.

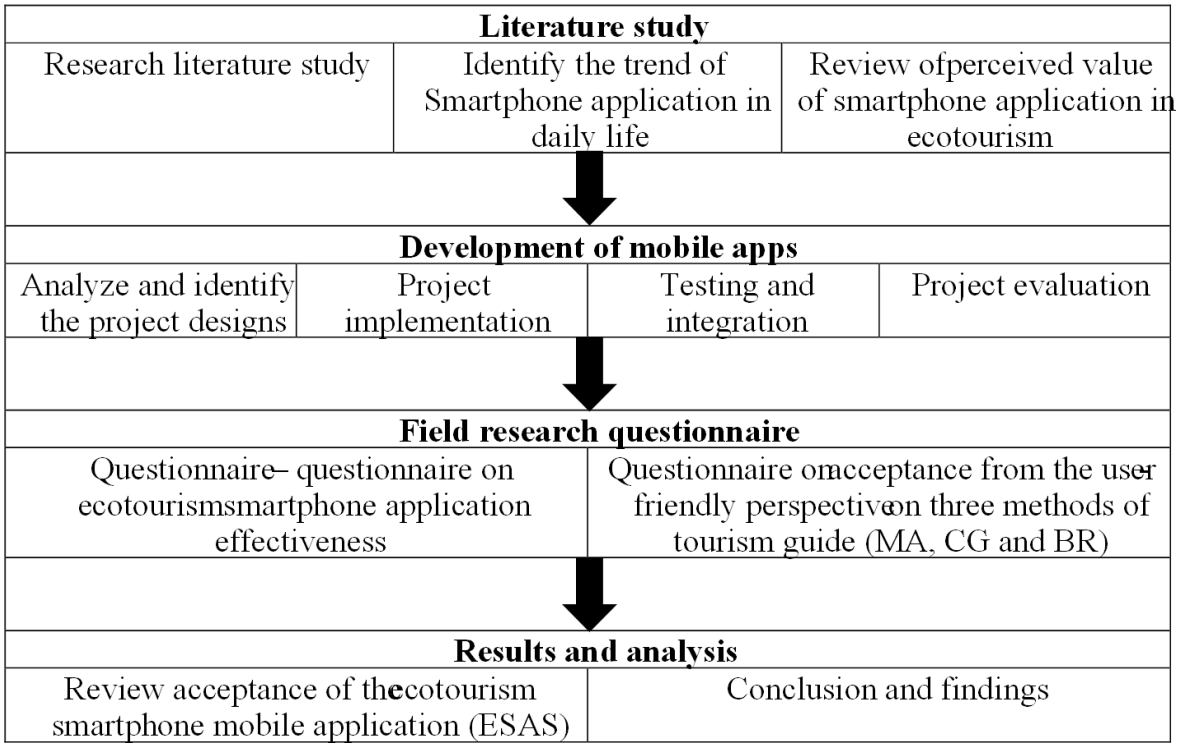


Figure 3.1: The systematic literature mapping.

This section describes the systematic literature mapping method applied in this study. This section also addresses the details of evaluation preparation and actions. The literature mapping analysis method was based on the recommendations of Petersen et al. (2015). Other systematic mapping studies in data synthesis and interpretation have also influenced this study.

According to Petersen et al. (2008), the Figure 3.1 hierarchical literature mapping method consists of five (5) discrete steps. The literature study in the first step was elaborated in Chapter 2. The second step was on the NAF mobile application development. The third step was to perform the search, followed by keywording for the questionnaire development and screening the questionnaire based on the research questions of this research. Finally, the end stage was the result and analysis of this research. The analysis method will aid in achieving research objectives, followed by the conclusion and recommendation.

3.2 Research Design

The research design attempted to convey how research developments should be modelled. According to Leavy (2017), a research design is an inquiry plan or configuration and strategy designed to elicit responses to research questions. It was frequently referred to as a strategy or idea for a study involving the convergence of theory, techniques, and specific methods (Turner et al., 2017). According to Rahi (2017), the research design ensures that the analysis and issues were important and used in the study. Considering the research's essence and context can help limit the relevant study approach. As a result, a researcher must consider the study approach used to conduct research using a research philosophy. Knowing the research's essence and context can help assess the appropriate approach for the analysis. Before directing the research, the researcher must contemplate the philosophy of science, the

investigative technique related to science philosophy, and the practical methods that interpret the methodology into action. Figure 3.2. illustrates the planning of a study, a researcher must contemplate the philosophical worldview assumptions that it will bring to the study, the strategy of inquiry that will be used in conjunction with this worldview, and the specific methods or procedures of research that will be used to put the approach into practice.

There were two key definitions: the research approach entails philosophical assumptions and diverse methodology or procedures, and both components were important. The research strategy was the plan or proposal to conduct research, and it involves the confluence of philosophy, study designs, and specific procedures to undertake the research. Figure 3.2 depicts a framework the researcher employed to illustrate the interaction of these three components. Hence, Creswell et al. (2016) express the association of qualitative, quantitative, and mixed research methods interconnected to philosophical worldview, quantitative strategies, and research methods.

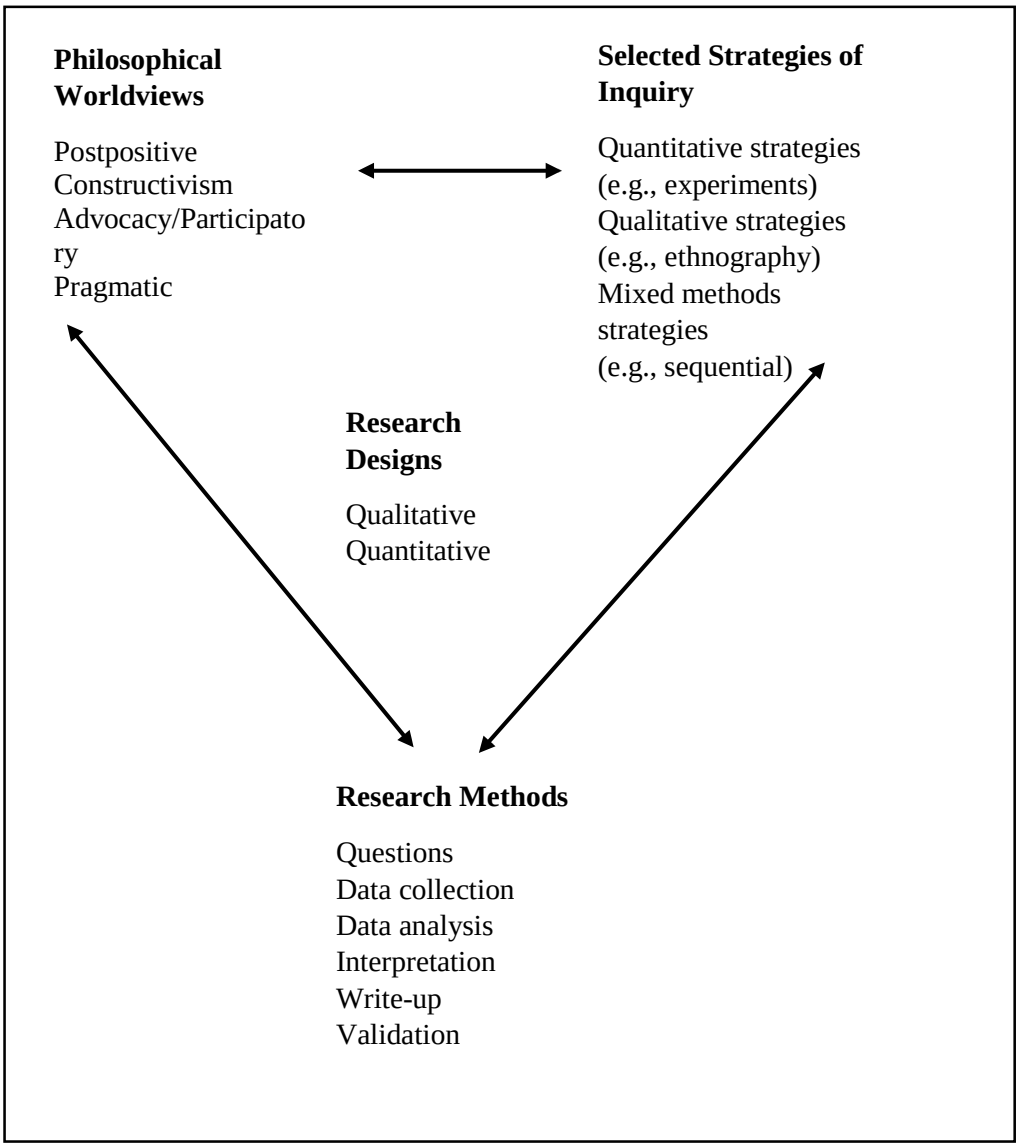


Figure 3.2: Philosophical Worldviews, Strategies of Inquiry and Research Method Association

Note: Reprinted from Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). Qualitative research designs: Selection and implementation. The counselling psychologist, 35(2), 236-264.

3.3 Philosophical Worldview of the Research

Philosophical principles were preserved in a research study (Tyler et al., 2018), shaping research practice. Tyler et al. (2018) propose that those planning a research project or strategy should clarify the significant philosophical concepts they shared. The preceding statement encourages the researcher to approach qualitative, quantitative, or hybrid testing methodology.

The term "Worldview" was used to refer to a specific set of values (Rousseau & Billingham, 2018), while others referred to them as paradigms (Makombe, 2017; Brierley, 2017), epistemologies and ontologies (Naepi, 2019), or commonly formulated research methodologies (Luciani et al., 2019). The four distinct worldviews debated in the literature were post-positivism, constructivism, advocacy/participatory, and pragmatism. Table 3.1 lists the key components of each position.

Table 3.1: Elements of Four Worldviews

Post positivism • Determination • Reductionism • Empirical observation and measurement • Theory Verification	**Constructivism** • Understanding • Multiple participant meanings • Social and historical construction • Theory generation
Advocacy/Participatory • Political • Empowerment Issue-oriented • Collaborative • Change-oriented	**Pragmatism** • Consequences of actions • Problem-centred • Pluralistic • Real-world practice-oriented

Note: Reprinted from Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). Qualitative research designs: Selection and implementation. The counseling psychologist, 35(2), 236-264.

Quantitative methods were also compatible with post-positivism. Post-positivists believe in determinism, meaning that outcomes or consequences can be influenced.

Therefore, it was also essential to identify the factors that influenced postpositive study outcomes. Post-positivists prefer to simplify theories to a few ideas to be evaluated, begin hypothesis testing, collect evidence supporting and opposing the concept, and make appropriate modifications before conducting further research (O'leary, 2017). Constructivists believe that people's expectations attempt to explain the context in which they live (O'leary, 2017). This worldview was generally used in conjunction with a qualitative study. Researchers extend subjective interpretations of the object and prefer to expand their ideas from conversations and encounters with others to various points of view. Constructivists create a pattern of meaning with the theory as in post-positivism.

Political ideology also influenced activism and participatory worldview, more commonly related to qualitative than quantitative methods (Kaushik & Walsh, 2019). Typically, the researcher begins research on a social problem related to a specific policy that will improve and expand people's lives and organisations where the researcher lives and works.

Before the post-positivism context, pragmatism derives its worldview from actions, conditions, and consequences. Pragmatists were thus defined by their functions and practices (Atkinson, 2017). As a result, they work on scientific topics and employ multiple methods to address problems, and they are frequently associated with mixed-method analysis. However, pragmatists were not constrained by post-positivism and constructivism's intellectual and functional constraints in this context (Neesham, 2018).

The researcher has a pragmatist worldview similar to the philosophical worldviews described by Tyler et al. (2018). Therefore, the researcher will define and evaluate the relationship between the model structures and use a statistical method to validate the findings. Respondents often gathered data using qualitative and quantitative methods for the study.

This study's objective was to find an association between various constructs. In particular, to compare the perceived value of visitors with ecotourism smartphone applications used during their stay. At the same time, it also explores the results of tourist learning and the satisfaction of the visitors of the control group tour.

This study employed a quantitative and qualitative (mixed research method) that focused on variable correlations. The analysis prompted the researcher to assess the significance of variables introduced by service providers (smartphone apps) and the perceived value relationship's impact on the other constructs. In addition, this study employed a semi-structured interview with the NAF's owner during the exploratory phase. The interviews were intended to gather preliminary data for designing a smartphone application.

A self-administered email and a social media (Facebook) survey medium were used to collect data. The constructs evaluated in this study were perceived value, meaningful experience, tourist behaviour, and mobile application quality. For this study, multi-item measure scales with 5-point Likert scales were used. All elements were used to calculate the modified items and reworded to fit the constructs used in this analysis. Combining qualitative and quantitative methods gives the research a large amount of valid and in-depth data and complements in developing research methods (Rahi, 2017).

Two instruments were used to collect data for this analysis. The first was the General Experience Scale (GES) and the Ecotourism Smartphone Application Scale (ESAS). GES was used to assess the general experience of visitors using three separate tour guides, including the Smartphone Application (SA) guide, Paper-based Brochure (BR), and Control Group, without using any parameters (CG). The ESAS scale was used to assess the relative worth of ecotourism tourists via a smartphone app.

The ESAS scale contains four sections (Sections A, B, C, and D). Section A comprises questions about respondents' demographic context, Sections B and C comprise questions about visitors' general experiences, and Section D comprises questions about the structure of smartphone application usage in ecotourism. The items used to calculate the structures have been modified and amended to accommodate the research context. A pre-test was performed on the known facts to determine which data would be collected for the following experiment process to ensure that the respondents found the language of the items to be consistent and understandable. The researcher should identify potential issues during the pre-test to ensure face validity.

An expert analysis (Appendix F) was performed by three UNIMAS lecturers using a pre-testing protocol. This examination aimed to ensure the questionnaires' format, language, and clarification so that respondents could understand the questions without disruption. Expert analyses were also performed to resolve issues before the final data collection process. In addition to the expert feedback, the required changes were made and distributed to the respondents.

Two statistical approaches were used to analyse the results. To interpret the data and provide descriptive interpretations of the study data, the researcher used IBM Statistical Kit for Social Science (SPSS) version 23. The IBM Statistical Kit for Social Science AMOS version 26 was utilised to measure the estimation model and assess the relationship in the structural model.

3.4 Research Sampling

3.4.1 Study Area in Sematan, Sarawak

This research was conducted at Niranur Agro Farm (NAF) in Sematan, Sarawak, and the location is shown in Figure 3.3. According to the Sarawak Ministry of Tourism, the Sampadi-Lundu-Sematan-Telok-Melano zone will be developed into an ecotourism corridor and launched as a new tourism commodity (theStar, 2014). Furthermore, the Lundu District Officer En. Hamsien Atar has approved an ecotourism master plan, which, according to him, will turn Lundu Sematan into an ecotourism hub because it contains elements of the sea, beaches, mountains, rivers, islands, and flora and fauna (Theborneopost, 2017). Malaysia has a great diversity of ecosystems. Ecosystem diversity refers to the variety of habitat types, biotic communities and ecological processes found in a given area's terrestrial, marine, and other aquatic ecosystems, as well as the processes and interactions that occur within these systems across them. The terrestrial ecosystems in Malaysia concentrated on the forests because forests almost entirely cover the country. However, Malaysia's top tourist attractions were rainforests, wildlife, and scenic beauty. Therefore, Malaysia's ecotourism primarily focused on tropical rainforests, sea habitats, and wetland ecosystems (MOSTE, 1998).

This study used a bee farm located at Sematan, Kuching, Sarawak. Bees were among the most common pollinators in tropical forests and one of the most common pollinators in agriculture. In addition, the relationship between bees and plants was critical to their environmental survival. Therefore, ecotourism may also be seen as a new way of encouraging bee protection in Malaysia by minimising forest clearance for agricultural, mining, and industrial purposes. Also, ecotourism restoration forests will help conserve the stingless bee nest and its habitat (Niranuragrofarm, 2017).



Figure 3.3: Location of Sematan Niranur Agro Farm

(Source: adapted from a Tourist attraction in Sematan site: https://niranuragrofarm.business.site/)

Tourism has a significant impact on a community. Tourists were the most visible source of return to destinations. However, this return was a concern, and the number of people who reap the benefits of aid varies greatly. The study explores the ecotourism smartphone applications use by examining the application's ease of use, meaningful experience, application utilitarian value, visitor's application loyalty and the application's usability.

3.4.2 Niranur Bee Farm (NAF)

Mohamad Aluis, in Figure 3.4, started his bee farm with two hives that he collected from the Sematan mangrove swamp forest. His parents helped him develop the bee farm using a family-owned piece of land in Sarawak's southernmost district to start an agro-farm for these stingless bees.



Figure 3.4: Founder of Niranur Agro Farm

Figure 3.5 illustrates the Niranur Bee Farm, and in 2015, the founder of NAF started with 15 beehives, and he increased the number of hives to 40 in a year. He then increased the number of hives to 160 in 2017, 180 in 2018, and 220 in 2020. Furthermore, he increased his production of kelulut honey in tandem with the growth of the hives, from 50 kg per month to around 100 kg today.



Figure 3.5: Niranur Bee Farm, Lundu Sematan,Sarawak

The Bee farms also provide a steady income with a preliminary revenue of RM8,000 per month, which has increased to RM12,000. However, he recognised that the business was not without difficulties and challenges. Because of its small size and stingless nature, the result was frequently a target for larger bees and hornets.

Mohamad Aluis' use of social media for marketing has made his company profitable. Mohamad Aluis stated that he had appointed several stores and distributors to market his goods, particularly in Kuching and Kuala Lumpur, but most sales were made through social media platforms.

In 2015, he also opened the Niranur Agro Farm to attract approximately 40,000 visitors annually. He anticipates a growth in the number of tourists in the coming years. Entry to the farm was free, but a visitor could taste the result honey for a fee of RM3, in which visitors could taste the raw honey with a straw directly from the hive.

3.5 Mixed-Method Research

The sequential analysis used the exploratory methodology, including inductive and deductive methods. The findings of the first-based research were subjected to both a qualitative and quantitative study (Asprers & Corte, 2019). The aim of a better understanding of Malaysia's ecotourism sector was discovered and gained from the respondent's responses. In this kind of analysis strategy, qualitative data improves designing or identifying quantitative tools, creating categorical knowledge by simplifying preliminary qualitative examples with quantitative data collection (Asprers & Corte, 2019).

Data were gathered through a personal interview with the NAF owner to gauge his expertise and determine his expectations and motivations regarding the relevant variables for the measurement model. The interview took place at NAF Sematan. The interview took about two hours to complete. The interview was transcribed to extract key points that can be used to develop mobile applications and measurement items during the data-gathering phase. A list of interview questions is attached as Appendix I. As described in Chapter 2, the measurement model framework includes the following variables: Application Ease of Use (AEOU), Application Loyalty (ALO), Meaningful Experience (ME), Application Usability (AU), and Application Utilitarian Value (AUV). In addition, this research used a survey-based method to accomplish objectives and address research questions. The survey-based method was beneficial to this research because it ensured that the study's objective was discussed within the framework of the measurement model.

A survey is a methodology that gathers information from a group of individuals' survey questionnaires (Zikmund et al., 2003). According to Lamm and Leamm (2019), survey polling was a method to collect participants' demographic profiles, opinions, and perceptions at a given time. Furthermore, Maymone (2018) and Zikmund et al. (2015)

highlight that the survey-based methodology was quick and low-cost and can be applied to a large survey group. O.Nyumba et al. (2018) identified broad surveys (200 or more respondents) as a key reason the survey testing approach was used.

A self-administered survey was used in this study to gather quantitative data. According to Zikmund et al. (2015), the self-administered survey was "a data collection technique from the respondents and recorded the respondents' answers" (p.12). Although the questionnaires were self-administered, the consistency of the terms used was also important. Furthermore, according to Succi and Cannovi (2020), the researcher created a successful questionnaire. Therefore, a valid questionnaire was essential, allowing the researcher to gather accurate answers to this study's research questions. However, the reasons for using this approach in this study were explained using numerous advantages of using self-administered questionnaires, such as:

i. Self-administered questionnaires were questionnaires that were simple and respected the respondents' privacy.
ii. Self-administered questionnaires were cost-effective, and a detailed questionnaire was less expensive than a physical test (Iragorri et al., 2021).
iii. Participants may respond to the questions even if the interviewer is absent (Moser & Korstjens, 2018).

Based on the advantages of a self-administered questionnaire, a suitable option for this study was a self-administered questionnaire. Several researchers with a business-to-business background have used self-administered questionnaires (Moser & Korstjens, 2018). Therefore, a mail survey method was used to distribute the self-administered questionnaires. In addition, a mail survey was useful in collecting answers to multiple questions from a geographically dispersed sample or prohibitively expensive when conducting telephone

interviews (Farooq & Villiers, 2017). The online survey was created with Google Forms, and the completed surveys were submitted to the researcher by pressing the submit button. This method was used because the respondents' locations were geographically dispersed, which explains why Google form surveys were sufficient for this study.

3.6 Sample Size

The required sample size was critical as it decreased the likelihood of a Type II error, which embraces the study results when they must be denied (Nyumba et al., 2018). Several approaches to determining sample size have been proposed in the literature. According to Roscoe 1975 (cited in Nyumba et al., 2018), the rule of thumb in sample size estimation was double the number of variables to achieve more consistency, and it should be times ten or more. Whitehead et al. (2016) simplified the decision by presenting a table to guide the sample size appropriate to the given population. Moser and Korstjens (2018) proposed that a 100 to 150 sample size was acceptable.

In contrast, Kock and Hadaya (2018) recommended a sample size of 100 to 200 people. The "ten times law" was used to determine the sample size for this study. According to the "10 times law," the required sample size was "ten times larger than the predictor variables in the research model" (Klaver et al., 2016). The current study includes four predictor constructs (e.g., perceived value, ease of use, usability value and meaningful experience), and according to the rule of thumb, the mandatory minimum sample size was forty respondents for this study.

3.7 Questionnaire Development

A questionnaire was a "formulated written set of questions to which respondents record their responses, usually within alternatives that were rather closely defined" (Sekaran

et al., 2020). Transparency was key to writing the questionnaire and developing its detailed layout. In addition, the questionnaire was commonly used in marketing relations (Pwere et al., 2016; Moliner et al., 2007), making the questionnaire more efficient for collecting data.

The survey instrument or questionnaire was developed in this study using the three-stage survey creation method suggested by Raja Sreedharan et al. (2018). First, a comprehensive literature review was conducted to identify the appropriate measures and their accuracy in the construct analysis. Questionnaires from the previous studies were adapted and redesigned to fit the context of this study. Finally, based on the current literature, the data gathered from exploratory discussions were organised into dimensions.

Second, three experts reviewed the questionnaire for appropriateness, readability, and uncertainty (Grindrod et al., 2016). The expert opinions helped to fine-tune the questionnaire elements. As a result, the survey questions were free of ambiguity or ambiguous words. In addition, the words and terms used have been set as simple as possible so those without formal education can understand the questions.

The questionnaire was updated based on all of the experimental study's input. The experimental study aimed to collect data from the study's final subject as a reference for the more extensive study suggested by Wicherts et al. (2016). Cronbach's Alpha was calculated once the data was obtained to assess the reliability of the items.

A total of six-page questionnaires comprising 108 items, divided into two parts, was the final set of questionnaires used to collect information (Sections A and B). Section A will include items offering insight into the respondent's demographic history. Section B items aim to measure the variables in the analysis. There were varying opinions on the length of the questionnaire. However, Sreedharan et al. (2018) mention that up to 12 pages of questionnaires were sufficient. "A general rule of thumb was that questionnaires should not

exceed six pages" (Zikmund 2003, p. 214). The questions set for this study (excluding the cover letter) fall within the six-page limit. In addition, the questionnaire was written on both sides of the document to give the impression that the survey was not too lengthy. Finally, questions were structured correctly, ordered, and easily spaced to reduce eye strain, affecting respondents' responses (Shammount, 2007).

3.7.1 Type of Questions

In this study, the researcher used closed-ended questions for the online survey on scale development. In close-ended questions, a range of substitute responses and the respondents must answer all the questions provided. Singer and Couper (2017) stated that close-ended questions give high consistency, are easily managed, fast and easy to collect the necessary details with the required nominal writing. In addition, close-ended questions allow the researcher to quickly code the collected data for further study (Iwaniec 2019). Close-ended questions were ideal in an email questionnaire where the participants responded to the questions themselves (Dejonckhree et al., 2019). These reviews explain why this study was best suited for closed-ended questions. Close-ended questions use nominal, ordinal intervals or ratio scales.

3.8 Scale Development

Scale development was a technique for creating a precise and reliable construct measure. Measuring organisational and psychological structures that posed particular challenges was part of the industrial-organisational study because it usually was unnoticed (e.g., work attitudes, perceptions, personality traits)—unobservable characteristics, as different to measurable characteristics (e.g., height, precipitation, speed).

Constructs cannot be calculated directly and tested; they should be done through self-report. Similarly, these principles (for example, core self-evaluations) were frequently very abstract and difficult to determine whether the items accurately reflected them reliable. Lastly, these structures were complex rather than a single, solitary term and could comprise several components. The scale development process was complex in developing a measurement tool and was extremely crucial during the validation process with these complexities.

Instrument development is a process that incorporates complexity so that the validity and reliability of the instrument capture a correlation value metric (Bakar et al., 2014). Ruzela (2017) describes the development of an entirely new instrument, the significant modification of an existing instrument, or the incorporation of two or more existing instruments into a new combined instrument. Generally, the procedural paradigm for developing measurement instruments was associated with language translation, responsiveness, transparency, and significance. The method phases include constructing definition, measure development, content validity measurement, measurement model specification, pre-testing scales, scale purification, scale validation, selection of new sample data, cross-validation, and standard development by MacKenzie et al. (2011).

Scale Creation Approaches. There were two approaches to the development of scale. First, a deductive strategy employed construct theory and originally developed conceptualisation to produce items within its scope. This technique helps define an initial pool of items when the scale's construction is significant enough. On the other hand, an inductive approach was used when there was ambiguity in the meaning or dimensionality of the construct. In this instance, organisational heads were asked to provide definitions and then extract conceptualisation that provides the basis for item generation.

Definition Construct. Regardless of the approach used to develop the scale, a clear conceptualisation of the construct was required to create a measurement scale. This process includes either delineating and describing the construct in detail through literature (i.e., specifying what it was and, therefore, what it was not)

It was also necessary to describe the target construct's conceptual scope. For example, a broad framework (e.g., attitudes in general) includes different items than a more specific framework (e.g., attitudes on performing administrative duties). The key theoretical step was determining the number of components that comprise the construction or dimensions. It was possible to consider a construct's dimensionality as if it was better conceived as a single variable (unidimensional) or a combination of several distinct subcomponents (multidimensional). Job satisfaction, for example, has been conceptualised and calculated as a unidimensional and multidimensional construct. The Nedeljković-Knežević et al. (2019) 3-item scale was a single scale of global job satisfaction, whereas Tasios and Giannouli (2017), job Descriptive Index, included five subscales: pay satisfaction, work itself, promotions, co-workers, and supervisors. While this example demonstrates that the same construct can be validly conceived, it was critical to properly define a multidimensional model's dimensions, as a distinct scale must be built for each.

A crucial concept in the construct description was to outline the nomological network: i.e., how other constructs were connected to the focal construct (and its unique dimensions). The nomological network will begin to be stated if the construct is described, including the construct definition. Construction should be similar, negatively related, and relatively independent of theory-based construction. The nomological network was required for the validation process, as it was a scale that empirically relates to proven measures in the way

that the theory predicts, demonstrating important types of validity proof (convergent and divergent validity).

Purposes of the scale created. It was essential to clearly state the objective of the scale before addressing the particular concepts of item writing. For example, was the scale used for research, selection, development, or other purposes? Was the scale intended for the general, adult, or another specific respondent? Outlining the scale's purpose and use in future contexts would define the scale's specific functional concerns. This guides the development of items in a variety of ways, such as (1) determining a suitable reading level for the target respondents; (2) determining whether the items can apply to general or specific contexts and circumstances (work contexts); (3) considering variations on how respondents understand the items (e.g., in various national contexts, the different definition of the word 'stress'); (4) deciding on how to interpret the items.

3.9 Summary

This chapter described the research methodology used to collect and analyse the data required to address the research questions developed in this study. The chapter begins with a discussion of the research design, followed by research sampling from where data will be collected and the approach used in sample selection for study in the wild. The chapter then explained the sample size for the data measurement and scaling.

CHAPTER 4

THE DEVELOPMENT OF ECOTOURISM SMARTPHONE APPLICATION SCALE

4.1 Survey Instrument Development

Scale development was a technique for creating a precise and reliable construct measure. Measuring organisational and psychological structures that posed particular challenges was part of the industrial-organisational study because it usually was unnoticed (e.g., work attitudes, perceptions, personality traits)—unobservable characteristics, as different to measurable characteristics (e.g., height, precipitation, speed).

Constructs cannot be calculated directly and tested; they should be done through self-report. Similarly, these principles (for example, core self-evaluations) were frequently very abstract and difficult to determine whether the items accurately reflected them reliable. Lastly, these structures were complex rather than a single, solitary term and could comprise several components. The scale development process was complex in developing a measurement tool and was extremely crucial during the validation process with these complexities.

Instrument development was a process that incorporated complexity so that the validity and reliability of the instrument capture a correlation value metric (Bakar et al., 2014). Ruzela (2017) describes the development of an entirely new instrument, the significant modification of an existing instrument, or the incorporation of two or more existing instruments into a new combined instrument. Generally, the procedural paradigm for developing measurement instruments was associated with language translation, responsiveness, transparency, and significance. The method phases included constructing

definition, measure development, content validity measurement, measurement model specification, pre-testing scales, scale purification, scale validation, selection of new sample data, cross-validation, and standard development by MacKenzie et al. (2011).

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workers, and supervisors. While this example demonstrates that the same construct can be validly conceived, it was critical to properly define a multidimensional model's dimensions, as a distinct scale must be built for each.

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4.2 Ecotourism Smartphone Application Scale (ESAS) Development

MacKenzie et al. (2011) present a systematic approach to structure conceptualisation, measurement development, and validation (see Figure 4.1). This process synthesised early-scale production literature (DeVellis 2021; Straub, 2004) and incorporated various methodological techniques to develop and validate construct and scale. The MacKenzie scale development procedure consists of ten steps, as depicted in Figure 4.2.

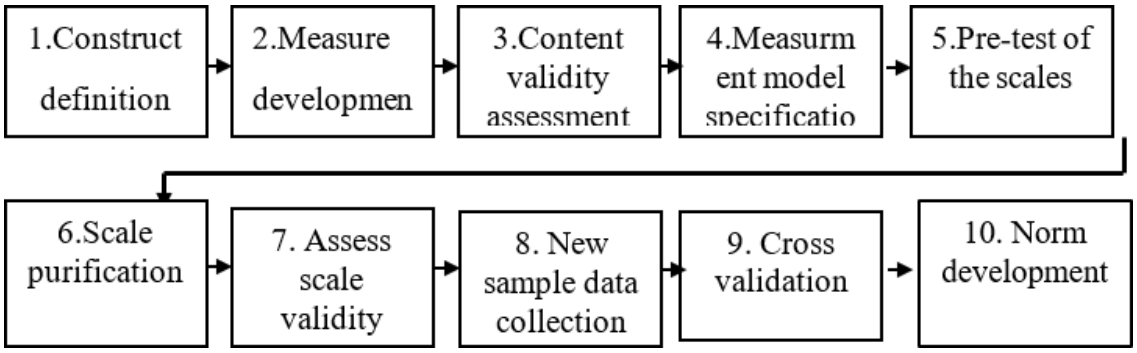


Figure 4.1: 10-Step Scale Development Procedure (Adopted from MacKenzie et al., 2011)

This study's measurement of values for mobile eco-tourism applications was divided into different measurement constructs: perceived value, tourist behaviour, mobile application quality, and meaningful experience in mobile eco-tourism applications. It was suggested when measuring values where survey items were unlikely to fully measure the concept (Rickards et al., 2012). In total, mobile ecotourism application variables were measured with perceived value. The instrument's validity related to the items' value in the instrument represents the proposed sub-constructs and dimensions of the instrument intended to be measured. Experts achieve this instrument's validity (Grindrod et al., 2016). The instrument's reliability was the instrument's accuracy to test the items accurately, measurements, and sub-

construction measured by investigating the inter-rater reliability. The reliability was calculated by investigating the internal accuracy using Cronbach's Alpha (Grindrod et al., 2016).

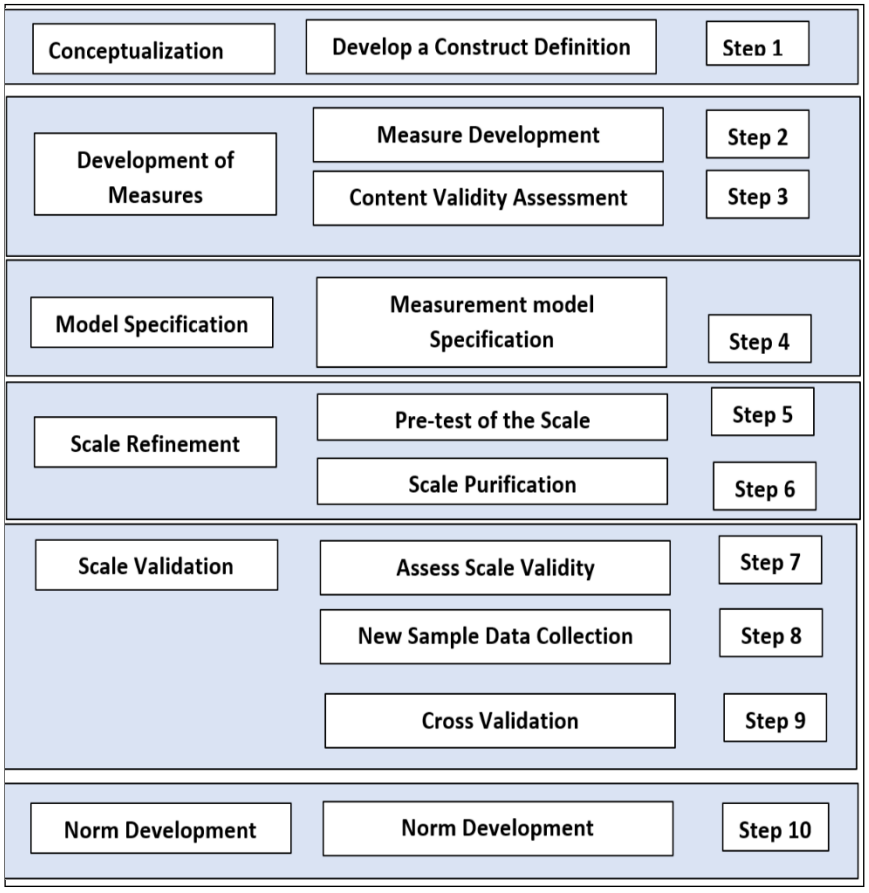


Figure 4.2: The phase of Scale Development and Validation Procedure (Adopted from MacKenzie et al., 2011)

4.3 Conceptualisation Stage

This conceptualisation stage used both inductive and deductive approaches. The deductive approach relied on theory and pre-formed conceptualisations of constructs to generate items within the domain. This approach was used because the researcher did not have enough substantial constructs to generate an initial pool of items. The inductive approach was used when the researcher was unsure about the dimensionality of the

constructs. In addition, the inductive approach helps determine the basis for generating scale items.

Step 1: Construct Definition

The first stage of the construct definition process was to develop a detailed and systematic conceptualisation of the structures because this was where analysis was being performed, resulting in significant calculation errors (DeVellis, 2011; MacKenzie et al., 2011). Therefore, MacKenzie (2011) conducted a systematic review and user experience analyses to inform construct conceptualisation. The following three questions were posed to guide this process:

i What were the primary usability standards proposed by mobile application users?ii What keywords were correlated with each usability criterion?

iii What was the definition for each keyword?

These queries were used to continuously evaluate the experience of tourists using the smartphone ecotourism application. The Axial coding method defines the structures and measurements for this research to review the previous study papers regularly. Axial coding was a method of connecting categories to their sub-categories that Strauss and Corbin (1990) call "axial" because coding occurs along a category's axis, relating to categories of structures and dimensions. The most important terms discovered are listed in Table 3.2. The terms were clustered, and subcategories were formed by summarising conceptually related terms. Grouping words were useful for compressing information and achieving conclusions (Huberman et al., 2002). Previous research into web and mobile site usability has also shown that web and mobile device content influenced users' desire to use the apps (Hoehle et al.,

2015). In other cases, current scientific conceptualisations or meanings of terms in the literature were defined by user experience.

The next stage of the conceptualisation process of the framework involved the recognition of higher-order constructs. It was significant to the method of scale growth of all theorised and identified constructs (MacKenzie et al., 2011). Theoretically, constructions with a similar motif and equivalent features can be inattentive to an advanced level (MacKenzie et al., 2011). The researcher extensively analysed the conceptual similarity constructs and checked the current literature on each identified construct to recognise possible higher-order constructs. The researcher explores at this point how distinct the constructs were and whether removing any of them would substantially reduce the construct's scope (MacKenzie et al., 2011).

Table 4.1: Coding Matrix Adapted from Miles and Huberman (1999)

Axial Codes	Subcategory	Open Codes Derived from Apple User Experience Guidelines
Orientation	Handle orientation changes	• People often expect to use their mobile applications in any orientation. • Knowing how to respond to this expectation within the users' mobile application and the task was important. • Launch the user's mobile application in users supported orientation, regardless of the current device orientation. • Avoid displaying a user interface element in a mobile application that tells people to rotate the device.
Content relevance	Focus on the primary task	• The primary focus of the mobile application was the primary task. • It was crucial to determine what was most important in each context or screen to maintain the focus of the mobile application.
	Elevate the content people are about	• People were interested in experience; they did not expect to manage, consume, or create mobile applications. • Minimise the number and prominence of the controls to reduce their weight in users' user interface.
Aesthetic graphics	Delight people with stunning graphics	• Rich, beautiful, engaging graphics draw people into a mobile application and reward the simplest task. • Beautiful artwork also helps build user applications' brands in people's eyes of users' mobile applications. • Mobile applications should consider the look of high quality. • Mobile applications should have high resolution.
Effort minimisation	Minimise the effort required for user input	• Information input takes time and attention, whether people tap the controls or use the keyboard in the user's mobile application. • Balance any user input request with what developers offer users in exchange for using a mobile app. • The mobile application should make it simple for users to make decisions. • If necessary, information from the operating system should be provided to mobile applications. • Mobile applications should not force people to provide them with information that can be easily found, such as their contacts or calendar information.

Axial Codes	Subcategory	Open Codes Derived from Apple User Experience Guidelines
Concise language	Be succinct	• When the user-interface text in a mobile application is short and direct, users can easily absorb it. • Ensure a mobile application's spelling, grammatical, and punctuation errors are corrected. • Keep all capital words to a minimum in a mobile application.
A standardised user interface element	Use user interface elements consistently	• People expect consistent standard views and controls across mobile applications. • Mobile applications should follow the recommended use for standard user interface elements. • A mobile application enabling an immersive task, such as a game, was reasonable to create customised controls. • Avoid radically modifying the appearance of control in a mobile application that performs a standard action. • Mobile applications should use standard controls and gestures correctly and consistently to behave as expected.

4.3.1 Development of Measures

The first stage in developing scales involved defining items to evaluate the structure under review. The key to successfully generating items was developing a theoretical foundation that indicates the content domain of the new item. The researchers aim to create items that measure the visitor user experience using ecotourism smartphone applications.

Step 2: Measure Development

The next step was to construct items until the structures of interest were well-defined (MacKenzie et al., 2011). Codes derived from the standards for a mobile user interface have been leveraged throughout the item's development. The researcher also reviewedthe previous studies. The researcher has explored related structures in that literature to find things that could be important to this study. In doing so, the researcher searched for additional keywords in identified literature that can be used for item development.

The generation of scale items was the most critical factor in scale development (Tsaur et al., 2016). At this point, the scale developer's primary concern was content validity. It was commonly called the psychometric least criterion for calculating competence and was the first stage in validating a new assessment (Asmelash et al., 2019). The authenticity of items must be factored into the calculation via the item criterion. According to Asmelash et al., (2019), material suitability should be determined soon after the items were constructed to ensure item refinement and/or substitution before the questionnaire was prepared and administered.

The researcher generated an initial pool of 500 items based on ecotourism, mobile application, meaningful experience, application usability and ease of use. The researcher then assessed each item and presented it in a table (Appendix A). Subsequently, the 500 items were assessed, and unrelated items to the mobile application experience were removed. A total of 262 items were eliminated at this stage. The researcher then evaluated 238 items

based on perceived value application usability, mobile application quality, and application utilitarian value. Subsequently, the researcher identified weak items with unclear and ambiguous wording. As a result, 167 items were removed. In the next phase of scale development, the researcher seeks the expert's advice and guidance to ensure the clarity and relevance of the scale.

Following a pre-testing procedure, the remaining 71 items were given to three experts with experience in scale development for review. The scale items were provided to the experts, and this review aimed to ensure the structure, wording and clarity of the questionnaires so that respondents could understand the pool items without interference. This expert review was also done to correct problematic items before the data collection.

Step 3: Content validity assessment

Content validity was distinct from the degree of all aspects of the construct expressed in the scale (MacKenzie et al., 2011; Straub et al., 2004). MacKenzie et al. (2011) proposed a variance analysis to determine item content validity. Though this approach was rarely used in information system (IS) research, it has been used in organisational studies (Yao et al., 2008). According to Colquitt et al. (2019) and MacKenzie et al. (2011), the primary community of interest should be responsible for material validity.

