Reconceptualisation of Tourism Destination Image in an Astronomical Tourism Context

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Declaration

This thesis presents work carried out by myself and does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; to the best of my knowledge it does not contain any materials previously published or written by another person except where due reference is made in the text; and all substantive contributions by others to the work presented, including jointly authored publications, are clearly acknowledged.

Samaneh Soleimani …….. 13 February 2017

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Abstract

In recent years, astronomical tourism has emerged as a distinctive form of niche tourism with an emphasis on the importance of astronomy-related activities. Because astronomical tourism is still in its early stages of development, there is little understanding of the functional and psychological attributes that astronomical tourists would consider when choosing a destination. In particular, there is a dearth of research regarding astronomical tourists' feelings and behaviours towards an astronomical tourism destination (dark-sky site).

Moreover, a review of the tourism literature demonstrated a deficiency of research exploring the relationship between astronomical tourists' recreation specialisation and their destination image formation process and the moderating role of motivational levels. Accordingly, the current research investigates the relationship between astronomical tourists' recreation specialisation, dark-sky site image components, future behavioural intentions and motivation. Understanding these relationships can improve identification and segmentation of this new concept.

As the research site, Australia is blessed to have many dark-sky sites close to the main cities compared with other continents. This underlines the utility of conducting the current research in Australia as an ideal destination for astronomical tourism as well as the future potential for the marketing of astronomical tourism in the country.

A mixed-methodology approach consisting of two research phases was adopted to achieve the answers to the research questions of the current research. The first phase was exploratory and involved 24 interviews with current presidents and vice-presidents of astronomical societies, astrophotographers, astrotour guides and astronomical tourists. This phase focused on identifying items to measure astronomical tourists' recreation specialisation, motivational patterns and dark-sky site image components. Content analysis was used to analyse the interview questions and determine appropriate items to develop a questionnaire. These findings informed the survey instrument design with 694 usable questionnaires nationwide.

Exploratory and confirmatory factor analysis, as well as structural equation modelling, have been utilised to validate the theoretical model. The exploratory phase identified notable differences in the perception of astronomical tourists towards the functional and psychological features of a dark-sky site. Moreover, astronomical tourists' motivations to participate in a specific tour had significant differences from other niche tourists. After measuring the

identified items through the questionnaire and testing the hypothesised relationships, the results indicate that there is a significant relationship between astrotourists' recreation specialisation, cognitive, affective, conative and overall dark-sky site image as well as their future behavioural intentions. In addition, the relationships among all four components of the dark-sky site image (cognitive, affective, overall and conative) are explored. The results reveal that there is a significant relationship among all components although cognitive dark-sky site image does not have a direct influence on overall dark-sky site image. Moreover, the influence of three astronomical tourist segments (novice, intermediate, advanced) and the influence of their demographic profiles on other constructs are explored. The results indicate significant differences among all segments of astrotourists based on their specialisation level. In addition, the findings reveal the partial influence of astronomical tourists' gender and age on their recreation specialisation, cognitive, affective, overall and conative dark-sky site image. Finally, astrotourists' motivational levels play a significant moderating role among the mentioned relationships. Examining these relationships provides important insights for destination marketers and managers who are offered suggestions to develop this niche market. These implications are discussed and theoretical contributions are highlighted.

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1 INTRODUCTION

1.1. Introduction

The purpose of the current research is to understand the astronomical tourism market by providing necessary definitions to establish the theoretical roots of this concept; and to conceptualise tourism destination image in the context of astronomical tourism. Moreover, the current research sets out to enrich the current knowledge of the relationship between recreation specialisation, destination image components and future behavioural intentions in light of the moderating effect of astrotourists' motivational levels. With this view, the current research examines the differences in destination image formation process by recreation specialisation, motivational levels and demographic characteristics of astronomical tourists. In the context of the current research, the destination is named 'dark-sky site'; and astronomical tourism is referred to a sub-segment of a special interest tourism, in which travellers are interested in astronomical related activities such as stargazing. Therefore, the relationship between dark-sky site components and other constructs such as recreation specialisation, motivation, future behavioural intentions and demographic characteristics is explored in astronomical tourism. This first chapter discusses the background of the research, the problem setting, the significance of the current research along with the research questions. Following this, an outline of the forthcoming chapters is discussed.

1.2. Background of the research

Understanding tourist expectations and their evaluation towards a destination are crucial aspects in tourism studies (Biran, Poria & Oren 2011). In recent years, the tourism industry has paid great attention to offering niche products featuring special interests in the tourism industry that cater to the needs of specific markets by focusing on more diverse tourism experiences and activities. Distinguishing niche products that are offered by specific destinations can help tourism destinations compete successfully.

To achieve the goal of having a competitive and alternative marketing, studying a different set of variables would make a contribution because the special-interest tourism markets such as astronomical tourism attract various kinds of tourists who have different sets of motivations, skills, involvement, specialisations and destination image perceptions. The evaluation of new experience and product has a great impact on tourists, leading them to be highly concerned and

knowledgeable about their decision-making in their travel choices (Damijanić & Sergo 2013; Novelli 2005). Thus, to achieve the most beneficial results, destination marketing organisations (DMOs) need to focus on understanding tourist attitudes, with a view towards making an effect on these attitudes and achieving a correct model for their product planning (Tung & Ritchie 2011).

Pearce's (2005) tourist behaviour concept map analyses various factors influencing tourist behaviour on the process of travel experience: before, during and after the trip (see Figure 1.2.1). At the first level, it identifies the importance of understanding the characteristics of the tourists in terms of their demographics, experiences, motivations and destination image before the trip. At the next level, it is noted that tourists' on-site experiences need to be managed. Finally, the outcomes can be considered in different perspectives, namely tourists, hosts and setting. Because astronomical tourism relies on specific destination attributes, understanding these features in terms of the cognitive, affective, conative and overall destination image help in understanding astronomical tourists' evaluation and feeling about a destination and their future behavioural intentions.

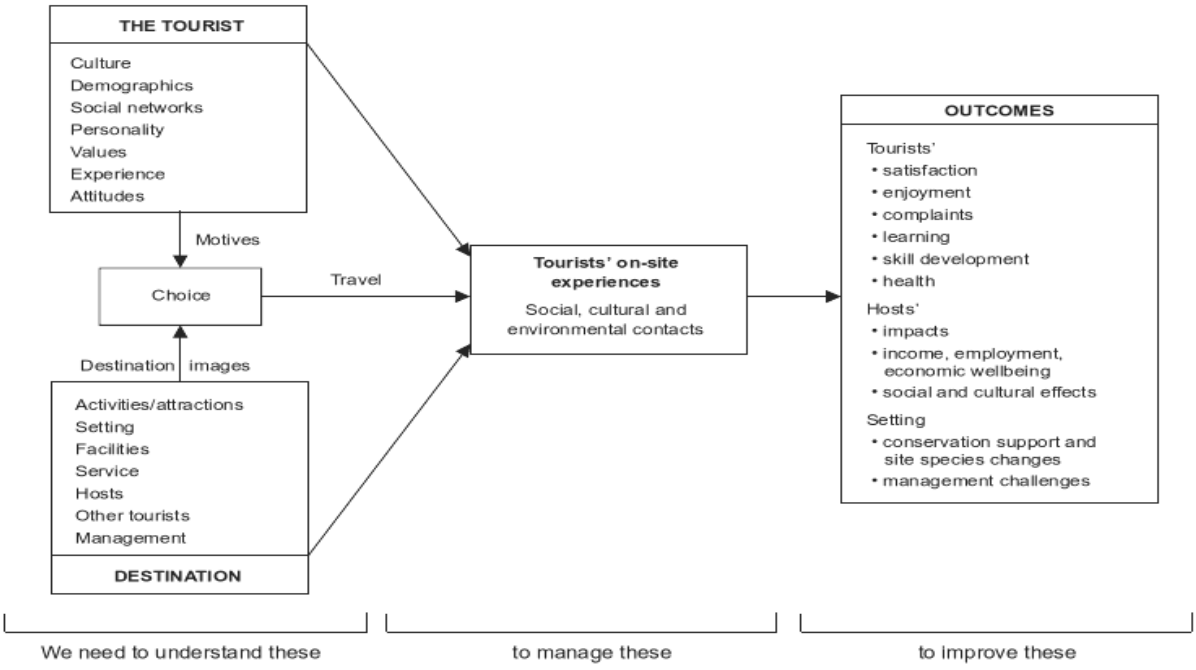


Figure 1.2.1. Concept map for understanding tourist behaviour, Pearce (2005)

Moreover, understanding the connection between these various elements provides important benefits for destination marketers to create niche markets and attract repeat visitors (Pearce

2005). In the astronomical tourism context, understanding these specific attributes of the market are beneficial for destination marketers to understand the astrotourism market and travel behaviour to manage and improve the astrotourists' destination image. For example, in the early stage of astrotourism product development in many nature-based destinations, investigating astrotourists' motivations and their destination image formation process are the primary developmental stages. This investigation leads to identifying how tourists' evaluation and image of the physical attributes of the destination can be differently influenced by the distinct characteristics of astrotourist markets.

In the other words, astronomical tourism as a subset of nature-based tourism offers a distinct product that needs more research to reveal its different aspects. For example, natural phenomena such as solar eclipses attract millions of nature-based tourists in destinations that are appropriate for observation (Collison & Poe 2013). This example reveals the importance of physical attributes of a chosen destination for astronomical tourism purposes. Identifying these attributes helps astronomical tour leaders improve their services.

However, the existing literature on astronomical tourism has been carried out in a small number of areas of focus such as astrotourists' motivations or general profiles of the astrotourists on the supply side without considering physical characteristics of a destination and how image formation proceeds in the various dimensions of image (Cater 2010; Collison & Poe 2013). For example, Cater (2010) asserts that astronomy and space have a long-standing association with the field of science, and the intellectual stimulation that results in creating unique experiences, as well as engaging in mental stimuli such as 'learning, exploring, discovering, creating or imagining' (Beard & Ragheb 1983). Much of special interest tourists' motivations for astrotourism are associated with learning, imagining and discovering while observing the deep sky that arouses intellectual and competence-mastery motivations.

In addition, there are other limited aspects of astrotourism research in the literature. For example, previous research reveals that the astrotourism market attracts different types of tourists who have different levels of expertise or intellectual motivations to participate in astrotourism tours (Eagle 2014a); and, in niche and special-interest tourism studies, market segmentation plays an important role in understanding the characteristics of different segments (Hu & Yu 2007; Park et al. 2002). However, there is no empirical research to confirm astrotourism specialisation level and market segmentation. Therefore, developing marketing strategies and product positioning based on the achieved empirical results can be enhanced

more effectively, which leads to meeting the certain needs of the specialised markets (Kim et al. 2010; Zografos & Allcroft 2007). Following this line of reasoning, the segmentation of the current research is based on astrotourists' specialisation, because astrotourists require a variety of skills, special knowledge and past experience that are reflected in this kind of segmentation (Scott & Thigpen 2003).

1.3. Problem setting

The tourism industry is playing a significant role in the economic growth of countries and cities around the world (Leiper 1990, 2003). In the tourism market, tourist destinations can be easily substituted if they offer similar attributes (Pike 2002). In this sense, it is important for destination marketers to identify and propose unique destination features that are sustainable and attractive to differentiate their destinations and to provide quality travel experiences (Damijanić & Sergo 2013; Essam & Gill 2005). Therefore, it is important to provide a suitable marketing strategy formulation based on effective positioning approaches, which focuses on the competitive advantages of each destination (Damijanić & Sergo 2013). To reach this goal, destination marketers need to identify destination attributes that attract tourists to create quality experiences and destination differentiation (Farnum, Hall & Kruger 2005).

Astronomical tourism is a form of tourism based on the special interest of tourists in sky-related activities such as sky observation and astrophotography. Astronomical tourism is also classified as a subcategory of nature-based tourism (Cater 2010; Weaver 2011). Recent studies have indicated that nature-based tourism is widely becoming specialised and diversified to meet the various expectations of special interest tourists (Fredman & Tyrväinen 2010). One of the reasons for this diversification is based on the physical characteristics of the tourism destinations like geo-tourism (Fredman & Tyrväinen 2010; Kim & Brown 2011). Therefore, astronomical tourism as one of the specialised segments of nature-based tourism is pursued by nature-based tourists with specialised knowledge and skills interested in the celestial part of nature as well as unique features of the destination (Eagle 2014a). Because this new form of tourism is highly reliant on physical attributes of the place—combining earth features as well as universally shared sky—(Collison & Poe 2013; Keller 2010), it can provide medium context suggesting the need to adjust conceptualisations of destination image or their ability to describe destination image in a special-interest tourism context like astrotourism. This research problem corresponds with Research Question 1 in Section 1.4.

Previous research has also considered the important role of tourist attitude and place attributes for the economic aspects of the decision-making process in terms of the number of visitors and their reason to choose a destination (Deutsch, Yoon & Goulias 2013). However, they have tended to focus more on attracting repeat visitors through the examination of their overall satisfaction without reflecting how these visitors evaluate particular attributes of a destination (Devesa, Laguna & Palacios 2010; Lee 2009). Thus, it is important to investigate how tourists evaluate the special characteristics of a destination rather than the overall impression of their experience because both tourist emotional interaction and experience of a place as well as place characteristics significantly influence the tourist decision-making process. Moreover, it is important to consider places from the users' point of view because each tourist conceptualises places differently (Gustafson 2001). This research problem corresponds with Research Question 2 in Section 1.4.

Destination image formation process in a special interest tourism sector such as astronomical tourism need to be investigated thoroughly as image formation towards a tourism destination is becoming an increasingly important research topic in the field of tourist behaviour. Besides, evaluating tourist experiences of a place is an important starting point for establishing and meeting tourist expectations, long-term destination competitiveness and differentiation (Farnum, Hall & Kruger 2005). Research on image formation is also beneficial for special-interest tourism market because special-interest tourism is a tourism sub-segment involving tourists attracted to a destination based on their specific tourism attractions and activities (Novelli 2005).

According to Kock, Josiassen and Assaf (2016), different scholars treated destination image from two perspectives; some treat destination image as an evaluative construct (e.g. Assaf & Josiassen, 2011; Assaker, Vinzi, & O'Connor, 2011); while, others consider it as a multi-faceted construct containing qualitative approaches to describe destination adjectives (e.g. Prayag & Ryan, 2012). Although Kock, Josiassen and Assaf (2016) confirmed previous arguments that destination image frameworks need to be developed in a more consistent way (Baloglu & McCleary, 1999; Gallarza, Saura, & Garcia, 2002; Josiassen, Assaf, Woo, & Kock, 2015); they recognised two main gaps in destination image studies: first, there is a lack of a comprehensive destination image model based on attitude research. Second, using the label of 'destination image' for several distinct concepts cause an impotent limitation in operationalizing the suggested models. To overcome these gaps, Kock, Josiassen and Assaf (2016) proposed a framework consisting of a multi-dimensional cognitive component, an

affective and an overall evaluative component; and a distinct plan to measure each component. Following this approach, in the current research, a destination image framework is proposed in which various components of cognitive, affective, overall and conative images are investigated with highly relevant measurement tools based on qualitative findings. Confirming the suggestions in previous research, applying these approaches help to overcome the limitation in operationalizing the theoretical models in practice. This research problem corresponds with Research Question 2 and 5 in Section 1.4.

In addition, previous literature argues that various market segments display different behaviours, and market heterogeneity has a significant role in the relationships among other variables like image and satisfaction (Castro, Martín & Martín 2007). Therefore, it is important to investigate the heterogeneous astronomical tourist market and conceptualise their level of specialisation as well as their interaction with the physical destination. To gain this segmentation in the current research, recreation specialisation theory has been adopted.

Recreation specialisation has been numerously investigated to understand different levels of tourists' specialisation in terms of their various aspects of behaviour and attitudes like motivations and destination choice (Kuentzel & McDonald 1992; McIntyre & Pigram 1992). Moreover, recreation specialisation has been widely used as a predictor in recreationist involvement models (Scott & Shafer 2001). Moreover, to provide sustainable tourism products and services, it is necessary to understand the heterogeneity of tour participants' preferences to customise tourism products (Chen & Cheng 2016). Previous research adopted recreation specialisation as a segmentation approach to uncover different preferences among various segments. For example, Chen & Cheng (2016) applied recreation specialisation as an appropriate measure to cluster cycle tourists into various specialisation groups in order to identify their preferences according to bike-rail transport services (e.g. price. bike storage type, bike storage location and service frequency). The results of their study indicated that different segments of cycle tourists have heterogeneous preferences. However, there has been a lack of studies to explore tourist psychological elements and destination image formation when they become specialised in engaging in a particular activity or choosing a specific destination (Bricker & Kerstetter 2000). In addition, no previous study has examined how differently specialised group segments with different perceptions interact with place. Because destination image is a complex multidimensional concept, which is perceived differently by people, it is important to understand how different types of tourist experience, how they perceive and what the outcomes are. This understanding is helpful to conceptualise multidimensions of

destination image based on the recreation specialisation segmentation. This research problem corresponds with Research Question 3 and 6 in Section 1.4.

To expand more theoretical knowledge on the destination image formation, it is necessary to understand how varying types of psychological factors, such as motivations and attitudes among heterogeneous market segments form destination image. Motivation, as a fundamental factor in tourist behaviour, explains the reasons behind tourists travel, their preferred type of experience, destination and their activity choice (Caber and Albayrak 2016; Kim, Lee, and Klenosky 2003). In recent years, scholars focused on identification of motivations in tourists with special interest (Caber and Albayrak 2016). For example, tourists motivation in visiting national parks (Kim et al. 2003), tourists motivation in participating in white-water rafting (Fluker and Turner 2000), and tourists motivations in participating in festivals (Schofield and Thompson 2007). Moreover, in previous research, the moderating effect of motivation has been investigated and proved (Xu and Chan 2016). For example, the motivation has been recognised as a moderator for the relationship between tourist expectation and attitude (Hsu, Cai, & Li, 2010), between experiences and brand image formation (Jin, Lee, and Huffman 2012), and between price and distance, and destination choice (Nicolau and Mas 2006). This research problem corresponds with Research Question 4 in Section 1.4.

Beside recreation specialisation and destination image theory, the other underpinning theory of the current research is Lazarus (1991) model of Cognitive-Motivational-Relational Theory. This theory has roots in psychological domain and discusses the relationships among emotions about person-environment relationships, the motivations as a person characteristic which determine the goal; and cognitive which means how things work. The goal of an individual is interrelated with his/her response to the environment (Lazarus 1991). In the tourism context, a goal-seeking behaviour of a tourist can be considered as a need to search an environment in line with his/her motivation; or an attempt to escape from a harmful environment (Li et al. 2010). Environmental psychologists support that indiviual's responces to an environment is out of their affective appraisal (affective image) and physical features (cognitive image) (Lazarus 1991; Li et al. 2010). Therefore, based on this theory, as image is a function of motivation, there is a correlation between tourists' cognitive and affective image as well as their motivation (Li et al. 2010).

On the whole, in the current research, the relationships between recreation specialisation and destination image components, including affective, cognitive, conative and overall destination

image; as well as future behavioural intentions have been explored. Besides, the role of motivation as a moderator for the relationships between recreation specialisation and destination image dimensions, has been examined to develop a more theoretical contribution in destination image studies.

These variables should be studied holistically because tourists with different levels of specialisation may choose their destinations differently based on different attitudes towards the destinations. Additionally, it is important to examine how these differences influence astronomical tourists' future behaviour. For example, novice astronomical tourists may expect to experience different physical and psychological aspects of a destination compared with advanced ones. Following that, the level of motivation may also moderate the relationship between recreation specialisation and destination image components. Therefore, there is a need to explore multiple dimensions of destination image when targeting special tourist markets with various specialisation levels and their preferred diversified physical and psychological attributes. This understanding helps destination marketers offer a quality experience to the growing segments of special-interest tourism to differentiate and sustain their destinations.

1.4. Research questions

Following the discussion above, the research questions of the current research are:

1. **What are appropriate names and definitions for:**

    1.1.Tourists with a special interest in astronomical activities?

    1.2.Appropriate destinations for astronomical tours?

2. **What are astronomical tourists' characteristics in terms of their:**

    2.1.Demographic characteristics

    2.2.Motivations

    2.3.Specialisation

    2.4.Cognitive destination image

    2.5.Affective destination image

    2.6.Conative destination image

3. **What is the relationship among astronomical tourists' recreation specialisation, dark-sky site image components and future behavioural intentions?** *This research question is discussed in terms of research hypotheses in Chapter 5.*

4. **How are the previously mentioned constructs moderated by motivational levels of astronomical tourists?** *This research question is discussed in terms of research hypotheses in Chapter 5.*

5. **Are there significant differences among mentioned constructs based on the astronomical tourists' demographic profiles?**

6. **Are there significant differences among mentioned constructs based on the astronomical tourists' specialisation segments?**

To answer these research questions, a mixed-methodology approach has been adopted. As discussed in Chapter Three, a qualitative phase is undertaken to identify the items measuring each construct in the current research. In this preliminary phase, the researcher tried to understand astrotourists' views regarding the physical and psychological features of a dark-sky site, how they become motivated and how they behave towards the appropriate destinations. The findings of the qualitative phase inform the questionnaire design leading to the quantitative phase of the current research. In the next section, the theoretical and practical contributions of the current research are discussed.

1.5. Significance of the research

As mentioned in research questions section, the research problem is presented in terms of identifying what astrotourism is, who astrotourists are and what the relationship among the constructs under study are (see Section 1.4). These constructs are recreation specialisation, motivation, destination image components, demographic profiles and future behavioural intentions. Therefore, the contribution of the current research is related to both theoretical and practical domains.

1.5.1. Theoretical significance

The theoretical contributions of the current research include the followings:

(a) Providing the definition of astronomical tourists and dark-sky site to focus the need on contextualising the destination image definitions;

The key characteristics of a tourism destination need to be identified to understand how tourists observe, perceive and evaluate the image towards the astronomical site. This understanding leads to more powerful destination branding, different destination positioning and a more competitive edge for a destination (Lin 2012). Thus, the current research makes a major contribution to conceptualise dark-sky site image as a new concept in tourism destination studies.

(b) Conceptualising multiple dimensions of dark-sky site image in the context of astronomical tourism by integrating previous models of destination image into a new theoretical model;

Several attempts have been made to study the effects of demographic characteristics and past experiences as determinants of tourist behaviour (Barros, Butler & Correia 2010; Deutsch, Yoon & Goulias 2013; Kozak & Metin 2001). However, recently, the role of psychological determinants has become an increasingly important topic of analysis in the field of tourist behaviour studies, which requires further research (Sirakaya & Woodside 2005). Therefore, first, the current research explores the complex relationships among recreation specialisation, motivation, cognitive, affective, conative and overall dark-sky site image as well as future behavioural intention to answer the physical and psychological determinants in the destination selection process.

(c) Examining the relationship among recreation specialisation, cognitive, affective, conative and overall destination image as well as future behavioural intentions;

Tourist behaviour research to date has tended to focus on motivation (Damijanić & Sergo 2013; Paris & Teye 2010), destination image (Beerli & Martín 2004a) and tourist experiences (Andereck et al. 2006; Biran, Poria & Oren 2011) separately or as determinants of tourists' satisfaction (Devesa, Laguna & Palacios 2010; Dunn & Iso-Aloha 1991; Meng, Tepanon & Uysal 2008) and repeated visitation behaviour (Fakeye & Crompton 1991; Huang & Hsu 2009; Lee 2009). However, little attention has been paid to how recreation specialisation plays a role in the destination image formation process. In recent years, there has been an increasing focus on the importance of overall image as an outcome of the tourist experience reflecting multiple dimensions such as affective, cognitive and conative factors (Deutsch, Yoon & Goulias 2013; Farnum, Hall & Kruger 2005). This is in contrast to studies in which their ultimate tourists' evaluation outcome is satisfaction and repeat visitation. Satisfaction and repeat visitation studies fail to reflect an in-depth understanding of tourist evaluation towards a place. For

example, an individual may be satisfied with a destination, but without forming any real feeling towards the place (Stedman 2003). Therefore, one of the contributions of the current research is to investigate how to improve the tourists' experiences of place by identifying the physical, psychological and behavioural images associated with dark-sky sites as a tourism destination. Another contribution is to differentiate between the evaluating constructs by separating the overall image, conative image and future behavioural intentions towards the dark-sky site.

Furthermore, a considerable amount of literature has been published on tourist segmentation studies with different kinds of approaches, such as international students versus domestic students (Field 1999; Kim & Jogaratnam 2003a, b), motivation (Andreu et al. 2000; Bieger & Laesser 2002; Park & Yoon 2009), attitude and age (Holbrook & Schindler 1996; Thyne & Lawson 2001); however, few studies have applied a specialisation segmentation approach. In applying specialisation segmentation theory (Bricker & Kerstetter 2000; Graefe 1981), different types of tourists are classified based on their skill and expertise.

This classification is important because skilled and knowledgeable tourists' evaluation and expectations and image perception of a place will be completely different from those tourists without such expertise (Needham, Sprouse & Grimm 2009; Oh & Hammitt 2012). On that account, research on specialisation segmentation is at the heart of understanding in developing more specialised products to target specific needs of different levels of astrotourists. In the current research, the relationship between recreation specialisation segmentation has been applied as a segmentation tool in the astronomical tourism context and its relationships with other constructs are explored.

Finally, of those studies that have looked directly at specialisation segmentation as a market segmentation tool in specific contexts, the focus has been on birdwatching (Kim et al. 2010; Burr & Scott 2004), fishing (Bryan 1977; Graefe 1981; Needham, Sprouse & Grimm 2009) and hiking (Kyle et al. 2003). Less attention has been given to astronomical tourists. This group's needs and expectations from destinations are significantly different from general nature-based tourists. Thus, the contribution of the current research is to use specialisation segmentation to distinguish this sub-segment from the other nature-based tourism groups and to identify specific needs and profiles of tourists who are interested in astronomical tours.

(d) Providing an empirically tested measure of astronomical tourists' recreation specialisation, motivation and destination image components;

The current research operationalises the measurement of these mentioned constructs in a more specialised context of astronomical tourism, which identifies the gap of differentiating the specific motivations, recreation specialisation and destination image of astronomical tourists from other nature-based tourists.

(e) Identifying how astronomical tourists' motivation regulate the relationship between tourists' recreation specialisation and dark-sky site image dimensions;

In the current research, the moderating role of motivation as a psychological factor in the relationships between tourists' recreation specialisation and dark-sky site image dimensions (cognitive, affective, conative, overall) is examined.

(f) Finally, suggesting strategies that use these determinants to manage competitiveness in destination marketing.

1.5.2. Practical significance

Previous studies have classified different segments of special-interest tourists by using specialisation measures. Different clusters have been reported depending on the variables used to measure specialisation (Kim et al. 2010). For example, in the context of birdwatchers, different segments have been identified, such as 'casual', 'interested', 'active' and 'skilled' (Scott & Thigpen 2003). In the current research, recreation specialisation measurement items have been identified in the qualitative phase to inform the questionnaire design and segment astronomical tourists based on their level of specialisation. This segmentation helps to identify different groups of astronomical tourists who have various levels of specialisation. The current research has also been designed to identify more specific differentiated products in astronomical tours and the expectation of astronomical tourists. Moreover, the current research identifies the different motivational patterns in astronomical tourists, how they choose a destination and how they behave towards those specific destinations (dark-sky sites). Therefore, the findings of the current research make a noteworthy practical contribution by identifying the underpinning structure of developing a niche product. This identification process takes place by understanding the most important knowledge about who astronomical tourists are and how they choose a destination.

Moreover, previous research has emphasised the importance of special-interest tourism as a significant proportion of the tourism market that is composed of high-income earners interested in participating in longer and more expensive tours to meet their needs (Hall & Weiler 1992).

Therefore, it is important to identify the astrotourists' demographic profile and the importance of its categories (i.e., age, income level, gender, etc.) on their specialisation level and destination image selection process. This identification provides notable economic outcomes for special nature-based tourism destination managers to plan based on the characteristics of astronomical tourists leading to repeated visitations, longer stays and higher money expenditure.

On the whole, the findings of the current research are useful for niche tourism destination marketers to target astronomical tourists based on the carefully examined results of their specialisation level, motivation, destination image selection process and their future behavioural intentions.

1.6. Glossary of terms and acronyms

In the following table, the definitions of key terms used in the current research are presented. These definitions help in understanding the frame of reference in the current research.

Table 1.6.1. Glossary of key terms and abbreviations

Analysis of Variance	**a statistical test to analyse the differences among group means and the variation among and between groups**
Astronomical tourism (astrotourism)	a special-interest tourism (SIT) market, in which travellers are motivated by sky-observation related experiences and their travel/destination choices are based on these experiences
Astronomical tourist (astrotourist)	a person with the needs to relate to both astronomical activities/events (e.g. stargazing, observing deep-sky objects, eclipses, etc.) and location (e.g. dark-sky site) where sky observation is feasible
Conceptualisation	a mental process to organise intangible observations and experiences into a meaningful and measurable formulation
Confirmatory factor analysis	a statistical technique to test a relationship between observable variables and their underlying latent constructs
Dark-sky Site	a specific setting that facilitates the skyscape observation from the sites that are embedded to meet the astrotourists' needs and accommodate the celestial and physical structures/services requirements
Nature-based tourism	a tourism segment in which travellers are attracted to the natural environment of a destination
Recreation	a set of particular activities undertaken for enjoyment which may be part of a tourism
Special interest tourism	the provision of customised tourism and recreational activities that meet the specific interests or needs of individuals
Structural equation modelling	a statistical technique to test statistical models through combination of multiple regression and factor analysis
Tourism	travel with the purpose of leisure, business or recreation
ANOVA	Analysis of Variance
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
DI	Destination Image
RS	Recreation Specialisation
SEM	Structural Equation Modelling
SIT	Special Interest Tourism

1.7. Structure of the thesis

The current research is presented in six chapters. As discussed, the introduction chapter (Chapter 1) presents an overview of the thesis consisting of the problem statement, research theoretical background, research questions, theoretical and practical contributions. Following that, the other five chapters are briefly outlined below.

Chapter 2 presents the literature review, which discusses the theories underpinning the development of the conceptual framework, identifying gaps in the literature and justification of the research questions. This chapter begins with a review of the recreation specialisation, destination image and motivation literature; following the literature review of the importance of demographic profiles and future behavioural intentions.

Chapter 3 provides a detailed explanation of the research methodology and discusses how the research was developed and conducted. A description of the methodology on how the methods are chosen and used to address the study objectives is provided. The choice of a mixed-methods approach is clarified, and each of the two method phases (qualitative and quantitative) is described. The theoretical underpinning of the research paradigm, the methods of data collection and data analysis for each phase of the research are discussed in this chapter. The methodology and methods provide the background within which the findings in Chapters 4 and 5 can be understood.

Chapter 4 presents the findings from the 24 semi-structured interviews of astronomical tourists. Content analysis using Microsoft Excel and NVivo 11 Pro enables the identification of the items measuring mentioned constructs under the research.

Chapter 5 sets out the results of the data analysis. Results of data analysis for each of the two method phases (qualitative and quantitative) are presented. Data from personal interviews are presented, along with the results of exploratory and confirmatory factor analysis, structural equation modelling and cluster analysis.

Chapter 6 presents discussions and conclusions of the findings from the data analysis of the study. The findings are related to the study purpose and research questions presented in the initial chapter. Conclusions and suggestions for further research are presented.

2 LITERATURE REVIEW

2.1. Introduction

The review of the literature considers the theoretical backgrounds of the constructs that have informed the current research. The first construct positions the research within the definition of astronomical tourism and the importance of its development to provide sufficient depth for consideration of the idea of astronomical tourism development as a special-interest/niche-tourism product. The second topic deals with the people–place relationship theories and the importance of understanding destination image theory to measure how tourists form emotional and functional connections with places, which is the outcome of the tourists' expectations and past behaviours. In the third topic, the essentials of tourist behaviour literature are reviewed extensively. These concepts address tourists' motivation, tourists' demographic profiles, tourists' recreation specialisation and tourists' future behavioural intentions. The literature review concludes with an assessment of the research literature, combining tourists' behaviour concepts to develop an overall framework. This conceptual framework helps to understand astronomical tourists' behaviour in the astrotourism context and dark-sky site image formation process in a detailed and combined framework. The review of each topic begins with a discussion of the generic literature on that topic and then links the discussion to the tourism literature.

2.2. Special interest tourism and nature-based tourism

Special interest tourism comprises niche tourism markets with different special interests and needs, such as rural tourism, religious tourism, medical tourism and nature-based tourism (Kruja & Gjyrezi 2011). Development of special interest tourism leads the tourism industry to offer competitive products to satisfy the expectations of the tourists with special demands (Kruja & Gjyrezi 2011). For example, Kruja and Gjyrezi (2011) examined special interest tourism development in Albania as a case study by adopting in-depth interviews and market analysis of known institutions such as WTO, WTTC, GTZ and USAID. In their paper, mountainous sceneries were considered as one of the tourist attractions with the emphasis that special interest tourists enjoy activities that are undertaken in natural environments. However, the role of the sky as one of the natural resources that contribute to the beauties of a natural setting is neglected. Therefore, astronomical tourism can also be classified in special interest

tourism because astronomical tourists are interested in enjoying, exploring, discovering and learning through sky (as a natural resource) observation and astronomical activities. In addition, nature-based tourism is also classified as one of the special interest tourism segments (Kruja & Gjyrezi 2011).