The researcher aimed for three UNIMAS experts with a strong understanding of the usability experience of visitors through smartphone tourism application usage. They were asked to rate each item and use their scores to determine the content validity of tourists' usability experience for ecotourism smartphone application use. Three experts from UNIMAS were involved in this content validity evaluation. They were Dr Wan Norizan Wan Hashim from the Faculty of Cognitive Sciences & Human Development, Dr Siti Shukhaila

bt Shaharuddin from the Faculty of Applied & Creative Arts and Dr Mohd Kamal bin Othman from the Faculty of Cognitive Sciences & Human Development.

The researcher approached each expert individually to evaluate the pool items and method. Experts were asked to review and upgrade the items in three different areas (Refer to Appendix F). The first round of evaluation was based on relevance, value representation, item quality, and the set of items reflecting the measurements of the sub-constructs. The items' complexity, consistency, and readability were rated second, and the instrument's format, presentation, time allocation, and suitability were rated third.

In this phase, the researcher used a content validity index (CVI) to check the validity and relevancy of the individual items in the scale. This CVI was one of the most used measures of content validity of an instrument in nursing research (Polit et al., 2006). Thus, the present study undertook a content validity evaluation. This first round of content validity evaluation was carried out on the individual items, the Item-Content Validity Index (I-CVI). Kovacic (2018) computed the individual item Content Validity Index (CVI) to score each item. The researcher calculates the content validity on individual items for clarity and relevancy of the items for this study. Based on the early advice by Lynn (1986) and Bausell (1981), use the 4-point ordinal scale. According to Lynn (1986), a 3-to-5-point scale can be considered, but she encourages using a 4-point scale to avoid a neutral or midpoint. The use of 4 point scale in item rating appears to be: 1= “not relevant”, 2 = “somewhat relevant”, 3 = “Quite relevant”, and 4 = “Highly relevant” (Lynn,1986). The items for the instrument were given to the UNIMAS expert to rate their relevancy. The item with a rate of 3 and 4 (quite relevant and highly relevant) was considered for the I-CVI. Table 3.4 shows the 101 items rating for the individual item.

The experts were requested to identify whether the item was essential in the construct. The experts were asked to score each item from 1 to 4 with a 4-point scale range of "not relevant", "somewhat relevant", "quite relevant", and "highly relevant", respectively. The content validity ratio varies between 1 and -1. The higher score indicates further agreement of panel members on the necessity of an item in an instrument (Zamanzadeh et al., 2015). Therefore, this study was considered the highest score with 3 (Quite relevant) and 4 (Highly relevant) given by the expert. The formula of content validity ratio was CVR = (Ne – N/2) / (N/2), in which the Ne was the number of panellists indicating "essential" and N was the total number of experts.

Individual experience in the study topic was frequently used to pick someone to review and criticise an assessment tool (e.g., a questionnaire). The suggested number of experts was summarised in Table 4.2 and its implications for the permissible CVI cut-off score.

Table 4.2: Number of experts and its implication on the acceptable cut-off score of CVI

Number of Experts	Acceptable CVI values	Source of recommendation
2 experts	At least 0.80	Davis (1992)
3 to 5 experts	Should be 1.0	Polit & Beck (2006), Polit et al., (2007)
At least 6 experts	At least 0.83	Polit & Beck (2006), Polit et al., (2007)
6 to 8 experts	At least 0.83	Lynn (1986)
At least 9 experts	At least 0.78	Lynn (1986)

Finally, suggestions to remove scale items and improve the wording of the scale items were also considered. The content expert does the re-examined scale items before the pilot study. This expert review's contribution toward content validity plays a major role in finalising the items. The reliability of the expert review was estimated using an internal coefficient of consistency and a uni-dimensionality check. (Ruzela Tapsir, 2017).

Table 4.3: Item rating for the Expert review

Items
Using mobile app improved the way I perceived information
Using the mobile app was interesting
Using the mobile app was feel good
Using the mobile app gives me pleasure
Using the mobile app, I feel relax
Learning to operate the system was difficult
Exploring new features by trial and error difficult
Remembering names and use of commands difficult
I am satisfied with the services provided by the mobile Based Tourism Attraction
Using mobile app improve the way I am perceived the ecotourism attractions
I am satisfied when friends or family recommend the App
Using the mobile app makes a good impression on other people
Using the mobile app was an enjoyment
Overall, I am satisfied with this visit
I always knew my location in the app
I intend to use the mobile app in the near time
Is the app fun/entertaining to use?
The app presenting its content in an interesting way?
Mobile application fulfils my needs
Mobile apps have an acceptable standard of quality
Mobile apps offer consistent quality
There was a need to have guides in order to obtain a relevant explanation
The visual explanation of concepts – through images/videos, etc. – was clear, logical, correct?
The arrangement and size of buttons/icons/menus/content on the screen appropriate?
The content of the app was important to me
It was difficult to understand the structure of the app
The appearance of the app was pleasant
The home screen of the app was easy to understand
Moving from one section in the app to another was easy
I was satisfied with the ease of use of the app
It was easy to perform the given tasks.
The app included terms and words that were unfamiliar to me
Using the app was frustrating
I'm going to use the app later
I am curious about the App
The number of users that have rated the App
I would find it easy to get the app to do what I want it to do
My interaction with the app was clear and understandable
I find the app to be flexible to interact with
It has to be skilful at using the app
I would find the app easy to use
Does the App provide better tourist support
I can easily recognize where the information I need was located

The visuals match with the desired concept (look and feel)
The layout design was consistent throughout the application
The interface does influence me to want to visit and know more about the place
I enjoy sharing my experience of ecotourism mobile apps with others
My experience sharing with other tourists was personally satisfying
Sharing my experience of using mobile apps with others in the mobile app gives me pleasure
The mobile app enables me to try the new technologies
Mobile apps for ecotourism was the new ways of doing things
Mobile apps arouse my curiosity
Willingly to revisit this app
I would not recommend this app to anyone
The information offered was sufficiently detailed to enjoy the attraction
The number of users that have already downloaded the App
The description of the App and the star rating
The number of features the app offers
The size of the app and the price
Learning to operate the app was easy for me
The size of the app was big
The price of the app was expensive
The price of the mobile app was economical
I am willing to pay for the apps developed
I predict that I would use the mobile app in the short term
I expect my use of the mobile app to continue in the future
I would use mobile apps without hesitation to satisfy my needs
The visit was great (money, time, effort)
The visit offers more value than expected
I will pay for this app
This app was likely to increase awareness of the importance of addressing apps

As a result, 16 items were removed from the item pool due to a lack of clarity. Finally, there were 55 items left in the item pool (Refer to Appendix B). These items were used for two different scales: visitors' ecotourism mobile application experience and visitors' general experience in ecotourism. Additionally, 39 pool items were kept for mobile application usage in ecotourism, and 16 were kept for visitors' general experience (Refer to Appendix C). These items were used for content validity in the following step. These scale items use Likert scales that were appropriate for measuring ecotourist perception of perceived value with mobile application experience, and the other scale will measure the general experience of the visitors

at the ecotourism. To be more specific, all scale items use a 5-point Likert Scale, with responses ranging from "Strongly Agree," "Agree," "Neutral," "Disagree," and "Strongly Disagree". The measurement items expected to measure the constructs using mobile eco-tourism applications were shown in the tables below in Table 4.4, and Table 4.5 showed the measurement items for the general experience of the visitors. The actual questionnaire was administered to respondents after the measures were improved based on expert feedback.

Table 4.4: 39 Items Retained from the initial pool for Ecotourism Smartphone application experience

Item No.	Item Description
1	Using the mobile app was interesting
2	Using the mobile app was feel good
3	Using the mobile app, I feel relax
4	Learning to operate the system was difficult
5	I always knew my location in the app
6	I intend to use a mobile app in the near time
7	The app interestingly presents its content
8	Mobile application fulfils my needs
9	The arrangement and size of buttons/icons/menus/content on the screen were appropriate
10	The content of the app was important to me
11	It was difficult to understand the structure of the app
12	The appearance of the app was pleasant
13	The home screen of the app was easy to understand
14	Moving from one section in the app to another was easy
15	I was satisfied with the ease of use of the app
16	The app included terms and words that were unfamiliar to me
17	My information in the app caused me to stay longer on my visit to this place
18	I find the app to be flexible to interact with
19	It has to be skilful at using the app
20	The App provides better tourist support
21	I can easily recognise where the information I need was located
22	The visual matches with the desired concept (look and feel)
23	The layout design was consistent throughout the application
24	The interface does influenced me to want to visit and know more about the place
25	The mobile app enables me to try the new technologies

Table 4.4 cont.

26	Mobile apps for ecotourism were the new ways of doing things
27	Mobile apps arouse my curiosity
28	I willingly reuse this app
29	I would not recommend this app to anyone
30	The number of users that have already downloaded the App
31	The description of the App and the star rating
32	The number of features the app offers
33	The size of the app and the price
34	I am willing to pay for the apps developed
35	I predict that I would use the mobile app in the short term
36	I expect my use of the mobile app to continue in the future
37	I would use mobile apps without hesitation to satisfy my needs
38	I will pay for this app
39	This app was likely to increase awareness of the importance of addressing apps

Table 4.5: 16 Items were retained from the initial pool for visitors' general experience

Item No	Item Description
1	I want to learn more about the natural environment
2	I travel to new places to learn about local culture and customs
3	This type of tourism was less harmful to the environment than all the other kinds of tourism
4	I can easily organize eco-trip by myself and travel alone or just with my friends/family
5	I have a passion for learning something new when I travel
6	I want to experience a new culture with the minimum influence on the environment and local community
7	I like to spend time in open-air
8	I want to meet people with similar interests
9	This visit has exceeded my expectations
10	Overall, I am satisfied with this ecotourism visit
11	Overall, I am happy with this ecotourism visit
12	I made the right choice to visit the ecotourism places
13	I will recommend this visit to my friends/family
14	My experience sharing with other tourists was personally satisfied
15	I will revisit the ecotourism attraction again
16	I am satisfied with the service provided by the tourism information centre

4.3.2 Model Specification

The model specification was the relation between items and constructs by a measuring model. The association between the latent variable and the underlying factors was defined as a measurement model (Dow et al., 2008). The measurement model specified the association between measured variables.

Step 4 Measurement Model Specified

The analysis model specification comes next in the instrument development process (MacKenzie et al., 2011). This approach defines how the metrics apply to structures and the interactions between first-order and second-order constructs. The development of the instrument was developed into two stages of the measurement models. In the first stage of the measurement model, all constructs were identified as the first-order construct in the theoretical framework, as shown in Figure 4.3, where the first all the scale items were related to the variables such as social influence, intention to pay, intention to revisit, content, aesthetic, satisfaction and loyalty.

The social influence variable was related to application loyalty, intention to pay was related to application utilitiration value, intention to revisit was related to meaningful experience, content and aesthetic were related to application ease of use, and satisfaction and loyalty were connected to application usability.

Figure 4.3 illustrates the measurement model for this analysis. In addition, the researcher has reproduced the association between the first-order and the second-order constructs. The theoretical items were created in the second-order build mentioned in Step 1.

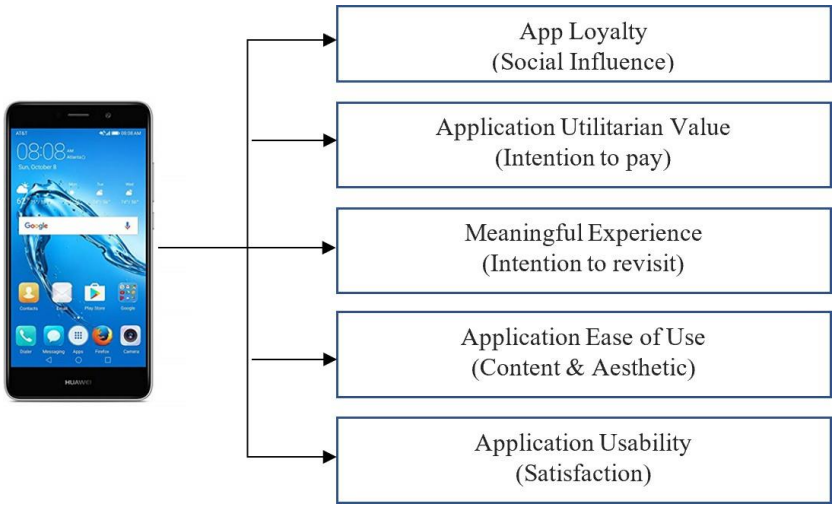


Figure 4.3: Measurement Model with First-Order Construct

Also, the researcher used the nomological principle to develop the second measurement stage. The nomological approach discovered a fundamental approach that can predict future events (Chettiparamb, 2019; Curcuruto et al., 2016). Osanloo and Grant (2016) argue that the association of the concept under examination to other concepts should be considered in a theoretical structure as a whole. The researcher, therefore, followed the recommendation of Osanloo and Grant (2016) and explored the nomological usability of mobile applications. To gain an understanding of the second order, construct dimensions of perceived value (Wang et al., 2019; McDougall et al., 2000), this study used the keywords "perceived value", "ecotourism", and "eco-travel" to search articles in the google scholar database. Through previous literature, the researcher investigates the validity of the proposed dimensions. The researcher discovered that the second-order construct was perceived value to explain the mobile application usability. Using the same procedure as previously described, a face validity check was performed with the supervisor. Items identified as too vague have been deleted, or the wording has been changed.

Finally, the researcher developed a measurement model, as in Figure 4.4. This measurement model will give an overall idea of this research. The dimensions of this research were measured into two values: the Social value was related to application loyalty, utilitarian application value and meaningful interaction. Epistemic value was related to application ease of use and application usability of an ecotourism smartphone application. At the end of this research, the visitors' experience will be measured by how they perceived the value of their usability experience of this ecotourism smartphone application.

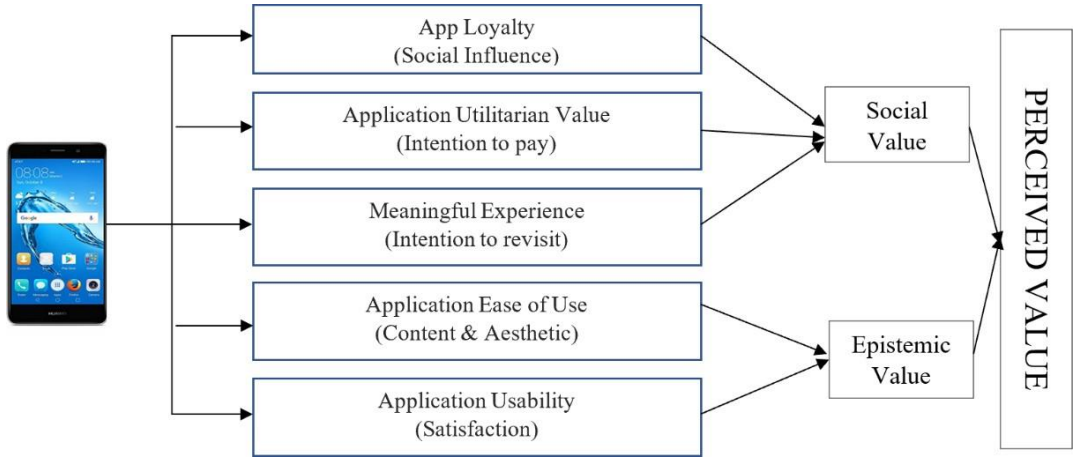


Figure 4.4: Measurement Model with First-order and Second-order Construct

4.3.3 Scale Refinement

The goal of scale refinement was to fix problems with the scale. It was critical to specify the measured construct accurately and ensure that the scale appropriately represents the construct (Foster et al., 1995). In addition, scale refinement was crucial in assessing the construct's validity concerning other variables on the scale. Standard psychometric scale methodology (Kaplan et al., 2017; DeVellis, 2003) was utilized in this study. Preparing the questionnaire and designing the questionnaire structure was an important aspect of questionnaire design. The survey instrument items were developed with a two-stage survey

creation method adapted from Chen et al. (2004). First, a comprehensive review of past studies linked to the target research construct was undertaken to find the required valid measurement for the construct's analysis. Items previously used in past studies were extracted, adopted, and reworded to fit the study context wherever possible.

Second, three lecturers analysed the questionnaire's suitability, readability, and inconsistency. The feedback from lecturers was used to rescript the items as a questionnaire. This will lead to the questionnaire being free of ambiguity or vague terms. The terminology and language used in this questionnaire must be kept as straightforward as possible so that even those with no formal education can understand the questions.

This study's final research instrument was a five-page questionnaire with sixty-four items divided into four sections (Sections A, B, C, and D). Section A was developed to show the demographic profile of the respondents. Section B was developed to measure ecotourism motivation. Section C was developed to measure ecotourism satisfaction, and Section D was developed to measure the variables in the study. Overall, this final research instrument was developed for those with experience using the mobile ecotourism application. Zikmud (2003) states, "a general rule of thumb was that questionnaires should not exceed six pages". Therefore, the questionnaire items in this study (except the cover letter) were posed within the five-page limit.

Step 5: Conduct Pre-test data collection

The measurement model has been adequately defined; a pre-test of the survey instrument was the next phase in the scale development process. First, it was necessary to gather data for theoretically similar constructs to determine the nomological validity of the focal constructs (MacKenzie et al., 2011). The researcher formed a survey for the pre-test, providing guidelines for the participants and establishing items. All items were calculated

using the five-point Likert scale (1= strongly agree, 2= agree, 3= neutral, 4= disagree, 5= strongly disagree). Before collecting data, the researcher asked the supervisor to read the instructions and feedback on the scale design.

The researcher then posted the questionnaire using emails and, in ecotourism, social media Facebook. The researcher attempted to obtain the 300 responses required to investigate the scales' items. Since the popularity of social media platforms among mobile device users, the researcher adopted online media such as Email, Telegram, Facebook and Whatsapp. The researcher followed this sampling strategy in social media since social media was widespread and successful. In addition, the investigator thought that it might add to the results' variables. Overall, the researcher asked ecotourism questions that allowed all respondents to have well-grounded views on a particular mobile ecotourism application to respond substantially to things relevant to the mobile ecotourism application's usability. A total of 300 responses were collected to pre-test the scale items.

Step 6: Scale Purification and Refinement

The initial elements were used in the pilot research questionnaire. This move aimed "to affirm assumptions of the new measures psychometric properties" (Hinkin et al., 1997, p.105). An online pilot survey was conducted. The researcher sent an e-mail to potential survey respondents inviting them to participate and randomly assigning ecotourism service respondents to report their experience with the smartphone application. The respondents were then asked to rate how much they agreed with the statement using the 5-point Likert scale (1=Strongly Agree and 5=Strongly Disagree). The data was analysed using exploratory factor analysis (EFA) with Varimax rotation.

Churchill (1979) proposed that the coefficient alpha (α) measure be used to begin the purification of the measuring system. The coefficient α value for the acting measurements ranged from 0.60 to 0.85, indicating the need to subtract some items from each dimension to increase the value. Items corrected but with a cumulative correlation of less than 0.60 were discarded. Next, individual items were eliminated by recalculating α values for the remaining items and testing new associations to eliminate items further. The EFA evaluated, validated, and minimised the items' underlying structure.

The adequacy calculation of the sampling by Kaiser-Meyer-Olkin (KMO) and the Bartlett Sphericity test was conducted to ensure the sample size, and EFA was sufficient. For the complete sample, KMO values should be above the recommended standard of 0.60, as suggested by Tabachnick et al., (2007). In comparison, the sphericity test for Bartlett was 3008.51 ($p<0.01$), indicating a correct factor analysis (see Appendix I). Next, the data were subjected to EFA, which removed non-related items due to cross-loading factors less than 0.60 (see Appendix J). Because the following variables were assumed to be associated, the remaining items were evaluated using oblique rotation's maximum probability calculation technique. Finally, a 5-factor model was implemented to describe the overall variances using eigenvalues greater than 1.0 and the screen test as factor extraction guidance. Cronbach's Alpha was 0.60 and was loaded to the expected factor (see Appendix K).

MacKenzie et al. (2011) state that the scale instrument should be purified and refined. This course includes a series of statistical experiments that use pre-test data to measure the scales' items. It was best to implement a specific course of action to test the calculation model, such as:

i. Assessment of goodness of fit

ii. Assessment of the validity of the set of indicators at the construct level

iii. Assessment of the reliability of the set of indicators at the construct level

iv. Assessment of the individual indicator and its validity and reliability

v. Elimination of the weak indicators

The statistical tests were carried out by the researcher using SPSS. In addition, the researcher used the Confirmatory Factor Analysis (CFA). Confirmatory Factor Analysis (CFA) investigates the sequence of associations (or covariances) between the observed measurements. The CFA aimed to predefine the factor model's ability to match the observed data set, whether the set of factors was associated, and the validity of a single-factor model in this analysis.

As suggested by the universal integrated method, it will evaluate the similarities of the factor structure, the interaction among the items (value indicators), and the underlying measurements and sub-constructs. This study focused on fit indexes such as the Confirmatory Fix Index (CFI), Principal Component Analysis (PCA), root mean square error (RMSEA), and root means square residual (SRMR) Tucker Lewis Index (TLI). This chapter will discuss the comprehensive study and detailed outcomes.

Step 7: Scale Validation

Validation was crucial in designing the scale; one cannot merely presume that it tests its aim to calculate the unobservable variables. After reliability and factorial validity were developed, a researcher provided validation evidence by analysing the scale validation design. In order to re-examine the purified scales, the scales were tested, edited, and the problematic items were removed. Therefore, the new data should be obtained from a new

sample. It was a crucial step in the information system that was often neglected (MacKenzie et al., 2011).

Step 8: New sample data collection

The researcher collected data from a new sample of NAF visitors. The data collected from the new sample shall be used to ensure the validity of the content test. This study aimed to recruit as many participants as possible, preferably more than 200, because the results were determined by Exploratory factor analysis (EFA) of 55 items. The sample size was important in collecting questions to make the answers acceptable for EFA. Past research suggested that the minimum sample size would be between 5 people to 100 people depending on the diversity of the target population (Carpenter 2018). Hoyle & Kenny (1999) proposed that the sample size should be between 100 and 200, while Cattell (1978) recommended a sample size with a minimum of 250 respondents, between three and six respondents per item. This study was distributed widely on the email list and promoted on social media (for example, Facebook, Instagram, and WhatsApp groups) for approximately eight months, and 343 respondents completed the questionnaire.

Step 9: Cross-Validation and Step 10: Norm Development

The statistical software SPSS and AMOS were used to test cross-validation. The scales' significant relationship to gender, age, and duration of stay, as well as the various tour guide conditions, has been tested. The results are explained in the next section. The overall ESAS diagram will show the final scale with additional constructs.

4.4 Proposed Measurement Model for Ecotourism Smartphone Application Scale

The findings of this study will provide data to assist in addressing research objectives 3 and 4. The third research objective was to ‘measure the association between perceived value context in Application Ease of Use (AEOU), Application Loyalty (ALO) and Meaningful Experience (ME) in using ecotourism smartphone application', and the fourth research objective was to ‘build a conceptual framework for the visitor experience at ecotourism attraction with a smartphone application and to test the role of perceived value in this study as shown in Figure 4.5.

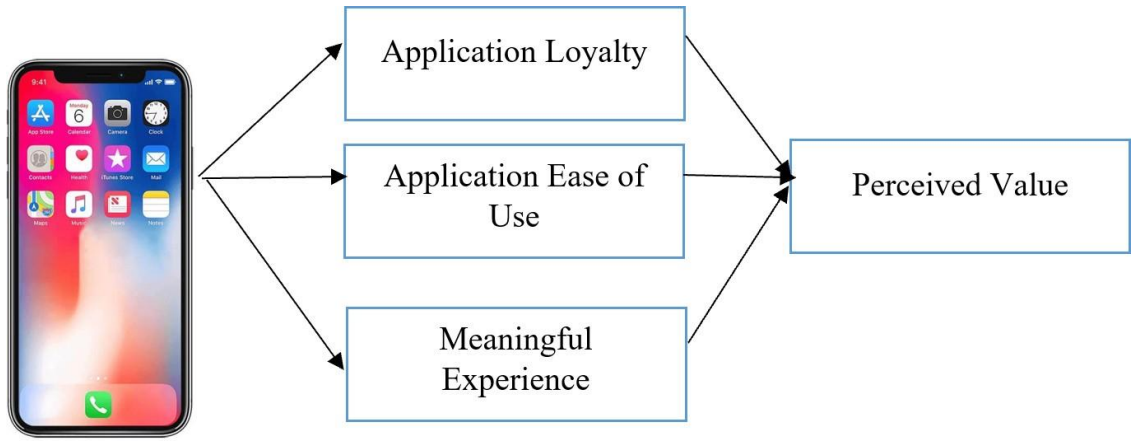


Figure 4.5: Proposed measurement model of Eco-tourist Perceived Value on mobile ecotourism application

Data analysis includes the reliability, validity, and identification of analytical methods. Following that, the justification of data manipulation and the interpretation of results occur. The process, as mentioned above, was broken down into five steps: first, scale selection and re-validation by expert analysis. Second, descriptive statistics were used to describe the results of the questionnaire scale items. Third, the researcher carried out two tests in SPSS: the Cronbach Alpha test and the key constructs identification analysis of all

five constructs processed. Fourth, the conceptual system testing used suitable scale items to ensure reliability and validity in the next stage. Fourth, the Confirmatory Factor Analysis (CFA) was used to achieve an acceptable model fit for the Structural Equation Modelling. Finally, items will statistically be fixed with the attributes of the latent constructs to which they belong to determine the proposed measurement scale. Furthermore, Regression analysis was performed to find the association between the four independent and dependent variables in the final model. Finally, the final model confirms/rejects the perceived value of ecotourism plays a part in the usage of mobile applications.

4.5 Scale Development

This study had two different scales, and the finalised research questionnaires contained sixty-four items in total and were divided into four sections (Sections A, B, C, and D). Section A contains demographic profile questions, Sections B and C were used to assess the general experience in ecotourism, and Section D assesses the visitors' experience with an ecotourism smartphone application. Table 4.6 shows items used to assess the ecotourism experience in this study.

The second scale was designed to test the ecotourism mobile application experience with different constructs, and it contains thirty-nine scale items to reflect the constructs (as shown in Table 4.7). Those five constructs include independent variables such as Application Ease of Use (AEOU), Application Loyalty (ALO), Meaningful Experience (ME), Application Usability (AU), and Application Utilitarian Value (AUV). All scale items selected from past articles and journal papers have been verified, providing satisfactory, reliable and valid in the past fieldwork. They were also validated by three experts in the relevant research domains for further theoretical confirmation of the scale items. All of these

items were on a five-point Likert scale with intervals of “1” (strongly disagree), “2” (disagree), “3” (Neutral), “4” (agree), and “5” (strongly agree).

Table 4.6: Ecotourism General Experience Scale

Item No	Item Description
1	I want to learn more about the natural environment
2	I travel to new places to learn about local culture and customs
3	This type of tourism was less harmful to the environment than all the other kinds of tourism
4	I can easily organize eco-trip by myself and travel alone or just with my friends/family
5	I have a passion for learning something new when I travel
6	I want to experience a new culture with the minimum influence on the environment and local community
7	I like to spend time in open-air
8	I want to meet people with similar interests
9	This visit has exceeded my expectations
10	Overall, I am satisfied with this ecotourism visit
11	Overall, I am happy with this ecotourism visit
12	I made the right choice to visit the ecotourism places
13	I will recommend this visit to my friends/family
14	My experience sharing with other tourists was personally satisfied
15	I will revisit the ecotourism attraction again
16	I am satisfied with the service provided by the tourism information centre

Table 4.7: Ecotourism Tourist Experience Using Ecotourism Smartphone Application

Item No.	Item Description
1	Using the mobile app was interesting
2	Using the mobile app was feel good
3	Using the mobile app, I feel relax
4	Learning to operate the system was difficult
5	I always knew my location in the app
6	I intend to use a mobile app in the near time
7	The app interestingly presents its content
8	Mobile application fulfils my needs
9	The arrangement and size of buttons/icons/menus/content on the screen were appropriate
10	The content of the app was important to me
11	It was difficult to understand the structure of the app
12	The appearance of the app was pleasant
13	The home screen of the app was easy to understand
14	Moving from one section in the app to another was easy
15	I was satisfied with the ease of use of the app
16	The app included terms and words that were unfamiliar to me
17	My information in the app caused me to stay longer on my visit to this place
18	I find the app to be flexible to interact with
19	It has to be skilful at using the app
20	The App provides better tourist support
21	I can easily recognise where the information I need was located
22	The visual matches with the desired concept (look and feel)
23	The layout design was consistent throughout the application
24	The interface does influence me to want to visit and know more about the place
25	The mobile app enables me to try the new technologies
26	Mobile apps for ecotourism were the new ways of doing things
27	Mobile apps arouse my curiosity
28	I willingly reuse this app
29	I would not recommend this app to anyone
30	The number of users that have already downloaded the App
31	The description of the App and the star rating
32	The number of features the app offers
33	The size of the app and the price
34	I am willing to pay for the apps developed
35	I predict that I would use the mobile app in the short term
36	I expect my use of the mobile app to continue in the future
37	I would use mobile apps without hesitation to satisfy my needs
38	I will pay for this app
39	This app was likely to increase awareness of the importance of addressing apps

4.5.1 Participants and Procedure

Ecotourists from Malaysia and other countries such as Kenya, India, Indonesia, Pakistan, New Zealand and Kerala supported this study. They were approached through email, WhatsApp and Facebook. All participants were recruited based on their interest in participating in this study. The participants were asked to answer the survey questionnaire that was distributed to them. The procedure of the study can be summarised as follows:

i. Recruitment: 320 participants were contacted via email, WhatsApp and Facebook. The researcher sends the survey questionnaire via email, Facebook, and WhatsApp.
ii. Informed Consent: An informed consent form was attached on the first page of the survey questionnaire, and they were asked to complete it before starting the survey, and they were allowed to withdraw from participating in this survey.
iii. Evaluation session: Respondents were required to mark on the questionnaires to provide feedback on the most recent ecotourism site. Respondents were informed that this questionnaire would require ten minutes to complete for statements about their ecotourism visit experience. All respondents should complete both the ecotourism experience (Sections B and C), and if they had used a mobile ecotourism application, they should fill out Section D. In addition, all respondents provide the standard demographic information requested in Section A.
iv. Debriefing session: The researcher showed appreciation by thanking the respondents for their contributions to this study.

4.6 Final Survey Procedures and Data Collection

4.6.1 Data Screening

Data screening was carried out upon completing the data collection process, which enforces specific minimum-quality raw data requirements (Iacobucci, 2010). This data screening procedure was divided into two stages: (1) searching for errors and (2) identifying and correcting errors in the data files. Searching for errors was to investigate the completion of the questionnaire sheet. Sometimes, the questionnaires were filled out incorrectly, impacting the study's findings. A careful review of the data at this stage can aid in identifying data entry errors in the identity and correcting the error. This process will include preliminary checks, handling missing data, and testing for the normality of data delivery.

4.6.2 Preliminary Checks and Handling Missing Data

Łopucki et al. (2022) proposed measuring the missing trend and calculating the sum of missing data for the entire data set. There were 343 responses in total. Then, perform preliminary checks on the data entered in the questionnaire sheets. During the verification process, it was discovered that some of the questionnaires were missing. This problem was found on twenty of the questionnaire sheets. The outcome estimates may be skewed if missing data were not distributed randomly (Tabachnick & Fidell, 2007). As a result, the analysis included 300 responses. Using the statistical SPSS software, all returned questionnaire sheets were entered into the database.

4.7 Findings

4.8 Demographic Profile

The sample characteristics were described using various demographic profiles such as gender, educational background, age, and citizenship. A total of 300 participants participated in this study, where all the participants answered Section A and Section B, and 200 out of 300 answered Section C, where these participants have experience using mobile eco-tourism applications. The participants were given a link to the survey form and were required to complete the questions on their experience with the smartphone tourism application and further share their overall experience of using smartphone tourism applications during their travel. Table 4.8 depicts the findings of the demographic profile of respondents.

54% of the participants were male, and 46% were female. Most participants were between 35 and 44 years old (36%), while 32% were between 25 and 34. Also, 21% were between 45 and 54 years old, and 7% were 55. Only 4% were between 18- to 24 years old. Most participants were from Malaysia, 70%, and other countries with, 30%. Most participants, or 89%, reported being educated at the college or university level, while 11% reported qualified participants from primary and secondary school. A substantial majority (66%) enjoyed their tour with family and friends, 21% travelled independently, and 13% spent their holiday with the organization members. The average time spent on the tour was 25% day trip, 36% with one night tour, 24% with two nights tour, 11% with three nights tour, and 4% with a four or nights tour.

Table 4.8: Demographic Profile of Online Survey Respondents

Characteristic	Number of respondents	Percentage(%)
Gender		
Male	162	54
Female	138	46
Age		
18 – 24 years	12	4
25 – 34 years	97	32
35 – 44 years	109	36
45 – 54 years	62	21
55 years above	20	7
Education Background		
Primary School	0	0
Secondary School	32	11
Diploma	57	19
Bachelor's degree	139	46
Master's Degree	59	20
Doctorate Degree	13	4
Citizenship		
Malaysia	200	70
India	56	21
Kenya	4	2
Pakistan	5	2
New Zealand	3	1
Kerala	8	4
Duration of Stay		
One night	108	36
Two nights	72	24
Three nights	34	11
Four or more nights	12	4
Day trip	74	25
Trip Companionship		
Family	112	37
Friend	86	29
Individual	62	21
Organization	40	13

This sample came from various demographic backgrounds (for example, various countries and education). Therefore, it was necessary to have a diverse set of respondents in this type of study. Furthermore, citizenship diversity was essential because all of the countries listed above have a significant tourism impact on ecotourism.

4.9 Reliability and Validity Test in SPSS

The reliability and validity tests were carried out with SPSS to test three different tests: bias test, Cronbach's Alpha, and Structural Equation Modelling. First, the bias test was performed using standard methods on validity and reliability of the latent variables with multiple scale items of the measurement constructs. Next, Cronbach's Alpha test was done for reliability checking. Finally, the main analysis was used for the validity test to decrease the number of scale items that must be transferred to the next stage of Structural Equation Modelling and validate all four constructs with the best scale item to represent them.

4.9.1 Cronbach's Alpha Test

The Cronbach alpha test increases the inter-correlation of scale items within the constructs. This test generates its test score, Alpha, as the criterion of internal accuracy, which has its widely reasonable standards when assessing build reliability. This study focused on obtaining an optimal alpha score of more than 0.7 (Tavakol & Dennick, 2011).

The items in the questionnaire were deemed accurate as the results in Table 4.9 indicate that the items with a value of 0.844 and 0.975 were strongly related to each other. Therefore, the Cronbach Alpha value for both scales meets the standard requirement of 0.7 and is sufficient for further analysis of the items.

Table 4.9: Cronbach Alpha Test Result for Ecotourism Smartphone Application Experience Scale and General Experience Items

Reliability Statistics ESAS	
Cronbach's Alpha	N of Items
.844	24
Reliability Statistics GES	
Cronbach's Alpha	N of Items
.975	6

Table 4.10 and Table 4.11 indicate that each construct has reached its sufficient Alpha, greater than 0.7. Therefore, because all constructs have sufficient reliability, they can proceed to the first phase of the validity test.

Table 4.10: Cronbach's Alpha Test Result for ESAS

Constructs	Cronbach's Alpha	No. of Items
App Loyalty	0.741	6
App Ease of Use	0.947	18
Meaningful Experience	0.701	5
App Usability	0.868	10
App Utilitarian Value	0.878	2

Table 4.11: Cronbach's Alpha Test Result for GES

Constructs	Cronbach's Alpha	No. of Items
Satisfaction	0.741	6
Learning	0.947	18

4.10 Exploratory Factor Analysis

One of the most important applications of factor analysis was using factor scores as input for the subsequent analysis phases (Brown, 2015). Therefore, the EFA was carried out before performing the CFA analysis. Furthermore, it was specifically decided to employ the principle component approach with varimax rotation since it was the most popular type of rotation and was frequently used in operation management research for simplifying components rather than variables (Brown, 2015).

In order to determine the factor structure of the scale, the EFA approach was performed. Using the Kaiser Meyer Olkin and Barlett tests, it was possible to evaluate whether or not the scale was suitable for factor analysis. In Table 4.12 and Table 4.13, the outcomes of the KMO and Barlett tests may be seen in the test's pre-implementation phase.

Table 4.12: KMO and Barlett Test Results for Visitors with Smartphone App Experience

	Visitors with the Smartphone app experience
Kaiser Mayer Olkin (KMO) Value	.831
Chi-square	7113.002
Df	741
Sig.	.000

Table 4.13: KMO and Barlett Test Results for Visitors with General Experience

	Visitors with General Experience
Kaiser Mayer Olkin (KMO) Value	.882
Chi-square	2455.512
Df	120
Sig.	.000

The KMO value of visitors with smartphone app experience was in Table showed 0.83. The Barlett Test result was significant for the visitors with a smartphone app ($\chi 2$=7113.002; $p < .000$). The KMO value of visitors with general experience in Table showed 0.882, and the KMO value for visitors with general experience ($\chi 2$=2455.512; $p < .000$). Both the KMO readings were close to 1, which showed that the sample size was suitable for further analysis and the Barlett result for both scales showed the normal distribution of the data.

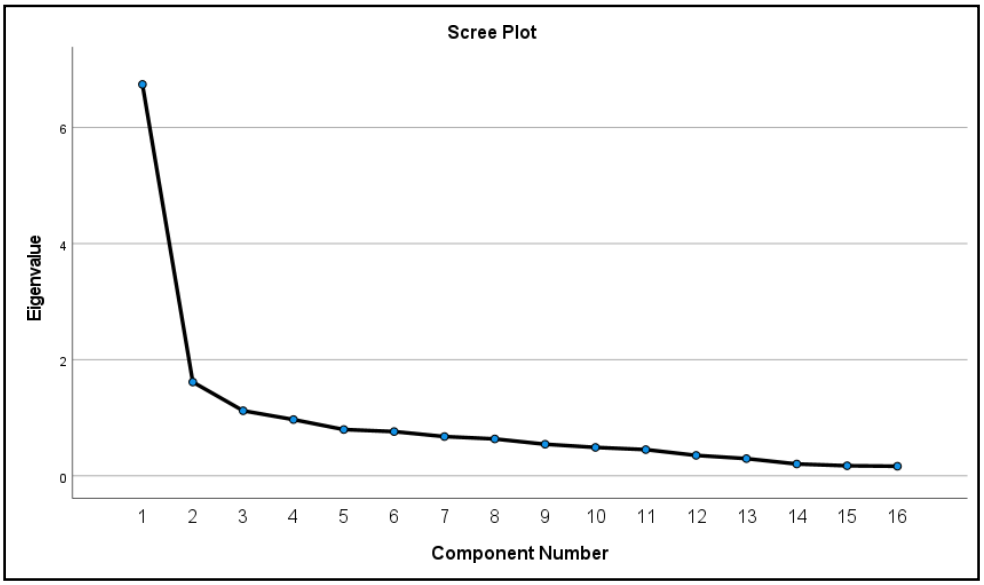


Figure 4.6: Eigenvalue Factor graph of the General Experience Scale

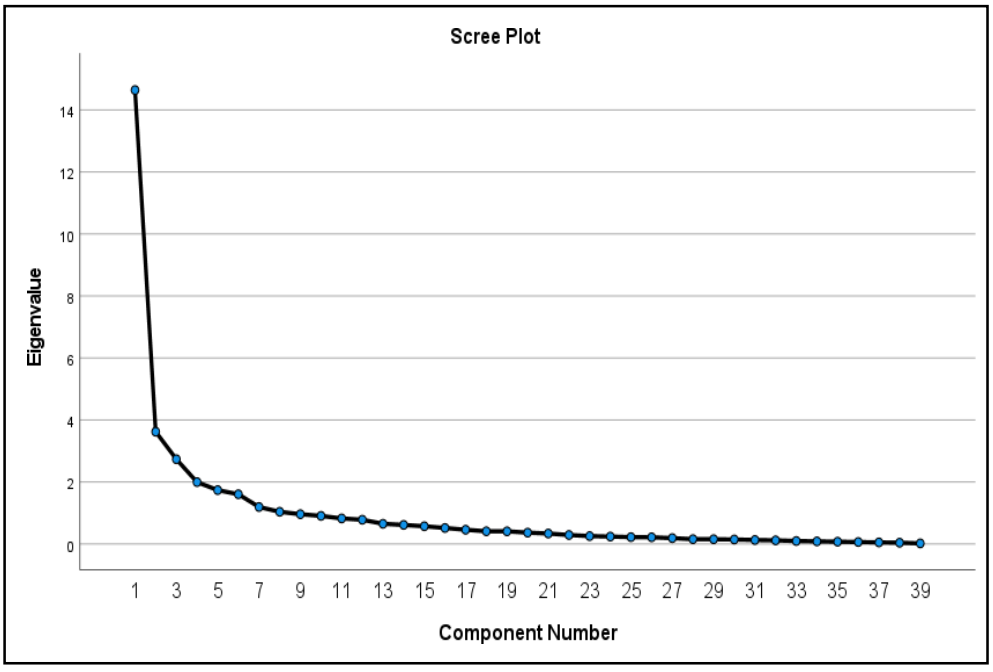


Figure 4.7: Eigenvalue Factor graph of the Visitors' Smartphone App Experience Scale

The result of EFA, considering the scree plot graphs and real values, was determined by the contribution of the total variance expressed in five factors. Eigenvalue factor graphics of the scale was given in Figure 4.6 and Figure 4.7. The factor' Eigenvalue was shown in the maximum number of factors to be retrieved, indicated by an abrupt change in the graph's slope, which decides the number of factors to keep. (Pallant, 2020). The scree plot also identified five factors for the visitor experience on using the mobile app and two factors for the general experience of the visitor.