Tourism scholars have defined and named nature-based tourism in different ways (Mehmetoglu 2005). For example, Laarman and Durst (1987) developed the definition of nature-based tourism combining three elements of education, recreation and adventure under the names of 'nature travel 'or 'nature oriented tourism'. However, Weber (2001) disagreed with using 'adventure' under the nature-based tourism category because he believed that adventure is combined with risk. Valentine (1993) used 'recreation' in his definition suggesting that nature-based tourism is 'primarily concerned with the direct enjoyment of some relatively undisturbed phenomenon of nature'. He stated that the level of this enjoyment depends on the level of travel dependency on nature in three segments: dependency of the activity on nature, enhancement of the activities by nature and activities that are related to a natural setting (Mehmetoglu 2005; Valentine 1993). Accordingly, most scholars interpret nature-based tourism as a tourism market in which visitors travel away from home to experience an activity in a natural setting (Fredman & Tyrväinen 2010). Following the previous discussions, Fredman and Tyrväinen (2010, p. 181) proposed one of the comprehensive definitions of nature-based tourism that has a flexibility to include subgroups of nature-based tourism: 'Nature-based tourism is human activities occurring when visiting nature areas outside the person's ordinary neighbourhood'. Along with their definition, they confirmed that nature-based tourism is becoming more specialised and diversified, which highlights the importance of investigating more about the process of this specialisation in different contexts.

In addition, Cohen (1972) developed a typology in which nature-based tourists can be identified in a spectrum of generalists to specialists. This typology is reflected in the specialisation concept in various contexts of bird watching, boating, etc. (Mehmetoglu 2005). Accordingly, Mehmetoglu (2005) investigated whether nature-based tourists can be segmented into two domains of specialists and generalists and if there are any differences between these two groups. This study was conducted at two wilderness centres in Norway; based on his findings, specialists nature-based tourists travel mainly for nature reasons, however, generalists treat nature as part of their travel. Moreover, the results of his study reveal that these two segments are significantly different based on their nationality, trip purpose, trip length and travel motives.

In previous centuries, the night sky has been considered a significant resource for human life for telling time, seasons' measurement, planting and harvesting opportunities. It also has deep roots in human cultural and literary background, such as story-telling based on the constellations (Collison & Poe 2013b). This natural resource keeps its cultural connection with people throughout the centuries and nowadays it has become one of the natural attractions people tend to travel to engage in the activities related to the sky. Constant growth in astronomical tourism in one of the national parks of the United States shows 1.3 million visitors in a calendar year (Collison 2013). Increasing the number of amateur astronomical societies and the need of astrotourists for travelling to reach their goals, make astronomical tourism a new phenomenon in special interest and nature-based tourism sectors, which requires more study.

2.3. Astronomical tourism development

Astronomical tourism, also termed astrotourism, refers to a nature-based tourism as a sub-segment of a special interest tourism (SIT) market, in which visitors are interested in observing and enjoying celestial phenomena (Cater 2010; Weaver 2011). Special interest tourism refers to tourism offering of specific products that meet a certain need of a particular market segment. In the case of astrotourism, astronomical phenomena are the natural resources that play a vital role as a primary tourism attraction in distinguishing it from other types of nature-based tourism products (Collison & Poe 2013). These products have been categorised with two approaches; first, based on the astronomical activities taking place during the day, night and twilight. Second, based on having the astronomical equipment or without them, which is called astronomy with 'naked eye' or 'aided eye' (Weaver 2011).

Various kinds of astronomical tourism products are worth considering and it shows that this kind of tourism can occur in different locations. As Weaver (2011) expresses in his study, in France and Los Angeles the 'Night Station' observatories gather people for stargazing using telescopes. Canada, Finland, Iceland, Greenland, Scotland and Russia attract a notable number of 'aurora tourists' enjoying this phenomenon with the naked eye annually. In Jordan and Chile, visitors can enjoy 'astronomical ecotourism camps' in deserts to observe the night sky and solar events as well as other ecotourism activities. In the North American Great Lakes area, there is another 'emerging niche product' called 'Tall Ship Astronomy Cruises' that provide a unique opportunity for tourists to experience night sky observation from the sea. Moreover, national

parks in the United States are offering distinct and specialised astronomical products to their visitors (Collison & Poe 2013).

Previous literature argues that various market segments display different behaviours and market heterogeneity has a significant role in the relationships among other variables like image and satisfaction (Castro, Martín & Martín 2007); therefore, it is important to study the heterogeneous astronomical tourists' market and conceptualise their level of involvement as well as their interaction with the physical destination. Moreover, destination marketers should offer quality experience to the growing segments of special-interest tourism to differentiate and sustain their destinations, because it is important to understand how different types of tourists experience a destination, how they perceive it and what the outcomes are.

Offering similar features in tourist destinations has led tourist destination organisations to develop tourism strategies in terms of offering specialised and niche products and experiences for tourists to achieve different outcomes, such as being attractive, economic and sustainable (Ibrahim & Jacqueline 2005; Pike 2009). Because there is a need for destination marketers to identify tourists' perceptions of their experiences before, during and after a trip (Damijanic & Sergo 2013; Essam & Gill 2005); at the early stage of developing a niche tourism product such as astronomical tourism, it is important to understand who astrotourists are, where they conduct their tours, how they call and define related tour features and destinations, what motivated them and based on what criteria they do segmentation in their tours. Therefore, this understanding is essential to inform the tourist decision-making process and tourist behaviour (Kim et al. 2010).

In a study by Cater (2010), three typologies of space tourism were proposed. First, 'astrotourism' which discusses the 'Lunar and Martian voyages', 'Orbital flights' and 'Sub-orbital flights' types; second, 'Atmospheric Space Tourism' with 'High Altitude Jet flights' and 'Weightless Flights' types and third, 'Terrestrial Space Tourism' with 'Simulations', 'Tours of space facilities', 'Edu-tainment', 'Space tourism related travel', 'Cyber space tourism experiences' and 'Popular culture' types. In this typology, stargazing tours are classified under the Terrestrial Space Tourism category. However, as stated by the author, this distinction was founded within aeronautic terminology. Therefore, the appropriateness of utilising this typology and proposed names within a tourism context needs to be explored. In addition, Cater (2010, p. 844) addressed that niche tours such as eclipse tours created because human beings are always curious to know 'what it is really like out there'.

In another study by Collison and Poe (2013), they studied astronomical tourism as a sustainable tourism segment with dark night sky as its main resource. They applied a case study method to examine an astronomical tourism program in Bryce Canyon National Park (BCNP) in the southwestern United States. The results of their study indicate the dark-sky program represents a significant resource to attract visitors to the park and astronomical tourists comprise the largest visitors for the peak season. However, one of the significant gaps that was also mentioned by Collison and Poe (2013) includes lack of research in terms of the astronomical tourists' characteristics, their expectations and demands.

In addition, it is important to understand the preferences of astrotourists for the success of this market. The previous literature indicated that astrotourists can be classified in two segments, special interest and nature-based tourists depending on their primary motivation and interest in astronomical attractions (Fayos-Sola, Marin & Jafari 2014). Special interest tourists range from amateur astronomers (D'Auria 2012), professional astronomers (Krco 2005) and astrophotographers (Thommes 2012). It is noted that hundreds of amateur and professional astronomers travel to different places to see astronomical phenomena (Fayos-Sola, Marin & Jafari 2014). Bill Kramer, one of the eclipse chasers, has listed 138 eclipse chasers (Kramer 2012) under the name of Eclipse Chaser Log Summary. These people travel to different places to chase eclipses as well as many other people who gather at a good dark-sky site for a few nights under stars. By attending a 'star party', these people can enjoy and learn a lot about the sky (Talcott 2009). According to Storksdieck et al. (2002), 90% of amateur astronomers were highly interested in observing objects in the night sky. It is noted that the astrotourism market often comprises socially and environmentally aware, highly educated tourists and visitors who travel both to learn and to achieve personal and social goals (Pine & Gilmore 1999, p. 13).

By contrast, nature-based tourists are those who are generally interested in natural settings and environment. MacRobert (2012) mentioned 'astronomy is an outdoor nature hobby'. Staying in contact with the natural environment makes a tourist go for rural tourism (Burns & Novelli 2008). Therefore, it is important to understand various types of tourists who have different motivations to participate in related activities.

In recent years, tourism motivations have demonstrated a move away from the old-style standardised rigid motivations of tourists to a more unique approach where wants and needs are focused upon (and consumers are willing to pay for) tours that may be more adventurous and meaningful ((Fayos-Sola, Marin & Jafari 2014; Robinson, Heitmann & Dieke 2011). Thus,

tourism destination managers who desire repeat visitation from novelty-seekers must continuously adjust themselves to offer new opportunities for novel experiences (Bello & Etzel 1985). Natural phenomena like solar eclipses gather millions of nature-based tourists in many destinations that are appropriate for observation (Editors of Sky & Telescope, 2006). These observations provide novel experiences for the tourists. Therefore, in developing a nature-based tourism product, destination marketers can propose new ideas for organising new tours such as aurora observing.

Accordingly, previous research has mainly focused on understanding nature-based tourists and ecotourists, who may be interested in limited astronomical-related tourism attractions within the context of nature-based tourism or ecotourism (Collison & Poe 2013; Weaver 2011). Only a few studies have begun to develop a clearer picture of the characteristics of astrotourists, who have an interest in a wide range of astrorelated learning, their experiences and the development of astronomical-related destinations (Cater 2010; Collison & Poe 2013). Therefore, the findings of the current research provide empirical results to develop an astronomical tourism and dark-sky sites theoretically and practically.

2.4. Theoretical approaches to understanding destination image

How people relate to their surrounding environments has been extensively investigated and has resulted in a range of terminologies describing people–place relationships. For example, sense of place (Symons 1999), place attachment (Cowell & Green 1994), place meaning (Manzo 2005), place identity (Proshansky, Fabian & Kaminoff 1983) and place bonding (Hammitt, Backlund & Bixler 2003) were conceptualised to explore the nature of people's emotional relationships with places (Prayag & Ryan 2011).

'Place' has meaning based on people's emotions and experiences. Speaking about this, Heidegger (1971) mentioned that individuals transform a house to a home because of the caring process they experience in the home. By the same token, several other studies emphasise the role of meaning, which changes spaces to places (Ryden 1993; Tuan F 1979). In this sense, meaning has generated through value and experience (Tuan 1979; Tuan 1977). With the same line of reasoning with a phenomenological approach, previous scholars indicated places compromise of physical setting, sensual individual experiences and their interpretations towards that place (Relph 1976; Tuan 1979; Tuan 1977; Tuan 1974). Therefore, it is important to discuss the role of place and physical environment in destination image formation process.

A geographer, Tuan (1974), suggested that a place comes into existence when people give meaning to an area that is part of a geographic space. However, some places have stronger sentiments for some people than others. This feeling is often derived from the mix of natural and cultural features of an environment. Cultural geographers and social/environmental psychologists have made the important contribution to conceptualise and understand people–place relationships (Carter, Dyer & Sharma 2007; Dixon & Durrheim 2000; Feld & Basso 1996; Kneafsey 1998; Krupat 1983; Low & Altman 1992; Sarbin 1983; Stedman 2002; Tuan 1974; Twigger-Ross & Uzzell 1996). For example, Entrikin (1989) discussed the need to redirect geographical research towards the concern for the richness of people's experience. Although there were some studies claiming that there is no relationship between physical design and social behaviour (Gutman 1966), numerous studies suggest the important relationships between physical design and social behaviour (Buttimer 1976, 1980; Rainwater 1966; Yancey 1971; Young & Willmott 1957). Therefore, these debates and inquiries of the pioneer cultural-geographical scholars have led to the importance of people's role in understanding the meanings of places (Ley & Samuels 1978). For example, some scholars emphasised the relationship between place and lived experiences; analysed the connections between place and culture and discussed the connections between place and identity (Bachelard & Jolas 1994; Duncan & Ley 1993; Keith & Pile 1993).

Reviewing the literature shows that an individual's engagement within a place connects materiality to meaning in an enduring process that integrates social, cultural, natural dimensions of place (Harvey & Braun 1996; Sack 1988). The experience of engagement and interaction with a place involve presence and action, which means being in and being with the place. Although geographic locations are tangible, their associated meaning, affective engagements and social interaction, are less tangible. As Bender (2002, p. 106) states, 'different people, differently placed, engage with the world in different ways.' Therefore, several scholars explored the importance of place perception and experience to revisit the notion of place on how it is socially constructed (Murphy, Johnson & Haarmann 2000; Myers 1991; Weiner 1991). Later on, this investigation led to the integration of cultural geography and tourism to explore the effect of tourism on place identity and place image (Cartier & Lew 2005). Some researchers implied the direct relationships between a particular place's physical characteristic and feelings towards that place (Jackson 1994; Shields 1991). Other researchers emphasised the dynamic process amongst an individual, social relations and physical attributes of a place (Hummon 1992; Manzo 2003). Besides that, even if the social value does not play a significant

role in the image creation, every place has its own unique features, which makes it recognisable to the people even without any prior experience. These features evoke emotional feelings after individuals' experience (Hull, Stewart & Yi 1992). Based on this experiential procedure, the physical environment has a great role in creating meaning and developing a particular image.

Tourism and leisure landscapes can be of both types, with strong image or placeless. For example, Paris has developed an image based on its history, architecture, culture and mythology that is considered as a romantic place to visit. Many tourists are interested in specific places because of an expected image and expected experiences. These experiences with places are always influenced by physical, historical, social and cultural aspects, which contribute to creating an image towards the destination. Therefore, destination image forms through specific interactions of social experiences embedded in subjective and emotional feelings, which are acquired by an experience or a set of experiences in a place. These experiences are constructed through the use of all our knowledge senses and developed over time (Massey 2006; Relph 1976; Sack 1988; Tuan 1974). Therefore, the destination image is changeable for each place over time and for different individuals, which needs to be explored more in a different time, context and place.

Destination image has strong roots in tourism and destination marketing that articulates a range of dimensions of how tourists construct relations with the destinations they visit. For example, a particular destination image is based on religion, art, food, specific activities and romance, to which tourists travel to experience. People use their senses of sight, sound, smell, taste and hearing, which can be felt through colour, movement, feel of wind, light and other sensual elements in various places to remember particular places (Echtner & Ritchie 1993; Ryden 1993; Tuan 1979). However, there is a lack of studies to explore various ways on how tourists remember places and form destination image towards the places and landscapes they have visited.

The following section of the current research elaborates the meaning of destination image, components of destination image research and the relationship among destination image with other constructs. Then, the discussion leads to the importance of destination image in understanding tourists' behaviour and the interaction of tourists with tourist destinations (Deutsch, Yoon & Goulias 2013). The arguments elucidate the need for more research into the destination image formation process, especially in an astronomical tourism context.

2.4.1. Destination image

Destination image theory background

Destination Image (DI) has its roots in marketing, social and environmental psychology, tourism, geography and sociology from the early 1970s. Hunt (1975), Gunn (1972) and Mayo (1975) introduced the concept of the image into tourism studies in the early 1970s. Since then, destination image studies in the tourism literature have been one of the most predominant topics in this arena (Pike 2002). Numerous studies in this field have investigated the destination image concept from various viewpoints, including destination image conceptualisation and dimensions (Echtner & Ritchie 1991; Gallarza, Saura & Garcia 2002; Stylos et al. 2016, 2017; Tasci, Gartner & Cavusgil 2007); destination image assessment and measurement (Chon 1990; Echtner & Ritchie 1991; Gallarza, Saura & Garcia 2002; Tasci, Gartner & Cavusgil 2007); destination image formation process (Chon 1990; Gallarza, Saura & Garcia 2002; Tasci & Gartner 2007); relationship between destination image and other constructs, such as satisfaction, place attachment and revisit intention (Chon 1990; Stepchenkova & Mills 2010; Stylos et al. 2016, 2017). Online destination has also been investigated as a fairly new concept which focused on the online representation of knowledge, feelings and overall impressions of a tourism destination (Mak 2017). A distinction between destination image and online destination image is Web technologies which provide a platform for tourists to co-construct an image of a destination (Mak 2017).

For example, Kim and Richardson (2003) discussed the body of literature on tourist image based on various perspectives and topics. In terms of perspective, they discussed the relationship between destination image and destination choice, the image formation process, change and modification of image and image measurement. Topics include the components of imagery, relationships between actual visitation and destination images, effects of geographic distance, influences of news coverage and cultural events and the destination images held by tourism interest groups other than tourists. Although, these perspectives and topics are broad and have been studied in recent years, these topics still need to be examined in different contexts and settings under new models. This need arises because destinations and people's attitude are changing over time.