Communality estimates generated; a variable will be omitted from the analysis if it was low communalities less than 0.6. The calculated commonality with a lower value than 0.6 was eliminated. The mobile app experience variables retained 37 items, and the general experience retained 15 items.

Table 4.14 indicates six significant factors extracted from the visitors with the smartphone app experience, and this scale comprises 39 items. The first factor was the largest proportion of the total explained variance, 37.547%, with an eigenvalue of 14.643. The second extracted factor explains 9.29% of the total variance with an eigenvalue of 3.623.

The third extracted factor value explains 7.017% of the total variance with an eigenvalue of 2.736 was the third factor. The fourth factor explaining 5.124% of the total variance with an eigenvalue of 1.999 was the fourth factor. Finally, the fifth factor explains 4.461% with an eigenvalue of 1.740. As for the general experience scale, three factors were extracted. This scale was comprised of 16 items. The first factor was the total explained variance of 42.147%, with an eigenvalue of 6.744. The second extracted factor explains 10.098 % of the total variance with an eigenvalue of 1.616, as shown in Table 4.15.

Table 4.14: Total Variance Explained for ESAS Scale

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.643	37.547	37.547	14.643	37.547	37.547
2	3.623	9.290	46.837	3.623	9.290	46.837
3	2.736	7.017	53.854	2.736	7.017	53.854
4	1.999	5.124	58.978	1.999	5.124	58.978
5	1.740	4.461	63.439	1.740	4.461	63.439
6	1.607	4.119	67.558	1.607	4.119	67.558
7	1.195	3.064	70.623			
8	1.041	2.668	73.291			
9	.963	2.468	75.759			
10	.908	2.329	78.088			
12	.784	2.010	82.217			
13	.653	1.675	83.892			
14	.617	1.583	85.475			
15	.574	1.472	86.947			
16	.518	1.329	88.276			
17	.462	1.184	89.460			
18	.412	1.057	90.517			
19	.411	1.053	91.571			
20	.368	.944	92.515			
21	.339	.870	93.385			
22	.292	.749	94.134			
23	.257	.659	94.793			
24	.241	.619	95.412			
25	.223	.573	95.985			
26	.218	.560	96.545			
27	.191	.491	97.035			
28	.158	.404	97.439			
29	.156	.400	97.839			
30	.147	.378	98.218			
31	.131	.336	98.553			
32	.120	.306	98.860			
33	.099	.254	99.114			
34	.086	.221	99.335			
35	.076	.195	99.529			
36	.065	.167	99.697			
37	.053	.137	99.834			
38	.043	.110	99.944			
39	.022	.056	100.000			

Table 4.15: Total Variance Explained for GES Scale

Total Variance Explai ıed						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.744	42.147	42.147	6.744	42.147	42.147
2	1.616	10.098	52.246	1.616	10.098	52.246
3	1.121	7.008	59.254	1.121	7.008	59.254
4	.969	6.058	65.312			
5	.798	4.985	70.297			
6	.762	4.764	75.061			
7	.677	4.230	79.291			
8	.636	3.973	83.264			
9	.544	3.403	86.667			
10	.490	3.061	89.728			
11	.452	2.823	92.551			
12	.352	2.202	94.753			
13	.297	1.855	96.608			
14	.204	1.275	97.883			
15	.174	1.085	98.967			
16	.165	1.033	100.000			

Table 4.16: Rotated Component Matrix for ESAS

Rotated Component Matrix[a]

	1	2	3	4	5	6
I willingly reuse this app	.833					
Mobile apps for ecotourism were the new ways of doing things	.827					
The interface does influenced me to want to visit and know more about the place	.797					
The layout design was consistent throughout the application	.773					
The mobile app enables me to try the new technologies	.766					
The home screen of the app was easy to understand	.715					
Mobile apps arouse my curiosity	.672					
Moving from one section in the app to another was easy	.649					
I expect the use of the mobile app to continue in the future	.619					
I was satisfied with the ease of use of the app	.600					
The visual matches with the desired concept (look and feel)						
I intend to use a mobile app in the near time						
The app interestingly presents its content		.771				
Mobile application fulfils my needs		.742				
The arrangement and size of buttons/icons/menus/content on the screen were appropriate		.715				
The information in the app caused me to stay longer on my visit to this place		.615				
The App provides better tourist support						
The appearance of the app was pleasant						
I find the app to be flexible to interact with						
I can easily recognise where the information I need was located						
The content of the app was important to me						
The description of the App and the star rating			.866			
The number of features the app offers			.821			
The size of the app and the price			.797			

Rotated Component Matrix[a]

	1	2	3	4	5	6
This app was likely to increase awareness of the importance of addressing apps						
I would use mobile apps without hesitation to satisfy my needs						
I am willing to pay for the apps developed				.769		
I will pay for this app				.735		
I predict that I would use the mobile app in the short term				.705		
The number of users that have already downloaded the App				.606		
Using the mobile app was interesting					.826	
Using the mobile app was feel good					.815	
Using the mobile app, I feel relax					.649	
It was difficult to understand the structure of the app						.819
The app included terms and words that were unfamiliar to me						.711
It has to be skilful at using the app						
Learning to operate the system was difficult						
I would not recommend this app to anyone						
I always knew my location in the app						

The Rotation Method conducted was Varimax with Kaiser Normalization for both scales to examine the underlying variable. While in this study, a 0.6 value was considered a cut-off value to retain the items. Another exclusion criterion was to delete the factor with two items. In Table 4.16, the smartphone app users were represented by a list of 39 measured items, which resulted in 6 factors, with one factor having only two items. Another 13 items were removed due to low factor loading than 0.6. While for the general experience scale in Table 4.17 represent 16 items, which results in three factors, with one factor having only two items removed. In total, eight items were removed due to low factor loading.

Table 4.17: Rotated Component Matrix for GES

Rotated Component Matrix[a]

	Component		
	1	2	3
I did the right choice to visit the ecotourism places	.859		
Overall, I am happy with this ecotourism visit	.826		
Overall, I am satisfied with this ecotourism visit	.794		
I will recommend this visit to my friends/family			
My experience sharing with other tourists was personally satisfied			
This visit has exceeded my expectations			
I can easily organize eco-trip by myself and travel alone or just with my friends/family		.757	
This type of tourism was less harmful to the environment than all the other kinds of tourism		.721	
I am satisfied with the service provided by the tourism information centre		.705	
I want to experience a new culture with the minimum influence on the environment and local community			
I will revisit the ecotourism attraction again			
I want to meet people with similar interests			
I have a passion for learning something new when I travel			.807
I travel to new places to learn about local culture and customs			.750
I want to learn more about the natural environment			
I like to spend time in open-air			

In summary, the overall EFA result is shown in Table 4.18. Each factor was given a name according to the grouping items. Upon the achievement of EFA, five factors of visitors' experience with smartphone application usage have emerged: App Ease of Use, App Loyalty, App Meaningful Experience, App Utilitarian Value, and Mobile App Usability.

The first factor, Application Ease of Use, was the largest proportion of the total explained variance, 37.547%, with an eigenvalue of 14.643. It contained the influence of ecotourism smartphone apps among tourists, the satisfaction with its usage, and the experience of using new technology in ecotourism.

Mobile app usability was the second extracted factor, explaining 9.29% of the total variance with an eigenvalue of 3.623 with four measuring items. Mobile app usability was defined as the quality attribute that assesses how easy a system interface is to use (Swaid et al., 2017). The app should have a positive attitude towards the use of the app. The app's usability was also related to learnability, where the app was easy to learn and use. Lastly, the app should be easy to remember, where the arrangement of the button, icon, menu, and content should be in place.

The third factor was the App Utilitarian value explaining 7.017% of the total variance with an eigenvalue of 2.736. Three items were considered for this factor. First, the utilitarian value was defined as a service that helps the consumer solve problems and accomplish tasks. The app's price and size classification was considered a technical aspect. This was very much relevant to the subjective quality of the app. Finally, the app's features were also an important key for an app. This can make an app more successful and user-centric.

App loyalty was the fourth factor, explaining 5.124% of the total variance with an eigenvalue of 1.999. Four measurement items about the user's perception and decision to

download and use the app. A positive word about the app will lead to purchase intention, and loyalty will influence the visitors to download and pay for the app.

The last factor was app meaningful experience measurement, which explains 4.461% with eigenvalue 1.740 and three measurement items. This factor was about the visitor's experience with using the ecotourism app. These items defined the excitement and happiness of using this mobile app. The satisfaction that the visitor gains replicates the visitor's positive feelings and enjoyment in using the app. This can achieve through the aesthetic design of the mobile app. Table 4.18 present the overall EFA for the ecotourism smartphone application scale.

Table 4.19 shows the overall EFA general experience scale factors. The first factor was learning about the visitor's experience using the ecotourism app. These items defined the excitement and the happiness derived from the trip. The second factor is named satisfaction, which reflects the visitor's positive feeling and enjoyment of the trip.

Table 4.18: Exploratory Factor Analysis on Ecotourism Smartphone Application Experience (N=200)

	Mean	Std. Dev	Factor Loading	Communality	Eigenvalue	Variance Explained	Cronbach Alpha
Factor 1 (App Ease of Use)					14.643	37.547	.975
I willingly reuse this app	3.28	.739	.833	.728			
Mobile apps for ecotourism were the new ways of doing things	3.32	.739	.827	.810			
The interface does influence me to want to visit and know more about the place	3.28	.716	.797	.671			
The layout design was consistent throughout the application	3.30	.907	.773	.694			
The mobile app enables me to try the new technologies	3.33	.836	.766	.804			
The home screen of the app was easy to understand	3.34	.832	.715	.758			
Mobile apps arouse my curiosity	3.32	.620	.672	.749			
Moving from one section in the app to another was easy	3.34	.775	.649	.625			
I expect the use of the mobile app to continue in the future	3.32	.697	.619	.742			
I was satisfied with the ease of use of the app	3.33	.625	.600	.754			
Factor 2 (Mob App Usability)					3.623	9.290	0.876
The app interestingly presents its content	3.32	.698	.771	.808			
Mobile application fulfils my needs	3.32	.734	.742	.777			
The arrangement and size of buttons/icons/menus/content on the screen were appropriate	3.32	.803	.715	.739			
The information in the app caused me to stay longer on my visit to this place	3.32	.982	.615	.848			

	Mean	Std. Dev	Factor Loading	Communality	Eigenvalue	Variance Explained	Cronbach Alpha
Factor 3 (App Utilitarian Value)					2.736	7.017	0.822
The description of the App and the star rating	3.46	.728	.866	.783			
The number of features the app offers	3.45	.836	.821	.748			
The size of the app and the price	3.27	.759	.797	.768			
Factor 4 (App Loyalty)					1.999	5.124	0.794
I am willing to pay for the apps developed	3.37	.853	.769	.816			
I will pay for this app	3.39	.732	.735	.781			
I predict that I would use the mobile app in the short term	3.35	.627	.705	.801			
The number of users that have already downloaded the App	3.26	.731	.606	.720			
Factor 5 (App Meaningful Experience)					1.740	4.461	0.811
Using the mobile app was interesting	3.29	.714	.826	.783			
Using the mobile app was feel good	3.25	.651	.815	.847			
Using the mobile app, I feel relax	3.24	.660	.649	.728			

Table 4.19: Exploratory Factor Analysis on General Experience on Ecotourism (N=300)

	Mean	Std. Dev	Factor Loading	Communality	Eigenvalue	Variance Explained	Cronbach Alpha
Factor 1 (Learning)					6.774	42.147	0.899
I like to spend time in open-air	3.52	.698	.859	.769			
I want to experience a new culture with the minimum influence on the environment and local community	3.45	.734	.826	.767			
I have a passion for learning something new when I travel	3.18	.803	.794	.772			
Factor 2 (Satisfaction					1.616	25.098	0.794
My experience sharing with other tourists was personally satisfied	2.96	.982	.721	.750			
This visit has exceeded my expectations	3.51	.728	.705	.664			
I can easily organize eco-trip by myself and travel alone or just with my friends/family	3.17	.836	.807	.707			

4.11 Exploratory Factor Analysis Discussion

This study aimed to develop a scaling tool to measure the visitors' experience during the ecotourism site visit. The visitors' experience in this study was divided into two scales where one scale measures the tourist experience using the mobile app, and the other is visitors' general experience. The scale development started on item writing, considering past literature studies. Fifty-five items were finalized for this study. The 55 items were divided into two sections: general experience with 16 items and mobile application user experience with 39 items. The sample size of this study consists of 300 participants. Cronbach alpha, KMO, and Varimax matrix were analysed using the sample. In addition, an Exploratory Factor Analysis (EFA) was conducted to determine the scale's structural validity.

Consequently, in the exploratory factor analysis conducted with 39 items, the scale had five factors, with 24 items explaining 37.547% of the total variance—the 24 items obtained from the Varimax matrix. First, the construct identified was “App Ease of Use," consisting of 10 items with load values varying from 0.6 to 0.833. In the contemporary technological setting, previous research has demonstrated that simplicity of use benefits continuous use (Chiu & Wang, 2008). With TAM, it was discovered that when a person decides to utilize technology, perceived usefulness and ease of use significantly impact their decision. This also considers critical aspects like perceived utility, ease of use, and attitudes toward app use to determine how much an app affects the user.

Furthermore, the mobile application's ease of use determines the time experienced users spend completing particular tasks or the speed with which tasks were completed. The second construct discovered was "Mobile App Usability," consisting of four items with load values varying from 0.615 to 0.771. Effectiveness, learnability, memorability, efficiency, and satisfaction were aspects of mobile app usability. Effectiveness was primarily concerned with

how satisfied users were and how accurately they could fulfil their objectives when browsing an application. Users' ability to adapt to different interaction modes as they grow more familiar with the system and their favourable views about the mobile app.

The third construct was "App Loyalty," consisting of 4 items with load values varying from 0.606 to 0.769. The impact of habit on consumer pleasure and the mediating role of satisfaction in the habit-loyalty relationship (Pereira et al., 2016). The most important component in anticipating consumer loyalty with app purchases based on their patterns was saving the expense of thinking and search efforts, especially under time constraints (Hsiao et al., 2016). The fourth construct was “App Utilitarian,” consisting of 3 items with load values varying from 0.797 to 0.866. Due to the obvious integration of mobile app technology, visitors' utilitarian and hedonic characteristics have increased (Yoon et al., 2018). These responsibilities were accessing product information, selecting products, paying for them, and other functions. Users were motivated to use these functions because of utilitarian benefits (Kesari & Atulkar, 2016). This was due to the importance of utilitarian value in persuading consumers to buy what they anticipated to have. The last construct in the mobile experience scale was “App Meaningful Experience," which consists of 3 items with load values varying between 0.649 to 0.849. Most significant experiences also make users feel good: meaning was favourably associated with affect balance (Lukoff et al., 2018). As a result, it may be argued that building loyalty and acquiring a competitive advantage is critical (Kempiak et al., 2017). As a result, it was easy to see how having a great experience will make visitors remember their vacation.

The result of the exploratory factor analysis, conducted with 16 items for the general experience of the visitor, the scale was found to have two factors with six items explaining 42.147% of the total variance. The six items were obtained from the Varimax matrix. The

first construct identified was “Learning," consisting of 3 items with load values varying from 0.794 to 0.859. It was possible to use ecotourism as a learning resource to attract people's attention to something interesting (Mondino & Beery, 2019). The research reveals how ecotourism may catalyze by serving as a learning tool for people of all ages, locals, and visitors through participatory ecological learning. This study also investigates how people see sustainable behaviour through participatory ecological learning by assessing the influence of their self-efficacy and self-concept on their learning perceptions.

The second factor was “Satisfaction,” consisting of 3 items with load values varying from 0.705 to 0.807. The level of happiness a visitor has throughout his or her stay in the destination will influence whether or not he or she becomes a loyal consumer of the place. Tourists who were pleased with their experience were more likely to return to the same location Tourists' satisfaction will also determine whether or not they will suggest the destination to others. If the tourists are happy, they may promote it to others. On the other hand, happy visitors were likely to promote it and may even influence others (Wang et al., 2012).

4.12 Structural Equation Modelling

The outcomes of structural equation modelling were linked to research objective four: "To build a conceptual framework for the eco-tourist experience at Ecotourism attraction with a Smartphone Application" and "What were the components involved in the ecotourism tourist experience framework using a smartphone application." As mentioned in Chapter 1 and Chapter 2, the newly proposed conceptual model was tested to show the results in a structural model.

The variables embody the association between the three dimensions to explore the conceptual model and identify the outcomes of customer perceived value. All four constructs

(Tourist Behaviour, Mobile Application Quality, Meaningful Experience, Perceived Value, Meaningful Interaction, and Purchase Attitude) were tested using CFA after Cronbach Alpha and Exploratory Factor Analysis (EFA). It was to confirm the relationship of the variables with perceived value. CFA provides techniques for ensuring that the conceptual model is reliable and has sufficient validity.

Structural Equation Modelling (SEM) was used more in marketing studies (Iacobucci, 2010). It allows the researcher to analyse the data quantitatively and qualitatively to test the hypotheses. The quantitative analysis was used to test hypotheses, and the qualitative test was used to discover a way to formulate a hypothesis (Huberman & Miles, 2002). The conceptual model of this study used SEM as a quantitative analysis tool to evaluate the hypotheses. SEM was also used to run a regression analysis sequence. CFA and SEM were used to investigate the relationship between the independent variables (Tourist Behaviour, Mobile Application Quality, Meaningful Experience, Meaningful Interaction, and Purchase Attitude) and the dependent variable of Perceived Value.

4.12.1 Justification of SEM Model

Structural models include statistical requirements and data measurement in marketing research to validate or test visitor behaviour theories (Bonfrer et al., 2002). In addition, structural modelling was used to predict visitor behaviour on the future behaviour pattern. This method also can assess the complex relationship between structural coefficients (Łopucki et al., 2022).

This SEM model has two research practices: covariance-based variance and SEM-based variance. Covariance-based SEM describes the associations between indicators and constructs, establishes the theoretical rationale behind the conceptual model, and predicts the relationship between constructs based on variance SEM (Henseler et al., 2012). In this study,

the developed conceptual model was based on a theory of tourist behaviour and meaningful interaction with the smartphone application, and the variables' relationship was tested using covariance-based SEM to confirm the relationship.

4.13 Confirmatory Factor Analysis

Confirmatory Factor Analysis was formulated using AMOS with the scale items that filter with Exploratory factor analysis were comprised. The EFA analysis identified five constructs for the ESAS scale and two construct items for the GES scale of visitors. The ESAS Ecotourism smartphone application usage constructs, namely: Meaningful Experience, App Ease of Use, App Loyalty, App Usability, and App Utilitarian Value and for GES, identified two constructs, namely Learning and Satisfaction. The CFA ensures and evaluates all the constructs on the good fit. Before moving on to SEM analysis, a few models fit measurements provided by AMOS were used to assess the final model. They were low chi-square, a model p-value (CMIN/DF), the Normed fit index (NFI), the Comparative fit index (CFI), the root means a square error of approximation (RMSEA), and the Tucker Lewis coefficient (TLI). CFA model fit indices, their thresholds, and the results derived from previous literature (McNeish et al., 2021).

Before moving on to SEM analysis, AMOS provides a few measurements of model fit to evaluate the final model. The ecotourism smartphone application tour CFA model is depicted in Figure 4.8. Furthermore, it depicts various constructs' final scale item results among the thirty-nine CFA-tested items. This research utilised indicators of five variables to examine the scale's characteristics. The variance of each dimension was fixed at 1.0 to establish the scales. In this way, the fundamental conditions and identification have been fulfilled, and Figure 4.8 depicts the standardised solution of the developed measurement model.

The goodness-of-fit indices for the measurement model for ESAS were as follows: normed chi-square value (of ^{2}) of 0.978, TLI = 0.923, NFI = 0.910, CFI = 0.943 and RMSEA = 0.005. A significant result of the normed chi-square test indicated that the model fits well with the dataset. Furthermore, the values of NFI and CFI, which were near 1, imply a good fit, and index values over 0.90 were considered acceptable (Hooper et al., 2008). Generally, these statistics have given evidence of a reasonably good data fit.

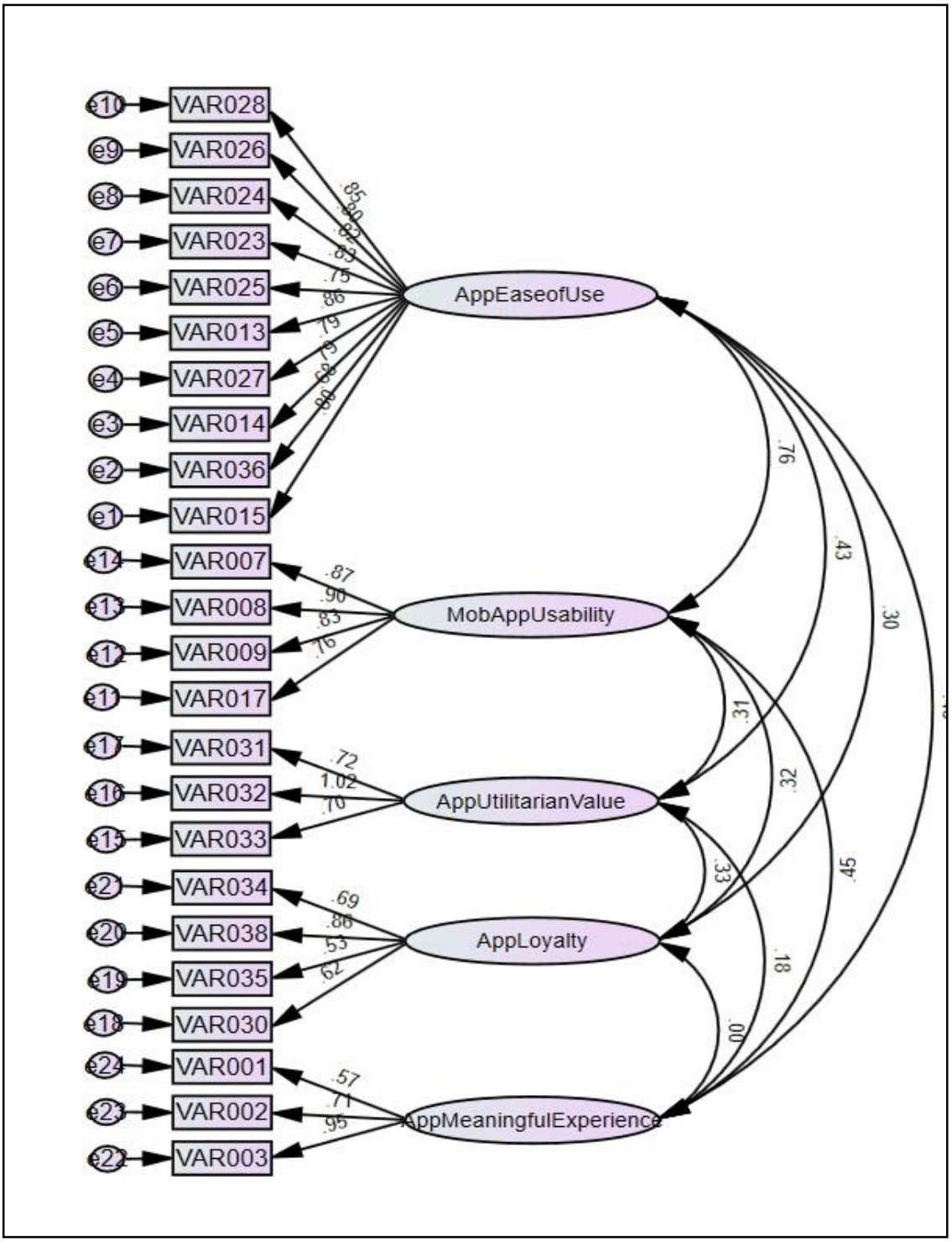


Figure 4.8: Confirmatory Factor Analysis Results for Ecotourism Smartphone Application Experience

The goodness-of-fit indices for the measurement model for GES were as follows: normed chi-square value (df ^{2}) of 0.993, TLI = 0.989, NFI = 0.950, CFI = 0.944 and RMSEA = 0.000. The significant result of the normed chi-squares test indicated that the model fits well with the dataset. The values of NFI and CFI, which were near to 1, imply a good fit, and index values over 0.90 were considered acceptable (Choi, 2010; Steenkamp & van Trijp, 1991). Generally, these statistics have given evidence of a reasonably good data fit. CFA result for the survey analysis of ecotourism general experience tour; as previously stated, only two constructs were discovered in this no-guide survey study as shown in Figure 4.9.

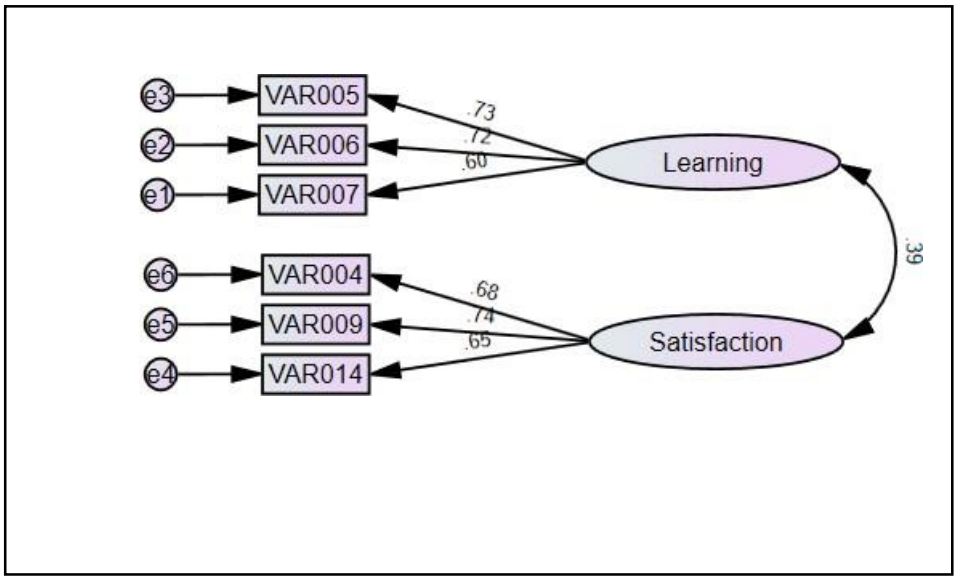


Figure 4.9: Confirmatory Factor Analysis results from visitor's general experience

4.13.1 Validity of Means and Standard Deviation

The mean was the average group score, whereas the standard deviation measures how far a group's scores differ from their mean (Stacey, 2005). These items' Mean and Standard Deviation show a high agreement on Smartphone Apps usage in ecotourism. According to the findings, smartphone application usage in ecotourism supports the decision-making process and total time consumption of smartphone application use during travel.

Tables 4.20 to 4.24 show the scale items for AME, AEOU, MAU, AUV, and ALO and their constructs and mean and standard deviation values. Tables 4.25 and 4.26 show the mean and standard deviation values for learning (LE) and Satisfaction (SA) scale items. This LE and SA scale can determine the value for different users, with and without a guide. The sample mean was used to measure the scale items of the study, while the standard deviation was used to measure the variability of sample scores.

Table 4.20: App Meaningful Experience Items

Item No	Questionnaire Item	Mean	Std. Deviation
AME01	Using the mobile app was interesting	2.95	1.025
AME02	Using the mobile app was feel good	3.09	0.814
AME03	Using the mobile app, I feel relax	2.94	0.848

Table 4.21: Application Ease of Use Items

Item No	Questionnaire Item	Mean	Std. Deviation
AEOU01	I willingly reuse this app	2.92	0.834
AEOU02	Mobile apps for ecotourism were the new ways of doing things	2.83	0.876
AEOU03	The interface does influence me to want to visit and know more about the place	2.77	0.894
AEOU04	The layout design was consistent throughout the application	2.76	0.883
AEOU05	The mobile app enables me to try the new technologies	2.81	0.911
AEOU06	The home screen of the app was easy to understand	2.88	0.885
AEOU07	Mobile apps arouse my curiosity	2.81	0.911
AEOU08	Moving from one section in the app to another was easy	2.87	0.811
AEOU09	I expect the use of the mobile app to continue in the future	2.73	0.890
AEOU10	I was satisfied with the ease of use of the app	2.77	0.863

Table 4.22: Mobile Application Usability Items

Item No	Questionnaire Item	Mean	Std. Deviation
MAU01	The app interestingly presents its content	1.713	1.380
MAU02	Mobile application fulfils my needs	1.380	1.811
MAU03	The arrangement and size of buttons/icons/menus/content on the screen were appropriate		
MAU04	The information in the app caused me to stay longer on my visit to this place		

Table 4.23: Application Utilitarian Value Items

Item No	Questionnaire Item	Mean	Std. Deviation
AUV01	The description of the App and the star rating	2.07	1.130
AUV02	The number of features the app offers	2.14	1.068
AUV03	The size of the app and the price	2.27	1.042

Table 4.24: Application Loyalty Items

Item No	Questionnaire Item	Mean	Std. Deviation
ALO01	I am willing to pay for the apps developed	3.18	0.757
ALO02	I will pay for this app	3.03	0.911
ALO03	I predict that I would use the mobile app in the short term	2.90	0.875
ALO04	The number of users that have already downloaded the App		

Table 4.25: Learning Items

Item No	Questionnaire Item	Mean	Std. Deviation
LE01	I like to spend time in open-air	3.27	0.739
LE02	I want to experience a new culture with the minimum influence on the environment and local community	3.27	0.739
LE03	I have a passion for learning something new when I travel	3.31	0.836

Table 4.26: Satisfaction Items

Item No	Questionnaire Item	Mean	Std. Deviation
SA01	My experience sharing with other tourists was personally satisfied	3.24	0.625
SA02	This visit has exceeded my expectations	3.17	0.732
SA03	I can easily organize eco-trip by myself and travel alone or just with my friends/family	3.15	0.665

The goodness fit index of the two scales was evaluated, and the following fit indices were shown in Table 4.27 for ESAS and Table 4.28. Overall, all of the indices tested for the model produced acceptable results.

Table 4.27: Confirmatory Factor Analysis Model Fit Indices, their acceptable Results for ESAS

Fit Index	Acceptable Levels	Model Fit Value	Model Fit Results
CMIN/DF	Good fit: values less than 1 Acceptable fit: values between 1 and 2	0.978	Acceptable fit
NFI	Good fit: values less than 0.7 Acceptable fit: values between 0.7 and 0.9	0.910	Acceptable fit
CFI	Good fit: values less than 0.95 Acceptable fit: values greater than 0.90	0.943	Good fit
RMSEA	Good fit: values less than 0 Acceptable fit: values less than 0.7	0.005	Good fit
TLI	Good fit: values less than 1 Acceptable fit: values between 1 and 2	0.923	Good fit

Table 4.28: Confirmatory Factor Analysis Model Fit Indices, their acceptable Results for GES

Fit Index	Acceptable Levels	Model Fit Value	Model Fit Results
CMIN/DF	Good fit: values less than 1 Acceptable fit: values between 1 and 2	0.993	Acceptable fit
NFI	Good fit: values less than 0.7 Acceptable fit: values between 0.7 and 0.9	0.950	Acceptable fit
CFI	Good fit: values less than 0.95 Acceptable fit: values greater than 0.90	0.944	Good fit

RMSEA	Good fit: values less than 0 Acceptable fit: values less than 0.7	0.000	Good fit
TLI	Good fit: values less than 1 Acceptable fit: values between 1 and 2	0.989	Good fit

4.14 Composite Reliability, Convergent Validity, and Discriminant Validity

The CFA test, composite reliability, convergent validity, and discriminant validity were used to ensure a good fit of the conceptual model. Composite reliability denotes a latent construct's dependability and internal consistency; an acceptable Composite Reliability (CR) value was 70% or higher. In Table 4.29, all the standard factor loadings were greater than 70%, indicating the CR. The Average Variance Extracted (AVE) and Convergent Validity (CV) of the measurement model were assessed using the AVE and CR. The AVE measures the level of variance captured by a construct versus the level due to measurement error. The AVE value greater than 0.7 was considered very good, and a value less than 0.5 was considered acceptable, as in Table 4.29. All the measurement constructs reach the acceptable level when their AVE exceeds 0.5. The values were specified as a CV.

Table 4.29: Standard factor loadings (1. Regression weights), Variance Extracted (2. Squared multiple correlations), and (3) reliability estimates

1	App Meaningful Experience 01	.826				
	App Meaningful Experience 02	.815				
	App Meaningful Experience 03	.649				
	Application Ease of Use 01		.833			
	Application Ease of Use 02		.827			
	Application Ease of Use 03		.797			
	Application Ease of Use 04		.773			
	Application Ease of Use 05		.766			
	Application Ease of Use 06		.715			
	Application Ease of Use 07		.672			
	Application Ease of Use 08		.649			
	Application Ease of Use 09		.619			
	Application Ease of Use 10		.600			
	Mobile Application Usability 01			.771		
	Mobile Application Usability 02			.742		
	Mobile Application Usability 03			.715		
	Mobile Application Usability 04			.615		
	Application Utilitarian Value 01				0.866	
	Application Utilitarian Value 02				0.821	
	Application Utilitarian Value 03				0.797	
	Application Loyalty 01					.769
	Application Loyalty 02					.735
	Application Loyalty 03					.705
	Application Loyalty 04					.606
2	AVE	0.763	0.725	0.711	0.828	0.704
3	Composite Reliability	81%	91%	80%	86%	80%
	Cronbach's Alpha	0.867	0.796	0.821	0.911	0.728

Table 4.30 shows the result of the squared correlation matrix where the discriminant validity test, the correlation between constructs value does not exceed 0.85, as demonstrated in the discriminant validity.

Table 4.30: Squared Correlation Matrix Result

	App Meaningful Experience	App Ease of Use	App Meaningful Experience	App Utilitarian Value	App Loyalty
App Meaningful Experience	**0.947**				
App Ease of Use	0.598	**0.649**			
App Meaningful Experience	0.789	0.542	**0.667**		
App Utilitarian Value	0.501	0.219	0.466	**0.617**	
App Loyalty	0.352	-0.302	0.242	0.409	**0.783**

Notes: Average Variance Extracted (AVE) was bold on the diagonal. The value below the diagonal was the squared correlation between constructs

Table 4.31: Standard factor loadings (1. Regression weights), Variance Extracted (2. Squared multiple correlations), and (3) reliability estimates

1	Learning 01	0.788	
	Learning 02	0.814	
	Learning 03	0.826	
	Satisfaction 01		0.841
	Satisfaction 02		0.839
	Satisfaction 03		0.853
2	AVE	0.809	0.844
3	Composite Reliability	85%	88%
4	Cronbach's Alpha	0.910	.934

Table 4.31 showed that all the standard factor loadings were greater than 70%, indicating the CR. The Average Variance Extracted (AVE) and Convergent Validity (CV) of the measurement model were assessed using the AVE and CR. The AVE measures the level of variance captured by a construct versus the level due to measurement error. The AVE value greater than 0.7 was considered very good, and a value less than 0.5 was considered acceptable, as in Table 4.31. All the measurement constructs reach the acceptable level when their AVE exceeds 0.5. The values were specified as a CV.

Table 4.32: Squared Correlation Matrix Result

	Learning	Satisfaction
Learning	**0.841**	
Satisfaction	0.598	**0.649**

Notes: Average Variance Extracted (AVE) was bold on the diagonal. The value below the diagonal was the squared correlation between constructs

Table 4.32 shows the result of the squared correlation matrix where the discriminant validity test, the correlation between constructs value does not exceed 0.85, as demonstrated in the discriminant validity.

4.15 Summary

The MacKenzie et al. (2011) 10-step process was used to create the ecotourism smartphone application and general experience scales. The study used 55 construct items, and the content validity was assessed using the social media platform Facebook. The analysis process and quantification of the overall response were then collected from the online survey. Finally, the analysis was carried out using SPSS. The result showed the scale developed to measure the tourist experience with smartphone applications during travel. The researcher has developed a scale called Ecotourism Smartphone Application Assessment (ESAS) that includes five constructs: App Meaningful Experience, App ease of use, App meaningful experience, App utilitarian value, and App loyalty. The ESAS scale can be used as a guideline for designing and developing the ecotourism smartphone app. The general experience Scale has two constructs: Learning and Satisfaction. The general experience scale allows us to assess the effectiveness of the general experience scale in evaluating the effects of learning and satisfaction with the tourist experience.

This study has empirically analysed the factors affecting tourist behaviour in accepting smartphone apps for travel purposes by focusing on TRA and integrating the form

of a variable (application loyalty). The result revealed that ALO positively affects attitude, which positively influences ESAS. Innovative tourists also like to learn and acquire new knowledge, increasing the perception of enjoyment of new technology. In contrast, PV has positively affected tourist behaviour by contributing to a better understanding of tourist needs and requirements in pre-during-post travel. The other constructs in the UTAUT2 model were significant determinants of tourist behavioural loyalty toward the apps. Perceived value was the antecedent that exerted the greatest effect. The present study's results indicate that social influence significantly affects behavioural loyalty toward the smartphone app. This may be because social value contributes to overall perceived value in smartphone app services. Furthermore, the meaningful experience and app usability has grown in the tourism planning stage and when tourists were experiencing a tourism stay.

CHAPTER 5

A STUDY IN THE WILD AT NIRANUR AGRO FARM (NAF)

5.1 Introduction

This study phase measured the perceived value of smartphone application technology usage among ecotourists in ecotourism sites. The first part of this chapter explained the User Experience (UX) design of the Niranur Agro Farm (NAF) smartphone application. This was followed by the Mobile Application Development Life Cycle (MADLC) as the framework for developing the NAF smartphone application (refer to Section 5.2). The MADLC was comprised of seven phases: (1) identification, (2) design, (3) development, (4) prototyping, (5) testing, (6) deployment, and (7) maintenance, and each phase was explained in detail concerning the NAF smartphone application development.

Subsequently, the Heuristic evaluation (HE) was discussed in Section 5.2.3. This research utilises the SMART heuristic evaluation to check the usability issues of the developed NAF smartphone application. This evaluation also helps to find the usability issues and guides to finding a solution to the usability issues. Eight participants participated in this HE. Before the software is made available to the intended consumers, the necessary usability issues must be resolved.

Section 5.3 discusses the design of the NAF paper-based brochure. The NAF paper-based brochure was designed using Adobe Photoshop Creative Cloud 2019. This NAF brochure was used as a guide to visit the NAF. Measuring visitors' experience using three conditions: NAF smartphone application, NAF paper-based brochure and control group without any guide. This study was carried out in NAF. A total of ninety participants were randomly chosen from the visitors who visited NAF during the eight months of data

collection. They were divided into three different conditions. The analysis was discussed in Section 5.6.

5.2 Niranur Agro Farm Application Development

There were various lifecycle models for smartphone application development, such as the waterfall, spiral, agile and iterative models. The literature on these software process models was reviewed to identify the most suitable model for this study. The waterfall model was the classical model of software engineering. This model was among the oldest and most widely used in government projects and many major organisations (Prenner et al., 2020). However, according to Modi et al. (2017), the waterfall model was easy to use, but it was a poor model for complex and object-oriented projects, and it was also considered a poor model where the requirement was at a moderate to high risk of varying.

The spiral model was another model used for iterative development, and this was the first model to explain why iteration matters. This spiral model suits large and mission-critical projects and works well for projects with a higher-priority risk analysis. The disadvantage of this model was that it was costly and did not work well for smaller projects. Thus, the iterative model was a life cycle that does not support from the start of the project, but supports begin with specifying and implementing just part of the software. This model was more flexible than the basic waterfall model, but the activities performed in parallel were subject to miscommunication and misassumptions. This model also has unforeseen interdependencies that can create problems. Hence it was not selected to be used in this study.

The agile model was an adaptive software development method. The agile model used an adaptive approach without detailed planning and clarity on a future task. The Agile model also uses minimum documentation and depends heavily on customer interaction. So, if the customer is not clear, the software development can drive in the wrong direction. This 1

model was also challenging to transfer technology due to a lack of documentation. Thus, this model was not appropriate for this NAF smartphone application development.

Mobile Application Development Life Cycle (MADLC) comprises seven phases: identification phase, design phase, development phase, prototyping phase, testing phase, deployment phase and maintenance phase. This MADLC was most suited for mobile application development as this model clearly defines and elaborates each task list in each phase (Vithani et al., 2014). This model ensures the development stages with minimum risk. Even though MADLC focused on dividing functional requirements into various modules and delivering them as a prototype at different interims, it was inexpensive. Table 5.1 shows the comparison of different software development models for better understanding. This comparison showed that the MADLC was the most suitable model for developing the NAF smartphone application.

Table 5.1: Comparison of software development model

Process Model / Characteristics of Mobile Apps	Spiral model	Waterfall model	Iterative model	Agile model	MADLC
Environment	Stable	High volatile environment	High volatile environment	High volatile environment	High volatile environment
Focus	Risk involved	A high amount of risk and uncertainty	The main focus was on producing a new version of the app at the end of the iteration to satisfy the customer's needs	Human Aspects of software engineering	The main focus was on dividing functional requirements into various modules, and they were delivered as a prototype at different interims
Multiple Platform	N/A	N/A	N/A	N/A	Yes
Suitability	Large, expensive and complicated projects	Simple and easy to use	Complex and Dynamic Applications	For small organizations, developmental and non-sequential projects	For apps that have similar ideas and were already existing in the market
Architecture	Designed for current and foreseeable requirements	Designed for current requirements	Designed when the requirements of the complete system were clearly defined and understood	Designed for current requirements	Designed for the user's requirements, and the user himself came out with an idea of how to develop the was further detailed and analysed
Refactoring	Expensive	Inexpensive	Inexpensive	Inexpensive	Inexpensive
User Involvement	Throughout the life cycle		At the end of every iteration	Constant feedback from the user	Constant feedback from the user
Documentation	Heavy	High	High	Low	High

Note: Reprinted from Kaur, A., & Kaur, K. (2015). Suitability of existing software development life cycle (SDLC) in the context of mobile application development life cycle (MADLC). International Journal of Computer Applications, 116(19).

The Mobile Application Development Life Cycle (MADLC) was a strategy that was suggested to be a formal life cycle for developing mobile applications in order to allow a precise methodology in system enhancement because it has complex usefulness and was not the same as a desktop application (Brundage et al., 2018). These technique approaches were being developed and proposed to facilitate the creation of efficient systems. There were six stages in the Mobile Application Development Life Cycle (MADLC). It was a precise technique for developing a mobile application with a specific aim. The MADLC was proposed because mobile applications were inconvenient and were not subject to the same constraints as desktop applications (Vithani et al., 2014).

Shanmugam et al. (2019) explain that each task registered in each phase was clearly defined and elaborated. In addition, Darus et al. (2017) adopted the MADLC method because it was highlighted with minimum risk. Furthermore, the Mobile Application Development Lifecycle model (MADLC) provides a methodical approach because mobile applications differ from desktop applications' functionality. Hence, the researcher used MADLC as the system development process for developing NAF. The MADLC method consists of seven phases: identification phase, design phase, development phase, prototyping phase, testing phase, deployment phase, and maintenance phase, as shown in Figure 5.1.

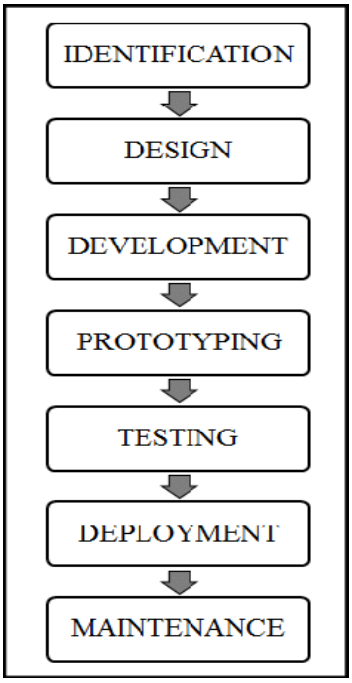


Figure 5.1: Mobile Application Development Life Cycle

Note: Reprinted from Kaur, A., & Kaur, K. (2015). Suitability of existing software development life cycle (SDLC) in the context of mobile application development life cycle (MADLC). International Journal of Computer Applications, 116(19).

i. Identification Phase

The identification phase aimed to develop an idea for the NAF application. This phase involved gathering and categorising ideas from the NAF founder. In this phase, the researcher collects information from the founder of NAF, Mr Mohd Alius Hamri, about the history of this bee farm bee species and relevant information. All this information was very useful for developing the NAF smartphone application.

For example, the concepts for the mobile application came from the NAF founder to the developer. Subsequently, the mobile application concept team addresses the list of ideas containing the feasibility criteria for the application. The current implementations on each standard platform were assessed for the proposal's feasibility, for example, evidence of the discrepancies with the current application. The other essential role was to outline the time

frame needed to develop the application. The initial raw data collection needs to be completed before the design phase. Then, the work conducted by the concept team of the mobile application could be reported and passed to the design team.

ii. Design Phase

The mobile application's preliminary design used the data from the identification phase. The preliminary design was used to check the feasibility of a mobile application design. The design process was divided into two areas: the first step was building a use case, and the second stage was evolutionary prototyping. A use case defines a software system as more accurate and documents how a customer communicates with the system and how the system responds (Litayem et al., 2015). A use case was an interaction series between actors and the system to achieve a specific objective, commonly used to describe system specifications in system analysis. At this point, the use case diagram was used to define the specifications of the framework and modules. A use case was described at the beginning based on user observations and an interview with the owner of Niranur Agro Farm (NAF). The actors in this NAF application were visitors and administrators, as depicted in Figure 5.2.

The modules and prototypes were classified from the application functionality. For instance, a prototype configuration can be shown by combining modules. Next, the application software architecture was developed with the specified functional requirements. Then it describes the designs and related units.

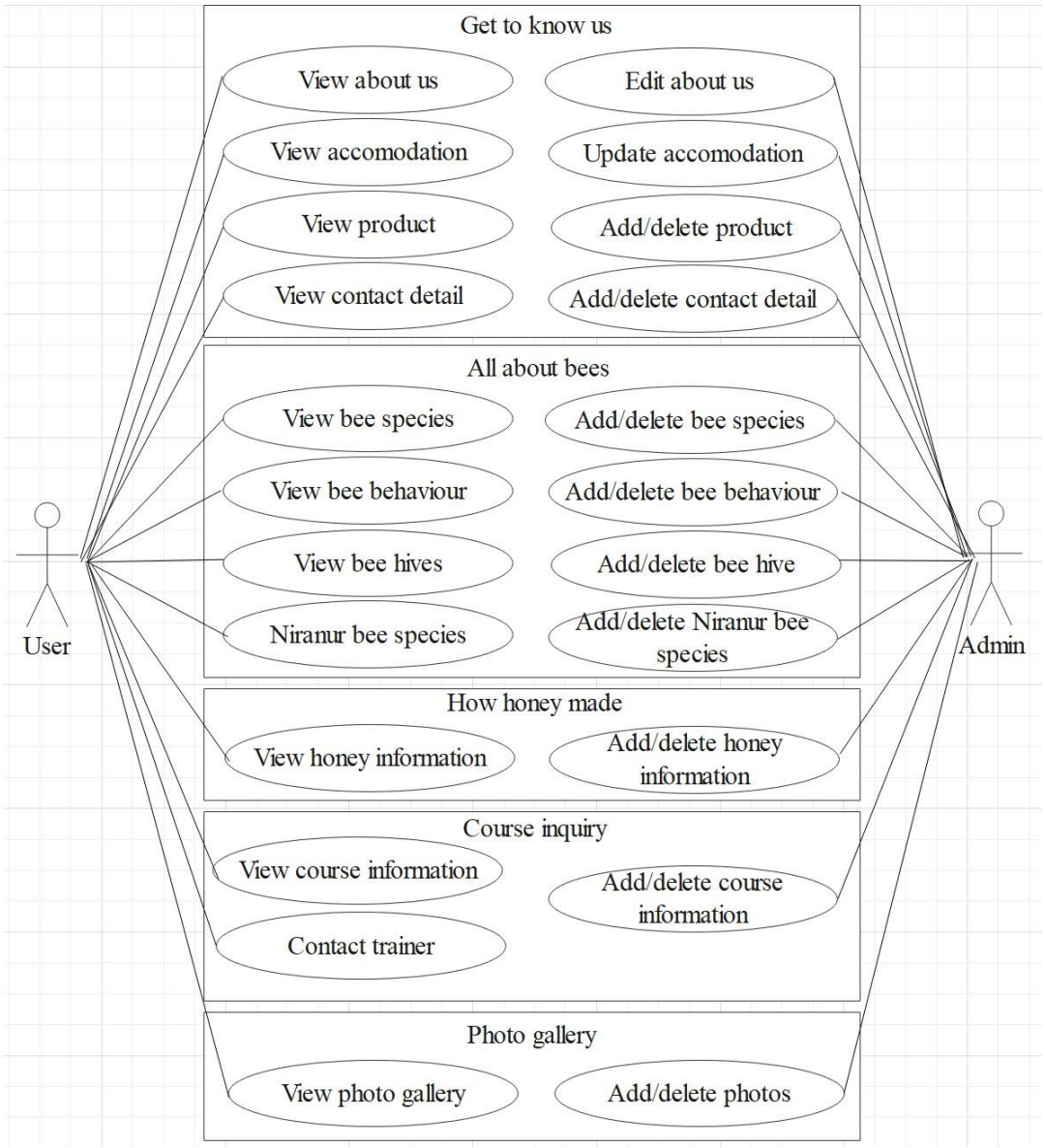


Figure 5.2: Use Case of Niranur Agro Farm

Evolutionary prototyping was performed continually at the next level to refine and redesign the use case. The perception of the user requirements was minimal at the beginning of this analysis, so the prototyping of low fidelity was constructed. The low-fidelity prototype was created to provide the end-user, the operator, with a direct user interface experience to test the usability of the use case. The development process of low fidelity was divided into two stages: paper sketches and computer-based design.

Paper and pen-based sketches were a simple, affordable, and reliable prototyping technique (Dewsbury et al., 2006). This sketch can be obtained without any software and was helpful for the developer in creating the mobile device user interface early on. A pre-visualisation method for the user interface design was the storyboard design. The approach to the storyboard was to discuss the graphic presentation and the definition of the user interface design. In addition, it was also a way to clarify and add meaning to the mapping between architecture and visual presentation. Van der Lelie (2006) explains how storyboards should be used in design practice at two levels: to see the new design before it develops and focus on the visualised interaction. The actual development of the storyboard was to facilitate thinking, visualisation, and reframing of the mobile phone user interface design. The researcher used a storyboard (visual and narrative) to help "thinking" as a process mechanism contributing to the brief and supporting tool used throughout the mobile app development.

Storyboard sketches were drawn for the user interface of NAF. The sketches were the first version of the interface design. The Adobe Ai mock-up design sketches were shown to the design team before discussion with the supervisor. With those changes and some new inspirations, the mock-up design was finalised to view the application user interface better. The paper-based sketch of the user interface of the NAF application was sketched from the splash screen to the main menu and submenu interface. Figure 5.3 shows the low-fidelity paper-based sketches for the NAF smartphone application design storyboard. The paper and pen-based sketches of the NAF application were transformed using the Adobe Ai user interface design, demonstrated in Figure 5.4.

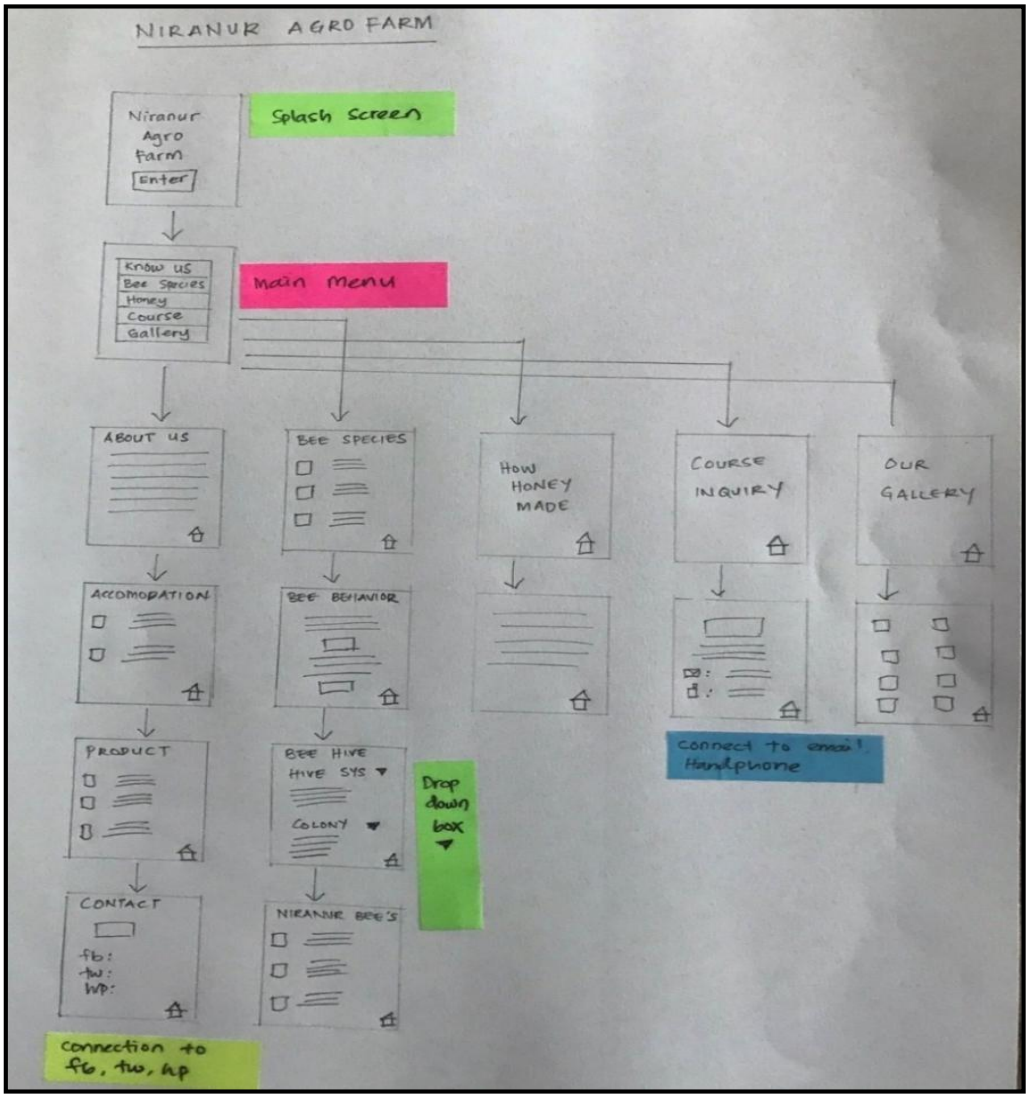


Figure 5.3: Paper and Pen-based

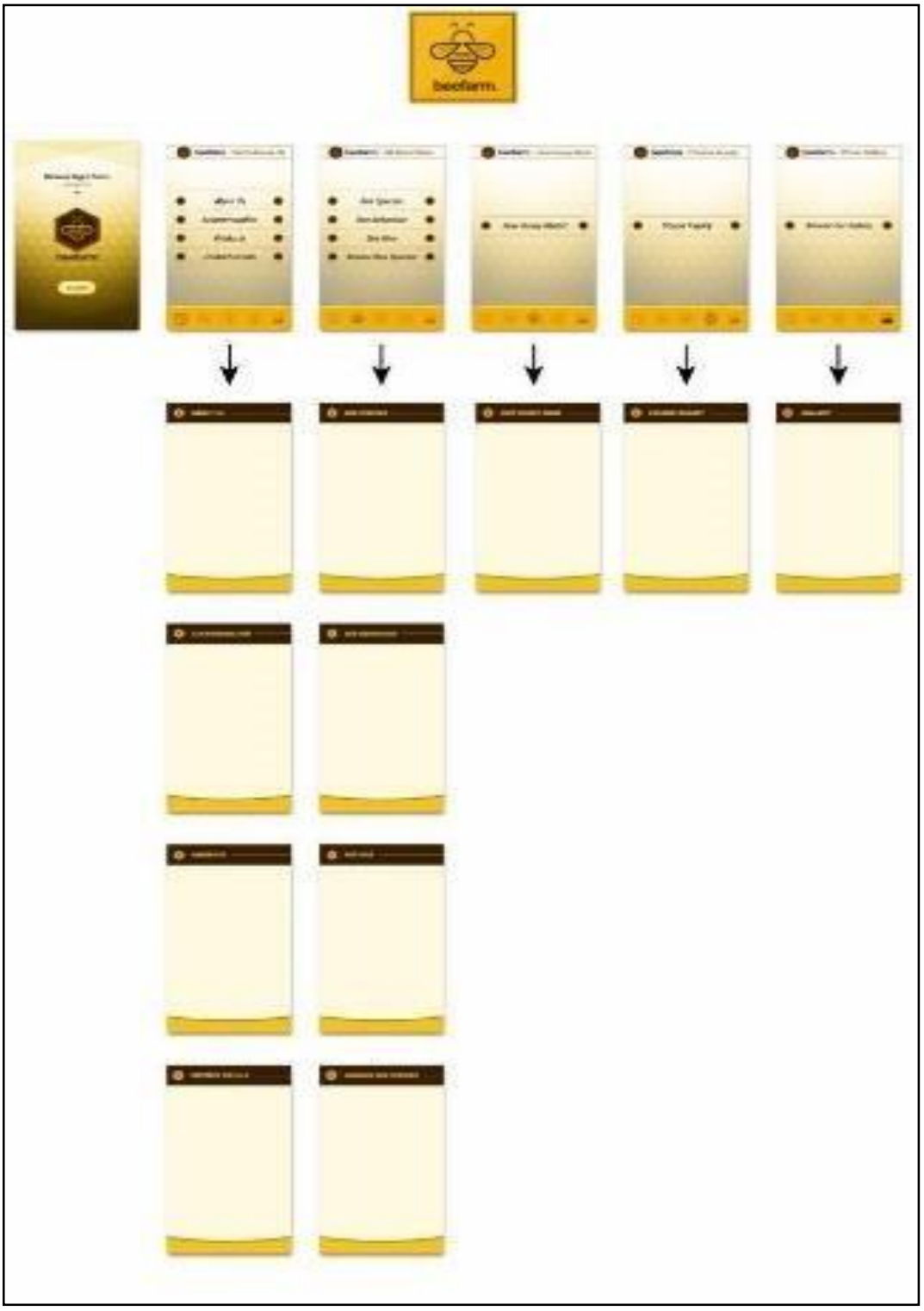


Figure 5.4: Low-Fidelity NAF prototype

On the other hand, when producing the actual User Interface (UI) layout design, more complex interaction issues can be evaluated and tested by high-fidelity prototypes. The NAF high-fidelity prototype captures the look and feel of the application's outcome, including the essential part of the information or functions. On the other hand, the structure and more thorough interaction challenges can be measured and checked by high-fidelity samples before designing the final UI. The NAF high-fidelity prototype captures the final product's look and feels and includes necessary content functionality and information elements. Thus, the high fidelity of NAF nearly showed the actual product design. The high-fidelity prototype of NAF also considers the choice of font size, colour combination, and button size.

The NAF smartphone application incorporated the brand colour of bees, namely yellow and brown. Next, the NAF application icon represents a bee entirely focused on the brand, and the interface's background uses a beehive pattern, as shown in Figure 5.5. A discussion with the research supervisor was conducted to finalise the application’s colour and icon and facilitate the construct definition.

5.2.1 UX Design and User Interface Graphics

User Experience (UX) is the consequence of a user’s internal state (predispositions, expectations, needs, motivation, mood, etc.) (Koek et al., 2017), the characteristics of the designed system (e.g., complexity, purpose, usability, functionality, etc.) (Christiansen et al., 2017), and the context (or the environment) (Pinchot, 2020) within which the interaction occurs (e.g., organisational/social setting, the meaningfulness of the activity, voluntariness of use, etc.) (Aranburu et al., 2018).

A user scenario is a useful tool in UX since it allows you to understand your users' goals, behaviours, motivations, and pain points. Therefore, before the next phase, the use case diagram broadly depicted how users interact with the system. In addition, the

participants' design concepts and main functionality were compared to design principles to see if the final product addressed the users' needs and followed design rules and principles. These design ideas were then turned into a wireframe design, which was used to further create and test the basic look and feel of the final product applications (Vithani et al., 2014).

One of the criteria for application design was that it should be easy to use and intuitive without lengthy explanations. In other words, it assures the intended mobile application users use it without assistance. This section analyses and discusses why the mobile application looks the way it does, why its functions were so visually focused, why the controls and settings were designed the way they were, and finally, how the colours for the application interface were chosen. In this way, it can improve the user experience and user satisfaction, which helps increase the number of users of the specific application. Furthermore, the application's architecture has a virtual colour interface on mobile devices replicating real ones based on the case study's theme. The application's design concentrates on simplicity to make the mobile application user-friendly, including choosing a colour for the NAF smartphone application that resembles the bee theme.

A good design was defined as a challenging objective to accomplish. The terms functionality and usability by good design were included in terms of colour, style, and feedback. It was required for a suitable mobile application because the aesthetic aspect was more difficult to measure; however, if the mobile application was aesthetically pleasing, it was very effective in sales and popularity (Zhang et al., 2018). Aesthetic or visual enjoyment provides a pleasant experience to the consumer and is unrelated to any other aspect of the application. Therefore, well-designed aesthetics increase customer satisfaction in mobile commerce (Ahmad & Ibrahim, 2017).

People associate perceived ease of use with aesthetics as complementary (Oyibo & Vassileva, 2020). The user interface is a significant aspect of any mobile application (Hussain et al., 2018). It was always mandatory for the Graphical User Interface (GUI) to be easy to use because most users do not read manuals. The entire experience of using the application depends on the complexity of the mobile application; this causes the user to switch from positive to negative feedback (Huda, 2018). It was recommended to use the Android Human Interface Guidelines because it was deployed on the Android platform for ease of use and informative mobile applications.

The requirements of mobile application design were transparency, deference, scope, aesthetic authenticity, accuracy, direct manipulation, input, metaphors, and user control, among the requirements and concepts needed in the design stage. The mobile user must have a set of targets to download the mobile application. The user must perform a predefined task to reach the target successfully. It can lead the user to reach a flow state by providing the consumer with an achievement. When the user has a good feel for the flow of the application, and it is very effective, focused, and insignificant, things can not interrupt the user's perception. The non-skeuomorphic or simple design makes more sense in a mobile application as it uses digital properties in a digital society (Wiberg, 2018).

In contrast, the skeuomorphic design seeks to recreate the user interface in the real digital world, recovering the limitation of the previous designs. An excellent example of weakness was that users assumed the iBook bookshelf had small free spaces (Neil, 2014). In addition, studies have shown that individuals generally report a preference for the non-skeuomorphic style. The design was minimalist typography and a beautifully designed interface (Johnson, 2020). The intervention was introduced with high-contrast colours (green and white) and was visibly easier for people with visual disabilities. Furthermore, the default

operating system (OS) platform has its own selected font family and colour, ensuring good readability as it resembles.

Emotions were multimodal, and visual feedback received from a researcher during the experiment was converted into emotions. The device architecture employed immediate synchronous responses to the events (Mclean et al., 2018). The contact between the user and the device was managed through the touchscreen. As literature has shown, there were six distinct forms of finger operation on a touchscreen: tap, double, long tap, drag, flick, and multi-touch. New technical developments would likely mean one additional movement, "force-touch" or "3D touch" (Johnson, 2020). However, everything within the framework was done by simple taps to simplify and retain a user-friendly interface for all users.

The information conveyed by the application was friendly, consistent, and efficient to satisfy its users. It can be done in terms of colours by choosing a colour pallet based on the inheritably harmonious colour design technique and applying it to all device buttons, sliders, and others. The Operating System (OS) framework chosen for execution wasconvenient enough to completely back such a colour concept. Therefore, the application design would add an already validated and standard colour pallet to the user, with almost zero adaptability time in the UI application. The consumer feels at home, in other words. Another reason to complete the design choice was to use the specific colour palette becausethe developer needs to ensure that it does not exclude the colour-deficient users if it wants tooptimise the app users, and this pallet was checked for colour deficiency.

Auditory stimuli have the capacity to individuals' affective responses. It has been shown that undesirable audio stimuli can influence a person's emotional state (e.g., fighting sound) and constructive audio stimuli (laughing sound). On the other hand, carefully chosen

audio stimuli can control the user's emotions in HCI (Partala & Surakk, 2003). For example, male users have benefited from the sound of applause by decreasing their anxiety levels towards reacting correctly during learning, but women were reacting differently on the other hand (Partala & Surakka, 2003) because sound stimuli have questionable effects, recommending the default sound warning was the right sound stimuli that will not interfere with the consumer's reactions negatively or positively (Kumar et al., 2019).

Safety issues were a critical element of this application called ethics. This application honours human effort to be appreciated somewhat by safe. Actions will occur intuitively, based on common sense, and the application will benefit users' lives. The mobile application must be transparent. The consumer must feel and be shielded from unwanted information or privacy infringement. Invisible operations, such as submitting private metrics to third parties or exposing the user's exact location, will not occur. A mobile application programme was a straightforward tool without any hidden info. The system was de-centralised, upholding human rights. The user's feeling that the user oversees their data was important. Our application would also not keep track of any usage-related details that the volunteer has done. The privacy policy will also state this. Extensive testing of the application must be carried out to ensure protection. It was to prevent software faults and responses by doing so. On the other hand, the application (based on the concept of understanding) should be programmed to click the back button to get to the previous page if the user makes a mistake or forgets something. The application was built so that no kinematic load or cognitive effort was needed.

User interface graphics were distinct in how users perceive graphics effectively designed for a mobile application user interface. It was critical for the designer to carefully design animations to be not overused in the mobile application (Wendel, 2020; Lomakina,

2017). It was also resulting a more incredible user interface if accurate icons or photos are used in the phone app (Wendel, 2020). Therefore, the NAF was not using any graphics due to space constraints. Finally, the NAF application was more focused on appealing aesthetic design. The overall user interface design of the NAF application is shown in Figure 5.5.

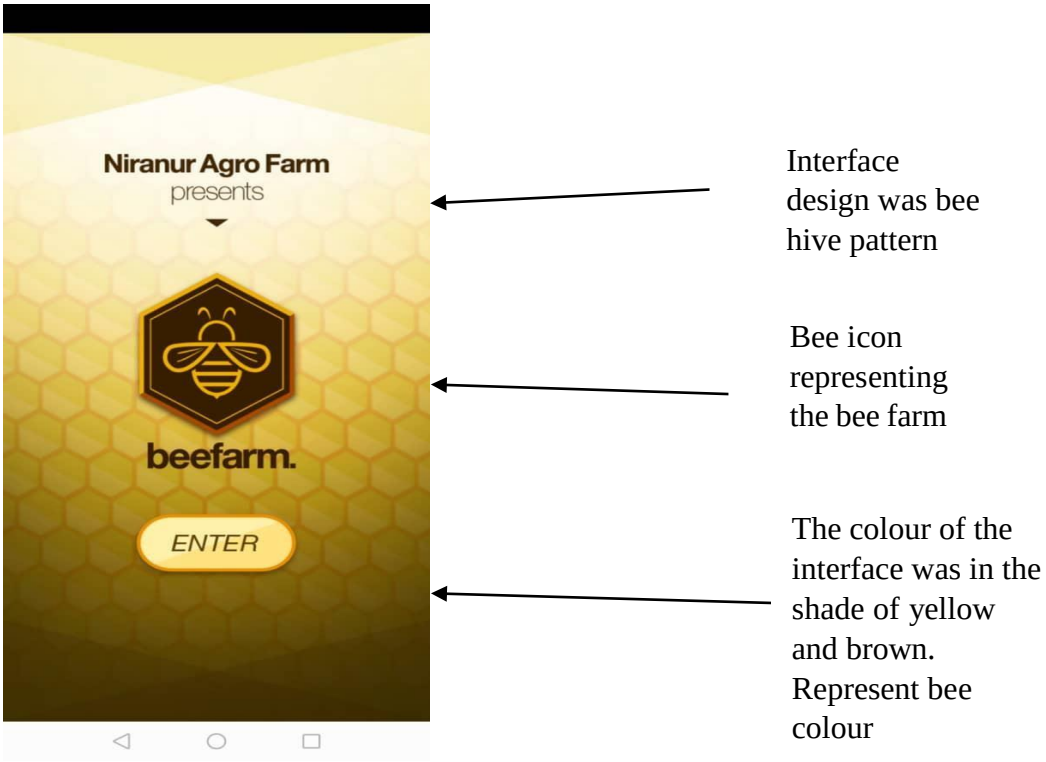


Figure 5.5: Design element used in Niranur Agro Farm Application

5.2.2 Screen Navigation

The structure of the NAF application and the overall look and feel of the application are shown below. In addition, the researcher will show the navigation of the application design stage by stage below.

i) Splash screen

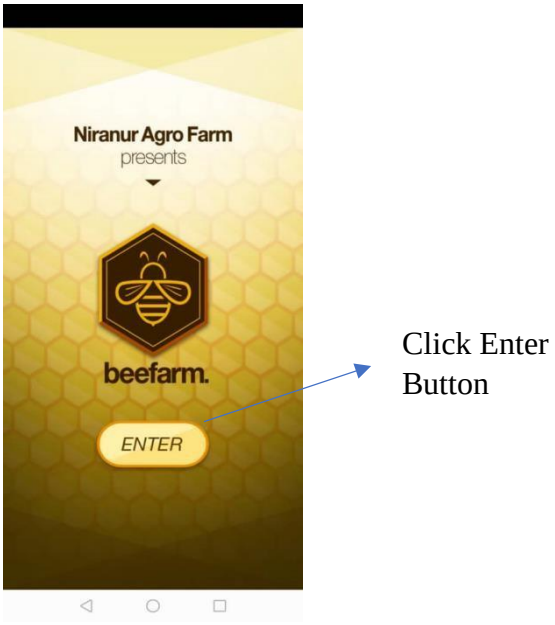


Figure 5.6: Splash screen of NAF

The above screen showed the splash screen of the NAF application. The user needs to press the enter button to navigate the application menus.

ii) Main menu design

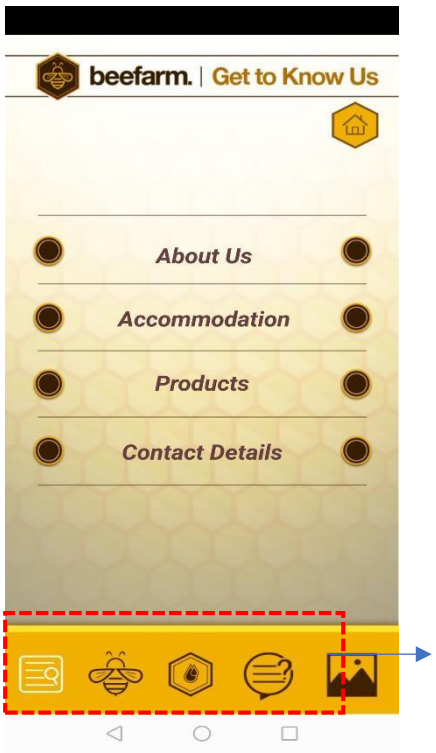


Figure 5.7: Main menu design of NAF

The above screen shows the screen design of menu icons. NAF use. The icon design intention was to help users become more skilled in menu selection. Norman and Nielsen (2017) have concluded that icons' usage was easily recognised, compact, and visually pleasing. The use of icons also enhances the aesthetic appeal of the application's design.

iii) Get to know us screen



Figure 5.8: First Menu, Get to know us and submenu of NAF

The first menu of the application was "Get to know us". This menu has 'about us', 'accommodation', 'product' and 'contact detail'.

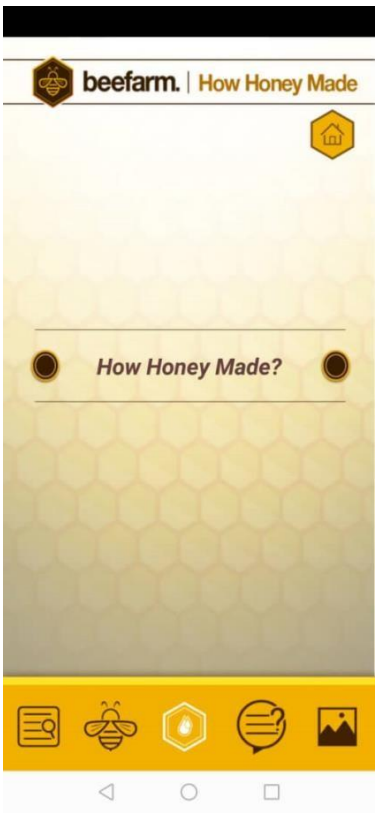
iv) All about bees' screen



Figure 5.9: Second Menu All about Bees and Submenus

The second menu of the application was "All about Bees". In this menu, 'bee species', 'bee behaviour', 'bee hive' and 'Niranur bee species' whilst the Bee species submenu contains three submenus of different stingless bee species. The Beehive menu consists of two submenus of a different method of colony transfer and hive system.

v) How honey made screen



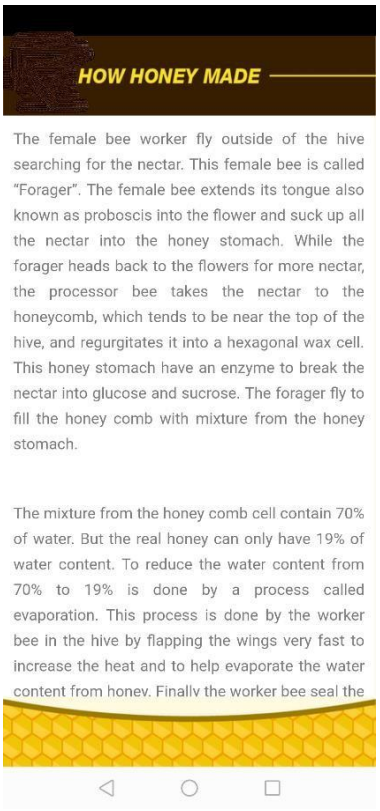


Figure 5.10: Third Menu screen How Honey made

The third menu of the application was "How Honey Made". In this menu, a description of the process of honey.

vi) Course inquiry screen

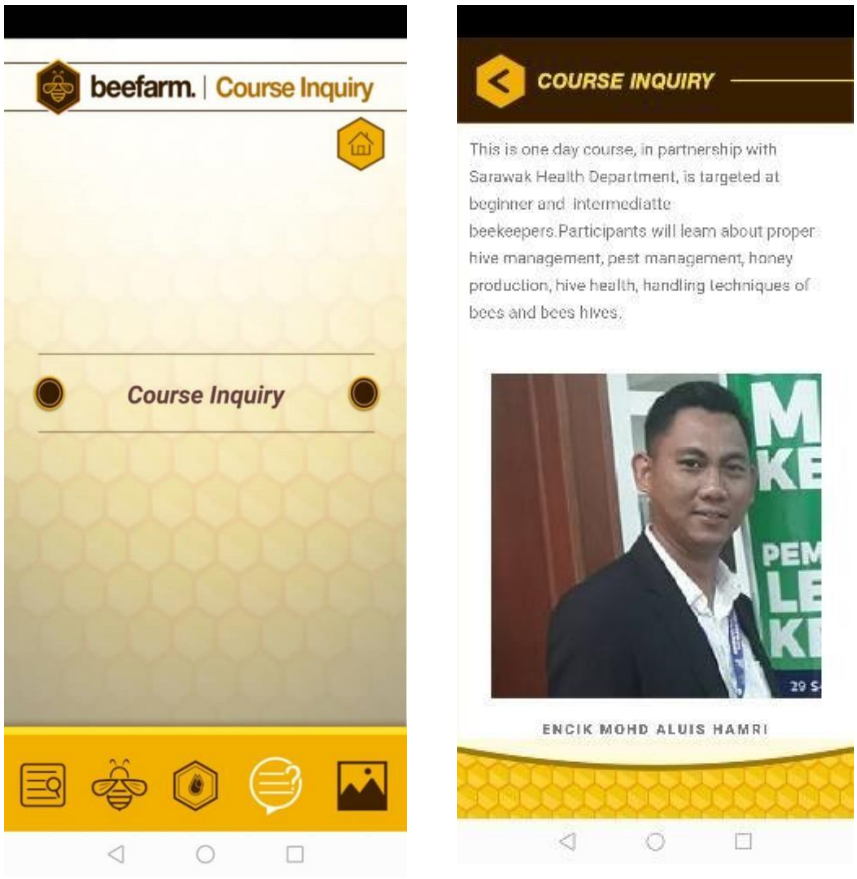


Figure 5.11: Fourth Menu screen Course Inquiry

The fourth menu of the application was “Course inquiry”. In this menu, the detail of the course inquiry was described in detail.

vii) Submenu: Browse our gallery

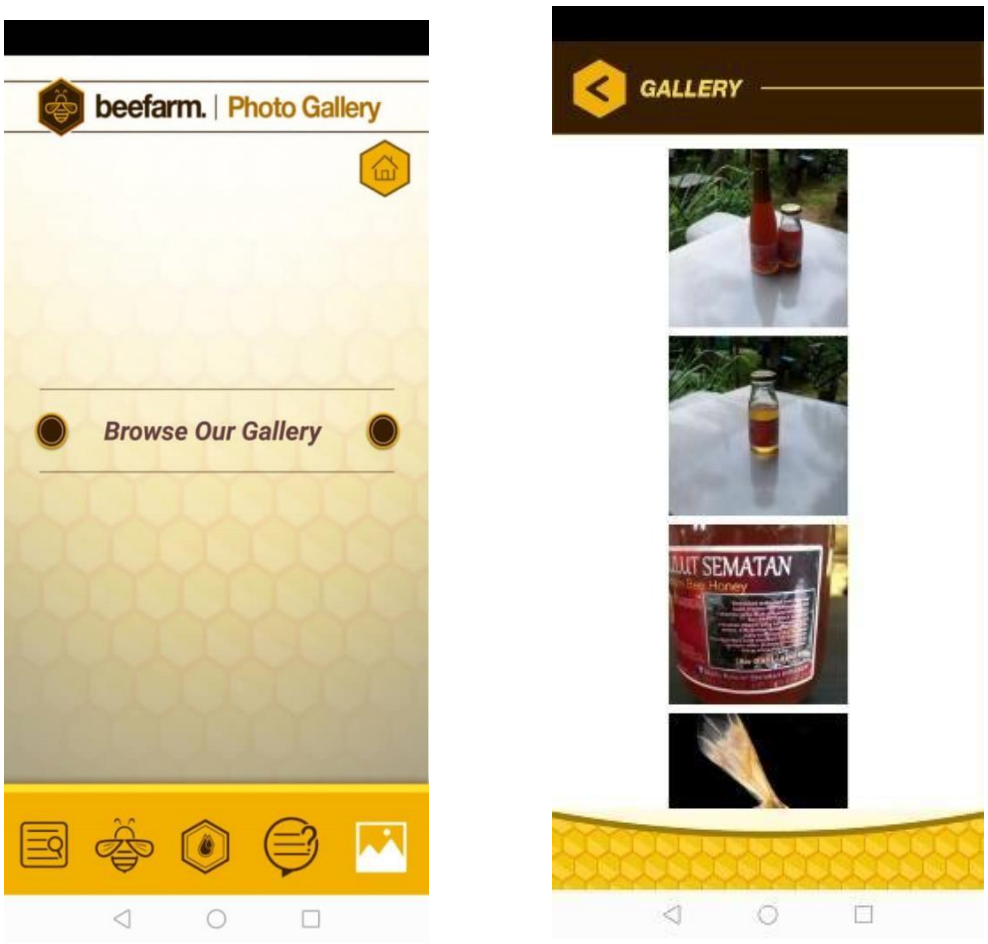


Figure 5.12: Fifth Menu screen Gallery of NAF

The fifth menu of the application was “photo gallery”. It consists of photos of Niranur Agro Farm products and bee species display.

viii) Development Phase

Many different techniques can be used to illustrate and discuss coding principles. Some coding categorization methods and coding definitions were discussed in this section. Coding systems allow designers to send precise signals to end-users by arranging symbols in order. Designers might use certain basic features to construct a coding system for appropriately classifying data.

In this stage of development, the coding was completed. In addition, the mobile application development process can happen parallel by creating different code modules of the same prototype. The development can occur in two stages: This parallel process can happen with two stages: coding for functional requirements and coding the user interface (UI) features. The source code was first configured for the core functions. In addition, modules may also be created for the same prototype separately and concurrently. These modules were integrated into the later stage. All essential interface components should be used with all mobile operating systems. After the production process, the prototype was then developed for further testing.

ix) Prototyping Phase

Still and Crane (2017) argued that paper prototyping enables a user-first approach. It enhances the design of the user experience and interfaces before any software engineering commences. The technical specifications and prototypes of the NAF application design were evaluated in this stage; prototypes were checked and sent to the supervisor. The required modifications were implemented through the implementation process after input was obtained from the supervisor. The improvement of the prototyping and testing processes until the final prototype design was complete. Finally, the final version of the prototype was submitted to the supervisor for his feedback. Every process done in this process was recorded and then forwarded to the following smartphone application development phase.

5.2.3 Heuristic Evaluation

Heuristic evaluation (HE) is a form of inspection focused on the expert evaluation of an entire system or prototype. Sometimes, evaluators do not have to be usability experts (Yáñez Gómez et al., 2014). Instead, the evaluation focused on the ease of use of mobile device features and determining whether users can execute their tasks successfully and

efficiently. Usability was a process of checking on effectiveness, performance, and satisfaction with a specified usage context.

Usability defines how easy a smartphone application's functions are and how well they allow visitors to complete their tasks efficiently. Therefore, usability evaluation methods were critical for system development to ensure quality. An expert-guided evaluation method, high-fidelity evaluation (HE), focused on measuring the performance of a real-world system or a prototype system.

As proposed by Joyce and Lilley (2014), a HE using the SMART heuristic was used as a guideline. A HE using the SMART heuristic was an evaluation tool and guideline for the design of mobile applications. The HE using SMART heuristic was used to assess the NAF smartphone application interface and to detect the usability issues that may occur when the user interacts with the application. This HE using the SMART heuristic also has guided the researcher to identify and resolve the usability issues in the NAF smartphone application.

The degree of the usability concerns discovered was determined using the severity rating scale devised by Nielsen (1994) and applied to the data. Following were the ratings assigned to each point on the scale: 0 indicates that there was no usability at all. 1. cosmetic problems (users will experience minimal difficulties; easily repaired); 2. minor problems (users will experience minor difficulties; should be rectified); 3. major problems (users will experience difficulty accomplishing the task; should be rectified); 4 problems were considered catastrophic (users will have great difficulties in achieving their goals; must be fixed).