Destination image and similar constructs

Brand image is one of the important concepts in consumer behaviour studies, which is closely similar to destination image in tourism studies (Dobni & Zinkhan 1990; Hosany, Ekinci &

Uysal 2007). The most commonly accepted definition of brand image is 'the perceptions about a brand reflected as associations existing in the memory of the consumer' (Keller, 1993). These associations are created through direct experience with the product, from information sources, or from pre-existing associations (Hosany, Ekinci & Uysal 2007; Martinez & Pina 2003). Brand image is also a multidimensional construct including functional and symbolic brand benefits (Ekinci & Uysal 2007; Low & Lamb 2000; Hosany, Martinez & de Chernatony 2004).

On the other hand, brand personality is another important concept for both academics and practitioners which constitutes the preferences and choices of the consumers (Aaker 1997; Gardner & Levy 1955). Brand personality is referred to 'the personality traits generally associated with humans that consumers perceive brand to possess' (Hosany, Ekinci & Uysal 2007, p. 66). In line with previous argument, tourism literature is increasingly apply the concept of destination personality which highly influence tourists' choice and perceived image of a destination (Hosany, Ekinci & Uysal 2007).

Although some scholars attempt to distinguish between brand image and brand personality, there are some issues regarding their definitional inconsistencies and interchangeable use of the tow concepts (Hosany, Ekinci & Uysal 2007; Cai 2002). On the contrary, some researchers endeavour to examine the relationship between brand image and brand personality by considering brand personality and brand identity as two components of brand image (Heylen, Dawson & Sampson 1995). These studies consider brand personality as an emotional side of brand image (Heylen, Dawson & Sampson 1995). Cai (2002) argues that image formation is close to image building but not to branding. Florek, Insch and Gnoth (2006, p.278) confirm that 'a brand is a symbol that codifies the image a producer likes to portray'. In image building, the brand identity has been recognised as a missing link in destination image studies (Cai 2002). Aaker (1996, p. 68) defines brand identity as "a unique set of brand associations that the brand strategist aspires to create or maintain". Therefore, a destination can create an image based on its identity (Florek, Insch & Gnoth 2006).

In summary, the most important point of differentiation between brand image and brand identity is that identity is created by the sender (tourism organisations, tourism destination managers) whereas image is created by the receiver (tourists) (Florek, Insch & Gnoth 2006; Kapferer, 1992; Qu, Kim & Im, 2011). Therefore, considering these arguments, there is a need for a solid theory development to overcome inconsistencies in the astronomical tourism image definitions and conceptualisation.

Destination image definitions and typologies

Regarding the definition of destination image, previous literature has recorded numerous definitions for the destination image. Although image is a widely used concept, many of these definitions are rather vague (Echtner & Ritchie 1991; Kim & Richardson 2003; Pearce 1988). Therefore, a more explicit description is needed to reach a common understanding of the destination image definition. Nghiêm-Phú (2014) classified a number of these definitions in his review paper, which has been adopted in Table 2.4.1. This classification is based upon the previous definitions of the destination image, which underlines the limitation in offering an explicit definition.

Table 2.4.1. Definitions of destination image

Researcher(s)	Definition
Stylos et al. (2017)*e*	Sets of impressions, ideas, expectations and emotional thoughts tourists maintain of a place representing associations and pieces of information connected with a destination
Lai and Li (2016)e	A voluntary, multisensory, primarily picture-like, qualia-arousing, conscious, and quasi-perceptual mental (i.e., private, nonspatial, and intentional) experience held by tourists about a destination. This experience overlaps and/or parallels the other mental experiences of tourists, including their sensation, perception, mental representation, cognitive map, consciousness, memory, and attitude of the destination.
Huang, Li and Cai (2010)*d*	A mental structure that integrates the elements, impressions and values people project onto a specific place
Donaldson and Ferreira (2009)*d*	A combination of the consumer's reasoned and emotional interpretations of a destination
Faullant, Matzler and Füller (2008)*d*	An attitude-like construct consisting of cognitive and affective evaluations
Anton and González (2008)*e*	Expression of knowledge, impressions, prejudices and collective emotional awareness related to a specific destination
Tasci, Gartner, and Cavusgil (2007)*e*	destination image is an interactive system of thoughts, opinions, feelings, visualizations, and intentions toward a destination
Reynolds (1965)*e* (as cited in Krizman & Belullo 2007)	Image is generally defined as a mental or attitudinal construct developed on the basis of a few selected impressions from among the flood of total impressions through a creative process in which those selected are elaborated, embellished and ordered
Bandyopadhyay and Morais (2005)*e*	Destination images are the expression of all objective knowledge, impressions, prejudice, imaginations and emotional thoughts an individual or group might have of a particular place
Kim and Richardson (2003)*c*	Totality of impressions, beliefs, ideas, expectations and feelings accumulated towards a place over time
Cai (2002)*e*	Perception about the place as reflected by the associations held in tourist memory
Tapachai and Waryszak (2000)*c*	Perceptions or impressions of a destination held by tourists with respect to the expected benefit or consumption values
Baloglu and McCleary (1999)*e*	consisting of an individual's mental representation of knowledge (beliefs), feelings, and global impression about a destination"
Mackay and Fesenmaier (1997)*b*	A compilation of beliefs and impressions based on information processing from a variety of sources over time, resulting in an internally accepted mental construct
Milman and Pizam (1995)*b*	A sum total of the images of the individual elements or attributes that make up the tourism experience
Kotler, Haider and Rein (1993)*e*	The sum of beliefs and impressions people hold about a place
Dadgostar and Isotalo (1992)*b*	The overall impression or attitude that an individual acquires of a specific destination. This overall impression is considered to be composed of the tourists' perceptions concerning the relevant qualities of the destination
Echtner and Ritchie (1991)*e*	Image is not only the individual traits or qualities but also the total impression an entity makes on the minds of others
Embacher and Buttle (1989)*c*	Ideas or conceptions held individually or collectively of the destination
Crompton (1979)*a*	An attitudinal concept consisting of the sum of beliefs, ideas and impressions that a person has of a destination
Lawson and Baud-Bovy (1977)*c*	An expression of knowledge, impressions, prejudices, imaginations and emotional thoughts an individual has of a specific place
Lawson and Baud-Bovy (1977)*c*	Impressions that a person or persons hold about a state in which they do not reside
Hunt (1971)*a*	Impressions that a person or persons hold about a state in which they do not reside

Note: *a*: collected by Gallarza, Saura and García (2002, p. 60); *b:* collected by Tasci, Gartner and Cavusgil (2007, p. 202–203); *c:* collected by San Martin and del Bosque (2008, p. 264); *d:* collected by Nghiêm-Phú (2014); *e:* collected by the Researcher

As depicted in the Table 2.4.1, each researcher infers a definition based on one particular point of view. For example, in early definitions, there was not a clear boundary to discuss how a destination image forms towards a place (Tasci, Gartner & Cavusgil 2007). One of the limitations of these definitions is their sole focus on the perceived image by the tourists without considering how these images have been created and projected in tourists' minds. The main argument of recent studies is that the tourist image is the result of the interaction between both perceived and projected images (Mariné Roig, & Anton Clavé 2013; Nghiêm-Phú 2014). Ateljevic and Doorne (2002, p. 651) advocate, 'As different producers and audiences are involved, meanings are differently created, encoded, communicated, interpreted, decoded and again communicated over time and diverse contexts. Producers and consumers negotiate through this communication in continuous acts of interpretation by (re) imaging and consuming the context'. Therefore, as previous authors tried to put forward the definition and concept of destination image by adding more components to it over time and considering the different aspects of destination image formation, integrating both projected and perceived images to examine a destination image formation in a specific context contributes strongly in developing a more complete way of understanding and measuring destination image. Another gap that is addressed in the current research is defining destination image in a specific context to reduce the vagueness of the definitions. Previous research tried to propose a definition that is applicable in every context; however, an image of a destination may need to be redefined based on the destination typology (i.e., country, city, night market, etc.). Therefore, by investigating a new definition for the dark-sky site, the definition of destination in this specific context is tailored to reflect this specific context.

Following a review of the literature, Nghiêm-Phú (2014) states that destination is considered in a variety ways, including, a country, a city, university, night markets, ski resorts, accommodations, restaurant, festivals, winescape and recreation farms (Bruwer & Lesschaeve 2012; Huang, Li & Cai 2010; Huang & Gross 2010; Kim & Perdue 2011; Lee et al. 2008; Llewellyn-Smith & McCabe 2008; Ryu, Lee & Kim 2012). Although the mentioned studies have widely researched various destinations, very few studies have considered a destination incorporating sky features as one of the destination typologies. Dark-sky sites have their own unique characteristics and features (discussed in detail in the next section), which need to be addressed empirically. Moreover, the literature review reveals the gap that little research has studied the images of a destination as perceived by one of its markets (Nghiêm-Phú 2014; Ozretic-Dosen, Skare & Krupka 2007). Therefore, because sky features are mostly considered

by a special-interest group of tourists called astronomical tourists, research on the images of a destination as perceived by this niche market fills the mentioned gap.

Tourism destination image

Tourism destination image is a complex construct rooted in wider social processes. In other words, 'images are simplifications of more complex ideas' (Nadeau et al. 2008, p. 84). Tourism itself is a social phenomenon, which is explained through narratives of images in the mind of the visitor representing various values (Mariné Roig & Anton Clavé 2013). The tourists' narratives are based on socially constructed narratives and symbols, which are reflected in images to express the narratives (Wong, Lee & Lee 2016). These images change over time based on destination evolution and the use of destination in tourists' mind. Therefore, it is important to understand the tourist image as an 'evolutionary entity' that changes in tourism models and destinations (Roig & Clavé 2013, p. 1).

Tourism destination image studies have been a persistent issue among tourism marketing and management studies over the last 40 years because of its complicated nature (Pike & Page 2014). This complexity has been mentioned in postmodern societies with the argument that visuality is a strong medium of cognition and representation because people's behaviour is derived from their image rather than an objective reality (Baloglu & McCleary 1999; Urry 1995). Therefore, understanding how and to what extent image of a destination affects tourists' behaviour and their decision-making process has an important implication for destinations themselves, their marketers and their management organisations.

To discuss systematically the complexity of tourist image, Gallarza, Saura and García (2002) distinguished four features of the image construct, including complexity, multiplicity, relativeness and dynamism. Complexity refers to the equivocal nature of the image. Image is multiple in its elements and processes. A relativistic feature of the image refers to being subjective, and dynamic characteristic of the image means its changing nature over time and space. Each of these features has their own dimensions.

2.4.2. Categories of destination image research

According to Nghiêm-Phú (2014), destination image studies can be divided into two categories. One is perceived image and the other is projected image. He states that perceived images are based on each individual point of view towards a destination, which includes his/her knowledge, impressions, benefits, expectations, emotions, imagination, values and

interpretations. The perceived image is formed based on the cognitive and affective aspects of destination image formation. For example, knowledge and values are the bases of reasons to choose a place based on destination image, which is part of the cognitive dimension; while emotions and imaginations are part of the emotional aspects of destination image, which is called affective aspects (Andreu, Bigné & Cooper 2000; Ji 2011; Nghiêm-Phú 2014). Moreover, as discussed by Echtner and Ritchie (2003), actual experience is one of the other factors that influence the destination image. Beerli and Martín (2004b) also confirm that past experience is one of the important factors that influences the perceived image of the destination after the visit because people rely more on their own experience than on information obtained from other sources.

On the other hand, projected destination image are those created by managers and marketers of a destination to promote their places (Andreu, Bigné & Cooper 2000; Ji 2011; Nghiêm-Phú 2014). Previous authors discussed the two sides of a tourist image using market economic theory. For example, MacKay and Fesenmaier (1997) adjusted the projected image to the supply side of the economy analogous with the destination and perceived image to the demand side corresponding to the people. Moreover, Kim and Richardson (2003) proposed their definition of destination image not only based on the image in the minds of the tourists but also including other factors to establish destination image. From another perspective, in the definition of Huang, Li and Cai (2010), it is proposed that people, themselves, project their impressions and values onto a place. To understand the tourist destination image formation process, it should be noted that tourist images can be images perceived in the tourists' minds, or images created and projected by tourism agents, including tourists themselves (Mariné Roig & Anton Clavé 2013). Therefore, based on the existing gap in the definition and conceptualisation of tourism destination image literature, more studies are needed to examine the nature of perceived and projected images in tourists' destination image formation process. Because of the complexity of the examination of both projected and perceived images of dark-sky sites simultaneously; the current research has focused on the identification of perceived images of the dark-sky sites.

2.4.3. Destination image and its relationship with other constructs

Because destination image has its influence on pre-, on-site and post-purchase decisions (Beerli & Martín 2004b), previous studies discussed the role of destination image, itself, as an antecedent and outcome as well as the role of other variables in predicting destination image.

These studies has focused on interrelationships and relationships of the destination image and other constructs. Interrelationships mean the mutual relations between destination image and other constructs (Nghiêm-Phú 2014). Therefore, the role of destination image has discussed in three-phased travel procedure; first before the travel, in tourists' destination decision-making choice; second, during the travel; in comparing what was expected and what is experienced, which results in satisfaction and perceived quality; and third, after travel: in revisiting and recommending to others (Agapito, Oom Do Valle & Da Costa Mendes 2013).

For example, information sources, tourist characteristics, experience and familiarity/novelty seeking have been considered as antecedents of destination image (Han, Hsu & Lee 2009; Ji & Wall 2011; Krider et al. 2010; Lee 2009). Additionally, place attachment, attitudes beliefs, destination personality, motivations, quality and values have relationships with destination image (Elliot, Papadopoulos & Kim 2011; Gertner 2010; Liu, Lin & Wang 2012; Lockshin & Lee 2011, 2012; Sahin & Baloglu 2011). In the same line, the influence of motivation, travel experience and demographic profiles of the individuals as antecedents on the various dimensions of the destination image. For example, some scholars found the direct effect of motivation on the affective component of destination image (Baloglu & Brinberg 1997; Dann 1996; Gartner 1993). Later, Beerli and Martín (2004b) and Bruwer and Lesschaeve (2012) confirmed the previous findings and revealed that motivations influence the affective component of image; the experience of vacation travel has a significant relationship with cognitive and affective images and the demographic characteristics influence the cognitive and affective assessment of image.

Regarding tourists' demographic variables, previous literature has examined the influence of an individual's characteristics on destination image formation and perceptions of places. For example, Walmsley and Jenkins (1993) found that visitors' age and gender influence on the images of places. However, some scholars argued that there is no significant relationship between the perceived image and tourists' gender and income (Baloglu & Brinberg 1997; Baloglu & McCleary 1999). According to these studies, other demographic variables such as marital status, age, education and occupation influenced the perceived image.

Empirical studies have also investigated destination image as an antecedent of the satisfaction, behavioural intentions of tourists and tourists' loyalty (Chi & Qu 2008; Faullant, Matzler & Füller 2008; Llewellyn-Smith & McCabe 2008; Loureiro 2013; Prayag & Ryan 2012).

Following the brief summary of previous studies in the preceding two paragraphs, the findings of the mentioned studies are forthwith discussed in detail.

Ji and Wall (2011) compared the perceived images of two cities by two groups of visitors and residents. They also examined the influence of information sources, age, education and place attachment on these perceived images. In their study, they only considered cognitive and affective dimensions of the destination image and the conative image is excluded because the researchers intended to examine the image formation, not the behavioural intentions. The results revealed that residents' and visitors' perceived images match more in terms of cognitive image and less on affective images. Cultural attraction, seafood, beaches, scenery, weather and cleanliness are among the factors in cognitive image held by visitors and residents; and arousing-sleepy and exciting-gloomy are the factors in affective image. Moreover, the results of this study show a weak positive correlation between place image and image perceived by both visitors and residents. There are also weak correlations between age, education, information sources and both residents' and visitors' image. In addition, they claimed that overall image is not a clear construct because it is not well defined whether it results from cognitive image or affective image or their combination. However, excluding conative and overall image in the destination image formation process leads to a limitation that prevents destination marketers and managers from acting based on their results.

Prayag and Ryan (2012) have analysed the relationships among four constructs, namely, destination image, place attachment, personal involvement and visitors' satisfaction as antecedents of loyalty. The results of their study found that destination image, personal involvement and place attachment are antecedents of tourists' loyalty; however, satisfaction levels mediate this relationship.

Han, Hsu and Lee (2009) examined the relationship between attitude towards behaviours, overall image, visit intention, word-of-mouth intention and willingness to pay more by considering the effects of gender and age in the context of the hotel customers' eco-friendly decision-making process. The results of this study showed that overall image is a positive function of attitude and significantly influences visit intention, word-of-mouth intentions and willingness to pay more. Moreover, the findings of this study revealed the mediating role of overall image on the effect of attitudes towards the behavioural intentions components. The importance of overall image is also confirmed in tourists' and customers' decision-making

processes, e.g. Baloglu and McCleary (1999), Bloemer and Ruyter (1998), Chen and Tsai (2007), Lin et al. (2007) and Ryu et al. (2007).