5.2.4 Participants and Procedure

Eight experts, aged 20-35 years, consisting of 4 postgraduate HCI students and four university lecturers with backgrounds in HCI, were recruited to participate in this study. They

were recruited based on their experience and expertise in usability tests, having conducted at least 10 HE before this study.

All participants recruited in this study were asked to evaluate the NAF smartphone app individually. Therefore, the procedure of the study can be summarised as follows:

i. Recruitment: Eight HCI experts were contacted via email and phone call.
ii. Briefing session: The researcher organised a briefing session to brief participants about the purpose of this study. They were informed about the purpose of the NAF app and how it would be used at NAF.
iii. Informed Consent: An informed consent form was provided to all participants, which they were asked to complete before starting HE. They were allowed to withdraw from participating in this HE at any time.
iv. Interaction with NAF smartphone application guide tour (Smartphone app): Respondents were loaned the Huawei 3i smartphone with the NAF ecotourism application installed. The respondents were requested to familiarise themselves with the NAF application. Furthermore, they were briefed on the app's purpose and how it will be utilised with real visitors at the site
v. Evaluation session: Respondents were asked to navigate the NAF application screen by screen and document any usability issues. Participants were asked to rank the identified issues, rate their severity using the severity rating scale, and map it with SMART heuristics guidelines.
vi. Debriefing session: The researcher thanked the respondents for contributing to this study.

Table 5.2: SMART Heuristic Checklist

Note. Adapted from "Towards the Development of Usability Heuristics for Native Smartphone Mobile Applications," by G. Joyce and M. Lilley, 2014

No	SMART Heuristic Evaluation	Description
1	Provide immediate notification of application status	Users were informed of the application status immediately
2	Use a theme and consistent terms, as well as conventions standards familiar to the user	Use a consistent theme that looks like a screen. The same concept, words, symbols, situations or actions refer to the same things. Again, common platform standards were followed.
3	Prevent errors where possible; assist user should an error occur	The mobile application was designed in such a way as error-proofed. When an error occurs, the user will get an error message and advise on how to fix it.
4	Display an overlay pointing out the main features when appropriate or requested	The overlay indicating the main feature and how to interact with the application allows first-time users to get up and running quickly, after which they can explore the mobile application at their leisure.
5	Each interface should focus on one task	Mobile interfaces were more attractive and memorable. Therefore, it was used more often. The application users were also more forgiving of attractive interfaces.
6	Design a visually pleasing interface	Mobile interfaces that were attractive and memorable and therefore used more often. Users were also more forgiving of attractive interfaces.
7	Intuitive interfaces make for easier user journeys	Mobile interfaces should be easy to learn, in which the next steps are obvious to allow the users to complete their tasks efficiently.
8	Design a clear navigable path to task completion	Users should immediately see how to interact with the application and navigate to task completion.
9	Allow configuration options and shortcuts	The mobile application might allow configuration options and shortcuts to the most important information and frequent tasks depending on the target users.
10	Cater for diverse mobile environments	Allow the users to change the interface brightness and sound settings
11	Facilitate easier input	Ensure users can input content easily and accurately. For instance, displaying the keyboards button as possible
12	Use the camera, microphone and sensors when appropriate to lessen the user workload	Consider using a camera, microphone and sensors to lessen the user's workload.
13	Create aesthetic and identifiable icon	An icon for a mobile application should be aesthetic and identifiable as this is what a user sees when searching for the application.

5.2.5 Result of Heuristic Evaluation for NAF

Once the application was designed and developed, the next phase ensured that the application had no usability issues. With the NAF application, the participants discovered 22 usability flaws. The usability flaws are listed in Table 5.3, along with their average severity scores. Many usability issues (17) were classified as minor, and four were classified as major. The participants scored one issue as 4 (catastrophic), and that was only one issue. Following the different criteria, Table 5.4 summarises the usability difficulties. The inconsistencies between buttons and menus were the only concerns participants classified as catastrophic and requiring immediate correction.

Table 5.3: Usability Issues with Niranur Agro Farm Application

		Average Rating	SMART Heuristic
1.	Inconsistent font size	2	S6
2.	The paragraph was not aligned	2	S4
3.	No link to the contact detail	**3**	S7
4.	Name the image	1	S7
5.	Not consistent image	2	S9
6.	No appropriate link menu to exit	**3**	S7
7.	There was no auto tab	2	S4
8.	The location map was not functioning	2	S11
9.	Inconsistent in page scrolling	**3**	S6
10.	Icon with text will help better	1	S11
11.	Loading of the page was too slow	2	S7
12.	Not consistent in a page exit	2	S6
13.	The aesthetic design of the page was not appealing	2	S13
14.	Inconsistency of buttons and menus	**4**	S13
15.	Lack of icon use	3	S2
16.	The proportion of photo size was not standardised	2	S2
17.	The home button was not relevant	1	S6
18.	Grammatical error	1	S2
19.	The “Description” word was not relevant	1	S6
20.	The sub-menu button was not consistent	2	S2
21	The sub-menu was not relevant	2	S8
22	Inconsistent exit button for sub-menu	2	S2
Total Usability Issues			**22/22**

Table 5.4: Total Usability Issues with Niranur Agro Farm Application based on SMART Heuristic

SMART Heuristic and its Description	Total
SMART 3: Prevent errors where possible; assist user should an error occur	5
SMART 4: Display an overlay pointing out the main features when appropriate or requested	2
SMART 6: Design a visually pleasing interface	5
SMART 7: Intuitive interfaces make for easier user journeys	4
SMART 8: Design a clear navigable path to ask for completion	1
SMART 9: Allow configuration options and shortcuts	1
SMART 11: Facilitate easier input	2
SMART 13: Create aesthetic and identifiable icons	2
Total	22

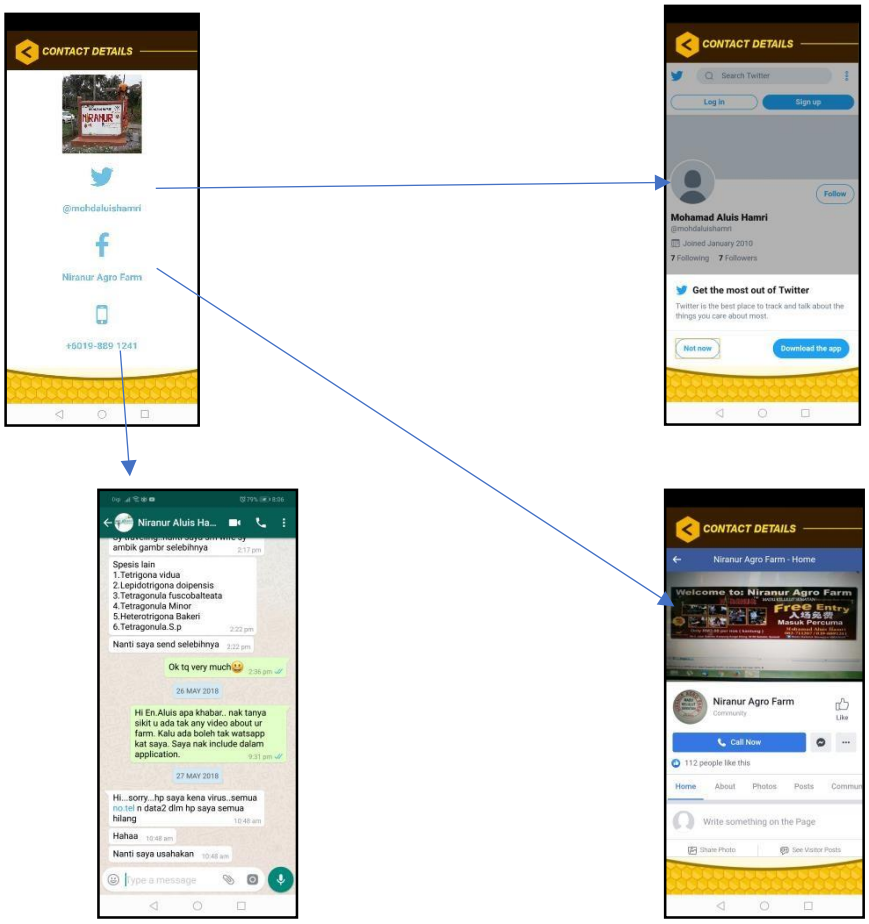
Figure 5.13(a) to 5.16(a) illustrate the issues identified and their solutions. Issues rated 3 for their severity and required improvements were page scrolling, no appropriate link to the exit menu, and no contact details. Figure 5.13 (b) to 5.16(b) depicts the solution for the issues that the participants discovered.

1. No link to the contact detail



This Contact detail do not have link to twitter, Facebook and WhatsApp

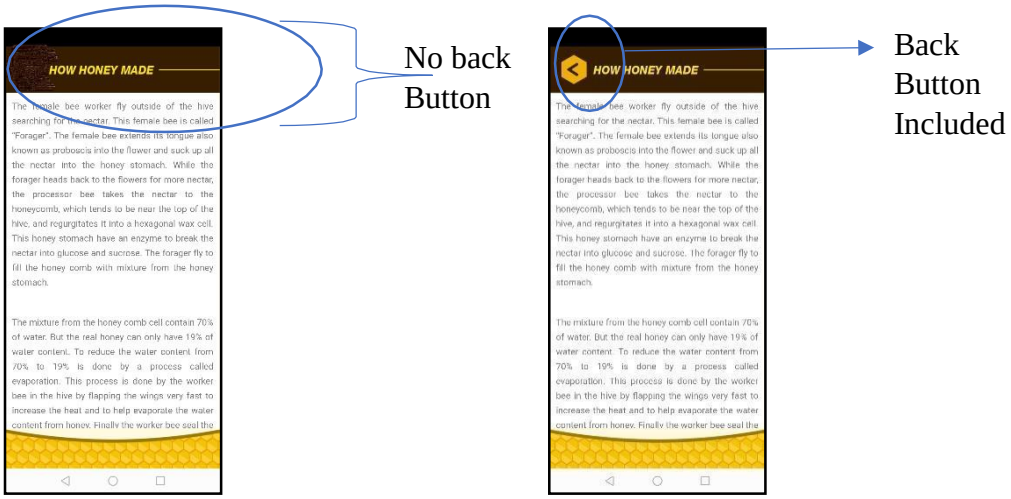
(a) Issues: No Contact Detail with the link to Facebook, Twitter, and Facebook



(b) Solution

Figure 5.13: Contact detail

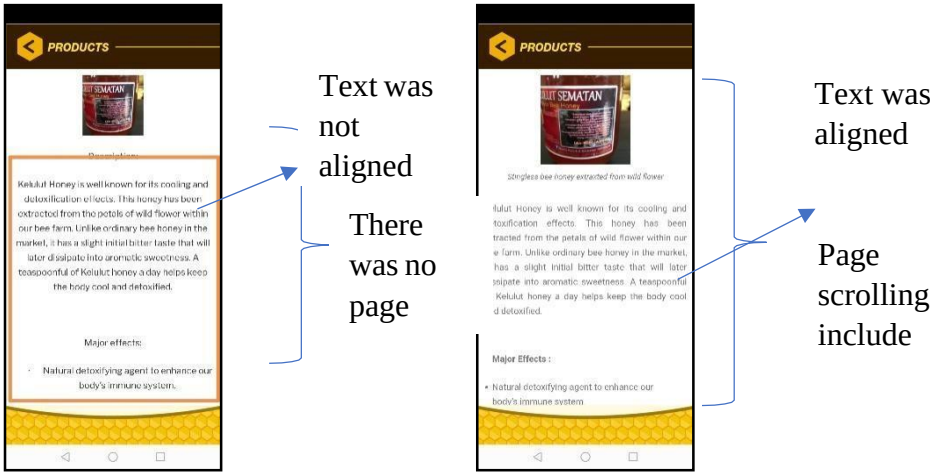
2. No appropriate link menu to exit



(a) Issues: No Back button (b) Solution: Back button inserted

Figure 5.14: Back button

3. Inconsistent in page scrolling

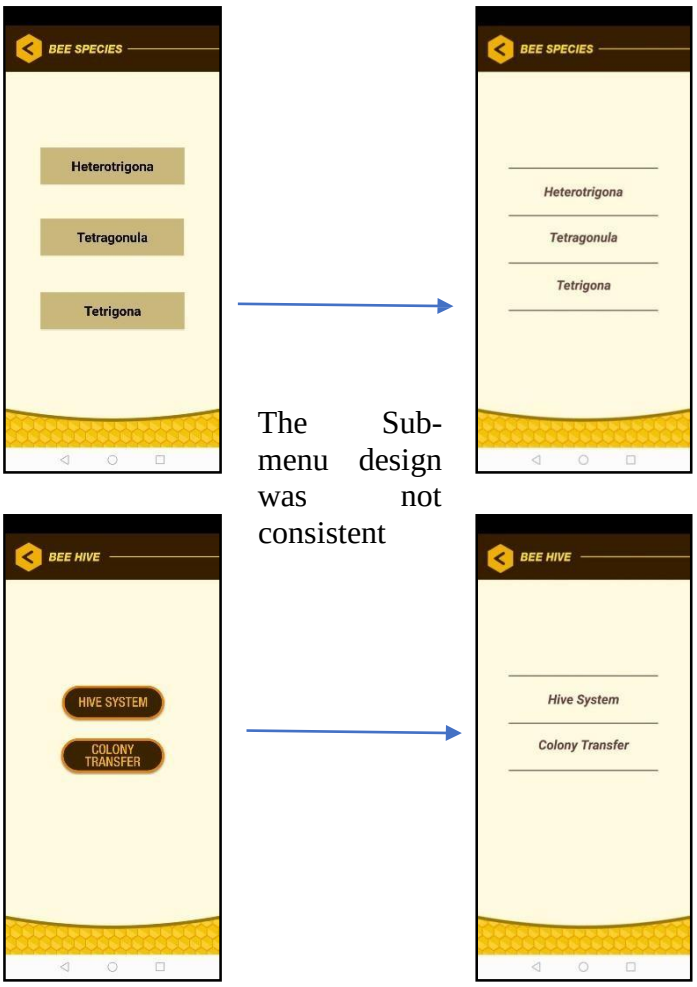


(a) Issues: Text was not aligned and no page scrolling

(b) Solution: Text aligned and page scrolling included

Figure 5.15: Page scrolling

4. Inconsistency of buttons and menus



(a)Issues (b) solution

(a) : Inconsistencies of menu and buttons

(b): Solution – consistent menu and buttons

Figure 5.16: Buttons amd menus

5.2.6 Heuristic Evaluation Discussion

Although the percentage of catastrophic issues in this study was low, they must be addressed before the smartphone app was available to customers. The key difficulties discovered in this study also necessitated the developers' attention before the app was made available to the intended audience. Additionally, the outcomes of this study corroborated prior findings on usability concerns with mobile technology, particularly about improper design content and navigational elements (Helyar, 2018; Chen, 2014). Design content and navigation were critical features of ecotourism applications because they can influence the user experience. Therefore, the design content and navigation must ensure the application is accessible and usable. Good navigation will allow the users to use the application for longer, with more confidence and ease of use.

x) Testing Phase – real setting testing

The testing stage in mobile application development is crucial in any lifecycle development**.** First, on an emulator/simulator, the testing of the prototype was carried out, followed by testing on the actual mobile application. Finally, real-time testing was performed on the Android version operating system. In this study, the usability testing of the NAF smartphone application was carried out using a Huawei model smartphone with a 5.5-inch screen size to test the application. The usability testing was performed to assess the ease of use of intuitive and, similar to industry-accepted interfaces, widely used. In addition, this test would see how well it can complete the task efficiently.

xi) Deployment Phase

The deployment phase was the final stage of the mobile application development process. Once testing was finished and the application was prepared for deployment.Then, for user consumption, the application was uploaded to the smartphone.

xii) Maintenance Phase

The maintenance phase was an ongoing mobile app development process, and the maintenance process must carry out from time to time. The developer gathers feedback from the user, and the necessary changes are made in bug fixes. Appropriate modification to the application with additional functionality and new user interfaces should be given as part of application updates at regular intervals. If a backend server is required for any application, this server and its related operating system must also be maintained.

5.3 NAF Paper-Based Brochure Design

A brochure was an informational booklet for an agency, company, event, product, or service. Malamed (2015) defines a brochure as a simple, stylish, and appealing package of information/content about a service. A well-designed brochure can capture the reader's interest, and a brochure is a professional, efficient, and inexpensive means of communication with the target audience. Therefore, the design process should consider accomplishing the purpose and emphasising the business need.

The NAF brochure design should be clear, attractive, and brief. Furthermore, the brochure should attract tourists with an attractive design, colour, fonts, graphics, and layout. NAF brochure considers all the essential design processes. Firstly, the content should be brief and only use the most necessary information. Pictures and charts were used when possible, and use bullet points in small chunks.

The brochure should create interest and appeal to potential visitors' emotions. The information organisation was critical, with subheadings, text boxes, and break-up text to make the brochure easy to read. The layout of the brochure was also important in presenting the information. The NAF brochure used three-fold, six-panel brochure layouts. The NAF brochure was well-developed, with an eye-catching design, helpful information, with

attractive images. The software used to create the NAF brochure was Adobe Photoshop Creative Cloud 2019. The NAF brochure design is illustrated in Figure 5.17 and Figure 5.18.



Figure 5.17: The Frontpage of the NAF Brochure



Figure 5.18: The back page of the NAF Brochure

5.4 Niranur Agro Farm Research Design

Research in-the-wild concept was first introduced by an anthropologist such as Chamberlain et al. (2015) to study cognition-in-the wild. This idea gained momentum in HCI as it aimed to move the study from laboratory settings. The concept of study in the wild in HCI refers to the study conducted outside the laboratory setting and understanding how the innovative technology impacted users in everyday living. It assesses prototypes in public spaces to see how they were adapted and used in everyday life (Chamberlain et al., 2015; Balestrini et al., 2020). Recording and observing how people interact with, adapt to, and use the prototype in the wild can be part of the evaluation process. Therefore, it can provide more ecologically valid findings compared to the evaluation conducted in laboratory settings (Balestrini et al., 2020). Furthermore, a study in the wild used a different approach to testing than a controlled laboratory environment (Chamberlain et al., 2015). Many researchers in

human-computer interaction (HCI) have included a study in the wild approaches to their research and design creation (i.e., Othman et al., 2021a; Othman et al., 2018; Mahfouz et al., 2016; Othman et al., 2015).

Balestrini et al. (2020) posited that conducting a study in the wild required more work, was messy, expensive, time-consuming and unpredictable, and often did not follow the plan. However, we took the challenges and adopted a study in the wild at Niranur Agro Farm (NAF) for six months. This study used a between-participants experimental design, and researchers randomly assigned participants into three groups: a control group (no guide) (CG), a paper-based brochure (BR), and a smartphone application guide (SA). Ninety (90) participants were chosen to participate in this study during the data collection period and were randomly given a choice of tour conditions. Participants were given a brief introduction before the visit and answered the survey.

Since this study used an experimental design, the number of participants need not be big. According to Cohen et al., (2007), the required number of participants in experimental research was 15. In our study, we doubled the number of participants in each group. Also, the study in the wild approach does not require many participants. For example, Brown et al. (2015) only had 20 participants in their study, 59 participants by Petrie et al. (2017) and 45 participants by Othman et al. (2021a).

5.5 Experimental Research: A study in the wild

The concept of study in the wild refers to testing prototypes in public spaces to see how they were adapted and used in everyday life (Chamberlain et al., 2012). Recording and observing how people interact with, adapt to, and use the prototype in the wild can be part of the evaluation process. Research in the wild used a different approach to testing than in a

controlled laboratory environment (Chamberlain et al., 2012). Many researchers in human-computer interaction have included in-the-wild approaches to their research and design creation, whereas research in urban studies was regularly tested in the built world and has always been in the wild. The study in the wild for this research was conducted at the Niranur Agro Farm (NAF) between June 2019 to November 2019. Participants were randomly assigned into three groups: a control group (no guide), a paper-based brochure, and a smartphone application guide. The research was performed with a brochure and smartphone application guide designed and developed by the researcher with the information provided by the NAF management. A total of 90 participants were randomly chosen to participate in this study. Participants were randomly given a choice of tour conditions. Participants were given a brief introduction before the visit and answered the survey.

5.5.1 Procedure for Experimental Research

Participants for this study were given 20 to 30 minutes to familiarise themselves with the NAF application and NAF brochure. Participants were randomly assigned into different groups: (1) NAF smartphone application, (2) NAF paper-based brochure, and (3) tour without any guide (Control group).

The procedures for each of the participants in this experimental research study were as follows:

i. **Briefing session:** The participants were assigned to the tour guide method (NAF smartphone application, NAF brochure, and Control group without any guide). They briefly explained the study.
ii. **Informed Consent Form:** Participants were asked to read the consent form and informed that they could withdraw from participating in this survey anytime. (See Appendix C, D, E)

iii. **Instruction:** The smartphone with the NAF app was loaned to the participants. The researcher then provides a brief explanation of how to use the app. The paper-based brochure guide participants were given the NAF paper-based brochure and then informed the participants to use it as a guide while visiting NAF. On the other hand, participants n the control group (no guide) were asked to explore the NAF without any guide.

iv. **Questionnaire:** Participants were asked to complete the questionnaire to assess their experience after they finished the tour. There were three sets of questionnaires. The questionnaires were assigned to individual groups of participants (NAF smartphone application (ESAS) (refer Appendix E), NAF paper-based brochure (refer Appendix D), and Control group without any guide (GES) (refer Appendix C).

v. **Debriefing Session:** Finally, the researcher thanked the participants for their participation and gave a token of gratitude for their contribution.

5.5.2 Data Screening

Once the data collection process is accomplished, the data screening insists on specific minimum quality standards for raw data (Iacobucci, 2010). Moore et al. (2021) reported that data screening and examination avail a researcher with two crucial benefits (1) the interrelationship of existing variables and (2) satisfying the assumption of multivariate data analysis. Data screening showed deviant values, extreme values, gaps in the data or other exceptionality. In addition, the data screening process involves two phases: (1) error checks and (2) error detection and correction of data files. This process indicates the transformation of the data into a normal distribution. There were 30 questionnaires for each group (Control Group (CG), Brochure (BR), and Smartphone Application (SA)) in this field

study. The first phase in this process was to examine the completion of the questionnaire sheet.

Sometimes, questionnaires were incomplete or incorrectly completed, affecting the study result. A detailed data review will help recognise data entry errors at this phase. This stage carried out preliminary checks, handling missing data, and checking the data distribution's normality.

5.5.3 Preliminary Checks and Handling Missing Data

Moore et al. (2021) suggested assessing the pattern of missing data and determining the number of missing data for the overall data set. Examining and replacing the missing data was crucial because it was susceptible to missing data and would not reveal any analysis if there were any missing values (Moore et al., 2021). First, the researcher ensures that the questionnaire was completed appropriately. 90 questionnaires have been returned (CG = 30 sheets, BR = 30 Sheets, and SA = 30 sheets). Next, conduct preliminary checks on the data entered in the questionnaire sheets. During the verification process, it was found that some of the data were incomplete and some were inconsistent. Therefore, the questionnaire sheet on this issue has been excluded. The result will lead to bias estimation if the missing data is not randomly distributed (Tabachnick et al., 2007). All returned questionnaire sheets were entered into the database using the SPSS statistical software.

5.5.4 Assessment of Normality

Normality discusses the data distribution and the individual metric variable correspondence with the normal distribution (Moore et al., 2021). Normality was the critical assumption in multivariate analysis (Demir, 2022). A non-normality distributed Data was highly skewed, and the test results could distort the relationship between interest variables

and implications (Courtney et al., 2018). The normality of the data was assessed in this study using the Shapiro-Wilk statistic. The distribution of Shapiro-Wilk normality between 5 and 2000 cases was assessed, and the significant result (significant value greater than 0.05) will indicate normality (Courtney et al., 2018). The Shapiro-Wilk test shown in Table 5.5 showed the normality of the three groups (CG, BR, and SA), as the Sig. value over the Shapiro-Wilk column was larger than 0.05, and it can be concluded that the data for the field study was normally distributed.

Table 5.5: Test of Normality for CG, BR, and SA

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Control Group	.151	30	.077	.907	30	.113
Paper-Based Brochure Group	.160	30	.057	.910	30	.115
Smartphone App Group	.140	30	.138	.951	30	.181

The Normal Q-Q plot was analysed and produced using the same data from the three groups, as illustrated in Figure 5.19. It can also be concluded that this graph seems to be normally distributed as it follows the diagonal line closely and does not appear to have a non-linear pattern.

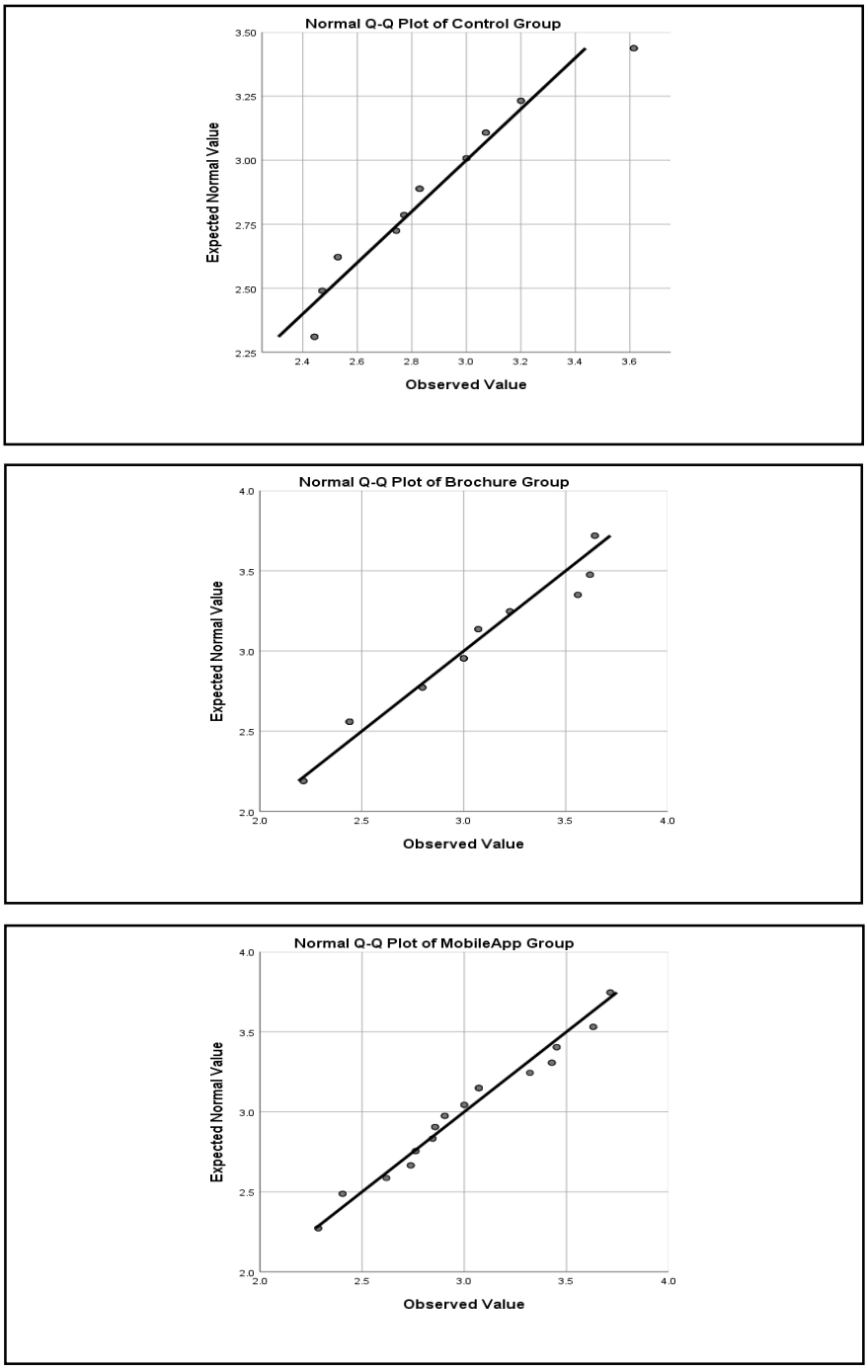


Figure 5.19: Q-Q plots for CG, BR, and MA on the Normality

5.6 Result

5.6.1 The Descriptive Sample and Demographic Sample

The demographic data and participants' profiles consisting of gender group, age group, and academic level are displayed in Table 5.6 below. In addition, this table displays the variances in participants' demographic backgrounds based on the variables from the NAF survey questionnaire.

Ninety participants took part in this survey. Female participants accounted for more than half, representing 63.3 % of the total, and male participants accounted for 36.7%. However, a few responses of 2.2 % were collected from senior citizens over 55. Most of them were considered highly educated, with 82.2% holding a Diploma, Bachelor's degree, Master's degree, and a lecturer with a PhD degree.

Table 5.6: Demographic Profile of the Sample for the Three Different Guides

Characteristic			
	Smartphone App (SA) (n=30)	**Brochure (BR) (n=30)**	**Control Group (CG) (n=30)**
Gender			
Female	19	20	18
Male	11	10	12
Age Group			
18-24	11	9	12
25-34	7	10	11
35-44	5	6	4
45-54	5	5	3
55 and above	2	0	0
Academic Status			
Primary School	0	0	2
Secondary School	4	2	8
Diploma	13	10	10
Bachelor's degree	10	15	9
Master's Degree	3	2	1
Doctorate Degree	0	1	0

The ecotourism experience among the participants is displayed in Table 5.7. Most participants agree that they used the ecotourism app during the trip. The ratio showed the SA group (60 %), followed by the BR group (56.7 %) and the CG group (66.7 %). The resultsshow that more than half of the participants have experience using the ecotourism app.

The survey showed that 96.7 % of the participants have experience on the ecotourism trip. In addition, 80 % of the participants have a unique and memorable experience on their ecotourism trip, and 85.6 % have experience of a close-up ecotourism trip, wildlife, or people from a different culture.

Table 5.7: Ecotourism Experience of the Three Different Guides Participants

No.	Question		MA (n=30)	BR (n=30)	CG (n=30)
1.	Did you use any ecotourism apps guide during your ecotourism trip?	Yes	18	17	20
		No	12	13	10
2.	Do you ever go on an ecotourism trip?	Yes	28	30	29
		No	2	0	1
3.	Does the ecotourism trip provide a unique or memorable experience	Yes	25	25	22
		No	5	5	8
4.	Does the ecotourism trip provide a close-up experience?	Yes	26	25	26
		No	4	5	4

5.6.2 Analysis of General Experience Scale with Control Group, Paper-based Brochure and Smartphone Application

A two-way repeated-measures ANOVA was carried out to observe the associations among the three groups (CG, BR, and MA) on the participants with the two constructs of the GES. There was a substantial difference in mean scores across the two GES constructs (Learning and Satisfaction) with a value of ($F = 64.11$, $df = 4, 224$, $p < 0.000$). A significant interaction was also observed between the groups (CG, BR and SA) and the GES factor

variables (F = 3.27, df = 8, 108, p < 0.02). However, there was no significant difference between the three groups (F 2, 56 = 1.20, p=0.30, n.s).

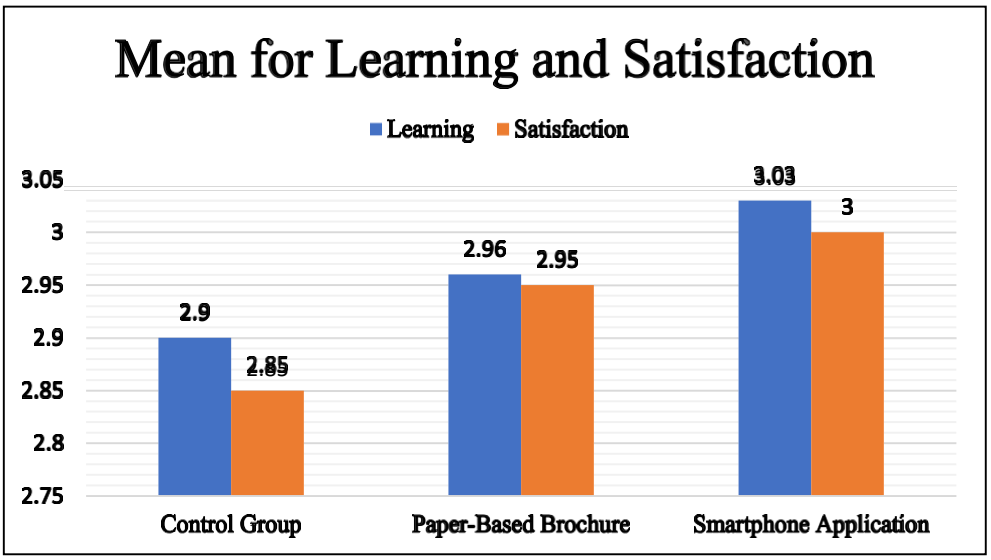


Figure 5.20: Mean scores on the two constructs of GES for three different groups

Figure 5.20 displays the mean ratings for the two GES constructs for CG, BR, and SA group participants. The mean ratings for the Learning and Satisfaction construct for all three groups (CG, BR, and SA) were above the midpoint of a 5-point rating scale. Table 5.8 shows the mean component ratings were significantly above the midpoint.

Table 5.8: Test of Significance of Mean Scores on the Two GES Constructs.

	CG df = 28	BR df = 28	SA df = 28
Learning	F = 0.409 p = 0.871	F = 0.568 p = 0.645	F = 0.647 p = 0.776
Satisfaction	F = 0.874 p = 0.706	F = 0.733 p = 0.623	F = 0.812 p = 0.723

The mean score for the smartphone application group was higher than the CG and BR groups. In addition, scores on the Satisfaction construct show a higher comparison to the Learning construct for all three groups. Finally, it was shown that visitors in the SA group were more satisfied and willing to learn more about the operations and services of the NAF compared to those of the other two groups.

The satisfaction construct of the CG group showed a better score than the other two groups. Thus, it was summarized that using the smartphone application and paper-based brochure distracts visitors from being satisfied with a tour experience. The post hoc test for comparing the mean score was not required as the p-value for all three groups was more than 0.05.

5.6.3 Analysis of General Experience Scale with Age and Gender

In examining the relationships among the two constructs of GES with different age groups and with the three different visitor groups (CG, BR, and SA), a two-way analysis of variance was carried out with the age group of 18 years to 24 years, 25 years to 34 years, 35 years to 44 years, 45 years to 54 years, and over 55 years (as shown in Figure 5.19). There was no substantial difference in the mean score of the two GES constructs across age groups ($F_{10,30} = 1.355^{b}$, $p = 0.248$) among the three different groups of respondents ($F_{5,30} = 1.012$p $= 0.443$). However, the age group over 55 years for SA showed a significant interaction ($F_{1,30}$; $p = 0$) where elderly people refused to use the app.

The relationship of gender between the two constructs of the GES scale, with the factor of the three different groups of respondents (CG, BR, and SA), was further analysed. There was no significant difference between genders ($F_{6,30} = 1.105^{b}$, $p = 0.382$). However, there was a significant difference between the mean scores of two GES constructs and

genders between the three groups ($F_{1,30} = 7.597$, $p = 0.012$). The average means for males and females for the two GES constructs are shown in Figure 5.21.

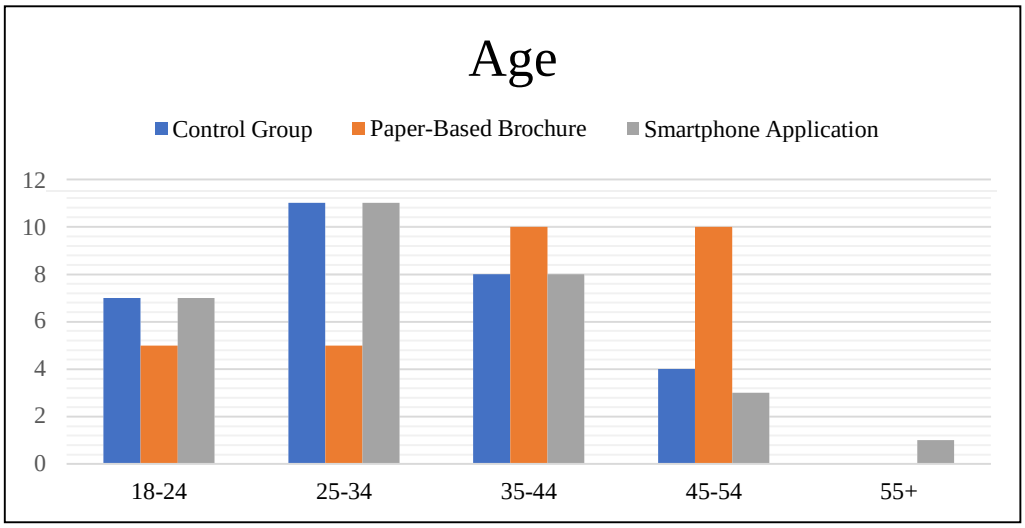


Figure 5.21: Mean scores on the two constructs of GES for three different groups

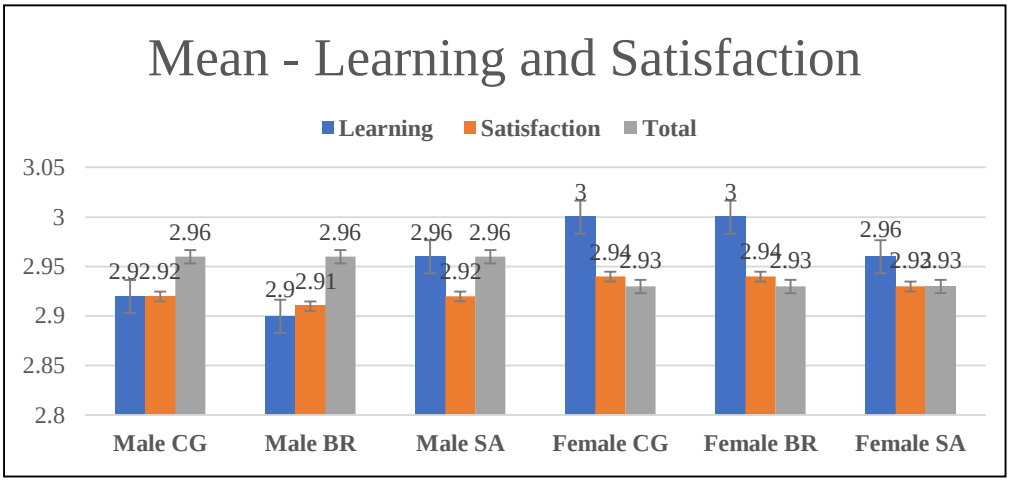


Figure 5.22: The mean score on the two constructs of GES by gender

5.6.4 Analysis of ESAS and NAF Smartphone Application Guide

A one-way ANOVA test examines the interaction between the smartphone application group of the ESAS constructs and the respondents with the NAF smartphone application. There was no significant difference in gender factor, where the p-value showed more than 0.05, as illustrated in Table 5.9.

Table 5.9: Test of Significance of Mean Scores on the ESAS Constructs with Gender

	AEOU df = 1	ALO df = 1	AME df = 1	MAU df = 1	AUV df = 1
Gender	F= 0.017 p = 0.897	F= 2.503 p = 0.125	F= 0.235 p = 0.631	F = 3.801 p = 0.061	F = 0.418 p = 0.523

A comparable test of significance of mean score was tested to see the interaction between age and ESAS constructs (App Ease of Use (AEOU), App Loyalty (ALO), App Meaningful Experience (AME), Mobile App Usability (MAU), and App Utilitarian Value (AUV)). In addition, a one-way ANOVA test was carried out to test the Age factor on the ESAS scale. The result showed no significant relationship between AEOU, ALO, AME, MAU and AUV and age groups with a one-way ANOVA measure shown in Table 5.10 below.

Table 5.10: Test of Significance of Mean Scores on the ESAS Constructs with Age Group

	AEOU df = 3	ALO df = 3	AME df = 3	MAU df = 3	AUV df = 3
Age	F= 0.788 p = 0.512	F= 2.419 p = 0.089	F= 0.000 p = 1.000	F = 4.032 p = 0.018	F = 2.225 p = 0.109

This test showed that the variances in the mean scores for all the constructs were moderately small. The Least Significant Difference (LSD) post hoc analysis showed that the ESAS-MAU for the MA group was not significant for all age groups except the 18-24 age group**.** Figure 5.21 illustrates that the age group involved in smartphone application use in tourism significantly increase the interest in ecotourism exploration technology.

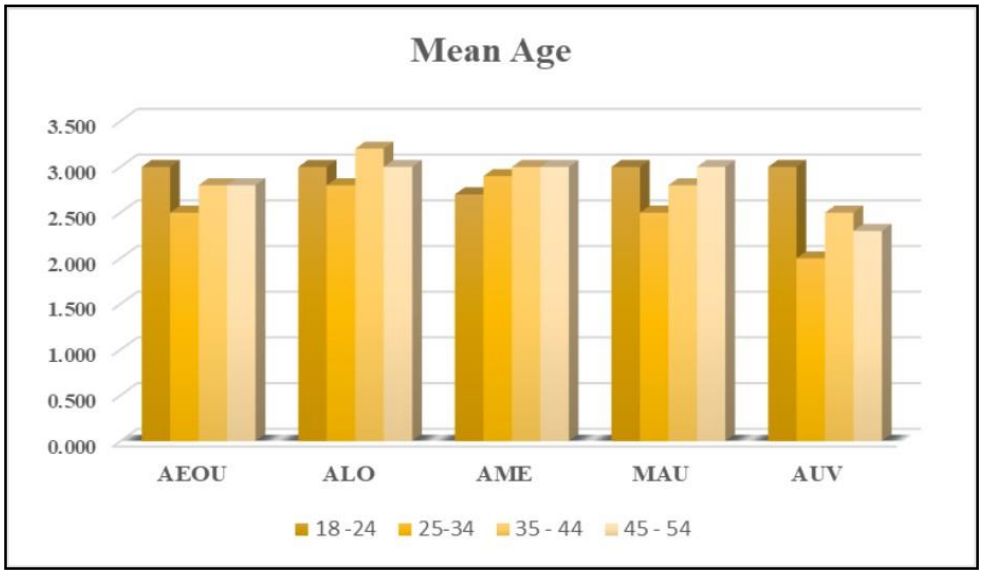


Figure 5.23: Age Mean scores - Constructs of MA group

5.6.5 Relationship between ESAS and NAF Smartphone Application Guide with Duration

The correlations between six constructs of the ESAS scale and the duration spent at the NAF calculated the associations between these constructs. The correlation matrix of the duration of stay with the ESAS scale (Pearson coefficients) is shown in Table 5.11.

Table 5.11: Correlation between Duration of Stay and the Five Constructs of ESAS

		Duration	ESAS-AEOU	ESAS-ALO	ESAS-AME	ESAS-MAU	ESAS-AUV
Duration	Pearson Correlation	1	.359	.229	-.097	.055	.580**
	Sig. (2-tailed)		.052	.223	.608	.773	.001
	N	30	30	30	30	30	30
ESAS-AEOU	Pearson Correlation	.359	1	.291	.405*	-.182	-.182
	Sig. (2-tailed)	.052		.119	.027	.335	.335
	N	30	30	30	30	30	30
ESAS-ALO	Pearson Correlation	.229	.291	1	.490**	.000	-.053
	Sig. (2-tailed)	.223	.119		.006	1.000	.781
	N	30	30	30	30	30	30
ESAS-AME	Pearson Correlation	-.097	.405**	.490*	1	.156	-.271
	Sig. (2-tailed)	.608	.000	.006		.411	.148
	N	30	30	30	30	30	30
ESAS-MAU	Pearson Correlation	.055	-.182	.000	.156	1	.481**
	Sig. (2-tailed)	.773	.335	1.000	.411		.007
	N	30	30	30	30	30	30
ESAS-AUV	Pearson Correlation	.580**	-.182	-.053	-.271	.481**	1
	Sig. (2-tailed)	.001	.335	.781	.148	.007	
	N	30	30	30	30	30	30

Table 5.11 shows the significant associations between inverse and positive correlated relationships within the data. For instance, there was a positive correlation and inverse relationship between duration. In this case, there was an association between the duration spent and the ESAS-AEOU construct, r = 0.405, p = 0.000. At the same time, there was an inverse relationship between the duration and the ESAS-ALO constructs, r = 0.490 p = 0.06. In conclusion, the duration of the NAF visit has a positive effect on Application Loyalty. However, on the other hand, the duration of the NAF visit had a negative impact on the Application's meaningful experience for the visitors, e.g., the duration spent at NAF reduced the level of tourist behaviour, such as interest and relaxation in smartphone applications usage.

There was a positive correlation between the ESAS-AEOU construct and the ESAS-ALO construct, r = 0.490, p = 0.006 and with the ESAS-AEOU construct, r = 0.405, p = 0.000. Therefore, it was concluded that a positive association exists between visitors'

Application Ease of Use with Application Loyalty and Utilitarian Application Value in using NAF smartphone applications during and before travel.

Furthermore, there was a positive correlation between the ESAS-MAU and ESAS-AUV construct, r = 0.481, p = 0.007. Another positive correlation was between the ESAS-AUV and ESAS-MAU construct r = 0.481, p = 0.007. Therefore, it can be summarized that there was an association between Mobile Application Usability and Application Utilitarian Value, Application Loyalty and Application Meaningful Experience and finally, Application Ease of Use and Application Utilitarian Value.

5.7 Discussion

The study was designed to measure visitors' experience at NAF with three different tour conditions (MA, BR, and CG) and validate the measures developed to measure the visitors' experience using GES and ESAS. The analysis showed that meaningful experience was associated with the visitors' age using a smartphone application tour guide and was highly associated with the smartphone application's ease of use and quality content.

5.8 General Experience Scale (GES)

Ecotourism includes travel to mostly natural areas with the potential to learn about and comprehend the natural environment while protecting ecosystems. Another element of ecotourism was that the tourist's experience was filtered by the local community's engagement (Cobbinah, 2015). Smart technologies or other types of tour guides can be used by organisations responsible for delivering information to potential visitors to persuade them to buy destination-related products (Bhuiyan et al., 2022; Halvatzaras & Kabassi, 2016; Ruzela et al., 2017).

Concerning the visitor's experience, the researcher found two constructs of GES that effectively compared NAF visitor experiences with one of the tour conditions: a control group or without any guide, using a smartphone application guide or paper-based brochure guide. The two dimensions were discovered in this scale: Learning (LA) and Satisfaction (SA).

5.8.1 Learning (GES – LA)

Cini and Passafaro (2019) discovered that young people commonly understood ecotourism, whereas Kasim and Wickens (2018) discovered good sentiments. According to this statement, the GES results show that the GES- LA construct scores were significantly higher for the MA group than for CG and BR. The smartphone app provided new methods to learn about a community's history through official and user-generated content. We expect to see more participatory online social activities that lead to interesting and rich community history narratives as smartphones become more accessible and pervasive (Dickinson et al., 2017). Evidently, participants in the SA group became more interested in learning about the natural environment and local culture than the other two groups.

Women were more likely than males to show their interest in learning about the culture, and they were more likely than men to be interested in and participate in high-status cultural activities (Lagaertet et al., 2017). Therefore, it was clear that women were more interested in learning about the environment and culture than men in all three groups. Furthermore, it creates cultural encounters that are more vivid and engaging, comparable to those found in mobile tourism. It also allows various scenarios where users can use their mobile devices to view and produce information without physically visiting the sites (Gavalas et al., 2014). Therefore, it can be concluded that the smartphone application

provides more learning interest with a meaningful and unique experience that meets the needs and interests of visitors.

The information provided in the MA and BR groups was similar, and it was noted that participants in the CG group had the least learning experience compared to MA and BR, and this was due to the BR guide and MA guide, which showed more information before and during their visit to the site compared to CG group. This was proven by Kasim and Wickens (2018) and Ramírez and Santana (2019). Visitors experiencing ecotourism for the first time were taught and provided with suitable knowledge, enhancing their vacation experience while raising awareness of the need for environmental preservation. However, official and informal routes can now be used to learn about ecotourism.

5.8.2 Satisfaction (GES – SA)

Satisfaction affects the extent of intention to continue to use smartphone applications during travel (Thakur, 2019). Thus, the degree of perceived value in smartphone application usage was satisfied with the smartphone experience. Furthermore, the analysis showed that satisfaction in the MA group was higher than the other two groups, CG and BR, and the level of satisfaction with the MA group was more efficient and effective among females than males.

Mobile application services include high availability and capability, time or location, portability, and location awareness (Khan et al., 2017). Thus, it can be summarized that the participants in this study were more satisfied with smartphone application guides usage as they have greater flexibility to access information and services from different physical locations.

In addition, the differences in satisfaction levels between participants in the three groups were moderately significant in this study. Therefore, it can be summarized that the satisfaction level varies between the visitors due to various factors, such as prior knowledge, motivation, interest, and technology.

5.9 Ecotourism Smartphone Application Scale (ESAS)

The growth of information and communication technologies (ICTs) has evolved the ecotourism smartphone application and the need for sustainability of this smart application. This research focused on eco-tourism visitors using technology. A smart ecotourism application to allow visitors to learn about ecotourism sites was designed and developed in this research. This research used a positivist paradigm using a case study in the Niranur Agro Farm, Sematan Sarawak. It was recognised that visitors' behaviour and interest in travel differ (Goodwin, 2017). For instance, current visitors adopt new technologies in travelling to find inspiration in their travel planning on where to travel and travelling activities.

Past literature suggests that visitors increasingly use technology as their source of information when choosing ecotourism destinations, which was motivated by the widespread availability of personal gadgets such as smartphones. As a result, destinations' ability to leverage the possible competitive advantages provided by emerging technology. This study addresses the issue in past articles, builds a smart ecotourism application, and inspires visitors to learn about ecotourism. Furthermore, the smartphone ecotourism application aimed to understand the functionality and patterns of ecotourism smartphone applications used by tourists to get information and interact in the context of a local ecotourism destination during the pre-travel, during-travel, and post-travel stages.

In conclusion, this study developed a scale to measure visitors using smartphone applications at ecotourism sites. The scale was named as Ecotourism Smartphone

Application Scale (ESAS). Five dimensions were discovered in the ESAS scale, and they were Application Ease of Use (AEOU), Application Loyalty (ALO), Mobile Application Usability (MAU), Application Meaningful Experience (AME) and Application Utilitarian Value (AUV). Furthermore, the relationship between these dimensions and the tourist was discovered and explained in the next section.

5.9.1 ESAS - AEOU

The dimension of ease of use was a reasonable belief in Technology Acceptance Model (TAM) and explores how they determine visitors' sustainability and meaningful experience in ecotourism (Lagaert et al., 2017). The quality of the application was essential to have a meaningful experience for the user using a smartphone application on the ecotourism spot. User experience in ecotourism can determine the mobile application quality for interacting with smartphone application guides. A high-quality smartphone application keeps visitors loyal and encourages other people to use the smartphone application. Thus, it was possible to increase the usage of smartphone applications. The quality of smartphone applications and their use among end-users should consider and ensure the fulfilment of each feature and influenced factors such as content, look and feel, app size, and several features.

Ease of use is a word that describes how simple innovation was to grasp, learn, and use (Pandowo et al., 2022). In simpler word, the user taps into the user interface design and make the user fall in love with it if the application has an easy-to-use interface. Therefore, this study validates the analysis, particularly for the ease of use dimension. Hence, there is no doubt that smartphone applications have become one of the most crucial aspects of travel and tourism. The analysis also demonstrates the quality of smartphone applications, which plays an important part without considering age, gender, and duration of stay. Therefore, it was essential to provide the appropriate content and look of the application so that the user

was satisfied with its volume and presentation. Furthermore, it observes the user's loyalty towards using the smartphone app and recommends it to others. The ease of use of smartphone apps was further supported by Ukpabi et al. (2018), which stated that the perceived ease of use of online apps contributes to the customer's impression and thus affects attitudes positively when customers use mobile apps.

5.9.2 ESAS - ALO

The tourist behaviour assesses the effect of the smartphone application guide on social communication between visitors and attitudes of tourist tours towards smartphone application usage. According to Arain et al. (2017), the application was developed to user preferences to use the application from a simple user interface; the information can be shown according to the GPS positioning system. A successful mobile app aims to attract, engage, and retain users by providing high-quality content to elicit or reinforce behaviour that leads to long-term loyalty or recurring usage (Kelić et al., 2017). As a result, users loyal to smartphone apps were This implies they were using the app regularly and communicating with it, but it also means the user was telling their friends about the particular smartphone app.

The evaluation of this study showed the change in enjoyment behaviour and the relaxation value of attitudes in smartphone application usage. Furthermore, the study showed that tourist behaviour positively correlates with the duration of the stay. As a result, the smartphone ecotourism application should be more prompt in presenting information meaningfully and designing good content to engage visitors during their tours.

Finally, the impact of the visitor’s loyalty and the frequency of use of smartphone applications has been measured. Thus, it was easier for tourists to obtain good and adapted

information on their locations and preferences. Furthermore, updated content can be resolved by receiving feedback on the existing connectivity state and reassuring them to associate this with the availability functionality.

5.9.3 ESAS - MAU

Yu et al. (2013) investigates mobile advertising information's influence on Millennials' positive attitudes toward brands and purchase intentions. The findings indicated that this study's purchase attitude was positive regarding perceived value. Furthermore, results indicate that the interaction with branded apps does not improve cognitive brand equity. In addition to the interactive features, Xie et al. (2013) proposes that smartphone device characteristics, such as screen size, advertising size, and ease of use, influenced consumer emotional responses to mobile advertising, resulting in positive emotions and increased purchase intentions.

Improving the quality of the interaction between tourists and smartphone applications in the tourism sector will make it easier to raise awareness of the context, the size of the app, and the price, if necessary. Therefore, it can be concluded that the apps should generate constructive feelings during navigation and include consistent high-quality and appealing content to increase the purchase attitude. Furthermore, apps should be developed for various platforms, such as tablets and smartphones, to ensure an enjoyable experience and that information/graphics are viable in all screen sizes.

Mohamed et al. (2017) defined usability as "typically considered the user's ability to use the application to complete a task satisfactorily." Therefore, this study discovered that smartphone applications reduce travel planning costs while providing a richer user experience because tourists visiting the destination will prepare what they want to see in

advance. In addition, the visitors can receive all the necessary information about their tourist destination (for example, a place to stay, nearby amenities, and product information) while in the tourist destination.

5.9.4 ESAS - AME

According to Dickinson et al. (2014), apps with functions tailored to smartphone travel experiences have emerged as a contextual tool for society to understand time, space, and things meaningfully. Therefore, a study was carried out using a smartphone application guide to improve visitors' experiences at the ecotourism spot with an enjoyable and meaningful experience with an easy-to-use guide. The result showed that the meaningful experience construct positively correlates to perceived value.

A smartphone application guide can help visitors try technologies and understand how to use them, making the tourist experience more interactive. The smartphone application also lets travelers have a strong desire to travel and give their travel reviews and more information on the tour. Furthermore, to set expectations and enhance the experience by sharing travel reviews and advice in making travel decisions, set the expectations, and enhance the experience by sharing their experience during and after a trip. According to Aziz et al. (2020), although each tourist may participate in similar activities at the same destination, the memorability of his or her experiences is not the same, which results in each tourist's opinion of his or her trip being different. Therefore, the smartphone application must reflect these needs and must be highly interactive and meaningful to navigate and leave a permanent impression on the smartphone application (Buditomo, 2018).

Therefore, the result of this study showed that a meaningful experience was gained through the ecotourism smartphone application and positively affected the intentions to visit

the ecotourism destination again. In addition, to the meaningful experience, the factors such as ease of use of the smartphone app create positive behaviour to create a memorable visit and experience for the visitors.

5.9.5 ESAS - AUV

User experience includes all factors that affect user interaction and system or product experience (Hornbæk & Hertzum, 2017). According to Yu and Kong (2016), the UX parameters used in the evaluation were ease of use, interactivity, behavioural intent, user-friendliness, ease of learning, and user satisfaction. This study used all of the UX elements to test the meaningful interaction between the tourist and smartphone applications, and, unfortunately, the meaningful interaction construct does not support the study. Finding ways to enable visitors to interact meaningfully with the smartphone application while travelling was crucial. Many would agree that the ease-of-use aspects should include usability, navigation, and data accessibility. Navigation of smartphone applications should be designed to be intuitive, predictable, and consistent, minimising the number of steps needed to simplify the process. Accessibility of the data should be readily available for use by the user at any time.

Learnability is the degree of ease of use (Yu & Kong, 2016) in which the user has taken the time to familiarise himself with a new product. In this study, meaningful interaction does support the study because visitors use the smartphone application quickly without referring to any instructions. Therefore, the interaction with the smartphone application has improved the clarity, consistency and visibility to help users find all the elements and features when they first encounter it.

5.10 Perceived Value for ESAS Scale

This section explains perceived value with other constructs such as Application Ease of Use, Application Loyalty, Mobile Application Usability, Application Meaningful Experience and Application Utilitarian Value. The perceived value was measured in single-item or multi-item scales, emphasising price perceptions (Anwar et al., 2021; Ozer et al., 2017). Perceived value directions in the mobile sector were similar to those in the consumer goods industry (Ashraf et al., 2018). Perceived value was related to two values in this study: social value and epistemic value.

Social value has a direct relationship to social status. In addition, this value was tested for the tourist's well-being and was the decision-making process. The impact on customer satisfaction depends on the significant perceived value of the visitors from their travel experience (Chuah et al., 2017). Few studies have been conducted to study the impact of mobile application variables on brand loyalty (Chuah et al., 2017; Alsheikh & Bojei, 2014). Since past research has produced inconclusive results, it was critical to investigate and test the value to determine whether social values positively and significantly impact tourist satisfaction. The analysis of this study showed that the social value was very much related to ALO, AUV, and AME. The goodness fit model showed that ALO, AUV and AME constructs positively impact social value.

Epistemic value was “measurements of the product or amenity to satisfy the desire for information” (Jamrozy & Lawonk, 2017). Epistemic value was also defined as the value of novelty and the value added from learning a new way of carrying out work with experience or information gathered through testing or discovering new technology. Epistemic values can impact customer intention, directly influencing customer satisfaction and loyalty (Cranmer et al., 2020). Similarly, Chuah et al. (2017) found that epistemic values

positively impact customer satisfaction and loyalty. The epistemic value was related to their study's utilitarian and hedonic values, where perceived value and utilitarian value significantly influenced brand loyalty (Prodanova et al., 2019). The results of this study show that epistemic value was strongly related to the ESAS model's AEOU and MAU constructs, with AME having a higher positive epistemic value than ALO.

5.11 Summary

Overall, this chapter explains the methodology for developing smartphone applications. Thus, the Mobile Application Development Lifecycle (MDLC) methodology was the best fit for smartphone application development because it easily accepts changes and encourages collaboration between developers and clients to reduce delivery time and simplify the development process. In addition, a heuristic evaluation was performed using (the SMART) heuristic guideline to check the usability of a smartphone application. This heuristic evaluation assists developers in designing more usable interfaces and is a tool for evaluating existing prototypes.

In addition to developing the NAF smartphone application, the researcher investigated visitors' experiences using the NAF smartphone application at ecotourism sites using three different tour conditions (SA, BR, and CG). The General Experience Scale (GES) was used in the study to determine which method provides better learning and satisfaction through the tour with no guide conditions. In another case, the study also investigates using SA, BR, and CG tour guides to investigate tourists' experience levels. Therefore, it can be concluded that the smartphone application guide has successfully engaged visitors by extending their visit to ecotourism sites among the three guides.Furthermore, the study has shown that introducing a smartphone application to ecotourism

positively affects visitors' experience. Therefore, the model was fit to use for other tourism areas.

CHAPTER 6

CONCLUSION

6.1 Introduction

This chapter reviews the findings and conclusion from the previous chapter, revisits the key findings, and responds to all research questions formulated in Chapter 1. Throughout this process, the researcher has developed two scales to explore the visitors' experience at the ecotourism site with and without smartphone applications. The General Experience Scale (GES) development compares visitors' experience at the ecotourism site with three conditions (smartphone application guide, paper-based brochure, and a control group without tour information). In addition, Ecotourism Smartphone Application Scale (ESAS) development was used to measure the perceived value of visitors using smartphone applications at the ecotourism site. The researcher has conducted several studies to develop and validate these scales and ensure their reliability and validity.

6.2 Research Question

The following research questions were formulated in Chapter 1 and addressed in this chapter.

6.2.1 Research Question 1

What were the primary constructs of visitors' experience using smartphone applications?

This study has successfully developed an appropriate scale to measure the main constructs of visitors' experience at the ecotourism site. The constructs identified in these scales were important in determining how ecotourism smartphone applications were linked to these constructs. These constructs were:

1. **Application Loyalty** measures the visitors' engagement in using a smartphone application and the smartphone application guide, whether the social impact was acceptable and beneficial.
2. **Application Meaningful Experience** with a smartphone application guide may indicate whether a user's intention to revisit a smartphone application makes them enjoy using it during their visit.
3. **Application Ease of Use** was how the smartphone application's content and aesthetics affected the visitors' decision to use it again during their visit.
4. **Mobile Application Usability**, whether the satisfaction and loyalty of visitors to interact with the smartphone application bring satisfaction to the visitors.
5. **Application Utilitarian Value** determine how visitors intend to pay for the smartphone application and measure how the visitor values a specific smartphone application.

6.2.2 Research Question 2

What were the constructs of the general ecotourism experience of visitors?

This study has successfully developed an appropriate scale to measure the main constructs of visitors' general experience at the ecotourism site. The constructs identified in these scales were important in determining the general experience of ecotourists without any guide were linked with these constructs.

1. **Learning**: As a learning experience, ecotourism facilitates the understanding and awareness of environmental issues among young people while promoting its attractions to visitors and locals.
2. **Satisfaction**: Visitors' perceptions of the tour and their happiness with it and analysing the sources of information they used to make travel arrangements were all

noted. They will likely share their knowledge of ecotourism-related activities, products, and information sources from their travels.

6.2.3 Research Question 3

What were the differences in visitor experience with and without smartphone application guides?

This study's findings show that using the smartphone application guide at the ecotourism site has significantly impacted the learning and satisfaction component. Visitors in a paper-based brochure and smartphone application guide groups have obtained more experience than visitors who do not use any guide (control group) during their visit.

The findings of this study can be used as a motivating tool with a smartphone application to provide more practical visits. Tourist satisfaction remains mostly and directly affected by smartphone apps. This study further found that tourists with different travel satisfaction and on-site sharing experience with others. Tourists treasured travel motivation and were more influenced by smartphone apps. Therefore, it can be summarised that smartphone applications and paper-based brochures never distract visitors from the satisfaction of gaining a tour experience, and it was becoming an electronic word-of-mouth of travel motivation and sharing motivation.

The relationship between ecotourism mobile application guides with age and gender showed a significant interaction between learning and visitor satisfaction. Furthermore, the relationship between learning and satisfaction showed that male and female satisfaction was higher than learning.

6.2.4 Research Question 4

What was the relationship between perceived Value, Application Ease of Use (AEOU), Application Loyalty (ALO), Meaningful Experience (ME), Application Usability (AU), and Application Utilitarian Value (AUV) when using a mobile ecotourism application?

The research findings indicate the relationship between perceived value (PV) comprised of social and epistemic value with Application Loyalty (ALO), Application Ease of Use (AEOU), Mobile Application Usability (MAU), Application Utilitarian Value (AUV) and Application Meaningful Experience (AME). The findings show a positive relationship between PV and ALO, AEOU, MAU, AUV and AME. Furthermore, the use of the mobile application guide differs significantly among the actively involved visitors. The mobile application guide is evident in today's environment, as it does not discourage visitors from developing an emotional and social connection to the ecotourism site. The most important thing was that visitors did not lose out on the value of enjoyment and relaxation with the ecotourism tour and the visitor because they used a smartphone application.

Furthermore, the smartphone application quality demonstrates a significant difference between visitors to the smartphone application guide and the fulfilment of its features such as content, look and feel, size and smartphone application features. The reliable content and attractive look increase the purchase attitude of those visitors who feel good about the smartphone application during navigation. It clearly showed the increase in the purchase attitude toward smartphone applications. Visitors' engagement with thesmartphone application guide addresses the ease to use and intention to use new technologywhere the visitors' desire to use the smartphone application can be enhanced. On the other hand, the reviews of visitors who have used the mobile application will encourage others to

use the app to have a more meaningful visit. Therefore, meaningful interaction with the smartphone application was sufficient if the application's clarity, consistency, and visibility with the information needed were visible to the visitors at any time.

6.2.5 Research Question 5

What constructs were identified to support the Ecotourism Smartphone Application Scale (ESAS) model?

The overall components of this study and their relationship are shown in Figure 6.1.

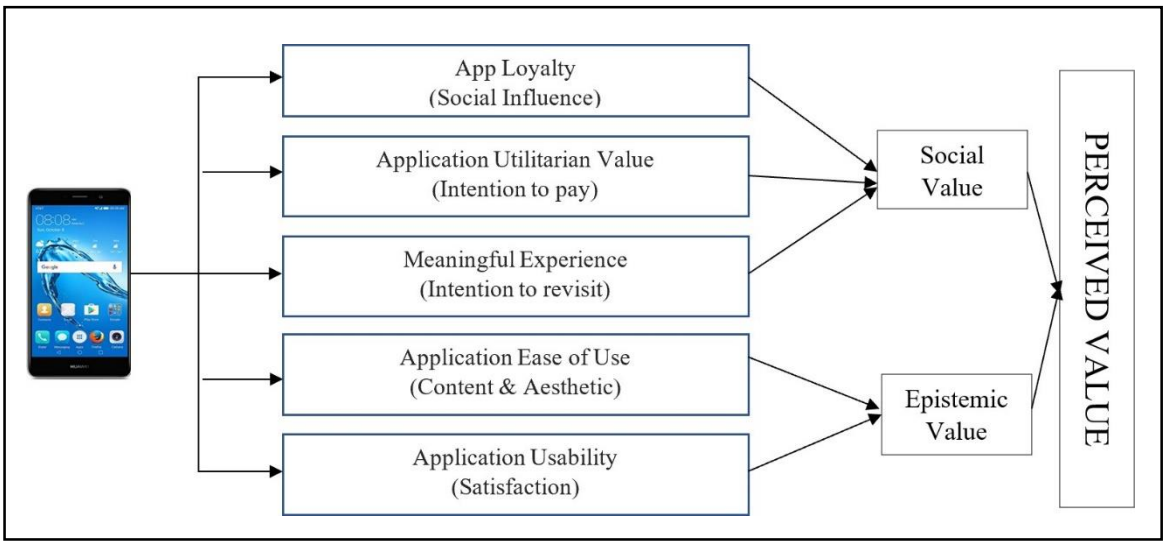


Figure 6.1: Measurement Model of ESAS

The measurement model for ESAS influenced by social and epistemic value. The five constructs related to the components were explained in section 6.2.1. The overall model construct was related to two values, as shown in Figure 6.1. The perceived value (PV) positively affects smartphone applications, whilst social value was associated with Application Loyalty (ALO), Application Utilitarian Value (AUV) and Application Meaningful Experience (AME). In addition, the fitness of the measurement model has a good impact on the perceived value. Finally, the epistemic value positively impacts the

Application Ease of Use (AEOU) and the Mobile Application Usability (MAU) construct. Overall, all the constructs fit well with the overall model.

6.3 Limitations and Future Research

Some drawbacks should be noted and acknowledged for future study. The first limitation was generalising the findings, as most respondents for the scale development survey were from Malaysia, and fewer participants participated outside of Malaysia. As a result, this may lead to assumptions that such experiments were not generalisable and lead to unexplained variables for the framework evaluation. It would be useful if many participants participated from countries with ecotourism as their main industry. It was recommended that the generalizability of the results be enhanced by developing a thoughtful research methodology and design that showed many key characteristics of tourism. Furthermore, the researcher should focus on the samples accurately selected, where the population must share the knowledge relevant to the research.

Second, this study concentrated on the factors that influenced smartphone usage. On the other end, the dialectic worldview proposes that the flip side of the phenomena, which was the non-use of smartphones or resistance to specific smartphone functionalities, was also crucial for a thorough understanding of the phenomenon. As a result, this study was limited in its ability to provide insights into the constraints of smartphone use and the detrimental effects of smartphone use on travel.

The third limitation was the lack of support from other countries tourism agencies. The study on measuring visitors' experience focused on Malaysia's ecotourism. In future studies, it would be interesting to investigate other countries' ecotourists to support this study and better understand other country people on their points of view in gaining experience in

ecotourism. Several ecotourism organisations were approached to participate in the early stage of this study (online survey), but they refused to participate because the information about their organisations was highly confidential. Although the researcher has emphasised that the data obtained during the survey would be used solely for research purposes, the lack of understanding from these ecotourism agencies remains an obstacle to the data collection process.

Furthermore, this study focused solely on smartphone application usage. Of the respondents for the study at the NAF showed that 30% of the respondents were above 55 years old and unfamiliar with smartphone use and the language used in the application. There was a language barrier during the survey at NAF. Although English was not considered the national language, only a few senior participants could understand the app's content. Furthermore, some of them struggled to communicate with the NAF smartphone application. As a result, it would be extremely beneficial if the researcher had a language option in the NAF smartphone application for those who have a problem understanding the content and allowing the elderly to have a meaningful experience using the NAF smartphone application. Usability becomes essential when it comes to a smartphone application. A high level of usability was critical when the target group was elderly users because they might have different disabilities such as small font size, screen size, font type, button and colour contrast. These issues lead the elderly to take much time to complete a task. Furthermore, the elderly also face menu and navigation problems as most elderly people are not familiar with icons.

6.4 Summary

Smart tourism using technologies has become a new norm in the tourism industry, particularly with a smartphone application and has significantly developed in the tourism field. As a result of the increased technology adoption, smart tourism has expanded from

traditional tourism and e-tourism to include concepts such as the smart destination, the smart experience, and the smart business. Integrating sophisticated technology and innovations into physical infrastructure and other services was meant by a "smart destination." For example, increasing visitor contact and improving decision-making for stakeholders increase the overall quality of tourism experiences at a location.

This research proposes a measurement model which provides a scale for the tourism industry to measure the visitors' perceived value with Application Loyalty, Application Ease of Use, Mobile Application Usability, Application Utilitarian Value and Application Meaningful Experience to support the smart experience of eco-tourism. A measurement model for measuring the visitors' experience with different constructs was developed based on a literature review on smart tourism. This measurement construct will help concerning the visitors' experience towards an ecotourism smartphone application and assess the value of smartphone applications across all the relevant features or functions. Furthermore, the visitor pays a certain price for the smartphone application and its services in acquiring and utilising the service to acquire relative content, the graphical user interface (look and feel) of the smartphone application. Finally, this research also demonstrated flexibility in the interaction of smartphone applications with visitors who indirectly communicate their content/ features to maintain a relationship.

This research aimed to determine the factors influencing perceived value (social value and epistemic value) in smartphone applications as a guide during travel. This study used different tour conditions to investigate visitors’ experiences at the ecotourism site. The researcher believes that the General Experience Scale (GES) would be appropriate for measuring visitors' experiences with a different tour guide for different ecotourism sites. In addition, the Ecotourism Smartphone Application Scale (ESAS) can measure the visitors'

experience toward perceived value with other constructs. This research discovered how the ESAS and GES scales were used to test the acceptance of the visitors and tourist behaviour while using tourism apps, intention to adopt and intention to visit tourist destinations in the relationship with perceived value. Theoretically, this study attempted an empirical explanation of the meaningful experience of visiting destinations with a UTAUT model using moderating factors such as ease of use, visitors' loyalty to the app, and the utilitarian value and attitudes towards using tourism smartphone apps. This research also determines how app ease of use, loyalty, meaningful experience, utilitarian value and app usability affect the relationship between ecotourism apps and intention to adopt apps during their travel. Hence, this research also focused on tourists' adoption of a smartphone app in destination discovery and product information and also motivated the travellers to get to know the places pre-during-post travel. Furthermore, this study also focused on satisfaction with smartphone apps before and after travel. The researcher would also be interested in conducting a second study with the ESAS scale in other real-world tourism scenarios or related industries.

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APPENDICES

Appendix A: Journal Publications

1. **Ganapathy, T**., Othman, M. K., & Yahya, A. S. (2022). Development and Validation of Ecotourism Smartphone Application Scale (ESAS) and General Experience Scale (GES). *International Journal of Human–Computer Interaction*, 1-17.

2. **Ganapathy, T**., Othman, M. K., & Yahya, A. S. (2021). Incorporating heuristic evaluation (HE) in the evaluation of visual design of the ecotourism smartphone app. *Journal of Visual Art and Design*, *13*(1), 18-34.

Appendix B:

Table of possible questions for ecotourism with multiple dimensions (Initial Pool)
First set of questionnaire

No.	Question	Source	Measures
1	How often did you experience the following activities during your current ecotourism experience?	Adapted from Benjamin A.B.Morse (2017) Ecotourist observational learning	Physical engagement
2	Hiked with a tour-guide within a natural area		
3	Hiked with other ecotourist within a natural area		
4	Hiked within a natural area where local community members were present		
5	How often did you experience the following activities during your current ecotourism experience	Adapted from Benjamin A.B.Morse (2017) Ecotourist observational learning	Verbal engagement
6	An informal discussion with a tour guide about environmental issues		
7	An informal discussion with other ecotourist about environmental issue		
8	An informal discussion with local community members about environmental issues		
9	How often did you experience the following activities during your current ecotourism experience	Adapted from Benjamin A.B.Morse (2017) Ecotourist observational learning	Cognitive engagement
10	Thought about the environmental behaviours demonstrated by the tour guide		
11	Thought about the environmental behaviours demonstrated by other ecotourist		
12	Thought about the environmental behaviour demonstrated by local community members		
13	How often did you observe the following behaviours during you current ecotourism experience	Adapted from Benjamin A.B.Morse (2017) Ecotourist observational learning	Guide Observation
14	The tour-guide recycling		
15	The tour-guide teaching others about the environment		
16	The tour-guide conserving water (e.g. using minimal water to wash hands)		
17	The tour-guide demonstrating composting techniques		
18	The tour-guide conserving energy (e.g. turning off the lights when leaving a room)		
19	How often did you observe the following behaviours during your current ecotourism experience	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Community observation
20	Local community members conserving water		

21	Local community members gardening (e.g. vegetables or flowers)		
22	Local community members recycling		
23	How often did you observe the following behaviour during your current ecotourism experience	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Tourist observation
24	Other ecotourists using reusable containers for water		
25	Other ecotourists picking up litter		
26	Other ecotourists reading books, publications and other material about environmental issues		
27	How often did you engage in the following behaviour during your current ecotourism experience	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Reproduction
28	Read books, publications and other material about environmental issues		
29	Picked up litter off the ground		
30	Recycled		
31	Composted biodegradable waste		
32	Conserved water (e.g. turning off the tap while brushing your teeth)		
33	Conserved energy (e.g. turning off the lights when leaving the room)		
34	Financially contributed to local conservation efforts		
35	Encouraged other ecotourists to protect the environment		
36	Encouraged local community members to protect the environment		
37	To what extent do you agree with the following statements about your current ecotourism experience	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Reinforcement
38	The tour-guide offered positive recognition to those who used reusable water bottles		
39	The tour-guide offered positive recognition to those who recycled		
40	Local community members offered positive recognition to those who conserved resources (e.g. water and energy)		
41	Local Community members offered positive recognition to those who picked up litter		
42	Other ecotourists offered positive recognition to those who financially contributed to local conservation efforts		
43	Other ecotourists offered positive recognition to those read books, publications and other material about environmental issues		

44	How likely is it that you will engage in the following behaviours within the next year	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Behavioural intention
45	Read books, publications and other material about environmental issues		
46	Watch TV programs or documentaries about environmental issues		
47	Enroll in a nature-based educational program		
48	Sort my trash to separate non-recyclable material from recyclable material		
49	Mobile application fulfil my needs as well	Hsiu Yu Yang, Chechen Liao & Ling Hui Yang (2013)	Functional value
50	Mobile apps have acceptable standard of quality		
51	Mobile apps offers consistent quality		
52	The price of mobile app is economical		
53	Using mobile app helps me to feel acceptable by others	Hsiu Yu Yang, Chechen Liao & Ling Hui Yang (2013)	Social value
54	Using mobile app makes a good impression on other people		
55	Using mobile app give me social approval		
56	Using mobile app improve the way I am perceived		
57	Using mobile app is interesting	Hsiu Yu Yang, Chechen Liao & Ling Hui Yang (2013)	Emotional value
58	Using mobile app makes me feel good		
59	Using mobile app give me pleasure		
60	Using mobile app makes me feel relax		
61	Using mobile app is an enjoyment		
62	Mobile app enables me to test the new technologies	Hsiu Yu Yang, Chechen Liao & Ling Hui Yang (2013)	Epistemic value
63	Mobile apps make experiment with new ways of doing things		
64	Mobile apps arouse my curiosity		
65	When in an unfamiliar environment of get lost, using mobile app can help me to identify my current location and further direction	Hsiu Yu Yang, Chechen Liao & Ling Hui Yang (2013)	Conditional value
66	No matter what time or place is, using mobile apps can assist me complete those thing that I want to do		
67	When I am in uncertain circumstances and need more information to facilitate decision, mobile apps can provide related real-time information (e.g. bus arrival time, weather, stocks) to help me make the decision.		
68	I intend to use mobile app in the near time	Hsiu Yu Yang, Chechen Liao & Ling Hui Yang (2013)	Behavioural intention
69	I predict that I would use mobile app in the short term		

70	I expect my use of mobile app to continue in the future		
71	I would use mobile apps without hesitation to satisfy my needs		
72	Environmental sustainability is required for protecting and conserving natural resources	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Environmental Knowledge
73	Human actions are contributing to changes in our atmosphere and climate systems		
74	Climate change is happening that has greater impact on sustainable development		
75	CBET will confirm to sustainable economic development	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Perceived Economic
76	CBET will create multiple economic opportunities		
77	CBET can attract more investment to local community		
78	Overall standard of living might improve considerably because of CBETM		
79	CBET can bring collective benefits such as infrastructure development which are used by the community as a whole, roads, schools, clinics, etc	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Perceived Social
80	CBET can improve cooperation between community residents		
81	CBET might decrease the crime rate within MPAs		
82	CBET will encourage a variety of cultural activities by the local residents	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Perceived Cultural
83	CBET can have more cultural exchange between tourists and residents		
84	CBET can hold our precious traditional culture		
85	CBET will respect for cultural diversity is necessary for SD		
86	CBET will respect for cultural diversity is necessary for SD	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Motivation
87	CBETM is essentials for sustainable development of MPAs		
88	CBETM might play a significant role in developing well-being of MPC		
89	I want to participate in community-based ecotourism	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Intention to Participate
90	I feel CBET is necessary for sustainable development		
91	I want to be a committee member of CBET		
92	I am interested in involving in implementation of CBET with help of the Department of Marine Parks		

93	The visit was great (money, time, effort)	M. Angles Oviedo-Garcia, Mario Castellanos-Verdugo, Manuela Vega-Vazquez & Francisco Orgaz-Aguera (2016)	Perceived value
94	The visit offers more value than expected		
95	Visiting this protected area offers more value than other protected areas		
96	Overall, I am satisfied with this visit	M. Angles Oviedo-Garcia, Mario Castellanos-Verdugo, Manuela Vega-Vazquez & Francisco Orgaz-Aguera (2016)	Satisfaction
97	Overall I am happy with this visit		
98	I think I did the right thing in choosing to visit this protected area		
99	I'm glad I decided to visit this protected area		
100	I am delighted to have visited this area protected		
101	This visit has exceeded my expectations		
102	I feel happy for deciding to come to this protected area		
103	To be close to nature	Tsung Hung Lee (2009)	Motivation
104	For mangroves watching		
105	For wildlife watching		
106	To experience the environment		
107	To learn about the wetland		
108	For ecological education		
109	To seek novelty		
110	To relax		
111	In to increase kinship or friendship		
112	Nature and landscape	Tsung Hung Lee (2009)	Satisfaction
113	Wetland biodiversity		
114	Wildlife watching		
115	Lagoon's recreation experiences		
116	Sandbar's recreation experiences		
117	Service quality		
118	Ecological guides		
119	Numbers of encounters with other tourists		
120	Safety equipments		
121	Ecotourism program		
122	Travel cost		
123	Overall satisfaction		
124	Willingness to revisit	Tsung Hung Lee (2009)	Behaviour
125	Willingness to recommendation to others		
126	Positive word-of-mouth to others		
127	Visiting Penang National Park (PNP) has encouraged me towards conservation efforts	Sara Kaffashi , Alias Radam, Mad Nasir Shamsudin, Mohd Rusli Yacob & Nor Hanim Nordin	Visitors Perception
128	Activities in PNP promote Environmental Education programs		
129	PNP provides an important view point on interaction between human and nature		

130	Conservation efforts at PNP have increased my awareness of the importance of national parks		
131	PNP has an important role in provision of environmental information		
132	PNP has an important role as ecotourism destination		
133	Interactive programs like fishing and canopy walking and camping increased my knowledge about the value of protected areas		
134	PNP is of great value for conducting research		
135	PNP has a role in wildlife conservation		
136	Provision of a better integrated management plan in PNP		
137	Better enforcement of rules and regulation		
138	Implementing entrance fees for conservation charge	Sara Kaffashi , Alias Radam, Mad Nasir Shamsudin, Mohd Rusli Yacob & Nor Hanim Nordin	Visitors Perception
139	PNP authorities and managers find additional sources of revenue for efficient management purposes		
140	Implement licenses or permits and charges, on certain activities such as fishing, using cameras and camping		
141	Develop and implement the interpretation programme		
142	Providing licensed guides		
143	Improvement of recreational facilities		
144	Implementing tax on tour operators or tourist guide		
145	Natural values must be unique.	Tugba Kiper, Gulen Ozdemir & Canan Saglam (2011)	Opinion about ecotourism
146	Socio-cultural values must be unique.		
147	Local management is the first responsible enterprise		
148	A strong cooperation is a must		
149	The opinions and participation of district people are important.		
150	New opportunities for employment can be composed.	Tugba Kiper, Gulen Ozdemir & Canan Saglam (2011)	Economic Effects
151	New investments come to region.		
152	Diversity can be provided for agricultural products.		
153	Life standards rise		
154	It supplements women employment.		
155	The quality of agricultural production rises and in quality production has its real value.		
156	Internal migration happens with tourism.	Tugba Kiper, Gulen Ozdemir & Canan Saglam (2011)	Socio-cultural effects
157	Festival etc. activities rise		
158	It supplements inter-sectoral cooperation.		