Overall, the current research addresses significant gaps that were found in the review of the previous literature in the relationship between destination image and other constructs. Although previous studies explored the relationship between recreation specialisation and place attachment (Bricker & Kerstetter 2000), to the researcher's knowledge, no research has been carried out to investigate the relationship between destination image dimensions and level of tourists' specialisation. In addition, although researchers agree that tourists' motivations influence destination image (Baloglu & Brinberg 1997; Beerli & Martín 2004b; Bruwer & Lesschaeve 2012; Dann 1996; Gartner 1993), the role of motivation as a moderator is not explored in the relationships between destination image components and recreation specialisation. Therefore, the current research has advanced the theoretical understanding of the destination image formation process by addressing these gaps.

2.4.4. Conceptual frameworks in previous destination image studies

The review of the literature revealed different approaches in proposing and evaluating destination image conceptual frameworks. One stream of studies argues that destination image formation is based on two components: first, cognitive evaluation, which is based on the individuals' knowledge of a destination; second, affective appraisals, which is the individual's feeling towards the destination (Beerli & Martín 2004a). For example, the findings of the Beerli and Martín (2004a) study highlight the nature of cognitive evaluation of a tourist destination towards a destination. The authors argue that cognitive image is based on the assessment of the attributes. These attributes can be resources or attractions a destination provides for the tourists. Based on their study, attractions are divided into categories such as seeing scenery and participating in desired activities. Accordingly, these attractions provide motivations for the individuals to visit a place (Lew 1987). Therefore, based on the previous studies, cognitive component of a destination image is regarded as an antecedent of the affective component (Baloglu & McCleary 1999). In addition, considering both components of the image formation results in the positive, or negative, evaluation of the overall image (Baloglu & McCleary 1999).

From a marketing perspective, destination image has been discussed in brand image studies (Echtner & Ritchie 2003; Hosany, Ekinci & Uysal 2006; Qu, Kim & Im 2011). In these studies, tourist destinations are considered as brands because changes in tourism sectors, tourism products, tourist destinations and tourists' expectations show that tourists' destinations are also

specific products with an assigned brand. Because brand image has a fundamental role in the success of a product, destination image (brand image) has a critical role in the success of a tourist destination (Hosany, Ekinci & Uysal 2006).

Regarding the image formation process, the model of image formation developed by Gunn (1972) proposed the following stages: '(1) accumulating mental images of the destination, thus forming an organic image; (2) modifying the initial image after more information, thus forming an induced image; (3) deciding to visit the destination; (4) visiting the destination; (5) sharing the destination; (6) returning home and (7) modifying the image on the experience in the destination' (Beerli & Martín 2004a, p. 625). Based on these stages, the author suggested two types of images: organic and induced. Organic images are those images that are not based on commercial sources, such as information received from friends and relatives. The induced images are those obtained from commercial sources of information such as tour operators or advertisements. However, this categorisation of image formation fails to consider the influence of the individuals' characteristics on destination image formation (Stern & Krakover 1993).

More specifically, the review of the literature has shown the most influential destination image formation conceptual frameworks. These conceptual models are (not in any order of importance) the cognitive/affective/conative model (Gartner 1993); the attribute-based/holistic, functional/psychological, common/unique model (Echtner & Ritchie 1991, 1993, 2003); and the cognitive/affective/overall model (Baloglu & McCleary 1999). These models are discussed in the following sections.

The cognitive/affective/conative conceptual framework: Gartner (1993)

Based on the model proposed by Gartner (1993), the cognitive component of destination image refers to 'the sum of beliefs and attitudes of [a destination] leading to some internally accepted picture of its attributes' (p. 193). The affective component of the destination image refers to 'the motives one has for destination selection' (p. 196). The conative image is 'analogous to the behaviour' (p. 196), which implies the action components based on the image developed during the cognitive stage and evaluated during the affective stage.

White (2004) advocated this model by mentioning that there is a need for researchers to focus on visitors' attitudes towards a destination or product. Because identifying affective, cognitive and conative components of the destination image provides a platform to understanding tourists' attitudes in terms of their beliefs, motives and behaviours towards a destination. Therefore, this model is beneficial in understanding the beliefs, feelings and intentions of the

tourists to visit a destination. However, Echtner and Ritchie (2003) argue that besides considering psychological attitudes and perceptions of the tourists, physical attributes of a destination should be taken into account as well.

Agapito, Oom Do Valle and Da Costa Mendes (2013) tested the hierarchical nature of the relationship between the destination image dimensions (cognitive, affective and conative) proposed by Gartner (1993). The findings of their study confirm the theoretical model and validated that the influence of the cognitive dimension on the conative dimension is higher when mediated by the affective dimension, thus providing credence for including the latter in the current research's model. Agapito, Oom Do Valle and Da Costa Mendes (2013) also noted that a number of studies have considered a conative component of the destination image as the loyalty towards that destination.

Regarding the affective image, previous research has highlighted that the affective components (feelings and emotions) have more impact on the individual's behaviour than the cognitive dimension (Bigné, Sánchez & Sánchez 2001; Li et al. 2010). Because of the affective components' higher impact, several researchers have used methodological components based on the feelings evaluations towards a destination for tourists' segmentation (Chen 2003). However, more research is needed to test the relationship between the cognitive, affective and conative images in more specialised contexts to advance the theoretical understandings of these relationships in general and in particular. Therefore, in the current research, the relationships between these constructs are explored to reveal the differences and similarities with previous models in a more specific context.

The attribute-based/holistic, functional/psychological, common/unique conceptual framework: Echtner and Ritchie (2003)

Echtner and Ritchie (2003) proposed a framework consisting of tangible and intangible components affecting destination image. These components are 'attribute-based' which are the destination characteristics and 'holistic' components, which are the psychological characteristics of an individual influencing destination choice (Figure 2.4.1).

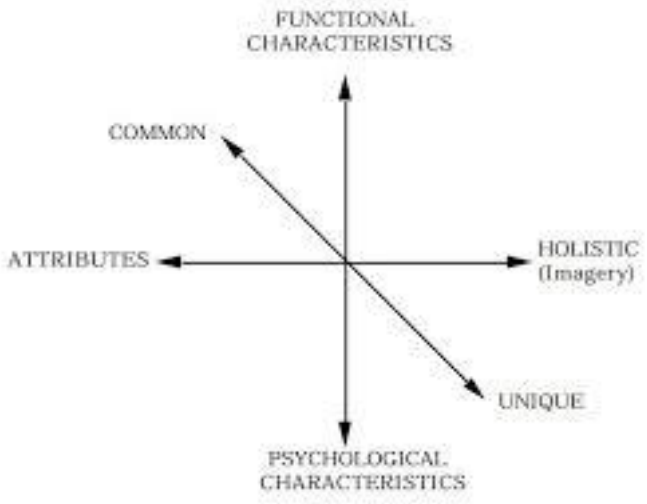


Figure 2.4.1. The components of destination image, Echtner and Ritchie (1993)

Echtner and Ritchie's model has been applied in numerous studies, especially in studies that investigated attribute components of image and open-ended questions (Li & Stepchenkova 2012; Lin, Chen & Park 2012; Prebežac & Mikulić 2008; Stepchenkova & Morrison 2008).

For example, Prebežac and Mikulić (2008) applied Echtner and Ritchie's (2003) model to measure the image of Hawaii among Croatian undergraduate business students, and the image of Croatia among Hawaiian tourism students. In their study, destination image construct include two main components which are attribute based and holistic. Images also range based on common or unique characteristics. Assessing destination image at holistic level revealed "stereotypical", "affective" and "uniqueness" and "activity-based" images. For example, based on this assessment, the image of Croatia would be described as an 'European country with beautiful nature and peaceful atmosphere, rich in culture and history, which offers great possibilities for sightseeing' (Prebežac & Mikulić 2008, p.169). Examining Croatia image at attribute-level revealed that two attributes of "beautiful scenery" and "beautiful natural attractions" attract Hawaiian tourism students.

Moreover, Stepchenkova and Morrison (2008) used Echtner and Ritchie's (2003) model to measure Russia's destination image among US pleasure travellers. Stepchenkova and Morrison (2008) enriched the measurement of destination image by using a combination of two software programs, CATPAC and WORDER, to enhance the statistical comparisons of images between visitors and non-visitors to Russia. The findings of their study show that the perceptions of Russia have often been negative among American travellers, and American travellers did not know Russia's destination features.

In another qualitative study, Li and Stepchenkova (2012) used three open-ended questions proposed by Echtner and Ritchie (2003) to measure Chinese outbound tourists' destination image of America. The authors found that Chinese outbound tourists' perceptions towards America are of a highly developed, urban, modern country featuring an advanced economy, democratic system and high technology.

In addition, using the free elicitation technique, Lin, Chen and Park (2012) asked Chinese tourists about their holistic, psychological and unique images of Taiwan. The results of this study revealed that Taiwan is perceived to be a beautiful island with attractive nature and culture, and cultural proximity makes Taiwan a sentimental destination for the Chinese.

Although the results are considerable, what lacks is that images of a destination vary from 'common functional and psychological traits to those based on more unique features, events, feelings or auras' (Echtner & Ritchie 2003, p. 7). Besides that, several empirical studies indicate that being familiar with the place, number of visits and length of stay impact on the perceived image of a destination (Baloglu & McCleary 1999; Beerli & Martín 2004b; Fakeye & Crompton 1991). Destination image also influences individual tourists' perception, behaviour and evaluation of the tourist experience (Echtner & Ritchie 1993; Gallarza, Saura & García 2002). Therefore, investigating different dimensions of the tourist destination image in a niche market such as astrotourism and its relationship with other variables add additional theoretical contributions to the body of academic tourism literature.

The cognitive, affective, overall destination image conceptual framework: Baloglu and McCleary (1999)

Baloglu and McCleary (1999) proposed a destination image model combining cognitive, affective and overall image. In this model, the cognitive component effects on affective component and overall image are affected by both affective and cognitive components. Figure 2.4.2 demonstrates their model, which includes the determinants of destination image (variety of information resources, types of information resources, age, education, socio-psychological travel motivations) and the destination image components (cognitive, affective and overall image). This model has been widely used in previous studies (Alaeddinoglu & Can 2010; Alvarez & Campo 2011; Gil & Ritchie 2009; Hung et al. 2012).

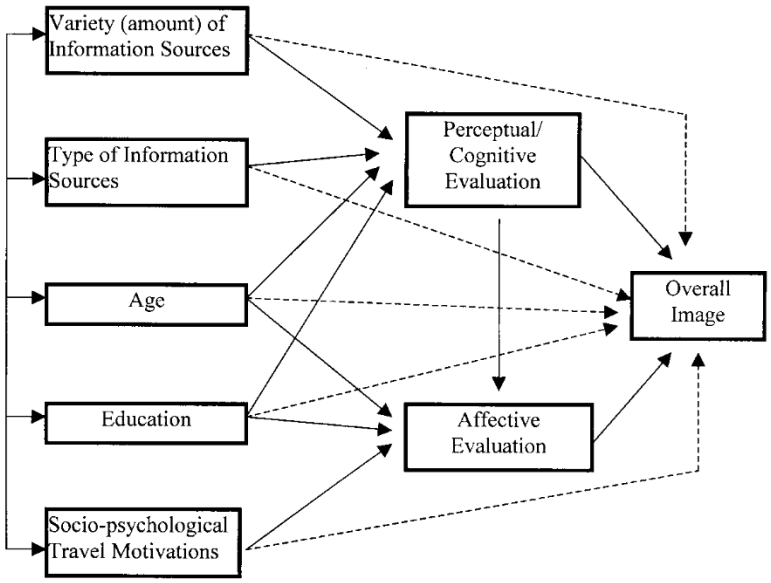


Figure 2.4.2. Path model of the determinants of tourism destination image before actual visitation, Baloglu and McCleary (1999)

Gil and Ritchie (2009) applied this model to investigate the image formation process among tourists and residents regarding museums. In their model, cognitive, affective and overall images were considered as the components of the image; visitors' information sources and motivation as condition variables; and satisfaction as a dependent variable. According to their findings, the image of a museum has a direct influence on satisfaction; both cognitive and affective dimensions of the image determine the overall image; however, the affective component has greater influence than the cognitive image. Moreover, the results show that there is no difference between tourists and residents in the image formation process and its influence on visitors' satisfaction.

In another study, Alaeddinoglu and Can (2010) investigated the destination attributes of Turkey from UK travel intermediaries' perspective based on the cognitive–affective–overall destination image model. The findings of this study revealed that, regarding the affective component of the destination image, Turkey is perceived as an arousing rather than a sleepy holiday destination; and, regarding cognitive destination image, Turkey's features are cultural and historical with natural attractions and hospitable people and appealing cuisine. Moreover, the lack and inadequacies of stability, safety, cleanliness of the environment and local infrastructures were the weak attributes of Turkey; which led to weakly good overall destination images from the UK travel intermediaries' perspectives. However, the results of this study would be more accurate if the researchers did not over-generalise the destination image to the whole of Turkey because the images of Istanbul (as a city) and Antalya (as a

resort) seem to be different. Alvarez and Campo (2011) addressed this limitation in their study. By using the same model of destination image (cognitive–affective–overall), they investigated the effect of controllable and uncontrollable stimuli on the country and destination images of Turkey. Their findings revealed that respondents evaluate Turkey more positively as a tourism destination rather than as a country. Therefore, the image of a country is perceived differently from that of a tourism destination image. Accordingly, the image of a destination needs to be narrowed down to its sub-segments; which underlines the importance of investigation on the appropriate destinations for sky observation (dark-sky sites) as a distinctive set of destinations.

2.4.5. Development of destination image formation models in recent years

Recently, several studies have attempted to develop the structure of destination image by integrating previous models and testing it in various contexts. For example, in the Echtner and Ritchie (2003) model, the attribute-based component is measured through a series of scale items ranging from tangible, or functional (beaches, shops, sports facilities, etc.), to more intangible, or psychological (receptiveness of local people, quality of service, etc.). These features are general attributes of a destination, which represent the common component of a destination image. Moreover, the holistic component of a destination image was measured by asking two open-ended questions (Echtner & Ritchie 1991, p. 11):

 ‘what images or characteristics come to mind when you think of _____ as a travel destination?

 how would you describe the atmosphere or mood that you would expect to experience while visiting _____?’

Stepchenkova and Morrison (2008) discussed that the first question is functional oriented, while the second one is a psychologically based question that shows the affective evaluation towards a destination such as exciting, boring, relaxing. Moreover, the holistic component of Echtner and Ritchie’s (2003) model resembles the overall component of the destination image because it shows the overall mental representation of a destination. Therefore, Echtner and Ritchie’s conceptual framework is in line with the cognitive–affective–overall image.

Qu, Kim and Im (2011) combined Echtner and Ritchie’s (2003) and Baloglu and McCleary’s (1999) model to develop a conceptual model for destination branding. To reach this point, they assert that the unique image of the destination should be added to cognitive and affective image affecting tourists’ behaviours through the mediating role of the overall image. Behavioural

intentions are measured through intention to revisit and intention to recommend a destination. The results of their study concluded that overall destination image plays a mediating role between the cognitive, affective and unique image as well as behavioural intentions.

Moreover, besides cognitive and affective dimensions of the image, some studies have investigated the multi-sensory image features of a destination (Huang & Gross 2010). For example, Huang and Gross (2010) measured the sensory images of Australia according to mainland Chinese travellers. These images included visual (scenic landscape features), auditory (sounds of nature), olfactory (smell of air/sea/food), gustatory (wine/juice/food) and tactile (feeling warmth under the sun). Although previous two models endeavoured to present different aspects of the destination, the sensory dimensions of destination image can be discussed and measured as a part of an affective image of a destination (Nghiêm-Phú 2014). Based on this argument, the functional, psychological and common/unique features of destination image proposed by Echtner and Ritchie (2003) can be integrated into the cognitive dimension of the Gartner (1993) and Baloglu and McCleary (1999) models.

While there is a lack of homogeneity regarding the explicit definitions of individuals' perception attributes (Beerli and Martín 2004a), scaling methods have been used in many studies to examine image perceptions (Gallarza, Saura & García 2002; Prayag 2009; Prayag & Ryan 2012; Tasci & Gartner 2007). In addition, because in some studies the validity and reliability of the adopted scales were not established, integrating structured and unstructured methods is an appropriate measurement tool to include psychometric properties (Beerli & Martín 2004b; Echtner & Ritchie 1991; Prayag & Ryan 2012; Tasci & Gartner 2007).

In a recent study, Nghiêm-Phú (2014) proposed an integrated model of destination image structure after reviewing 177 articles about destination image between 2008 and 2012. In the proposed model, destination image as a multidimensional structure has two main components: cognitive and affective. Following previous models in destination image formation, the cognitive component is divided into three elements: functional, psychological and mixed. However, their proposed model has not been examined empirically yet.