159	The convention and tradition of district area are affective factor for the region.		
160	Conventional culture is lived by protected		
161	The affective factor of region rises.	Tugba Kiper, Gulen Ozdemir & Canan Saglam (2011)	Environmental effects
162	Natural texture is protected		
163	The opportunities of underwork and bodywork rise.		
164	Conventional life style changes	Tugba Kiper, Gulen Ozdemir & Canan Saglam (2011)	Negative Effets
165	The decays of natural resource happen.		
166	Population rises.		
167	Transportation density rises.		
168	Visual and noise pollution happen.		
169	Environmental pollution rises.		
170	Hotel, motel or other usages cause environmental decays.		
171	Feasible population rise effects local peoples' daily life in a negative way.		
172	I will recommend this attraction to friends and relatives	Perunjodi Naidoo, Prabha Ramseook-Munhurrun & Premita Seegoolam (2011)	Loyalty intentions
173	I will revisit this attraction again		
174	I am satisfied with the services provided by the Nature Based Tourism Attraction	Perunjodi Naidoo, Prabha Ramseook-Munhurrun & Premita Seegoolam (2011)	Visitor Satisfaction
175	There is availability of brochures in English and /or French of the attraction	Perunjodi Naidoo, Prabha Ramseook-Munhurrun & Premita Seegoolam (2011)	Communication
176	The information offered is sufficiently detailed to enjoy the attraction		
178	Information about forbidden and limited behaviours at the attraction are provided		
179	Foreign language leaflets are helpful		
180	There is a need to have guides in order to obtain relevant explanation		
191	Is the app fun/entertaining to use?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Engagement-Entertainment
192	Does it use any strategies to increase engagement through entertainment (e.g. through gamification)?		
193	Is the app interesting to use?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Engagement – Interest
194	Does it use any strategies to increase engagement by presenting its content in an interesting way?		
195	Does it provide/retain all necessary settings/preferences for apps features (e.g. sound, content, notifications, etc.)?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Engagement – Customisation
196	Does it allow user input, provide feedback, contain prompts (reminders, sharing options, notifications, etc.)?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian	Engagement – Interactivity

		Tjondronegoro & Madhavan Mani (2015)	
197	Is the app content (visual information, language, design) appropriate for your target audience?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Engagement - Target Group
198	How accurately/fast do the app features (functions) and components (buttons/menus) work?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Functionality - Performance
199	How easy is it to learn how to use the app; how clear are the menu labels/icons and instructions?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Functionality – Ease of Use
200	Is moving between screens logical/accurate/appropriate/ uninterrupted; are all necessary screen links present?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Functionality – Navigation
201	Are interactions (taps/swipes/pinches/scrolls) consistent and intuitive across all components/screens?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Functionality – Gestural Design
202	Is arrangement and size of buttons/icons/menus/content on the screen appropriate or zoomable if needed?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Aesthetics – Layout
203	How high is the quality/resolution of graphics used for buttons/icons/menus/content?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Aesthetics – Graphics
204	How good does the app look?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Aesthetic - Visual Appeal
205	Does the app contain what is described?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Information – Accuracy
206	Does app have specific, measurable and achievable goals (specified in app store description or within the app itself)?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Information – Goals
207	Is app content correct, well written, and relevant to the goal/topic of the app?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian	Information – Quality of Information

		Tjondronegoro & Madhavan Mani (2015)	
208	Is the extent coverage within the scope of the app; and comprehensive but concise?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Information – Quantity of Information
209	Is visual explanation of concepts – through charts/graphs/images/videos, etc. – clear, logical, correct?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Information – Visual Information
210	Does the app come from a legitimate source (specified in app store description or within the app itself)?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Information – credibility
211	Has the app been trialled/tested?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Information – Evidence Base
212	Would you recommend this app to people who might benefit from it?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Subjective Quality
213	How many times do you think you would use this app in the next 12 months if it was relevant to you?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Subjective Quality
214	Would you pay for this app?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Subjective Quality
215	What is your overall star rating of the app?	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Subjective Quality
216	This app is likely to increase awareness of the importance of addressing apps	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Perceived Impact – Awareness
217	This app is likely to increase knowledge/understanding	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Perceived Impact – Knowledge
218	This app is likely to change attitudes toward improving health	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian	Perceived Impact – Attitudes

		Tjondronegoro & Madhavan Mani (2015)	
219	This app is likely to increase intentions/motivation to address changes in health	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Perceived Impact – Intention to Change
220	Use of this app is likely to encourage further help seeking	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Perceived Impact – Help seeking
221	Use of this app is likely increase/decrease	Stoyan R Stoyanav; Leanne Hides; David J Kavanagh; Oksana Zelenko; Dian Tjondronegoro & Madhavan Mani (2015)	Perceived Impact – Behaviour Change
222	Does the system work correctly?	Adapted from Stephane Ganassali 2008	Efficacy
223	Does the system provide the required information to be correct users?		
224	Are data being registered correctly in the database?		
225	Are restrictions, the plan of completeness and the frameworks confirmed?		
226	Is the utilization of human resources better/ adequate?	Adapted from Stephane Ganassali 2008	efficiency
227	Do hardware systems work correctly and according to the main plan?		
228	Is the tourist's experience more efficient according to statistics/ surveys?		
229	Are the capabilities of the existing IT systems and AR application fully exploitable?		
230	Does the new system contribute effectively to ensure the smooth running of the organization in achieving its objectives and improve its image?	Adapted from Stephane Ganassali 2008	efficiency
231	Does the new AR system provide better tourist support		
232	Overall the service quality of dolomitisuperski.mobi (DS) is high	Adapted from Wolfram Hopken, Matthias Fuchs (2010)	Service quality
233	Being a visitor in the area I would find DS useful		
234	Using DS would support my vacation		
235	I find DS is easy to use		
236	I can easily recognize where the information I need is located		
237	When I visit the area, I plan to use the service (usage free of charge)		

238	Quality of guides is important for your selection of ecotourism products? Strongly disagree	Adapted from Cheung Ting-on, 2010	Perceived preference
239	Quality of information is important for your selection of ecotourism products?		
240	Preferred type of ecotourism information: Printed Form:		
241	Minimum impact on nature is essential for your selection of ecotourism products?		
242	Well-managed site is important for your selection of ecotourism destinations?	Adapted from Cheung Ting-on, 2010	Visitor perception
243	High ecological value of the site is important for your selection of ecotourism destinations? Good facilities (e.g. toilet, information centre etc.) of the site are important for your selection of ecotourism destinations?		
244	Good facilities (e.g. toilet, information centre etc.) of the site are important for your selection of ecotourism destinations?		
245	Good accessibility (e.g. transportation and road network) is important for your selection of ecotourism destinations.		
246	Ecotourism could increase environmental awareness of people.	Adapted from Chhewang Rinzin, Walter J.V. Vermeulen 2008	Environment awareness
247	Proper ecotourism planning helps to reduce adverse impacts on nature		
248	Proper ecotourism planning helps to reduce adverse impacts on cultural heritage		
249	Establishment of ecotourism accreditation and certification system helps to improve the quality of ecotourism activities.		
250	Hong Kong has the potential to develop ecotourism		
251	Learning to operate the system difficult easy	Adapted from John P. Chin Virginia A. Diehl Kent L. Norman 2010	learning
252	Exploring new features by trial and error difficult easy		
253	Remembering names and use of commands difficult easy		
254	Tasks can be performed in a straight-forward never always manner		
255	Design for use without documentation. Provide easy-to-use task-oriented help	Adapted from http://edutechwiki.unige.ch/en/Usability_and_user_experience_surveys#User_Interface_Usability_Evaluation_with_Web-Based_Questionnaires	usability
256	Speak the user's language (avoid jargon). Make use of existing knowledge (familiar mental models)		

257	Avoid extraneous information, steps, actions. Information should be in a logical, natural order.		
258	Using the system in my job would enable me to accomplish tasks more quickly	Adapted from http://garyperlman.com/quest/quest.cgi?form=PUEU	Perceived usefulness
259	Using the system would improve my job performance		
260	Using the system in my job would increase my productivity		
261	Using the system would make it easier to do my job		
262	I would find the system useful on my job		
263	Learning to operate the system would be easy for me	Adapted from http://garyperlman.com/quest/quest.cgi?form=PUEU	Perceived ease of use
264	I would find it easy to get the system to do what I want it to do		
265	My interaction with the system would be clear and understandable		
266	I would find the system to be flexible to interact with		
267	It would be easy for me to become skilful at using the system		
268	I would find the system easy to use		
269	The content of the app were important to me	Adapted From Raquel Ctalina Vaquero Rodolfo Morales Lopez 2016	User satisfaction
270	It was difficult to understand the structure of the app		
271	The appearance of the app was pleasant		
272	The home screen of the app was easy to understand		
273	Moving from one section to another was easy		
274	The use of the app was fluent		
275	I always knew my location in the app		
276	I understood how to track my workout easily		
277	I was satisfied with the ease of use of the app		
278	It was easy to perform the given tasks.		
279	The app included terms and words that were unfamiliar to me		
280	Using the app was frustrating		
281	Im going to use the app later		
282	Using mobile app helps me to feel acceptable by others	Adapted from Hsiu Yu Yang, Chechen Liao & Ling Hui Yang (2013)	Social value
283	Using mobile app makes a good impression on other people		
284	Using mobile app give me social approval		

285	Using mobile app improve the way I am perceived		
286	The visit was great (money, time, effort)	Adapted from M. Angles Oviedo-Garcia, Mario Castellanos-Verdugo, Manuela Vega-Vazquez & Francisco Orgaz-Aguera (2016)	Perceived value
287	The visit offers more value than expected		
289	Visiting this protected area offers more value than other protected areas		
290	Overall, I am satisfied with this visit	Adapted from M. Angles Oviedo-Garcia, Mario Castellanos-Verdugo, Manuela Vega-Vazquez & Francisco Orgaz-Aguera (2016)	Satisfaction
291	Overall I am happy with this visit		
292	I think I did the right thing in choosing to visit this protected area		
293	I'm glad I decided to visit this protected area		
294	I am delighted to have visited this area protected		
295	This visit has exceeded my expectations		
296	I feel happy for deciding to come to this protected area		
297	What is the relationship between the natural resources and the nature-based tourism industry?	Adapted from Larissa De Marino Fernabdes (2010)	Perceived environmental value
298	Are there any current environmental issues in Itacaré?		Perceived environmental value
299	Knowledge from previous visit		Perceived information
300	Advice from friends/ relatives		
301	Internet, do you remember the websites?		
302	Guides (e.g. Time Out, Lonely Planet, Rough Guide etc)		
303	Information from local website (Lakecomo.it/en, lagodicomoelugano.com/en)		
304	Broshures from Tour Operators and travel agents		
305	Specific Newspapers/ magazines, for example:		
306	Is there a travel prediction in the application?	Harwati & Imam Djati Widodo (2017)	Measure learnability
307	Is there an application menu in the travel package?		
308	Is there a selection of travel forecast budget visit in application menu?		
309	Is there a selection of travel packages duration in application menu?		
310	Looking for travel predictions		
311	Looking for travel packages		
312	What is your opinion regarding the organization of menus in applications	Harwati & Imam Djati Widodo (2017)	Measure satisfaction
313	What is your opinion regarding the terms used in the application		

314	What is your opinion about the language used in the application		
315	What is your opinion regarding the design of the application		
316	Do you fix errors during the use of the system with ease?	Harwati & Imam Djati Widodo (2017)	Measure errors
317	Do you easily feel 'lost' when using this application?		
318	Do you remember back in the menus and the look of your application easily?	Harwati & Imam Djati Widodo (2017)	Measure memorability
319	Do you think you can use these applications easily in the future?		
320	Find menu prediction of travel	Harwati & Imam Djati Widodo (2017)	Learnability & Efficiency
321	Find menu travel packages		
322	Find the option to visit the prediction budget travel		
323	Finding long been in menu selection travel packages		
324	Looking for travel predictions by category: (types of traveller, avg_age, length, Budget)		
325	Looking for travel packages by category: (Length of time, Num of ppl)		
326	I found the system unnecessarily complex	L. S., Lee1, S. S., Shaharuddin1, G. W., Ng and S. F., Wan-Busrah	Measure Effectiveness
327	I thought the system menu navigation was easy to use		
328	I found the various functions in this system were well integrated and efficient to select	L. S., Lee1, S. S., Shaharuddin1, G. W., Ng and S. F., Wan-Busrah	Measure Efficiency
329	I would imagine that most people would learn to use this system very quickly		
330	I think that I would like to use this system frequently	L. S., Lee1, S. S., Shaharuddin1, G. W., Ng and S. F., Wan-Busrah (2016)	Measure satisfaction
331	I felt very confident using the system		
332	The main menu of the interface looks straight forward to understand		
333	The visual design is unnecessarily complex		
334	The visual are matching with the desire concept (look and feel)		
335	The graphic features are easy to recognize		
336	The interface is attractive and creative		
337	The layout design is consistent throughout the application		
338	I think I like the overall interface of the application		

339	The interface does influence me, to want to visit and know more about the place		
340	Provide travel stories and journey tips	Goh, D.H., Ang, R.P., Lee, C.S., and Lee, C.K. (2010)	Measure tourism service
341	Provide interest guides (e.g., national and state parks, top beaches, top romantic getaways)		
342	Provide general information about destination (e.g., language, laws, climate, culture, currency)		
343	Provide street maps and sightseeing route		
344	Provide information about tourist attractions		
345	Obtain operating hours of tourist attraction		
346	Provide information about shopping and eating		
347	Is there a travel prediction in the application?	Harwati & Imam Djati Widodo (2017)	Measure learnability
348	Is there an application menu in the travel package?		
349	Is there a selection of travel forecast budget visit in application menu?		
350	Is there a selection of travel packages duration in application menu?		
351	Looking for travel predictions		
352	Looking for travel packages		
353	What is your opinion regarding the organization of menus in applications	Harwati & Imam Djati Widodo (2017)	Measure satisfaction
354	What is your opinion regarding the terms used in the application		
355	What is your opinion about the language used in the application		
356	What is your opinion regarding the design of the application		
357	Do you fix errors during the use of the system with ease?	Harwati & Imam Djati Widodo (2017)	Measure errors
358	Do you easily feel 'lost' when using this application?		
359	Do you remember back in the menus and the look of your application easily?	Harwati & Imam Djati Widodo (2017)	Measure memorability
360	Do you think you can use these applications easily in the future?		
361	Find menu prediction of travel	Harwati & Imam Djati Widodo (2017)	Learnability & Efficiency
362	Find menu travel packages		
363	Find the option to visit the prediction budget travel		
364	Finding long been in menu selection travel packages		

365	Looking for travel predictions by category: (types of traveller, avg_age, length, Budget)		
366	Looking for travel packages by category: (Length of time, Num of ppl)		
367	The process of experience sharing in the mobile apps is enjoyable		Perceived Enjoyment
368	I have fun sharing information in the mobile apps		
369	I enjoy sharing my experience with others in mobile apps		
370	My experience sharing with other tourist is personally satisfying		
371	Sharing my experience with others in mobile app give me pleasure		
372	When I need information on a brands its product or service	Andrea Potgieter, 2015	Motivation
373	When I want to be entertained		
374	When friends or family recommend the App		
375	When I am curious about the App		
378	When it is an extension of a website that regularly use		
379	When it was mentioned by the brand/organisation		
380	When I want to purchase a product or service		
381	The number of users that have rated the App	Andrea Potgieter, 2015	Consideration
382	The number of users that have already downloaded the App		
383	The description of the App		
384	The star rating of the App		
385	The number of features the app offers		
386	The size of the app		
389	The price of the app		
390	How often did you experience the following activities during your current ecotourism experience	Adapted from Benjamin A.B.Morse (2017) Ecotourist observational learning	Cognitive engagement
391	Thought about the environmental behaviours demonstrated by the tour guide		
392	Thought about the environmental behaviours demonstrated by other ecotourist		
393	Thought about the environmental behaviour demonstrated by local community members		

394	How often did you observe the following behaviours during you current ecotourism experience	Adapted from Benjamin A.B.Morse (2017) Ecotourist observational learning	Guide Observation
395	The tour-guide recycling		
396	The tour-guide teaching others about the environment		
397	The tour-guide conserving water (e.g. using minimal water to wash hands)		
398	The tour-guide demonstrating composting techniques		
400	The tour-guide conserving energy (e.g. turning off the lights when leaving a room)		
401	How often did you observe the following behaviours during your current ecotourism experience	Muhammad Mehedi Masud, Abdullah Mohammed Aldakhil, Abdelmohsen A.Nassani & Mohammad Nurul Azam (2016)	Community observation
402	Quality of guides is important for your selection of ecotourism products? Strongly disagree	Adapted from Cheung Ting-on, 2010	Perceived preference
403	Quality of information is important for your selection of ecotourism products?		
404	Preferred type of ecotourism information: Printed Form:		
405	Minimum impact on nature is essential for your selection of ecotourism products?		
406	Well-managed site is important for your selection of ecotourism destinations?	Adapted from Cheung Ting-on, 2010	Visitor perception
407	High ecological value of the site is important for your selection of ecotourism destinations? Good facilities (e.g. toilet, information centre etc.) of the site are important for your selection of ecotourism destinations?		
408	Good facilities (e.g. toilet, information centre etc.) of the site are important for your selection of ecotourism destinations?		
409	Good accessibility (e.g. transportation and road network) is important for your selection of ecotourism destinations.		
410	Ecotourism could increase environmental awareness of people.	Adapted from Chhewang Rinzin, Walter J.V. Vermeulen 2008	Environment awareness
411	Proper ecotourism planning helps to reduce adverse impacts on nature		
412	Proper ecotourism planning helps to reduce adverse impacts on cultural heritage		
413	Establishment of ecotourism accreditation and certification system		

	helps to improve the quality of ecotourism activities.		
414	Hong Kong has the potential to develop ecotourism		
415	Learning to operate the system difficult easy	Adapted from John P. Chin Virginia A. Diehl Kent L. Norman 2010	learning
416	The controls of the audioguide were not easy to use.	Adapted from Jennett *et al.* (2008) immersion in games questionnaire	Usability
417	The controls of the audioguide were difficult to understand.		
418	I became unaware that I was even using any controls on the audioguide		
419	The audio/multimedia guides' controls were not invisible to me.		
420	I felt myself to be directly travelling through the game according to my own volition.		
421	I did not feel as if I was moving through the game according to my own will.		
422	It was as if I could interact with the world of the game as if I was in the real world.		
423	Interacting with the world of the game did not feel as real to me as it would be in the real world		
424	The controls of the audioguide were not easy to use.	Adapted from Jennett *et al.* (2008) immersion in games questionnaire	Usability
425	The controls of the audioguide were difficult to understand.		
426	I became unaware that I was even using any controls on the audioguide		
427	How often did you observe the following behaviour during your current ecotourism experience		
428	Other ecotourists using reusable containers for water		
429	Other ecotourists picking up litter		
430	Other ecotourists reading books, publications and other material about environmental issues		
431	How often did you engage in the following behaviour during your current ecotourism experience		
432	Read books, publications and other material about environmental issues		
433	Picked up litter off the ground		
434	Recycled		
435	Composted biodegradable waste		
436	Conserved water (e.g. turning off the tap while brushing your teeth)		
437	Conserved energy (e.g. turning off the lights when leaving the room)		

438	Financially contributed to local conservation efforts		
439	Encouraged other ecotourists to protect the environment		
440	Encouraged local community members to protect the environment		
441	To what extent do you agree with the following statements about your current ecotourism experience		
442	The tour-guide offered positive recognition to those who used reusable water bottles		
443	The tour-guide offered positive recognition to those who recycled		
444	Local community members offered positive recognition to those who conserved resources (e.g. water and energy)		
445	Local Community members offered positive recognition to those who picked up litter		
446	Other ecotourists offered positive recognition to those who financially contributed to local conservation efforts		
447	Is the utilization of human resources better/ adequate?	Adapted from Stephane Ganassali 2008	efficiency
448	Do hardware systems work correctly and according to the main plan?		
449	Is the tourist's experience more efficient according to statistics/ surveys?		
450	Are the capabilities of the existing IT systems and AR application fully exploitable?		
451	Does the new system contribute effectively to ensure the smooth running of the organization in achieving its objectives and improve its image?	Adapted from Stephane Ganassali 2008	efficiency
452	Does the new AR system provide better tourist support		
453	Overall the service quality of dolomitisuperski.mobi (DS) is high	Adapted from Wolfram Hopken, Matthias Fuchs (2010)	Service quality
454	Being a visitor in the area I would find DS useful		
455	Using DS would support my vacation		
456	I find DS is easy to use		
457	I can easily recognize where the information I need is located		
458	When I visit the area, I plan to use the service (usage free of charge)		
459	Quality of guides is important for your selection of ecotourism products? Strongly disagree	Adapted from Cheung Ting-on, 2010	Perceived preference

460	Quality of information is important for your selection of ecotourism products?		
461	Preferred type of ecotourism information: Printed Form:		
462	Minimum impact on nature is essential for your selection of ecotourism products?		
463	Well-managed site is important for your selection of ecotourism destinations?	Adapted from Cheung Ting-on, 2010	Visitor perception
464	High ecological value of the site is important for your selection of ecotourism destinations? Good facilities (e.g. toilet, information centre etc.) of the site are important for your selection of ecotourism destinations?		
465	Good facilities (e.g. toilet, information centre etc.) of the site are important for your selection of ecotourism destinations?		
466	Good accessibility (e.g. transportation and road network) is important for your selection of ecotourism destinations.		
467	Ecotourism could increase environmental awareness of people.	Adapted from Chhewang Rinzin, Walter J.V. Vermeulen 2008	Environment awareness
468	Proper ecotourism planning helps to reduce adverse impacts on nature		
469	Proper ecotourism planning helps to reduce adverse impacts on cultural heritage		
470	Establishment of ecotourism accreditation and certification system helps to improve the quality of ecotourism activities.		
471	Hong Kong has the potential to develop ecotourism		
472	Learning to operate the system difficult easy	Adapted from John P. Chin Virginia A. Diehl Kent L. Norman 2010	learning
473	Overall, I am satisfied with this visit	M. Angles Oviedo-Garcia, Mario Castellanos-Verdugo, Manuela Vega-Vazquez & Francisco Orgaz-Aguera (2016)	Satisfaction
474	Overall I am happy with this visit		
475	I think I did the right thing in choosing to visit this protected area		
476	I'm glad I decided to visit this protected area		
477	I am delighted to have visited this area protected		
478	This visit has exceeded my expectations		
479	I feel happy for deciding to come to this protected area		
480	To be close to nature	Tsung Hung Lee (2009)	Motivation

481	Provide travel stories and journey tips	Goh, D.H., Ang, R.P., Lee, C.S., and Lee, C.K. (2010)	Measure tourism service
482	Provide interest guides (e.g., national and state parks, top beaches, top romantic getaways)		
483	Provide general information about destination (e.g., language, laws, climate, culture, currency)		
484	Provide street maps and sightseeing route		
485	Provide information about tourist attractions		
486	Obtain operating hours of tourist attraction		
487	Provide information about shopping and eating		
489	Is there a travel prediction in the application?	Harwati & Imam Djati Widodo (2017)	Measure learnability
490	Is there an application menu in the travel package?		
491	Is there a selection of travel forecast budget visit in application menu?		
492	Is there a selection of travel packages duration in application menu?		
493	Looking for travel predictions		
494	Looking for travel packages		
495	What is your opinion regarding the organization of menus in applications	Harwati & Imam Djati Widodo (2017)	Measure satisfaction
496	Learning to operate the system would be easy for me	Adapted from http://garyperlman.com/quest/quest.cgi?form=PUEU	Perceived ease of use
497	I would find it easy to get the system to do what I want it to do		
498	My interaction with the system would be clear and understandable		
499	I would find the system to be flexible to interact with		
500	It would be easy for me to become skilful at using the system		

Appendix C:
CONSENT FORM

Please read this consent agreement carefully before you decide to participate in the study.

Project Title	:	Measuring Visitors' Perceived Value with Ecotourism Smartphone Application
Researcher	:	Tanalachimi Ganapathy
Description of Study	:	This study assessing the Scale of smartphone application usage in ecotourism and we are inviting the eco-tourist to participate in this survey to validate the scale. This study is focusing on assessing the tourist behaviour, mobile application quality and meaningful experience in using the smartphone application in ecotourism.
Confidentiality of Data	:	Data obtained from the respondents are assured to be strictly **CONFIDENTIAL** and only for academic purposes. Therefore, please answer the questionnaire confidently and honestly. Your cooperation is highly appreciated.
Section to Answer	:	This study is split into Four parts, Section A, B and C. Section A deals with survey respondent's profile, Section B is the Learning and Satisfaction of visitors towards Ecotourism and Section C is for the participants who have experience in using Smartphone Application in Ecotourism. Eco-tourists who have experience using ecotourism smartphone application respond to **ALL** Sections A, B, and C. Eco-tourists who have no experience using the smartphone application need only respond to Section A, B and C and Eco-tourist who don't have the experience in using the smartphone application only need to answer Section A and B.
Contact Person	:	If you have questions about this research may contact the researcher @ tana.gana@gmail.com
Consent to Participate	:	I have voluntarily decided to participate in this study. I understand that I may answer any questions about research procedures at any point during the study period. I also understand that I may voluntarily terminate my participation in this study at any time.

Section A: All participants need to answer this section

1. What is your gender?
   (a) Male
   (b) Female

2. What is your age?
   (a) 18-24
   (b) 25-34
   (c) 35-44
   (d) 45-54
   (e) 55 and older

3. What is your highest level of education?
    (a) Primary school
    (b) Secondary school
    (c) Diploma
    (d) Bachelor Degree
    (e) Master's Degree
    (f) Doctorate Degree

4. In what country have you spent the majority of your life? Please name it?

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5. When was the time you visited a tourism places?
    a. Within the past month
    b. 1-3 months ago
    c. 4 months ago
    d. Don't know/ I cant remember

6. How many times have you participated on ecotourism experiences? (Ecotourism is a travel to natural areas that conserves the environment and improve the well-being of local people.)
    (a) 0 times
    (b) 1 time
    (c) 2 times
    (d) 3-4 times
    (e) 5 or more times

7. What was the duration of your most recent ecotourism experience or trip?
    a) Day trip
    b) 1 night
    c) 2 nights
    d) 3 nights
    e) 4 or more nights

8. Did you use any ecotourism apps guide during your ecotourism trip?
    a) Yes
    b) No

9. Do you ever go on an ecotourism trip?
    a) Yes
    b) No

10. How did you decide to go on an eco-tourist trip?
    a) Newspaper
    b) Website
    c) Pamphlets
    d) Advertisement (youtube, tv..etc)

11. Who do you usually travel with on an ecotourism trip?
    a) Individually
    b) Family
    c) Friends
    d) Organization

12. What type of ecotourism have you experience before? You can choose more than one?

    Cultural heritage tour
    Animal tour
    Forest or Jungle tour
    Sanctuary or reserve tour
    Others (Please specify) ……

13. Does the ecotourism places that you have visited provide pristine/unaltered nature
    a) Yes
    b) No

14. Does the ecotourism trip provide a unique or special experience?
    a) Yes
    b) No

15. Does the ecotourism trip provides close-up experience? (close-up places, wildlife or people from different culture)
    a) Yes
    b) No

Section B:
This section questionnaire is collected in order to understand your opinions on ecotourism travel. Any of your experience in visiting ecotourism places and how was your travelling experience during your travel period.

No.	Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)

1	I want to learn more about the natural environment					
2	I travel to new places to learn about local culture and customs					
3	This type of tourism is less harmful to the environment than all the other kinds of tourism					
4	I can easily organize eco-trip by myself and travel alone or just with my friends/family					
5	I have a passion for learning something new when I travel					
6	I want to experience a new culture with the minimum influence on the environment and local community					
7	I like to spend time on open-air					
8	I want to meet people with similar interests					
9	This visit has exceeded my expectations					
10	Overall, I am satisfied with this ecotourism visit					
11	Overall, I am happy with this ecotourism visit					
12	I made the right choice to visit the ecotourism places					
13	I will recommend this visit to my friends/family					
14	My experience sharing with other tourists is personally satisfied					
15	I will revisit the ecotourism attraction again					
16	I am satisfied with the service provided by the tourism information centre					

Section C:

Please read the following note before completing this questionnaire.

This questionnaire is collected purely for an academic research purpose in order to understand your opinions on Mobile Application usage in Ecotourism. Any of your experience in visiting ecotourism places and how this ecotourism mobile application would help your travel period. Your participation is completely voluntary and the responses and the results are treated confidentially. Thank you in advance for your cooperation.

No.	Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	Using the mobile app is interesting					
2	Using the mobile app is feel good					
3	Using the mobile app, I feel relax					
4	Learning to operate the system is difficult					
5	I always knew my location in the app					
6	I intend to use a mobile app in the near time					
7	The app interestingly presents its content					
8	Mobile application fulfils my needs					
9	The arrangement and size of buttons/icons/menus/content on the screen are appropriate					
10	The content of the app was important to me					
11	It was difficult to understand the structure of the app					
12	The appearance of the app was pleasant					
13	The home screen of the app was easy to understand					
14	Moving from one section in the app to another was easy					
15	I was satisfied with the ease of use of the app					
16	The app included terms and words that were unfamiliar to me					
17	My information in the app caused me to stay longer on my visit to this place					
18	I find the app to be flexible to interact with					
19	It has to be skilful at using the app					
20	The App provides better tourist support					
21	I can easily recognise where the information I need is located					
22	The visual matches with the desired concept (look and feel)					
23	The layout design is consistent throughout the application					
24	The interface does influence me to want to visit and know more about the place					
25	The mobile app enables me to try the new technologies					

No.	Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
26	Mobile apps for ecotourism are the new ways of doing things					
27	Mobile apps arouse my curiosity					
28	I willingly reuse this app					
29	I would not recommend this app to anyone					
30	The number of users that have already downloaded the App					
31	The description of the App and the star rating					
32	The number of features the app offers					
33	The size of the app and the price					
34	I am willing to pay for the apps developed					
35	I predict that I would use the mobile app in the short term					
36	I expect my use of the mobile app to continue in the future					
37	I would use mobile apps without hesitation to satisfy my needs					
38	I will pay for this app					
39	This app is likely to increase awareness of the importance of addressing apps					

Appendix D:
Participation Information Sheet **Control Group: NAF**

Project Title	:	Measuring Visitors' Perceived Value with Ecotourism Smartphone Application
Researcher	:	Tanalachimi Ganapathy
Description of Study	:	This study assessing the general view of ecotourist visiting Niranur Agro Farm without any guide. This study also assess the impact of without guide tour. We are inviting the eco-tourist to participate in this survey to validate this method of tourism. This study is also focusing on assessing the experience and satisfaction of ecotourist during their travel.
Confidentiality of Data	:	Data obtained from the respondents are assured to be strictly **CONFIDENTIAL** and only for academic purposes. Therefore, please answer the questionnaire confidently and honestly. Your cooperation is highly appreciated.
Contact Person	:	If you have questions about this research may contact the researcher @ tana.gana@gmail.com further detail as shown below.
Consent to Participate	:	I have voluntarily decided to participate in this study. I understand that I may answer any questions about research procedures at any point during the study period. I also understand that I may voluntarily terminate my participation in this study at any time.

Thank You for reading this research brief. Your time is very much appreciated.

Consent Form

Title: Measuring Visitors' Perceived Value with Ecotourism Smartphone Application

I, the undersigned, confirm that (please tick box as appropriate):

1. I have read and understand the information about the project, as provided I the Participant Information Sheet. ☐
2. I have been given the opportunity to ask questions about the project and my participation ☐
3. I voluntarily agree to participate in the project ☐
4. I understand I can withdraw my consent after my participating in this research without giving reason and not penalised for withdrawing from this survey ☐

5. The procedure regarding confidentiality have been clearly explained (eg. Names, contact no, email etc) to me ☐
6. The use of data in this research has been explained to me ☐
7. I understand that I have righto request the withdrawal of any information that I have given ☐
8. I along with the Researcher, agree to sign and date this informed consent form ☐

Participant:

_____	_____	_____
Name of Participant	Signature	Date

Researcher:

_____	_____	_____
Name of Participant	Signature	Date

Section A: Participant Demographic. All participants need to answer this section

1. What is your gender?
   (a) Male
   (b) Female

2. What is your age?
   (a) 18-24
   (b) 25-34
   (c) 35-44
   (d) 45-54
   (e) 55 and older

3. What is your highest level of education?
   (a) Primary school
   (b) Secondary school
   (c) Diploma
   (d) Bachelor Degree
   (e) Master's Degree
   (f) Doctorate Degree

4. In what country have you spent the majority of your life? Please name it?

5. When was the time you visited a tourism places?
    (a) Within the past month
    (b) 1-3 months ago
    (c) 4 months ago
    (d) Don't know/ I cant remember

6. How many times have you participated on ecotourism experiences? (Ecotourism is a travel to natural areas that conserves the environment and improve the well-being of local people.)
    (a) 0 times
    (b) 1 time
    (c) 2 times
    (d) 3-4 times
    (e) 5 or more times

7. What was the duration of your most recent ecotourism experience or trip?
    (a) Day trip
    (b) 1 night
    (c) 2 nights
    (d) 3 nights
    (e) 4 or more nights
8. Did you use any ecotourism apps guide during your ecotourism trip?
    (a) Yes
    (b) No

9. Do you ever go on an ecotourism trip?
    1. Yes
    2. No

10. How did you decide to go on an eco-tourist trip?
    (a) Newspaper
    (b) Website
    (c) Pamphlets
    (d) Advertisement (youtube, tv..etc)

11. Who do you usually travel with on an ecotourism trip?
    (a) Individually
    (b) Family
    (c) Friends
    (d) Organization

12. What type of ecotourism have you experience before? You can choose more than one?

(a) Cultural heritage tour
(b) Animal tour
(c) Forest or Jungle tour
(d) Sanctuary or reserve tour
(e) Others (Please specify)
……

13. Does the ecotourism places that you have visited provide pristine/unaltered nature

(a)Yes
(b) No

14. Does the ecotourism trip provide a unique or special experience?
(a) Yes
(b) No

15. Does the ecotourism trip provides close-up experience? (close-up places, wildlife or people from different culture)
(a) Yes
(b) No

16. What was the cost of ecotourism trip real experience?
(a) More expensive than other holiday tour
(b) Less expensive than other holiday tour
(c) Not sure

Section B: Please read the following note before completing this questionnaire.
This questionnaire is collected purely for an academic research purpose in order to understand your opinions on ecotourism travel without using any guide. Any of your experience in visiting ecotourism places and how was your travelling experience during your travel period. Your participation is completely voluntary and the responses and the results are treated confidentially. Thank you in advance for your cooperation.

No.	Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1.	I want to learn more about the natural environment					
2.	I travel to new places to learn about local culture and customs					
3.	I have a passion for learning something new when I travel					
4.	I want to experience a new culture with the minimum influence on environment and local community					
5.	I like to spend time on open-air					
6.	I want to meet people with similar interests					
7.	Overall I am satisfied with this ecotourism visit					
8.	Overall I am happy with this ecotourism visit					
9.	I did the right choice to visit the ecotourism places					
10.	I will recommend this visit to my friends/family					

11.	My experience sharing with other tourist is personally satisfied					
12.	I will revisit the ecotourism attraction again					
13.	I am satisfied with the service provided by tourism information canter					

Thank You for your Participation

Appendix E:

Brochure: NAF

Participation Information Sheet

Project Title	:	Measuring Visitors' Perceived Value with Ecotourism Smartphone Application
Researcher	:	Tanalachimi Ganapathy
Description of Study	:	This study assessing the Brochure usage in ecotourism and we are inviting the eco-tourist to participate in this survey. This brochure is specially designed for the purpose of gathering your value comments about the Niranur Agro Farm visit. This study is focusing on assessing the significant effect toward the tourist's trip quality and value using Niranur Agro Farm Brochure.
Confidentiality of Data	:	Data obtained from the respondents are assured to be strictly **CONFIDENTIAL** and only for academic purposes. Therefore, please answer the questionnaire confidently and honestly. Your cooperation is highly appreciated.
Contact Person	:	If you have questions about this research may contact the researcher @ tana.gana@gmail.com further detail as shown below.
Consent to Participate	:	I have voluntarily decided to participate in this study. I understand that I may answer any questions about research procedures at any point during the study period. I also understand that I may voluntarily terminate my participation in this study at any time.

Thank You for reading this research brief. Your time is very much appreciated.

Consent Form

Title: Measuring Visitors' Perceived Value with Ecotourism Smartphone Application

I, the undersigned, confirm that (please tick box as appropriate):

1. I have read and understand the information about the project, as provided I the Participant Information Sheet. ☐
2. I have been given the opportunity to ask questions about the project and my participation ☐
3. I voluntarily agree to participate in the project ☐
4. I understand I can withdraw my consent after my participating in this research ☐

without giving reason and not penalised for withdrawing from this survey

5. The procedure regarding confidentiality have been clearly explained (eg. Names, contact no, email etc) to me ☐
6. The use of data in this research has been explained to me ☐
7. I understand that I have righto request the withdrawal of any information that I have given ☐
8. I along with the Researcher, agree to sign and date this informed consent form ☐

Participant:

_____	_____	_____
Name of Participant	Signature	Date

Researcher:

_____	_____	_____
Name of Participant	Signature	Date

Section A: Participant Demographic. All participants need to answer this section

17. What is your gender?
    (c) Male
    (d) Female

18. What is your age?
    (f) 18-24
    (g) 25-34
    (h) 35-44
    (i) 45-54
    (j) 55 and older

19. What is your highest level of education?
    (g) Primary school
    (h) Secondary school
    (i) Diploma
    (j) Bachelor Degree
    (k) Master's Degree
    (l) Doctorate Degree

20. In what country have you spent the majority of your life? Please name it?

_____

21. When was the time you visited a tourism places?
    (e) Within the past month
    (f) 1-3 months ago
    (g) 4 months ago
    (h) Don't know/ I cant remember

22. How many times have you participated on ecotourism experiences? (Ecotourism is a travel to natural areas that conserves the environment and improve the well-being of local people.)
    (f) 0 times
    (g) 1 time
    (h) 2 times
    (i) 3-4 times
    (j) 5 or more times

23. What was the duration of your most recent ecotourism experience or trip?
    (f) Day trip
    (g) 1 night
    (h) 2 nights
    (i) 3 nights
    (j) 4 or more nights

24. Did you use any ecotourism apps guide during your ecotourism trip?
    (c) Yes
    (d) No

25. Do you ever go on an ecotourism trip?
    3. Yes
    4. No

26. How did you decide to go on an eco-tourist trip?
    (e) Newspaper
    (f) Website
    (g) Pamphlets
    (h) Advertisement (youtube, tv..etc)

27. Who do you usually travel with on an ecotourism trip?
    (e) Individually
    (f) Family
    (g) Friends
    (h) Organization

28. What type of ecotourism have you experience before? You can choose more than one?
    (f) Cultural heritage tour

(g) Animal tour
(h) Forest or Jungle tour
(i) Sanctuary or reserve tour
(j) Others (Please specify)
…….

29. Does the ecotourism places that you have visited provide pristine/unaltered nature

(a)Yes
(b) No

30. Does the ecotourism trip provide a unique or special experience?
(c) Yes
(d) No

31. Does the ecotourism trip provides close-up experience? (close-up places, wildlife or people from different culture)
(c) Yes
(d) No

32. What was the cost of ecotourism trip real experience?
(d) More expensive than other holiday tour
(e) Less expensive than other holiday tour
(f) Not sure

Section B:
This section questionnaire is collected in order to understand your opinions on ecotourism travel. Any of your experience in visiting ecotourism places and how was your travelling experience during your travel period.

No.	Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1.	I want to learn more about the natural environment					
2.	I travel to new places to learn about local culture and customs					
3.	I have a passion for learning something new when I travel					
4.	I want to experience a new culture with the minimum influence on environment and local community					
5.	I like to spend time on open-air					
6.	I want to meet people with similar interests					
7.	Overall I am satisfied with this ecotourism visit					
8.	Overall I am happy with this ecotourism visit					
9.	I did the right choice to visit the ecotourism places					
10.	I will recommend this visit to my friends/family					
11.	My experience sharing with other tourist is personally satisfied					

12.	I will revisit the ecotourism attraction again					
13.	I am satisfied with the service provided by tourism information canter					

Section C:

Please read the following note before completing this questionnaire.

This questionnaire is collected purely for an academic research purpose in order to understand your opinions on Brochure usage in Ecotourism. Any of your experience in visiting ecotourism places and how brochure would help your travel period. Your participation is completely voluntary and the responses and the results are treated confidentially. Thank you in advance for your cooperation.

No.	Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1.	The brochure presenting its content in an interesting way?					
2.	The brochure fulfil my needs					
3.	The presentation, layout, design and arrangement of content and size of picture on the brochure is appropriate?					
4.	The appearance of the brochure is pleasant					
5.	The information in the brochure caused me to stay longer on my visit to this place?					
6.	The content of the brochure is easy to understand					
7.	I can easily recognize where the information I need is located in the brochure					
8.	The visual and design of brochure matching with the desired concept (look and feel) of the bee farm					
9.	The layout design is consistent throughout the brochure					
10.	The design of the brochure does influence me, to want to visit and know more about the place					
11.	The brochure design enables me to look into the content of the brochure					
12.	The ecotourism brochure is a way of get information about the visiting place					
13.	The brochure arouse my curiosity towards the ecotourism place					
14.	Using a ecotourism brochure is interesting					
15.	Using a ecotourism brochure is to feel good					
16.	Explore the content of the brochure is difficult					
17.	It was difficult to understand the content organization of the brochure					
18.	The brochure included terms and words that were unfamiliar to me					
19.	It has to be skilful at understanding the brochure					
20.	I would not recommend this brochure to anyone					

Thank You for your Participation

Appendix F:

Smartphone Application: NAF

Participation Information Sheet

Project Title	:	Measuring Visitors' Perceived Value with Ecotourism Smartphone Application
Researcher	:	Tanalachimi Ganapathy
Description of Study	:	This study assessing the smartphone application usage in ecotourism and we are inviting the eco-tourist to participate in this survey. This study is focusing on assessing the tourist behaviour, mobile application quality and meaningful experience in using the smartphone application in ecotourism.
Confidentiality of Data	:	Data obtained from the respondents are assured to be strictly **CONFIDENTIAL** and only for academic purposes. Therefore, please answer the questionnaire confidently and honestly. Your cooperation is highly appreciated.
Contact Person	:	If you have questions about this research may contact the researcher @ tana.gana@gmail.com further detail as shown below.
Consent to Participate	:	I have voluntarily decided to participate in this study. I understand that I may answer any questions about research procedures at any point during the study period. I also understand that I may voluntarily terminate my participation in this study at any time.