Following the previous discussion, integrating models of destination image and building a holistic model is useful to understand the destination image formation process in a relatively new market such as astronomical tourism because knowing this process helps in understanding the quality of physical experience reflected in the tourists' destination image in terms of its cognitive image from functional and psychological aspects, as well as its affective, conative

and overall image. Moreover, destination image affects tourists' decision-making towards a dark-sky site because in the astronomical observation context, the attributes of an appropriate destination have been distinguished based on several criteria, such as the 'cloudiness of skies, high elevation, freedom from the haze and humidity and vast empty spaces with little or no light pollution' (Keller 2010, p. 36). Because identifying an appropriate astronomical place is a difficult task, studies on dark-sky site images can make a contribution to improving and sustaining dark-sky sites as tourism destinations (Collison & Poe 2013).

2.4.6. Skyscape and its importance in a dark-sky site

Landscape

For most tourism and recreation activity, destination choice is a critical issue. Destinations can be defined with several approaches. Leiper (2003) defines destinations as 'places towards which people travel and where they choose to stay for a while to experience certain features or characteristics—a perceived attraction of some sort' (p. 91). On the other hand, tourism destination is referred to as a geographical region or a major attraction, which provides memorable and satisfying visitor experiences (Wang et al. 2011). On the other hand, according to the European Landscape Convention, the landscape is defined as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Barroso et al. 2012, p. 330). This definition is in line with previous studies that underlines each person may relate differently to the same landscape (Barroso et al. 2012; Gobster 1996; Gobster et al. 2007).

Broadly, there are two methodological approaches in assessing the landscape: expert approach and the subjective approach. The expert approach asserts that the aesthetic landscape qualities are the landscape characteristics themselves. However, the subjectivity approach asserts that the value of the aesthetic landscape qualities is not only related to the landscape itself but also to the observers' previous information and experiences with the landscape (Huang 2012). These two approaches can be examined in future studies simultaneously to fill the gap in the skyscape literature; if the ordinary people appreciate the aesthetic qualities of the skyscape in the dark-sky site, it shows that sceneries' appreciation is related to the skyscape itself. However, if only amateur astronomers appreciate the beauties of the sky sceneries, it can be the results of the fact that previous information and past experiences are forming these appreciations.

The importance of scenic landscape has been discussed by Brown (2006). Brown (2006) presents a method for measuring and analysing development options for tourism and residential development on Kangaroo Island, South Australia, using a survey research technique. In this study, the researcher has used a Kangaroo Island Map Dots to show the place values in terms of aesthetic/scenic value, economic, recreation, life sustaining, learning value, biological, spiritual, intrinsic, heritage, future, therapeutic and wilderness value, special places and development/no development places. According to his findings, tourism development preferences are closely related to recreation, economic and scenic landscape values. However, residential development preferences are associated with recreation, economic and learning values. Moreover, preferences for the 'no development' option are closely associated with wilderness and intrinsic values of the landscape.

Reviewing the literature, Huang (2012) assessed the visitors' responses to the changes of Taiwan's landscape from an agricultural scenery to a recreation-oriented scenery. This study advocated the idea that tourism is one of the major causes to change the landscapes because of the physical contacts of people and places (Terkenli 2002). The findings of the study show the visual features of the agricultural and tourist landscapes perceived differently. Moreover, participants preferred tourist landscapes more than agricultural landscapes. The findings also showed that, apart from historicity, the visual landscape characters played an influential role in participants' preferences for both agricultural and tourist landscapes. Accordingly, one of the benefits of research about the visitors' appreciation of scenery is the development of rural tourism.

Moreover, previous research has shown that landscape image consists of the landscape structural elements, which are reflected in the 'visual expression of the overall landscape characteristics' (Krause 2001). Moreover, tourist landscapes are important in forming the relationship between visitors and places (Terkenli 2002). Because tourists seek experiences that they cannot find in their daily lives (MacCannell 1992; Selwyn 1996), destinations should offer a site with unique characteristics and experiences to make themselves an attraction for tourists (Leiper 1990).

Previous studies explained that landscape preferences form based on the differences between demographic groups, personalities, previous experience and culture (Herzog et al. 2000; MacKay & Fesenmaier 1997; Zube & Pitt 1981; Zube, Sell & Taylor 1982). For example, MacKay and Fesenmaier (1997) found individual characteristic variables were weaker

predictors of landscape preferences generally, although each of them had different effects. For example, age and marital status did not influence the landscape preferences; income and gender were significant predictors for specific types of images; however, familiarity with the landscape was a significant factor in the landscape preferences formation process. With the same line of reasoning, previous studies in landscape preference literature found that how people judge a landscape is based on their demographic profile, especially their age and gender as well as their familiarity with the landscape (Ulrich 1993; Weaver & McCleary 1984).

In an early study, MacKay and Fesenmaier (1997) discussed the pictorial element of the landscape in image formation. They examined how the content of promotional visuals affects image formation. Visuals are the pictorial, photographic, educational and promotional materials used in a destination. The findings show that by using promotional visuals, three landscape perception elements and four dimensions of image were projected. Three dimensions of the visuals (uniqueness, attractiveness, texture) in landscape perception were the most significant predictors of the destination image. Individual characteristic variables were weaker predictors of destination image generally, although each of them had different effects. For example, age and marital status did not influence the destination image interpretation; income and gender were significant for specific types of images; however, familiarity with the destination was consistently a significant factor in destination image dimensions. This means that the more familiar individuals are with a destination, the more psychologically attached they are and they are closer to the holistic, psychological and unique dimensions of a destination. However, visitors unfamiliar with a destination are closer to the attribute, functional and common dimensions of the destination image. Unfamiliar market segments used their cognitive evaluation of visuals in landscape preferences to form a destination image; however; familiar market segments used affective evaluation of visuals to form their destination image. The findings of this study support the idea of landscape perception elements as significant predictors of destination image formation. Moreover, it supports the significance of familiarity with the destination across all image dimensions. However, applying different methodology techniques like focus groups has changed the results associated with familiarity. Focus group results show the predictor effect of familiarity on affective evaluation of the visuals and lack of familiarity with cognitive evaluation. The unique contribution of this study is integrating visual elements of a landscape into the methodology by using image survey. However, this paper has only focused on the role of pictorial elements of a landscape in creating

a destination image without considering other elements like verbal messages and managerial practices.

In addition, Bruwer and Lesschaeve (2012) examined eight dimensions in developing a winescape construct. In their study, which was undertaken in a Canadian wine region, the natural beauty of the landscape was found as the most important dimension of the winescape. In a similar study, Quintal, Thomas and Phau (2015) found that winescape setting has a significant influence on wine tourists' attitude. In another study, Faggi et al. (2013) examined the importance of water as landscape feature viewing by visitors and locals. The findings of this study showed that the respondents' profile has a significant effect on their preferences. In line with previous studies, the results confirmed that water is preferred regardless of the gender. However, differences between the perceptions of visitors and residents were in line with the differences in their residency place and their study on watercourse management. Moreover, water was important for the visitors because of its visual aesthetic value, not for its benefits like drinking, swimming, fishing, etc. In addition, scarcity, mystery and familiarity were found as possible explanations in water preferences. In this study, landscape features include water, emotion, colour, maintenance, extension/horizon, animals, nature, wilderness, sounds of nature and vegetation. However, the sky was not considered as a distinct element of nature. Aside from that, nature is a general term, and it cannot be measured as a separate item in this study because animals, water, vegetation etc. are already part of nature. Therefore, the main gaps are the reason to separate nature not being clear and the effect of the sky is not measured as a distinct part of nature.

Following the previous discussion, familiarity with a destination represents a key marketing variable in market segmentation because people who are more knowledgeable about a destination tend to have more positive images of the destination (Baloglu & Mangaloglu 2001; Crompton 1979; Stepchenkova & Mills 2010). This familiarity can play both positive and negative roles in the image evaluation and it has been mainly associated with past experience. This means that the more familiar individuals are with a destination, the more psychologically attached they are and they are closer to the holistic, psychological and unique dimensions of a destination (Quintal & Polczynski 2010). However, visitors who are unfamiliar with a destination are closer to the attribute, functional and common dimensions of the destination image. Unfamiliar market segments used their cognitive evaluation of visuals to form a destination image; however, familiar market segments used affective evaluation of visuals to form their destination image. Accordingly, the current research's sample only included those

tourists who have visited a dark-sky site before and have participated in an astronomical tour during the last three years to investigate the current market of astrotourists who are already familiar with a dark-sky site.

In astronomical tourism settings, place has been considered as a landscape where dark skies at night are without 'artificial light pollution' as well as containing other attributes like cloudiness of skies, high elevation, without haze and humidity and vast empty space (Collison & Poe 2013; Keller 2010). Because these particular settings are rare and unique; it is important to understand visitors' experience and evaluations of images. This understanding can make a great impact on improving and developing new experiential products among this market.

In addition, the image is described as 'a mental picture formed by a set of attributes that define the destination in its various dimensions' (Beerli & Martín 2004a, p. 623). Therefore, because in astronomical tourism the area perceived by people is 'sky' not land, and the sky has its own required set of attributes to be defined as an appropriate sky observation site, the 'skyscape' is formed to be considered in a dark-sky site.

Destination attributes

Previous research has considered the important role of tourist attitude and place attributes in the decision-making process (Deutsch, Yoon & Goulias 2013). Hence, recent studies argue that there is a need to use psychological interactions of tourists to a place and place characteristics because it will be helpful to attract the special-interest market and provide a great insight in travel behaviour models development (Deutsch, Yoon & Goulias 2013). Thus, it is important to investigate how tourists experience a destination to light the way in which destination marketers can develop a destination based on tourists' expectations and experiences.

Destination attributes are features of a destination associated with a destination's perceived image, which can be defined through cognitive, affective, conative and global evaluations (Baloglu & McCleary 1999; Beerli & Martín 2004a; Kaplanidou et al. 2012). Destination image measurement is varied across different studies. Beerli and Martín (2004a) provided a list of attributes derived from previous literature. These dimensions include natural resources, general infrastructure, tourist infrastructure, tourist leisure and recreation, culture history and art, political and economic factors, natural environment, social environment and atmosphere of the place. Previous literature has demonstrated the influence of these destination dimensions on tourists' intention to visit a destination (Baloglu & McCleary 1999; Gartner 1993; Lee, Lee & Lee 2005; Tapachai & Waryszak 2000; Woodside & Lysonski 1989). However, the

examination of destination attributes of sky observation places (sites) has not been discussed in the tourism literature. Therefore, there is a need to investigate the sky features and the appropriate sites for sky observation to be able to measure these attributes in terms of their destination image dimensions.

Moreover, destination attributes are the principal determinants of destination attractiveness and the reason why people visit certain destinations (Vengesayi 2008). Moreover, core resources and attractors of a destination are the primary elements of destination appeal and fundamental reasons for prospective visitors to choose one destination over another (Crouch & Ritchie 1999). The core resources and attractors are based on seven major types, namely *the physiography* of a destination based on its landscape, scenery and climate; *the culture and history* of a destination; the range of *available activities* at a destination; the various *special events* offered by a destination to make a memorable experience for visitors; *destinations' superstructure*; the *types of entertainments* and the *strength of market ties* as a major catalyst for destination visitation (Crouch & Ritchie 1999, p. 3).

Following the previous line of discussion, it can be inferred that landscapes are the tangible product resulting from the interaction between people and a specific geographical site (Huang 2012). Different groups of people have different expectations of what a landscape should provide for them and they search for different landscapes with different qualities based on their expectations (Kaplan & Kaplan 2011; Kearney et al. 2008; Palmer & Hoffman 2001). For example, Barroso et al. (2012) showed in their study that the landscapes' preferences among various types of users can be assessed with high precision based on specific features of the landscape if the adopted design of the study carefully addressed the differences. Therefore, people who are considering the sky as an important element in their landscapes have different expectations and look for special features of the landscape, which needs to be addressed carefully.

As discussed in Section 2.4.2, previous literature has indicated that common attributes of a destination range from abstract to tangible. Abstract attributes are such as the opportunity for adventure, and common attributes are such as sceneries. These classifications failed to classify sky features in one of the categories. On the one hand, sky features can be considered as sceneries and on another hand, they can be considered as an opportunity to try something new, and have an adventure because of the unique places where astronomical activities take place. Moreover, in the landscape aesthetic literature, photographs of sceneries have been used to

identify the landscape preferences based on four variables: physical features, land cover types, informational variables and perceptual variables (Kaplan, Kaplan & Brown 1989). In their categories, the sky has been considered as a physical attribute of a destination.

Regarding the importance of skyscape in a dark-sky site image formation, it should be noted the current research is beneficial for the special-interest tourism market because special-interest tourism is a tourism sub-segment involving tourists attracted to a destination based on its specific attractions and activities such as sky features (Novelli 2005).

2.4.7. Selection of the destination image formation dimensions in the context of astronomical tourism

While the dimensions of destination image formation within tourism originate from the models discussed earlier, the appropriate dimensions need to be examined differently in the context of new emerging tourism contexts and specialist segments such as astronomical tourism. To choose these dimensions in the current research, attitude theory in marketing has also been researched. Attitude theory and destination image theory have similar roots. For example, attitude definition is also diversified across different disciplines. Attitude is defined as 'a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related' (Allport 1935, p. 810). Previous researchers have also suggested the three components of affective, cognitive and conative for attitude (Bagozzi et al. 1979). These three components in marketing reflect the same explanations, as affective component is feelings, cognitive component is beliefs and conative component is to act towards a product or brand (Zufan & Koklarova 2014).

The following components have been identified to be part of the model in examining the destination image formation process in an astronomical tourism context:

- *Cognitive dark-sky site image*

According to the empirical studies, because the cognitive image lacks homogeneity in attributes, the cognitive component of the image is the central factor in understanding the tourists' behaviour (Hunt 1975). Moreover, measuring cognitive components of a destination image result in better understanding of tourists' perceptions and achieving reliable data to assist destination planners (Chen 2001).

Because of the importance of cognitive destination image formation, previous studies proposed various concepts to measure it. As discussed earlier, the components are physical (tangible) to psychological (intangible), attribute-based to functional or holistic to psychological, etc. because cognitive dark-sky site image provides a full picture of the necessary items on how the destination image is formed based on all functional, psychological and mixed astronomical destination attributes. These attributes in astronomical tourism studies are totally different from other tourism segments. For example, one of the functional attributes of a dark-sky site image is haze-free environment (Keller 2010). Therefore, the cognitive dark-sky site image needs to be discussed and measured accurately in the astronomical tourism context.

- *Affective dark-sky site image*

The affective component of the destination image refers to the favourable, unfavourable or neutral feelings towards a destination (Stepchenkova & Morrison 2008).

According to the environmental and psychological literature, cognitive and affective elements are interrelated, where the affective element is mostly dependent on the cognitive element (Baloglu & McCleary 1999). Other studies support these findings (Anand, Holbrook & Stephens 1988; Beerli & Martín 2004a, b; Holbrook 1978; Li et al. 2010; Lin et al. 2007; Russell & Hogan 1980; Stern & Krakover 1993). Moreover, Russell and Snodgrass (1987, p. 246) noted that 'estimated, perceived, or remembered affective quality of an environment' influences the behaviour.

Agapito, Oom Do Valle and Da Costa Mendes (2013) discussed that although previous researchers claim that to gain a better understanding on how people assess the places, the affective component of image should be separated from the cognitive component (Baloglu & Brinberg 1997; Cai, Wu & Bai 2004; Li et al. 2010; Russell & Hogan 1980; Russell & Snodgrass 1987), there is a lack of empirical support to show the influence of both cognitive and affective images on the conative images of a destination.

According to Huang and Gross (2010), previous researchers focused mainly on examining the cognitive component of the destination image (Echtner & Ritchie 1991; Murphy 1999; Ryan & Cave 2005). However, it is important to investigate the affective component of the destination because of the key role of emotions in tourists' decision-making procedure (Hsu et al. 2008). Therefore, investigation of the affective component of a destination image is

worthwhile, especially when the discussion is about the emotions and affections of the individuals participating in an emerging niche tourism like astronomical tourism.

- *Overall dark-sky site image*

Although an exact definition of overall image is still elusive, several researchers described it in various forms (Han, Hsu & Lee 2009). Some early researchers defined overall image as the individuals' beliefs, thoughts and impressions about a place (Crompton 1979; Kotler, Haider & Rein 1993). Moreover, Assael's (1998) overall image is a consumer's total perceptions about a product (which can be tourism products) formed by processing information from various information sources. In addition, in another study, overall image refers to the positive, negative or overall evaluation of a product, brand or tourism destination (Beerli & Martín 2004a). Although researchers proposed different definitions, it seems that all of the definitions have a common thread in which forming an image of a product or place is a complex process through integrating various components of the image.

In empirical studies by Baloglu and McCleary (1999a, b) and Stern and Krakover (1993), the direct influence of the cognitive and affective image on the overall image and the indirect influence of the cognitive image through affective image have been shown. One of the important reasons to select the overall image is because it is greater that its parts and simplifies the decision-making process by tourists as well as destination marketers and managers to plan about a destination (Baloglu & McCleary 1999; Beerli & Martín 2004a, b; Echtner & Ritchie 1993; Stern & Krakover 1993; Agapito 2013). However, studying each dimension of the destination image helps in better understanding the complexity of the overall destination image (Gartner 1993; Kim & Yoon 2003; Li et al. 2010; Russell & Snodgrass 1987).

Assaker, Vinzi and O'Connor (2011) discussed that although tourists evaluate each component of a destination separately, dissatisfaction with one element leads to a negative overall image and evaluation. Therefore, in this study, the overall dark-sky site image is considered beside the other dark-sky site image component as an overall evaluation and image towards a destination.

Moreover, Baloglu and McCleary (1999a) empirically checked the relationship between tourists' motivations, the affective and overall destination image. The results of their study revealed a moderate relationship between these components. However, because their results were based on only one of the five factors of motivations that were directly related to the

affective destination image, they point out that their findings need to be assessed further. Therefore, in the current research, the relationship between these components will be assessed for more clarification and in a different context.

- *Conative dark-sky site image*

Gartner (1993), Pike and Ryan (2004) and White (2004) acknowledged another dimension in the destination image construct named conative or behavioural element. Conative image refers to how a tourist behaves towards a destination based on his/her cognition and affect about that destination (Stepchenkova & Morrison 2008). This behaviour is reflected in the individual's actual behaviour, intention to revisit, to recommend and to spread the positive word of mouth (Bigné, Sanchez & Sanchez 2001; Gartner 1993; Konecnik & Gartner 2007; Pike & Ryan 2004; Tasci & Gartner 2007; Tasci, Gartner & Cavusgil 2007). A number of researchers have associated this component to the loyalty towards a destination (Bigné, Sanchez & Sanchez 2001; Bigné Alcañiz, Sánchez García & Sanz Blas 2009; Cai, Wu & Bai 2004; Chen & Gursoy 2001; Chi & Qu 2008; Li et al. 2010; Petrick 2004; San Martín & Rodríguez del Bosque 2008).

Measuring conative image is important because it reflects the likelihood of destination choice and selection as well as a tendency to visit a destination (Pike & Ryan 2004). As discussed by Agapito, Oom Do Valle and Da Costa Mendes (2013), the overall destination image model of Gartner (1993) consisting of conative dimension is supported by previous studies (Dann 1996; Pike & Ryan 2004; Tasci & Gartner 2007; Tasci, Gartner & Cavusgil 2007); however, the relationships among the components have been only partially validated (Baloglu & McCleary 1999; Beerli & Martín 2004a, b; Konecnik & Gartner 2007; Li et al. 2010; Lin et al. 2007). Therefore, it is important to study the components of destination image separately to understand better how people evaluate, choose and behave towards a destination (Baloglu & Brinberg 1997; Cai, Wu & Bai 2004; Li et al. 2010; Russell & Hogan 1980; Russell & Snodgrass 1987). Previous models, such as the model proposed by Nghiêm-Phú (2014), fail to consider the conative component of image formation, although this component provides a reliable basis for destination marketers and managers to invest in the niche and emerging tourism markets.

2.5. Essential concepts in understanding tourists' behaviour in astronomical tourism context

2.5.1. Recreation specialisation

Recreation specialisation, as a research concept, was exposited and expanded in two studies by Bryan (1977, 1979). The first study focused on anglers, whereas the second expanded to other recreation activities including hiking, skiing, canoeing and hunting. The main goal of Bryan's studies was to provide the conceptual framework to help managers better understand the diversity in a given recreation activity amongst its participants (Bryan 1977, 1979).

Initially, recreation specialisation was defined as 'a continuum of behaviour from the general to the particular, reflected by equipment and skills used in sport and activity setting preferences' (Bryan 1977, p. 175). This definition suggests that tourists can be classified in a continuum from general/casual tourists who have low involvement in tourism activities to specialised/expert tourists who have high involvement. Within each level, behaviours and orientations are distinctive (Bryan 2000). In this later study, the level of specialisation is dependent on certain criteria, such as skill, setting preference, type of equipment owned, prior experience and club membership. However, some scholars discussed the limitations of this theory in reflecting individual characteristics such as participants' affective attachment and commitment (McIntyre 1989; McIntyre & Pigram 1992). For example, in a study by Block, Black and Lichtenstein (1989), the relationship between a runner's experience and the importance of equipment ownership was negative. In other words, the type of equipment does not indicate the commitment level or involvement in an activity. Nevertheless, numerous studies in recreation specialisation have considered equipment ownership as one of the important criteria in recreation specialisation (Lee & Scott 2004; McFarlane 2004; Morgan & Soucy 2009; Oh & Ditton 2008; Tsaur & Liang 2008).

In the meanwhile, Little (1976) developed a specialisation loop consisting of cognitive, behavioural and affective systems into a personal recreation involvement system. These three systems mutually reinforce one or another. This loop was important in fulfilling the limitation of Bryan's study in reflecting the affective system in recreation specialisation (McIntyre & Pigram 1992).

McIntyre and Pigram (1992) expanded the concept of recreation specialisation by integrating Bryan's and Little's studies to create a new construct described as 'enduring involvement'. Components of enduring involvement—namely 'self-expression, enjoyment, importance and

centrality' are equivalent to the affective system of Little's recreation specialisation loop (McIntyre 1989). The behavioural system also indicated participation frequency, and the cognitive system is related to the participants' skill and knowledge. McIntyre and Pigram's (1992) investigation determined three aspects of recreation specialisation for vehicle-based campers, namely self-expression, attraction and centrality.

Scott and Shafer (2001) further refined the concept of recreation specialisation. They highlighted the developmental process of participants in a recreational activity towards higher levels of involvement in the long run. To modify McIntyre and Pigram's (1992) loop, they proposed specialisation in terms of a progression of behaviours, skills and knowledge, as well as personal and behavioural commitment in outdoor and indoor recreational activities such as fishing and playing bridge (Scott & Godbey 1994).

First, behavioural progression refers to the individual's preference to participate in a particular activity rather than other activities. Scott and Shafer (2001) argued that experience years, participation frequency, types of equipment, number of visited sites and owning books and magazines related to the activity are indicators of behavioural progression that can be helpful in measuring the level of behavioural involvement in the activity (Lee & Scott 2004; Scott & Shafer 2001). Second, skill and knowledge progression differ in various types of activities as well as participants' desire to develop their skill and knowledge within a particular activity (Scott & Shafer 2001). The final progression is personal and behavioural commitment. Personal commitment refers to the individuals' identity development in defining themselves within a recreational activity. Behavioural commitment refers to 'a strong affective attachment and inner conviction that activity is worth doing for its own sake' by investing financial and emotional resources (Scott & Shafer 2001, p. 329). According to Scott and Shafer's (2001) study, recreational activities can be viewed as 'central life interests' if these activity participants possess personal and behavioural commitments.

Although Bryan (1977) treated specialisation as a progression through three stages of involvement starting as novices, developing through establishment stage and ending as experts, Scott and Shafer (2001) debated the validity of this progression. They pointed to the lack of research to investigate the extent of recreationists' progress towards advanced levels over time. Similarly, in the study of canoeists and kayakers, Kuentzel and McDonald (1992) observed that experience and commitment do not increase linearly over time. Moreover, recent studies also support that there is no evidence for recreational activities participants' moving forward

along the specialisation continuum (Kuentzel & Heberlein 2006, 2008; Oh, Sorice & Ditton 2010; Scott & Lee 2010). Therefore, in recreation activities, progression can be considered as an exception instead of a rule (Kuentzel & Heberlein 2006).

In previous literature, recreation specialisation theory has been examined using a variety of approaches. Some examined the relationship between various dimensions of recreation specialisation or what dimensions need to be included under recreation specialisation (Lee & Scott 2004). Others treated it as an independent variable and examined its effect on other dependent variables such as behaviour, motivations, satisfaction and place attachment (Needham & Vaske 2013). For example, Lee and Scott (2004) investigated the relations of a three-dimensional model of recreation specialisation. Their study about the bird-watching specialisation revealed that behaviour, skill and knowledge and commitment were moderately related but did not reinforce mutually. Put simply, some birdwatchers participate in the activities regularly but they did not have the required skill and knowledge, while some may participate infrequently but have high skill and knowledge. Following the same line of reasoning, accurate data collection of recreation specialisation is required to obtain reliable results.

In addition, Oh, Sutton and Sorice (2013) proposed that anglers' specialisation was indirectly related to their substitutability of fishing sites through experience preferences, consumptive orientation and place attachment. The results of their study revealed that as specialisation in fishing increased, anglers became more attached to specific locations and they were less likely to substitute these specific fishing areas with other ones.

In tourism studies, various market segmentations approaches have been applied to identify different typologies of the nature-based tourism market (Kim & Brown 2012; Kim et al. 2010; Scott & Thigpen 2003). Numerous studies on market segmentation classified the typologies of tourists based on their demographic variables, socio-economic variables, behavioural patterns, psychographic and geographic characteristics (Kim & Brown 2012; Park et al. 2002). Although these typologies give insight in market segmentation, they are not reflective of previous experience, skills and knowledge of the tourists, which are all important for identifying different levels of expertise in an astrotourism market. Scott et al. (2005) argue that recreation specialisation typology helps in understanding a big picture, which includes past experience and skills as well as their involvement. The typology used in the current research reflects the novice-advanced continuum, which has been considered as an important segmentation in

astronomical tourism studies because the classification of the astronomical tour activities are based on their level of skill and knowledge compared with other general nature-based tours (Eagle 2014b).

In the context of astronomical activities, generalists can be defined as people who are mainly interested in the night sky as one part of the natural environment and casually participate in activities like stargazing parties. In contrast, specialists are those who are highly motivated to track the positions of stars, variable stars, eclipses, comets and meteors as well as astrophotographers who frequently participate in astronomical activities and tours in appropriate locations. Therefore, it is important to study this heterogeneous market to satisfy the needs of this specialised tourism group.

Moreover, in astronomical activities, skills and knowledge represent the ability to identify star constellations, types of stars like dual or variable, ability to distinguish planets from stars, understanding night sky maps and tracking night sky calendars, which shows different events happening each month as well as the ability to identify appropriate equipment and working with them (Eagle 2014b). The last component of specialisation, which is called behavioural components, include variables such as level of experience (past, general and recent), frequency of participation in related activities, equipment, type of activity and involvement years (Bryan 1977; Hammitt & McDonald 1983; Schreyer 1984; Burr & Scott 2004; Scott & Thigpen 2003; Virden & Schreyer 1988; Weekley 2002). Previous studies have applied this theory in different settings, such as special leisure activities (e.g. fishing, climbing and birdwatching) and sports. The results of these studies show that behavioural and attitudinal components of this theory have played independent roles on other dependent variables such as preferences for a certain setting in a special tourism market (Bryan 2000).

Lehto, O'Leary and Morrison (2004) investigated the relationship between specialist travel and travel behaviour and the results support the recreation specialisation theory. In this study, tourists who were more interested in choosing a special set of activities were those who have frequently travelled to the same destination. Returning tourists make more focused decisions in special types of activities and sense of a certain place. Thus, it is important for destination marketers and planners to understand 'who would be interested in doing what?' to match the attractions and activities in a destination with the demand of the different segments of the specialised tourists (Lehto, O'Leary & Morrison 2004; Smith 1994).

Apart from targeting the repeat visitor market, it is argued that offering different packages from a destination marketing perspective should consider this important criterion to identify whether tourists are casual, experts or a mix of both (Lehto, O'Leary & Morrison 2004). It is noted that specialisation segmentation can help in conducting more specific research from the casual–expert continuum. In the context of astronomical tourism, identifying different segments of astrotourists (e.g. novice vs advanced tourists) will help to provide specialised packages, tour programs, tour guides and equipment to meet the needs of each segment (Eagle 2014b).

In particular, understanding the relationships between constructs like recreation specialisation and destination image dimensions (cognitive, affective, overall and conative image) moderated by astrotourists' motivation and demographic characteristics is beneficial in improving marketing communication messages and creating different images while offering distinct products and unique experiences for each segment.

Several studies examined the prediction of other variables, such as experience preferences, consumptive orientation and motivation based on recreation specialisation theory (Oh & Hammitt 2012; Virden & Schreyer 1988) in different contexts other than astronomical tourism. Recreation specialisation theory is helpful to identify skills, expertise and knowledge of astrotourists, especially targeting experts who have higher levels of skills and involvement in astronomical observations such as the ability to identify star constellations, types of stars and utilising appropriate equipment (Eagle 2014b). However, few studies have been found that surveyed the market segmentation of astronomical tourism. Most researches have been focused on motivations of astrotourists or general profiles of them (Collison & Poe 2013; Weaver 2011); but there is a lack of empirical research on different types of tourists, their activities, their experiences, their needs and expectations based on specialisation segmentation, and how these needs are connected to the tourist destination image formation. Therefore, recreation specialisation theory gives an in-depth understanding of tourists' perceptions, preferences, and decision-making towards a specific destination, which is helpful in linking to the destination image conceptualisation (Bricker & Kerstetter 2000; Oh & Hammitt 2012).

Although it seems that specialisation would be associated with place attachment because of the special activities taking place in a specific location and repeated travelling to the destination, previous studies have not provided a significant or direct relationship between specialisation and destination image (Bricker & Kerstetter 2000; Oh & Hammitt 2012). In the astronomical context, this relationship needs to be investigated to reveal whether in a specific activity the

results will be the same or it will have a reverse result in various specialisation segments such as novice to advance. Based on the specific requirements for choosing an appropriate astronomical setting to offer astrorelated activities, more studies are needed to examine the process of image formation between astrotourists with an astronomical destination.

2.5.2. Motivation

Motivations are internal forces that lead individuals to act to achieve their goals, wants and needs (Hudson 2008). Motivations come from the biological and cultural background of each individual, and these factors influence tourist experiences, behaviour and decision-making (Pearce 1988). Fodness (1994) states that motivations are internal psychological factors such as needs and wishes that lead to a tension in the mind and body of an individual, which makes him/her act to reduce the tension and satisfy her/his needs. In this respect, motivation in the tourism context refers to the needs that make an individual participate in a tourism activity, which is mainly based on psychological needs (Crompton 1979; Park & Yoon 2009)

In tourism, there are several motivation theories that have been used, e.g. Maslow's Hierarchy of Needs, push and pull factors, Travel Career Ladder and Travel Career Pattern (Damijanić & Sergo 2013; Hudson 2008; Kozak, Metin 2002; Maslow 1943). Travel Career Ladder has been proposed as an important theory in tourism studies. This theory is based on Maslow's Hierarchy of Needs and is developed by Pearce and Caltabiano (1983), Moscardo & Pearce (1986) and Pearce (1988, 1993). This theory has been developed by considering other motivation theories and tries to propose a sound theory that leads to offering a modified framework called Travel Career Pattern (Blamey 1998; Pearce 2005; Ryan 1998; Todd 1999). This theory examines the intrinsic and extrinsic tourist motivations in different layers. These layers are classified as core motives, middle layer motives (extrinsic and intrinsic) and outer layer motives. Core motives are novelty (fun, difference), escape/relax (away from routine, resting) and relationships (with family, friends). Middle layer motives (extrinsic) are self-development through host-site involvement (meeting locals), kinship (being with considerate, respectful others) and nature (harmony and appreciation). Middle layer motives (intrinsic) are self-actualisation (new life perspective) and self-enhancement (skills, mastery). Outer layer motives are isolation (away from crowds), stimulation (daring experience), social status (experiencing fashionable places), nostalgia (reflecting on memories), autonomy (obligated to no-one) and romance (having romantic relationship) (Pearce 2005). This classification makes the theory more beneficial to

identify primary motivations associated with a specific tourism market; such as astronomical tourism.

Travel Career Pattern is a recently adjusted theory in tourist motivation containing previous motivation factors mentioned in other approaches such as push and pull motivation theory. The theory contains all elements that make a 'sound theory' in travel motivation; by acknowledging not only intrinsic, but also extrinsic motivation. This classification is missing in the push and pull motivation theory; therefore, travel career pattern theory will be helpful in gaining an overall view of the motivations in special-interest tourism markets. In addition, tourists' motivation can be studied based on their actual experiences (Pearce 2005; Pearce & Panchal 2010).