Thank You for reading this research brief. Your time is very much appreciated.

Consent Form

Title: Measuring Visitors' Perceived Value with Ecotourism Smartphone Application

I, the undersigned, confirm that (please tick box as appropriate):

1. I have read and understand the information about the project, as provided I the Participant Information Sheet. ☐
2. I have been given the opportunity to ask questions about the project and my participation ☐
3. I voluntarily agree to participate in the project ☐

4. I understand I can withdraw my consent after my participating in this research without giving reason and not penalised for withdrawing from this survey ☐
5. The procedure regarding confidentiality have been clearly explained (eg. Names, contact no, email etc) to me ☐
6. The use of data in this research has been explained to me ☐
7. I understand that I have righto request the withdrawal of any information that I have given ☐
8. I along with the Researcher, agree to sign and date this informed consent form ☐

Participant:

_____	_____	_____
Name of Participant	Signature	Date

Researcher:

_____	_____	_____
Name of Participant	Signature	Date

Section A: Participant Demographic. All participants need to answer this section

33. What is your gender?
    (e) Male
    (f) Female

34. What is your age?
    (k) 18-24
    (l) 25-34
    (m) 35-44
    (n) 45-54
    (o) 55 and older

35. What is your highest level of education?
    (m) Primary school
    (n) Secondary school
    (o) Diploma
    (p) Bachelor Degree
    (q) Master's Degree
    (r) Doctorate Degree

36. In what country have you spent the majority of your life? Please name it?

_____

37. When was the time you visited a tourism places?
    (i) Within the past month
    (j) 1-3 months ago
    (k) 4 months ago
    (l) Don't know/ I cant remember

38. How many times have you participated on ecotourism experiences? (Ecotourism is a travel to natural areas that conserves the environment and improve the well-being of local people.)
    (k) 0 times
    (l) 1 time
    (m) 2 times
    (n) 3-4 times
    (o) 5 or more times

39. What was the duration of your most recent ecotourism experience or trip?
    (k) Day trip
    (l) 1 night
    (m) 2 nights
    (n) 3 nights
    (o) 4 or more nights
40. Did you use any ecotourism apps guide during your ecotourism trip?
    (e) Yes
    (f) No

41. Do you ever go on an ecotourism trip?
    5. Yes
    6. No

42. How did you decide to go on an eco-tourist trip?
    (i) Newspaper
    (j) Website
    (k) Pamphlets
    (l) Advertisement (youtube, tv..etc)

43. Who do you usually travel with on an ecotourism trip?
    (i) Individually
    (j) Family
    (k) Friends
    (l) Organization

44. What type of ecotourism have you experience before? You can choose more than one?

(k) Cultural heritage tour
(l) Animal tour
(m) Forest or Jungle tour
(n) Sanctuary or reserve tour
(o) Others (Please specify)
……

45. Does the ecotourism places that you have visited provide pristine/unaltered nature

(a) Yes
(b) No

46. Does the ecotourism trip provide a unique or special experience?

(e) Yes
(f) No

47. Does the ecotourism trip provides close-up experience? (close-up places, wildlife or people from different culture)

(e) Yes
(f) No

48. What was the cost of ecotourism trip real experience?

(g) More expensive than other holiday tour
(h) Less expensive than other holiday tour
(i) Not sure

Section B:

This section questionnaire is collected in order to understand your opinions on ecotourism travel. Any of your experience in visiting ecotourism places and how was your travelling experience during your travel period.

No.	Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1.	I want to learn more about the natural environment					
2.	I travel to new places to learn about local culture and customs					
3.	I have a passion for learning something new when I travel					
4.	I want to experience a new culture with the minimum influence on environment and local community					
5.	I like to spend time on open-air					
6.	I want to meet people with similar interests					
7.	Overall I am satisfied with this ecotourism visit					
8.	Overall I am happy with this ecotourism visit					
9.	I did the right choice to visit the ecotourism places					
10.	I will recommend this visit to my					

	friends/family					
11.	My experience sharing with other tourist is personally satisfied					
12.	I will revisit the ecotourism attraction again					
13.	I am satisfied with the service provided by tourism information canter					

Section C:

Please read the following note before completing this questionnaire.

This questionnaire is collected purely for an academic research purpose in order to understand your opinions on Mobile Application usage in Ecotourism. Any of your experience in visiting ecotourism places and how this ecotourism mobile application would help your travel period. Your participation is completely voluntary and the responses and the results are treated confidentially. Thank you in advance for your cooperation.

No.	Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	Using the mobile app is interesting					
2	Using the mobile app is feel good					
3	Using the mobile app, I feel relax					
4	Learning to operate the system is difficult					
5	I always knew my location in the app					
6	I intend to use a mobile app in the near time					
7	The app interestingly presents its content					
8	Mobile application fulfils my needs					
9	The arrangement and size of buttons/icons/menus/content on the screen are appropriate					
10	The content of the app was important to me					
11	It was difficult to understand the structure of the app					
12	The appearance of the app was pleasant					
13	The home screen of the app was easy to understand					
14	Moving from one section in the app to another was easy					
15	I was satisfied with the ease of use of the app					
16	The app included terms and words that were unfamiliar to me					
17	My information in the app caused me to stay longer on my visit to this place					

No.	Items	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
18	I find the app to be flexible to interact with					
19	It has to be skilful at using the app					
20	The App provides better tourist support					
21	I can easily recognise where the information I need is located					
22	The visual matches with the desired concept (look and feel)					
23	The layout design is consistent throughout the application					
24	The interface does influence me to want to visit and know more about the place					
25	The mobile app enables me to try the new technologies					
26	Mobile apps for ecotourism are the new ways of doing things					
27	Mobile apps arouse my curiosity					
28	I willingly reuse this app					
29	I would not recommend this app to anyone					
30	The number of users that have already downloaded the App					
31	The description of the App and the star rating					
32	The number of features the app offers					
33	The size of the app and the price					
34	I am willing to pay for the apps developed					
35	I predict that I would use the mobile app in the short term					
36	I expect my use of the mobile app to continue in the future					
37	I would use mobile apps without hesitation to satisfy my needs					
38	I will pay for this app					
39	This app is likely to increase awareness of the importance of addressing apps					

Thank You for your Participation

Appendix G:
ECOTOURISM SMARTPHONE APPLICATION SCALE (ESAS)
4 Point Ordinal scale: NR=Not Relevant, SR= Somewhat Relevant, QR=Quite Relevant, HR=Highly Relevant

Consent Form

Thank you for your assistance in this study. We would like to ask your expert assistance in conducting Heuristic Evaluation for ecotourism smartphone mobile guide. The result from this study will provide more information about user interaction with smartphone apps. Your participation in this study is in voluntary basis and you are allowed to withdraw from the study at any time without prejudice. Only Tanalachimi and Dr.Kamal Othman will have access to the data collected today in its original format.

Please sign below to indicate that you have read and you understand the information on this form and that any questions you might have about the session have been answered.

Date :

Please print your name : _____

Please sign your name : _____

Thank You.

		Dr.Wan	**Dr.Siti**	**Dr.Kamal**
No.	**Items**	**Reviewer 1**	**Reviewer 2**	**Reviewer 3**
TB1	Using mobile app improve the way I perceived information	SR	HR	HR
TB2	Using mobile app is interesting	HR	HR	HR
TB3	Using mobile app is feel good	HR	HR (Q3 Q4 COMBINE)	HR (Q3 Q4 COMBINE)
TB4	Using mobile app give me pleasure	HR	QR	QR
TB5	Using mobile app i feel relax	HR	QR	QR
TB6	Learning to operate the system difficult	HR	HR	HR

TB7	Exploring new features by trial and error difficult	HR	vague	SR
TB8	Remembering names and use of commands difficult	HR	HR	HR
TB9	I am satisfied with the services provided by the mobile Based Tourism Attraction	NR	HR	HR
TB10	Using mobile app improve the way I am perceived the ecotourism attractions	NR	HR	HR
TB11	I am satisfied when friends or family recommend the App	NR	HR	HR
TB12	Using mobile app makes a good impression on other people	SR	VAGUE	NR
TB13	Using mobile app is an enjoyment	HR	REWORD - enjoyment	Reword
TB14	Overall, I am satisfied with this visit	SR	NR	NR
TB15	I always knew my location in the app	HR	The word location is not clear	Change the word Location
TB16	I intend to use mobile app in the near time	HR	HR	HR
MAQ 1	The app is fun/entertaining to use?	QR	Informative - NR	QR
MAQ 2	The app presenting its content in an interesting way?	QR	QR	QR
MAQ 3	Mobile application fulfil my needs	QR	HR	HR
No.	**Items**	**Reviewer 1**	**Reviewer 2**	**Reviewer 3**
MAQ 4	Mobile apps have acceptable standard of quality	SR	HR	
MAQ 5	Mobile apps offers consistent quality	SR	HR	HR
MAQ 6	There is a need to have guides in order to obtain relevant explanation	Not clear	HR	HR
MAQ 7	The visual explanation of concepts – through images/videos, etc. – clear, logical, correct?	QR	Revise Q	Revise
MAQ 8	The arrangement and size of buttons/icons/menus/content on the screen appropriate?	QR	HR	QR
MAQ 10	The content of the app were important to me	QR	HR	HR
MAQ 11	It was difficult to understand the structure of the app	HR	HR	HR

MAQ 12	The appearance of the app was pleasant	HR	HR	HR
MAQ 13	The home screen of the app was easy to understand	HR	HR	HR
MAQ 14	Moving from one section in the app to another was easy	HR	HR	HR
MAQ 15	I was satisfied with the ease of use of the app	HR	HR	HR
MAQ 16	It was easy to perform the given tasks.	HR (Reword the word Task)	NR	Reword
MAQ 17	The app included terms and words that were unfamiliar to me	HR	HR	HR
MAQ 18	Using the app was frustrating	Redundant	HR	Reword
MAQ 19	Im going to use the app later	NR	HR	HR
MAQ 20	I am curious about the App	NR	HR	NR
MAQ 21	The number of users that have rated the App	Not sure	Reword	Reword
MAQ 22	I would find it easy to get the app to do what I want it to do	Not sure	NR	NR
MAQ 23	My interaction with the app is clear and understandable	QR	HR	HR
MAQ 24	I find the app to be flexible to interact with	HR	HR	HR
MAQ 25	It have to be skilful at using the app	HR	HR	HR
No.	**Items**	**Reviewer 1**	**Reviewer 2**	**Reviewer 3**
MAQ 26	I would find the app easy to use	Redundant	Q22 same meaning	Check with Q22
MAQ 27	Does the App provide better tourist support	HR	HR	HR
MAQ 28	I can easily recognize where the information I need is located	HR	HR	HR
MAQ 29	The visual are matching with the desire concept (look and feel)	HR	HR	HR
MAQ 30	The layout design is consistent throughout the application	HR	Q5 same meaning	HR
MAQ 31	The interface does influence me, to want to visit and know more about the place	HR	HR	HR
ME1	I enjoy sharing my experience of ecotourism in mobile apps with others	SR	HR	HR
ME 2	My experience sharing with other tourist is personally satisfying	SR	HR	HR

ME 3	Sharing my experience of using mobile apps with others in mobile app give me pleasure	SR	HR	HR
ME 4	Mobile app enables me to try the new technologies	QR	HR	HR
ME 5	Mobile apps for ecotourism is the new ways of doing things	QR	HR	HR
ME 6	Mobile apps arouse my curiosity	HR	HR	HR
ME 7	Willingly to revisit this app	HR	HR	HR
ME 8	I would not recommend this app to anyone	HR	HR	HR
ME 9	The information offered is sufficiently detailed to enjoy the attraction	Not sure	HR	HR
PV1	The number of users that have already downloaded the App	HR	HR	HR
PV2	The description of the App and the star rating	HR	HR	HR
PV3	The number of features the app offers	HR	HR	HR
PV4	The size of the app and the price	HR	HR	HR
PV5	Learning to operate the app is easy for me	HR	HR	HR
PV6	The size of the app is big	Q6,Q7,Q8 is bringing same meaning as Q4	HR	HR but recheck the items
PV7	The price of the app is expensive		HR	
PV8	The price of mobile app is economical		HR	
PV9	I willingly to pay for the apps developed	HR	HR	HR
PV10	I predict that I would use mobile app in the short term	HR	HR	HR
PV11	I expect my use of mobile app to continue in the future	HR	HR	HR
PV12	I would use mobile apps without hesitation to satisfy my needs	HR	HR	HR
PV13	The visit was great (money, time, effort)	HR	HR	HR
PV14	The visit offers more value than expected	HR	HR	HR
PV 15	I will pay for this app	HR	HR	HR
PV16	This app is likely to increase awareness of the importance of addressing apps	HR	HR	HR

Appendix H:
Instruction

Bee Farm Mobile Application

1. You are provided with a smartphone app, a checklist of **SMART** Heuristic and paper to document the usability issues with the smartphone apps.
2. Tap on Bee Farm application icon and click the **ENTER** button to explore the application.
3. You are allows to explore the apps as long as you requires and document any usability issues of your concern screen by screen in the checklist given and tick the severity problem that you have found from the mobile application.
4. Use the **SMART** Heuristic to map the usability issues with the relevance heuristic.

Many thanks for your help with this research on the heuristic evaluation on mobile application.

No	SMART Heuristic Evaluation	Description
1	Provide immediate notification of application status	Users are informed of the application status immediately
2	Use a theme and consistent terms, as well as conventions standards familiar to the user	Use a consistent theme look alike screen. The same concept, words, symbols, situation or actions refer to the same things. Common platform standards are followed.
3	Prevent errors where possible; assist user should an error occur	The mobile application is designed in such a way of error-proofed. When an error occurred the user will get an error message and offer advice how to fix it.
4	Display an overlay pointing out the main features when appropriate or requested	The overlay indicating the main feature and how to interact with the application allows first-time users to get up-and-running quickly, after which they can explore the mobile application at their leisure.
5	Each interface should focus on one task	Mobile interfaces are more attractive and memorable. Therefore it is used more often. The application users are also more forgiving of attractive interfaces.
6	Design a visually pleasing interface	Mobile interfaces that are attractive and memorable and therefore used more often. Users are also more forgiving of attractive interfaces.
7	Intuitive interfaces make for easier users journeys	Mobile interfaces should be easy to learn in which next steps are obvious so that it allows the users to complete their tasks easily.
8	Design a clear navigable path to task completion	Users should be able to see right away how they can interact with the application and navigate their way to

		task completion.
9	Allow configuration options and shortcuts	Depending on the target users, the mobile application might allow configuration options and shortcuts to the most important information and frequent tasks.
10	Cater for diverse mobile environments	Allow the users to change the interface brightness and sound settings
11	Facilitate easier input	Ensure users can input content easily and accurately. For instance, displaying keyboards button as possible
12	Use the camera, microphone and sensors when appropriate to lessen the user's workload	Consider the use of camera, microphone and sensors to lessen the user's workload.
13	Create aesthetic and identifiable icon	An icon for a mobile application should be aesthetic and identifiable as this is what a user sees when searching for the application.

Appendix I: ESAS AND GES PCA

Notes

Output Created		14-Jan-2020 12:22:29
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Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /STATISTICS=DESCRIPTIVE CORR.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

ESAS

Reliability Statistics

Cronbach's Alpha	N of Items
.844	24

GES

Reliability Statistics

Cronbach's Alpha	N of Items
.975	6

Factor Analysis (33/39)

Communalities

	Initial	Extraction
VAR00001	1.000	.689
VAR00002	1.000	.681
VAR00003	1.000	.715
VAR00004	1.000	.602
VAR00005	1.000	.524
VAR00006	1.000	.604
VAR00007	1.000	.747
VAR00008	1.000	.757
VAR00009	1.000	.712
VAR00010	1.000	.585
VAR00011	1.000	.680
VAR00012	1.000	.747
VAR00013	1.000	.796
VAR00014	1.000	.775
VAR00015	1.000	.786
VAR00016	1.000	.601
VAR00017	1.000	.827
VAR00018	1.000	.749
VAR00019	1.000	.604
VAR00020	1.000	.639
VAR00021	1.000	.728
VAR00022	1.000	.709
VAR00023	1.000	.735
VAR00024	1.000	.715
VAR00025	1.000	.605
VAR00026	1.000	.735
VAR00027	1.000	.737
VAR00028	1.000	.725
VAR00029	1.000	.495
VAR00030	1.000	.679
VAR00031	1.000	.804
VAR00032	1.000	.806
VAR00033	1.000	.646
VAR00034	1.000	.819
VAR00035	1.000	.434
VAR00036	1.000	.690
VAR00037	1.000	.645

VAR00038	1.000	.758
VAR00039	1.000	.664

Extraction Method: Principal Component Analysis.

ESAS Total Variance Table

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.643	37.547	42.870	14.643	37.547	42.870
2	3.623	9.290	52.795	3.623	9.290	52.795
3	2.736	7.017	57.875	2.736	7.017	57.875
4	1.999	5.124	62.342	1.999	5.124	62.342
5	1.740	4.461	65.926	1.740	4.461	65.926
6	1.221	3.130	69.056	1.221	3.130	69.056
7	.923	2.366	71.421			
8	.855	2.191	73.612			
9	.770	1.974	75.586			
10	.739	1.894	77.480			
11	.703	1.802	79.282			
12	.644	1.651	80.933			
13	.624	1.601	82.534			
14	.582	1.492	84.027			
15	.553	1.417	85.444			
16	.489	1.254	86.698			
17	.469	1.204	87.901			
18	.439	1.125	89.026			
19	.395	1.014	90.040			
20	.381	.977	91.017			
21	.329	.843	91.860			
22	.306	.785	92.645			
23	.273	.700	93.345			
24	.252	.647	93.992			
25	.250	.641	94.633			
26	.229	.588	95.221			
27	.216	.553	95.774			
28	.209	.535	96.309			

29	.201	.516	96.825			
30	.179	.458	97.283			
31	.177	.453	97.736			
32	.153	.392	98.128			
33	.136	.349	98.476			
34	.131	.335	98.812			
35	.118	.302	99.114			
36	.107	.273	99.387			
37	.093	.239	99.626			
38	.087	.222	99.848			
39	.059	.152	100.000			

Extraction Method: Principal Component Analysis.

GES TOTAL VARIANCE TABLE

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.774	42.147	48.147	6.774	42.147	48.870
2	1.616	25.098	50.795	1.616	25.098	52.795
3	1.381	5.080	52.875	1.381	7.017	57.875
4	1.242	4.467	63.342	1.242	5.124	62.342
5	1.198	3.584	65.926	1.198	4.461	65.926
6	1.021	3.130	69.056	1.021	3.130	69.056
7	.923	2.366	71.421			
8	.855	2.191	73.612			
9	.770	1.974	75.586			
10	.739	1.894	77.480			
11	.703	1.802	79.282			
12	.644	1.651	80.933			
13	.624	1.601	82.534			
14	.582	1.492	84.027			
15	.553	1.417	95.444			
16	.489	1.254	100.00			

Extraction Method: Principal Component Analysis.

ESAS ROTATED COMPONENT MATRIX

	Component					
	1	2	3	4	5	6
VAR00001	.833					
VAR00002	.827					
VAR00003	.797					
VAR00004	.773					
VAR00005	.766					
VAR00006	.715					
VAR00007	.672					
VAR00008	.649					
VAR00009	.619					
VAR00010	.600					
VAR00011						
VAR00012						
VAR00013		.771				
VAR00014		.742				
VAR00015		.715				
VAR00016		.615				
VAR00017						
VAR00018						
VAR00019						
VAR00020						
VAR00021						
VAR00022			.866			
VAR00023			.821			
VAR00024			.797			
VAR00025						
VAR00026						
VAR00027				.769		
VAR00028				.735		
VAR00029				.705		
VAR00030				.606		
VAR00031					.826	
VAR00032					.815	
VAR00033					.649	
VAR00034						.819
VAR00035						.711
VAR00036						
VAR00037						
VAR00038						
VAR00039						

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization

GES ROTATED COMPONENT MATRIX

	Component		
	1	2	3
VAR00001	.859		
VAR00002	.826		
VAR00003	.794		
VAR00004			
VAR00005			
VAR00006			
VAR00007		.757	
VAR00008		.721	
VAR00009		.705	
VAR00010			
VAR00011			
VAR00012			
VAR00013			.807
VAR00014			.750
VAR00015			
VAR00016			

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization

APP LOYALTY

Reliability Statistics

Cronbach's Alpha	N of Items
.741	3

Item Statistics

	Mean	Std. Deviation	N
ALO02	3.1833	0.757	3
ALO03	3.0333	0.911	3
ALO05	2.8333	0.875	3

APP EASE OF USE

Reliability Statistics

Cronbach's Alpha	N of Items
.947	10

Item Statistics

	Mean	Std. Deviation	N
AEOU02	2.92	0.834	10
AEOU03	2.83	0.876	10
AEOU11	2.77	0.894	10
AEOU22	2.76	0.883	10
AEOU12	2.81	0.911	10
AEOU13	2.88	0.885	10
AEOU14	2.81	0.911	10
AEOU23	2.87	0.811	10
AEOU27	2.73	0.890	10
AEOU28	2.77	0.863	10

Meaningful Experience

Reliability Statistics

Cronbach's Alpha	N of Items
.701	3

Item Statistics

	Mean	Std. Deviation	N
ME04	2.95	1.025	3
ME05	3.09	0.814	3
ME06	2.94	0.848	3

APP USABILITY

Reliability Statistics

Cronbach's Alpha	N of Items
.868	4

Item Statistics

	Mean	Std. Deviation	N
MAU02	1.713	1.380	4
MAU03	1.380	1.811	4
MAU04	2.90	1.072	4

MAU05	1.892	1.256	4

APP UTILITARIAN VALUE

Reliability Statistics

Cronbach's Alpha	N of Items
.878	3

Item Statistics

	Mean	Std. Deviation	N
AUV09	2.07	1.130	3
AUV15	2.14	1.068	3
AUV18	2.27	1.042	3

SATISFACTION

Reliability Statistics

Cronbach's Alpha	N of Items
.741	3

Item Statistics

	Mean	Std. Deviation	N
SA06	3.24	0.625	3
SA10	3.17	0.732	3
SA16	3.15	0.665	3

LEARNING

Reliability Statistics

Cronbach's Alpha	N of Items
.741	3

Item Statistics

	Mean	Std. Deviation	N
LE06	3.27	0.739	3
LE10	3.27	0.739	3

LE16	3.31	0.836	3

ESAS

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.831
Bartlett's Test of Sphericity	Approx. Chi-Square	7113.002
	Df	741
	Sig.	.000

GES

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.882
Bartlett's Test of Sphericity	Approx. Chi-Square	2455.512
	Df	120
	Sig.	.000

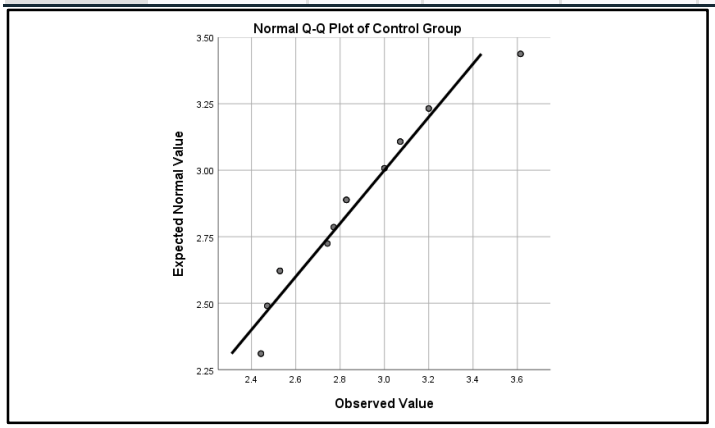
Appendix J: Analysis for the Three different Tour Guide (CG,BR,SA)

Notes

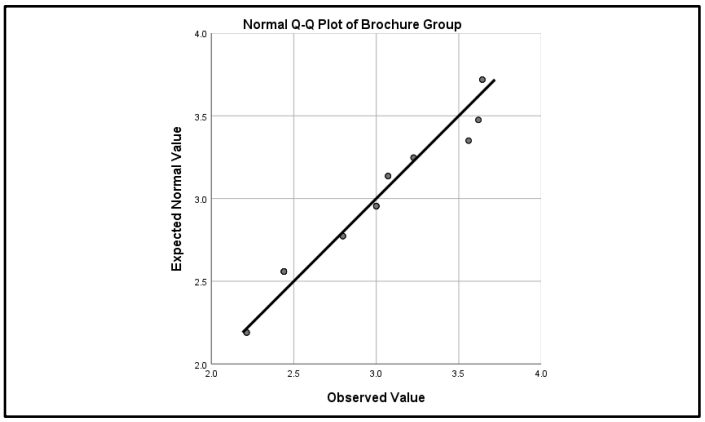
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	Cases Used	Statistics are based on cases with no missing values for the dependent variable or factor(s) being analyzed.
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Tests of Normality

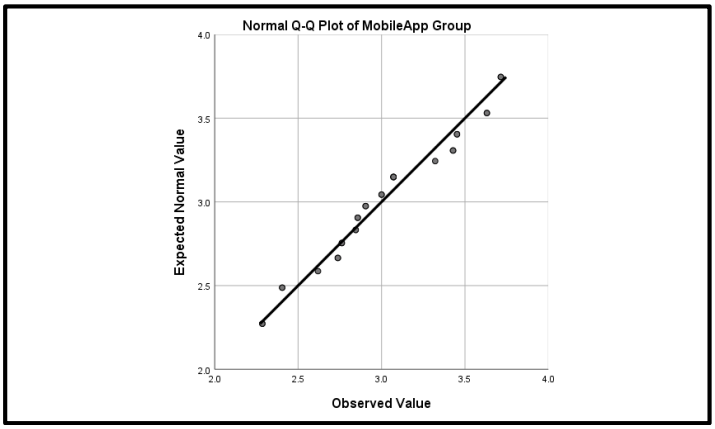
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
MEANCG	.151	30	.077	.907	30	.013
MEANBR	.160	30	.057	.910	30	.015
MEANMA	.140	30	.138	.951	30	.181



MEANBR



MEANMA



Age factor for GES

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
CG * Age 18-24	Between Groups	(Combined)	.286	3	.095	.788	.512

	Within Groups		3.149	26		.121	
	Total		3.435	29			
CG * Age 25-34	Between Groups	(Combined)	.630	3	.210	2.419	.089
	Within Groups		2.259	26		.087	
	Total		2.889	29			
CG * Age 35-44	Between Groups	(Combined)	.000	3	.000	.000	1.000
	Within Groups		1.778	26		.068	
	Total		1.778	29			
CG * Age 45-54	Between Groups	(Combined)	3.290	3	1.097	2.225	.109
	Within Groups		12.820	26		.493	
	Total		16.110	29			
CG * Age 55 above	Between Groups	(Combined)	.381	3	.127	.333	.802
	Within Groups		9.930	26		.382	
	Total		10.311	29			
PAMEAN * 2. What is your age?	Between Groups	(Combined)	4.339	3	1.446	4.032	.018
	Within Groups		9.327	26		.359	
	Total		13.667	29			

MEANCG MEANBR MEANMA * MeanAppUse_BR * MeanEcoTrip_CG

Report

MeanAppUse_BR	MeanEcoTrip_CG		MEANCG	MEANBR	MEANMA
1.00	1.00	Mean	2.9018	3.0818	2.9003
		N	8	8	8
		Std. Deviation	.37162	.51107	.25785
	Total	Mean	2.9018	3.0818	2.9003
		N	8	8	8
		Std. Deviation	.37162	.51107	.25785
2.00	1.00	Mean	2.9103	2.8565	3.0278
		N	18	18	18
		Std. Deviation	.33940	.48734	.49681
	2.00	Mean	2.6536	3.1399	3.1429
		N	4	4	4
		Std. Deviation	.36652	.27976	.19343
	Total	Mean	2.8636	2.9080	3.0487
		N	22	22	22
		Std. Deviation	.35031	.46472	.45521
Total	1.00	Mean	2.9077	2.9258	2.9886
		N	26	26	26
		Std. Deviation	.34208	.49587	.43595
	2.00	Mean	2.6536	3.1399	3.1429
		N	4	4	4
		Std. Deviation	.36652	.27976	.19343
	Total	Mean	2.8738	2.9544	3.0091
		N	30	30	30
		Std. Deviation	.34999	.47492	.41298

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Learning_CG	Between Groups	5.720	28	.204	.409	.871
	Within Groups	.500	2	.500		
	Total	6.220	30			
Learning_BR	Between Groups	12.538	28	.448	.568	.645
	Within Groups	.000	2	.000		
	Total	12.538	30			
Learning_MA	Between Groups	9.060	28	.324	.647	.776
	Within Groups	.500	2	.500		
	Total	9.560	30			
Satisfaction_CG	Between Groups	3.997	28	.143	.874	.706
	Within Groups	.163	2	.163		
	Total	4.161	30			
Satisfaction_BR	Between Groups	3.652	28	.130	.733	.623
	Within Groups	.000	2	.000		
	Total	3.652	30			
Satisfaction_MA	Between Groups	3.712	28	.133	.812	.723
	Within Groups	.163	2	.163		
	Total	3.875	30			

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SatisfactionMA
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GES CG Gender

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Learning_CG	Female	14	2.9714	.55943	.14952	2.6484	3.2944	2.20	3.80
	Male	16	2.8375	.36674	.09169	2.6421	3.0329	2.20	3.40
	Total	30	2.9000	.46312	.08455	2.7271	3.0729	2.20	3.80
Satisfaction_CG	Female	14	2.8673	.47036	.12571	2.5958	3.1389	2.14	3.43
	Male	16	2.8304	.29146	.07287	2.6750	2.9857	2.29	3.14
	Total	30	2.8476	.37877	.06915	2.7062	2.9891	2.14	3.43

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Learning_CG	Based on Mean	2.367	1	28	.135
	Based on Median	2.357	1	28	.136
	Based on Median and with adjusted df	2.357	1	25.607	.137
	Based on trimmed mean	2.365	1	28	.135
Satisfaction_CG	Based on Mean	4.109	1	28	.052
	Based on Median	2.921	1	28	.099
	Based on Median and with adjusted df	2.921	1	24.625	.100
	Based on trimmed mean	4.244	1	28	.049

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
LearningCG	Between Groups	.134		.134	.616	.439
	Within Groups	6.086	28	.217		
	Total	6.220				
SatisfactionCG	Between Groups	.010		.010	.069	.795
	Within Groups	4.150	28	.148		
	Total	4.161				.439

```
ONEWAY LearningBR SatisfactionBR BY Gender_Brochure
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /MISSING ANALYSIS
  /POSTHOC=TUKEY ALPHA(0.05).
```

GES BR Gender

		N	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
Learning_BR	male	11	.21609	2.1700	3.1330	2.00	3.83
	Female	19	.12952	2.8682	3.4125	2.17	4.00
	Total	30	.12005	2.7156	3.2066	2.00	4.00
Satisfaction_BR	male	11	.09649	2.6032	3.0332	2.43	3.29
	Female	19	.08267	2.8489	3.1962	2.43	3.57
	Total	30	.06479	2.8151	3.0801	2.43	3.57

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
LearningBR	Based on Mean	2.663	1	28	.114
	Based on Median	.931	1	28	.343
	Based on Median and with adjusted df	.931	1	22.514	.345
	Based on trimmed mean	2.571	1	28	.120
SatisfactionBR	Based on Mean	.108	1	28	.745
	Based on Median	.090	1	28	.766
	Based on Median and with adjusted df	.090	1	27.184	.766
	Based on trimmed mean	.110	1	28	.743

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
LearningBR	Between Groups	1.665	1	1.665	4.287	.048
	Within Groups	10.873	28	.388		
	Total	12.538	29			
SatisfactionBR	Between Groups	.291	1	.291	2.424	.131
	Within Groups	3.361	28	.120		
	Total	3.652	29			.048

```
ONEWAY LearningMA SatisfactionMA BY Gender_MA
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /MISSING ANALYSIS
  /POSTHOC=TUKEY ALPHA(0.05).
```

GES MA Gender

		N	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
Learning_MA	Male	15	.18146	2.5664	3.3447	2.00	4.00
	Female	15	.10887	2.8665	3.3335	2.67	4.00
	Total	30	.10483	2.8134	3.2422	2.00	4.00
Satisfaction_MA	Male	15	.06686	2.8566	3.1434	2.57	3.43
	Female	15	.11819	2.7275	3.2344	2.14	3.57
	Total	30	.06674	2.8540	3.1270	2.14	3.57

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
LearningMA	Based on Mean	3.198	1	28	.085
	Based on Median	3.152	1	28	.087
	Based on Median and with adjusted df	3.152	1	24.904	.088
	Based on trimmed mean	3.338	1	28	.078
SatisfactionMA	Based on Mean	4.243	1	28	.049
	Based on Median	2.457	1	28	.128
	Based on Median and with adjusted df	2.457	1	19.171	.133
	Based on trimmed mean	3.986	1	28	.056

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
LearningMA	Between Groups	.156	1	.156	.466	.500
	Within Groups	9.404	29	.336		
	Total	9.560	30			
SatisfactionMA	Between Groups	.003	1	.003	.020	.889
	Within Groups	3.872	29	.138		
	Total	3.875	30			

```
ONEWAY LearningMA SatisfactionMA BY Gender_MA
```

```
/STATISTICS DESCRIPTIVES HOMOGENEITY
/MISSING ANALYSIS
/POSTHOC=LSD ALPHA(0.05).
```

Descriptive Statistics

	N	Sum	Mean	Std. Deviation
MAQMEAN	30	85.25	2.8417	.34418
TBMEAN	30	90.00	3.0000	.31562
MEMEAN	30	90.00	3.0000	.24759
MIMEAN	30	55.17	1.8389	.74533
PVMEAN	30	88.00	2.9333	.59628
PAMEAN	30	50.00	1.6667	.68649
Valid N (listwise)	30			

Report

1. What is your gender?		MAQMEAN	TBMEAN	MEMEAN	MIMEAN	PVMEAN	PAMEAN
Male	N	15	15	15	15	15	15
	Mean	2.8333	3.0889	3.0222	1.7500	2.9778	1.4333
	Std. Deviation	.42022	.38764	.32038	.63387	.67220	.45774
Female	N	15	15	15	15	15	15
	Mean	2.8500	2.9111	2.9778	1.9278	2.8889	1.9000
	Std. Deviation	.26201	.19787	.15258	.85558	.52955	.80623
Total	N	30	30	30	30	30	30
	Mean	2.8417	3.0000	3.0000	1.8389	2.9333	1.6667
	Std. Deviation	.34418	.31562	.24759	.74533	.59628	.68649

ESAS Constructs Gender

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
MAQ * 1. What is your gender?	Between Groups	(Combined)	.002	1	.002	.017	.897
	Within Groups		3.433	28		.123	
	Total		3.435	29			
TB * 1. What is your gender?	Between Groups	(Combined)	.237	1	.237	2.503	.125
	Within Groups		2.652	28		.095	
	Total		2.889	29			
ME * 1. What is your gender?	Between Groups	(Combined)	.015	1	.015	.235	.631
	Within Groups		1.763	28		.063	
	Total		1.778	29			
MI * 1. What is your gender?	Between Groups	(Combined)	.237	1	.237	.418	.523
	Within Groups		15.873	28		.567	
	Total		16.110	29			
PV * 1. What is your gender?	Between Groups	(Combined)	.059	1	.059	.162	.691
	Within Groups		10.252	28		.366	
	Total		10.311	29			

PA * 1. What is your gender?	Between Groups	(Combined)	1.633	1	1.633	3.801	.061
	Within Groups		12.033	28		.430	
	Total		13.667	29			

Age_Group

Report

2. What is your age?		MAQMEAN	TBMEAN	MEMEAN	MIMEAN	PVMEAN	PAMEAN
18-24	N	2	2	2	2	2	2
	Mean	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000
	Std. Deviation	.00000	.00000	.00000	.00000	.00000	.00000
25-34	N	11	11	11	11	11	11
	Mean	2.7197	2.8182	3.0000	1.8182	3.0606	1.4545
	Std. Deviation	.32760	.22918	.21082	.79129	.13484	.47194
35-44	N	15	15	15	15	15	15
	Mean	2.9111	3.1333	3.0000	1.7667	2.8222	1.6000
	Std. Deviation	.38507	.35187	.30861	.68444	.83444	.71214
45-54	N	2	2	2	2	2	2
	Mean	2.8333	3.0000	3.0000	1.3333	3.0000	2.0000
	Std. Deviation	.00000	.00000	.00000	.00000	.00000	.00000
Total	N	30	30	30	30	30	30
	Mean	2.8417	3.0000	3.0000	1.8389	2.9333	1.6667
	Std. Deviation	.34418	.31562	.24759	.74533	.59628	.68649

ESas with Age group

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
MAQMEAN * 2. What is your age?	Between Groups	(Combined)	.286	3	.095	.788	.512
	Within Groups		3.149	26		.121	
	Total		3.435	29			
TBMEAN * 2. What is your age?	Between Groups	(Combined)	.630	3	.210	2.419	.089
	Within Groups		2.259	26		.087	
	Total		2.889	29			
MEMEAN * 2. What is your age?	Between Groups	(Combined)	.000	3	.000	.000	1.000
	Within Groups		1.778	26		.068	
	Total		1.778	29			
MIMEAN * 2. What is your age?	Between Groups	(Combined)	3.290	3	1.097	2.225	.109
	Within Groups		12.820	26		.493	
	Total		16.110	29			
PVMEAN * 2. What is your age?	Between Groups	(Combined)	.381	3	.127	.333	.802
	Within Groups		9.930	26		.382	
	Total		10.311	29			
PAMEAN * 2. What is your age?	Between Groups	(Combined)	4.339	3	1.446	4.032	.018
	Within Groups		9.327	26		.359	
	Total		13.667	29			

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
MEANCG * MeanAppUse_BR	Between Groups	(Combined)	.009	.009	.009	.067	.797
	Within Groups		3.544	28	.127		
	Total		3.552	29			
MEANBR * MeanAppUse_BR	Between Groups	(Combined)	.177	.177	.177	.780	.385
	Within Groups		6.364	28	.227		
	Total		6.541	29			
MEANMA * MeanAppUse_BR	Between Groups	(Combined)	.129	.129	.129	.751	.394
	Within Groups		4.817	28	.172		
	Total		4.946	29			

Duration and six constructs of EMAS

Correlations

		Duration	EMAS-MAQ	EMAS-TB	EMAS-ME	EMAS-MI	EMAS-PV	EMAS-PA
Duration	Pearson Correlation	1	.359	.229	-.097	.055	-.117	.580**
	Sig. (2-tailed)		.052	.223	.608	.773	.537	.001
	N	30	30	30	30	30	30	30
EMAS-MAQ	Pearson Correlation	.359	1	.291	.405*	-.182	.161	-.182
	Sig. (2-tailed)	.052		.119	.027	.335	.394	.335
	N	30	30	30	30	30	30	30
EMAS-TB	Pearson Correlation	.229	.291	1	.490**	.000	.366*	-.053
	Sig. (2-tailed)	.223	.119		.006	1.000	.046	.781
	N	30	30	30	30	30	30	30
EMAS-ME	Pearson Correlation	-.097	.405*	.490**	1	.156	.623**	-.271
	Sig. (2-tailed)	.608	.027	.006		.411	.000	.148
	N	30	30	30	30	30	30	30
EMAS-MI	Pearson Correlation	.055	-.182	.000	.156	1	.259	.481**
	Sig. (2-tailed)	.773	.335	1.000	.411		.166	.007
	N	30	30	30	30	30	30	30
EMAS-PV	Pearson Correlation	-.117	.161	.366*	.623**	.259	1	-.197
	Sig. (2-tailed)	.537	.394	.046	.000	.166		.298
	N	30	30	30	30	30	30	30
EMAS-PA	Pearson Correlation	.580**	-.182	-.053	-.271	.481**	-.197	1
	Sig. (2-tailed)	.001	.335	.781	.148	.007	.298	
	N	30	30	30	30	30	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix K:
Interview Question: Niranur Agro Farm at Lundu Sematan Area.

Section A:

1. What are the information that tourist frequently ask?
2. What are the services that tourist frequently ask?
3. Where do the tourist search for information? (website, information centre, tour guide)
4. Do the tourist get anything from here? (honey, product etc)
5. How you update the new information about this tourist spot?
6. What are the obstacle faced by tourist when they visit this tourist spot?
7. Is there any tourist come for the research purpose to this place? If yes where are they from? (university, any research organisation)
8. What is the interesting thing about your tourist spot?
9. What do you think about implementation of a smartphone apps for your farm?
10. What you think about the usability of the app?
11. Is there anything else that you would like to add or think is important and relevant or even a suggestions for improving the tourist need?

Section B:

12. Your Age: _____
13. Your gender: _____
14. Occupation: _____