Travel Career Pattern has been applied in several studies such as spa tourism (Pearce & Panchal 2010), international tourists (Pearce 2005), backpackers' motivations (Paris & Teye 2010) and health motives (Panchal & Pearce 2011). According to these studies, each tourism segment has its own motivations. For example, applying this theory in spa tourism highlighted relaxation and wellbeing as the key motivations in spa tourism and these motives are in connection with different levels of travel experience (Pearce & Panchal 2010). In addition, in the backpackers' motivation study, cultural knowledge and relaxation were found to be core motivations (Paris & Teye 2010). The outstanding feature of the travel career pattern approach is investigating travel experience levels from bottom to top (Wang & Pizam 2011). Applying this theory is useful not only because of making a connection between tourist motivation and experience, but also because of identifying the gap of whether the expectation/motivations have been met after the travel experience or not. This gap identification can make a contribution in terms of creating unique experiences for the tourists.

Recent research suggests that tourist motivations (personal factors) are one of the most important factors influencing the final assessment of a destination experience (Morgan, Lugosi & Ritchie 2010; Ryan 2002). For example, Kyle, Mowen and Tarrant (2004) examined motivational factors of 1500 residents who visited their surrounding urban park and their attachment to this setting. In this study, motivation factors such as learn, activity, nature and social have been considered as predictors of place dimensions (place dependence, affective attachment, place identity and social bonding). The results of this study indicate that each dimension of motivation positively influences each dimension of place, and its strength increases over time regardless of the participants' historical involvement with the provider.

This study notes the need to understand factors affecting dimensions of place, which will result in better management of the natural settings based on the diversity motivations of the various visitors. However, there is a lack of research on what motivates them, how they have experienced a place and how these motivations influence place dimensions. Understanding these gaps will help to modify and improve tourism offers for future destination marketing and product positioning (Wang & Pizam 2011).

Nature-based tourists often use push and pull motivation theory because nature-based tourists pursue more general motivation patterns to choose a destination (Blamey 1998). In contrast, Travel Career Pattern Theory concentrates on tourist career development as well as self-actualisation with a good background of the learning (Pearce & Panchal 2010). Therefore, it is worthwhile to consider the Travel Career Pattern to identify which intrinsic and extrinsic motivations are more associated with astronomical tourists.

Previous literature has also shown that tourists' personal characteristics such as motivation interact with destination images (Krider et al. 2010). Motivation as a reflection of people's needs and wants is also linked to the choice of activities and destination choice (Gee, Makens & Choy 1997; Hsu, Tsai & Wu 2009; Moscardo et al. 1996). Moreover, motivations to learn include the belief to see iconic and unique attractions of a destination and to participate in the activities, which lead to gain more education and knowledge (Ashwell 2015; Crompton 1979).

Following the previous discussions on motivation theories, Brown, Driver and McConnell (1978) suggested the Recreational Experience Preference (REP) scale as a measurement tool based on the expectancy valence model of human behaviour to understand the visitors' motivations. According to this model, 'individuals will engage in a given recreational activity at a given location because of particular expectations of positively valued psychological outcomes' (Raadik et al. 2010, p. 234). In early research, Driver and Tocher (1970) defined recreational experience as 'the sum of the participants' mental, physical, and spiritual responses to the recreational engagement' (Raadik et al. 2010, p. 233). Later, Brown, Driver and McConnell (1978) expanded this concept and developed four levels of demands for recreation opportunities, including activities, setting, experiences and benefits. Raadik et al. (2010) utilised REP items to explore the visitors' motivation in a Northern European national park. The results of their study revealed four REP dimensions, namely self-discovery, experience of places, seeking solitude and challenging self.

Accordingly, in the current research, the mentioned theories are considered in the scale development of motivational patterns in an astronomical tourism context. After analysing the qualitative data, the results are compared with the previously developed scales to identify the similarities and differences and to design a contextualised scale to measure astrotourists' motivations.

In addition to the previous discussions, the indirect role of motivation as a moderator or mediator has been discussed in previous studies. For example, Phillips and Jang (2007) studied the moderating role of motivation between cognitive and affective destination image and visitors' intention to visit New York City. The sample of their research was college students, and the results of their study confirmed the moderating role of motivation. In other words, they found that the influence of cognitive and affective image on the visit intention are regulated based on the visitors' motivation levels. That is, with the same cognitive and affective image, visitors with higher level of motivation are more likely to visit a destination compared with those with a lower level of motivation. As a result, it is important to consider motivation as the moderator that influences the relationship between the astronomical tourists' recreation specialisation and their dark-sky site image dimensions to choose a natural environment to satiate particular desires and needs.

Put differently, given that recreation specialisation influences the dark-sky site image components, it is important to investigate the role of motivation in regulating this influence. Therefore, the results of the current research fill the gap to answer for astrotourists with the same recreation specialisation level; those with higher level of motivation are more likely to have higher levels of cognitive, affective, conative and overall image.

2.5.3. Future behavioural intentions

The importance of destination image on tourists' behaviour has been discussed in earlier literature (Tasci & Gartner 2007). This importance has reflected the influence of both overall image and other destination image components on the consumers (tourists) behavioural factors (Chen & Hsu 2000; Chen & Kerstetter 1997; Leisen 2001; Rittichainuwat, Qu & Brown 2001; Sirakaya, Sonmez & Choi 2001; Tasci & Gartner 2007). Previous scholars discussed this influence in different stages of the travel, pre-visit, during the visit and post-visit, although a few researchers have attempted to investigate the influence of image after visiting a destination (Dadgostar & Isotalo 1992; Tasci & Gartner 2007). Therefore, this gap needs to be addressed to identify how tourists tend to behave based on their destination image to satisfy the needs of

the destination marketers. Moreover, this identification advances the theoretical knowledge by recognising the differences of tourists' image relationship with behavioural intentions before and after their travel.

In addition, tourism destination images affect tourists' decisions because of the intangibility of the tourists' destination products (Tasci & Gartner 2007). The extent of this influence is different based on different components of the destination image. For example, some scholars suggest that cognitive images have more influence on tourists' decision-making and their behaviours than affective images (Crompton 1979; Tapachai & Waryszak 2000; Walmsley & Young 1998).

Previous literature revealed that destination image influences tourists' destination choice (Tasci & Gartner 2007). Some scholars focused on the importance of positive yet strong images of destination to influence tourists' destination choice (Hunt 1975). However, some other scholars underlined the importance of distinctive features of a destination that influence the choice of tourists (Bramwell & Rawding 1996). Tourists with different needs and interests choose their destinations based on the destinations' unique features (Joppe, Martin & Waalen 2001). These tourists with special needs and interests search for the benefits that a destination offers them to satisfy their expectations (Gartner 1989; Tapachai & Waryszak 2000; Tasci & Gartner 2007). For example, Gartner (1989) emphasised that a 'benefit package, unique to the destination, expected to provide the greatest intrinsic reward to the traveler'.

Finally, although there are several studies looking at relationships between destination image components and tourists' post-visit behaviour, no consensus exist on whether all components of destination image affect future behavioural intentions and whether they affect revisit intention and recommendations to the same extent (Chen & Phou 2013; Tasci & Gartner 2007). Especially there is scarce research to differentiate between the conative image of a destination or tourists' past behaviour and its relationship with future behaviour in terms of their willingness to pay and participate in a similar tour in a near future. Therefore, in the current research, these gaps regarding the post-visit behaviour of tourists in a niche tourism segment such as astronomical tourism is addressed. In the current research, future behavioural intentions compose the factors to investigate the relationship between destination image components and future behavioural intentions regardless of a specific destination to fulfil previous gaps in the literature.

2.5.4. Demographic characteristics

Tourists' demographic characteristics and their influence on destination image formation processes have been extensively investigated in previous studies (Baloglu & Mangaloglu 2001; Chen & Kerstetter 1997; Hirschman & Holbrook 1982; MacKay & Fesenmaier 1997; Rittichainuwat, Qu & Brown 2001). These demographic characteristics include age, gender, household income level, education level and number of visits. In previous studies, tourists' demographic characteristics were discussed with different approaches. Some studies have suggested that identification of the tourists' demographic characteristics play a significant role in a destination image formation process and development of a niche market (Crouch et al. 2009; Tasci & Gartner 2007). For example, Dann (1996) states, 'no two people see a destination in exactly the same way' (pp. 52–53). However, some other scholars argue that demographic characteristics of individuals have no significant influence on their market choice (Hunt 1975; Litvin & Kar 2003). For example, Hunt (1975) claimed that an image of a product is independent of the costumers' demographic profiles.

In addition, the results of the previous studies of the influence of tourists' characteristics on destination image were also different (Tasci & Gartner 2007). For example, the results of a study by Krider et al. (2010) revealed that tourists' personal characteristics like age, gender and life cycle stage moderate the tourist destination image. They state that understanding how different groups of tourists' characteristics interact with destination images assists in developing marketing strategies for specific destinations.

The tourism literature shows that demographics have an influence on destination choice (Koo, Wu & Dwyer 2010; Lew & McKercher 2006; McKercher 1998); or activity selection in a tourism destination (Kutzner & Wright 2010; Moscardo & Pearce 1999; Ryan & Huyton 2000). For example, in some studies, age has been considered as a significant variable especially with the strong position of baby boomers in tourism demand (Kutzner & Wright 2010; Moscardo & Pearce 1999; Ryan & Huyton 2000).

Previous studies have also discussed the influence of demographic factors on recreation specialisation levels. For example, previous studies have concluded that males have higher recreation specialisation levels than females (Gertner 2010; Kim & Perdue 2011; Lee et al. 2008; Scott & Godbey 1994). Therefore, it is important to examine the influence of demographic profile of tourists for different tourism markets to identify their differences and target them specifically.

2.6. Research propositions

A conceptual model developed by Pearce (2005) provides an overview of the different factors associated with tourist behaviour before, during and after their travel experience. Understanding the connection between these factors provides valuable benefits for destination marketers to manage tourist experiences more efficiently. This model is useful in identifying the important factors that are forming tourist behaviour and can provide a platform to choose the necessary elements in developing an emerging tourism segment like astronomical tourism. With regard to the conceptualisation of each construct, the current research develops the following propositions:

The literature shows that the affective dimension of the destination image arises from the cognitive dimension. Although some researchers argue that the affective component of destination image should be separated from the cognitive image in their influence on the conative image to achieve a better understanding on how people assess a place (Baloglu & Brinberg 1997; Cai, Wu & Bai 2004; Li et al. 2010; Russell & Hogan 1980; Russell & Snodgrass 1987), other researchers discussed that there is a relationship between destination image and tourists' behaviour and action towards the destination (conative destination image) based both on their cognition and affect (Beerli & Martín 2004a, b; Bigné et al. 2001, 2009; Konecnik & Gartner 2007; Stepchenkova & Mills 2010; Tasci & Gartner 2007; Tasci et al. 2007). However, there is a lack of empirical support to reveal the influence of both cognitive and affective image on the conative image of a destination and researchers excluded conative image in their studies (Zhang et al. 2014; Agapito, Oom Do Valle and Da Costa Mendes 2013). It is only recently that Stylos et al. (2016) concluded that conative image is important to determine tourists' future behaviour. Hence, this argument informs the first four propositions of the current research:

Proposition 1: There are significant relationships between astrotourists' cognitive dark-sky site image and their affective, overall and conative dark-sky site image and their future behavioural intentions.

Proposition 2: There are significant relationships between astrotourists' affective dark-sky site image and their overall and conative dark-sky site image and their future behavioural intentions.

Proposition 3: Astrotourists' overall dark-sky site image has a significant influence on their conative dark-sky site image.

Proposition 4: There is a significant relationship between astrotourists' conative dark-sky site image and their future behavioural intentions.

In previous literature, determinants of destination image have focused on tourist motivation factors (such as learn, activity and nature) (Kyle, Mowen & Tarrant 2004); tourist demographic and demographic characteristics (like age and education) (Jorgensen et al. 2005) and tourist involvement factors (such as attraction, self-expression and centrality to lifestyle) (Gross & Brown 2008; Kyle et al. 2003). This has given the researchers the opportunity to expand and test which determinants have stronger predictive abilities, how these determinants influence destination image and where these relationships may be stronger or weaker. However, because tourists' demands for experience quality in special-interest tourism is changing and they conceptualise each place differently (Carter 1977 in Gustafson 2001), it is now more valuable to examine how astronomical tourists recreation specialisation and their cognitive, affective, conative and overall dark-sky site image and future behavioural intentions differ based on their characteristics in terms of their demographic profiles (gender, age, education level, marital status, income, occupational status). Hence, the fifth proposition for the current research is:

Proposition 5: There are significant differences in the astrotourists' specialisation segmentation, cognitive, affective, conative and overall dark-sky site image and future behavioural intentions based on their demographic profiles (gender, age, education level, marital status, income, occupational status).

Because tourist destination image formation in an astronomical tourism setting is complex, one theory is necessarily insufficient to examine the destination image formation and the relationship between each component and as well as other determinants and moderators between these relationships. In this sense, recreation specialisation theory focuses on tourist high to low specialised in special-interest tourism (Bryan 2000). Previous studies have indicated the role of tourist specialisation in the differences between each segment past experience, involvement and self-development (Graefe 1981; Kuentzel & Heberlein 1997; Kuentzel & McDonald 1992). However, few studies have considered the role of tourist specialisation segmentation as an independent variable influencing tourist destination image components. Given the expected growth of astronomical tourists, more research should be conducted to classify them based on their specialisation. Therefore, research on these

relationships makes a major theoretical contribution in understanding complex relationships between the heterogeneous astronomical market, psychological factors and dark-sky site image components. Consequently, the sixth proposition of the current research is:

Proposition 6: There are significant differences in astrotourists' cognitive, affective, conative and overall dark-sky site image and future behavioural intentions based on their specialisation level (novice, intermediate, advanced).

Previous studies on recreation specialisation theory focused on different approaches. For example, some of them discussed the classification of special-interest tourists based on recreation specialisation (Kim et al. 2010). Some other studies tested the three-dimensional model of recreation specialisation to fit in different contexts like birding specialisation (Lee & Scott 2004). A number of studies have treated recreation specialisation as an independent variable influencing other variables such as conservation attitudes and behavioural intentions (Jett 2007) or place attachment (Oh & Hammitt 2012). In addition, one of the previous studies has focused on the role of recreation specialisation as a moderator variable. Thapa, Graefe and Meyer (2005) examined the mediator and moderator effects of scuba-diving specialisation. The results of their study showed the strong partial mediator role of specialisation between knowledge and behaviour of scuba divers, but no significant influence as a moderator has been found. However, the need for more research about the role of recreation specialisation as an independent variable and its influence on destination components is needed. Study on the role of astrotourists' recreation specialisation segmentation provides a deep theoretical contribution in understanding astronomical tourist behaviour and destination image formation on different levels. Hence, based on the above arguments, the seventh proposition of the current research is:

Proposition 7: There are significant relationships between astrotourists' recreation specialisation and their cognitive, affective, overall and conative dark-sky site images and their future behavioural intentions.

Motivation has been considered as an important construct because the individual's behaviour is driven by the 'pursuit of specific outcome' (Kyle, Mowen & Tarrant 2004, p. 441). However, no study has examined how the mentioned relationships are moderated by motivation in a new context like astronomical tourism that can help destination marketers to differentiate their destinations and offer iconic experiences based on tourists' perspective. Therefore, the moderating role of astronomical tourists motivations reveals the differences in the relationships

between predictor variable (recreation specialisation) and the dependent variables (dark-sky site image components). Based on the above argument, the eighth proposition of the current research is:

Proposition 8: The strength of the relationships between astrotourists' recreation specialisation and their cognitive, affective, overall and conative dark-sky site image are moderated by astrotourists' motivation levels.

2.7. Conclusion

In summarising the literature review, it is useful to suggest the main gaps discussed in this chapter.

- In the tourism destination image formation process, the role of sky features in attracting a special segment of tourists has been neglected and there is lack of research about astronomical tourists and astronomical tourism.
- Destination image definition is somehow a vague concept that needs to be contextualised within a specific setting and from a specific tourism market to reduce its ambiguities.
- For the astronomical tourism segment, there is a lack of investigation on their motivations, specialisation levels and destination image formation process.
- The influence of recreation specialisation on destination image components and moderating role of motivation between their relationships is unexplored.
- The role of motivation as a moderator is not explored in the relationships between destination image dimensions and recreation specialisation.
- There is lack of empirical support to examine simultaneously the relationships among these variables incorporating four components of destination image and their impact on future behavioural intentions in an astronomical tourism context.

3 RESEARCH METHODOLOGY

3.1. Introduction

The previous chapter discussed the literature about specialisation segmentation, destination image, motivations and tourism marketing. In addition, fundamental gaps in the literature have been identified and discussed. This chapter discusses the research methodology development to answer the research questions (see Section 1.4.). A mixed-methods approach for each phase is discussed in detail within the sequential exploratory design, following consideration of data sources, sample and methods of analysis. It is worth noting the distinction between a paradigm, research methodology and research methods. A paradigm is defined as a 'worldview, complete with the assumptions that are associated with that view' (Mertens 2003, p. 139). Research methodology is 'a broad approach to a scientific inquiry specifying how research questions should be asked and answered' (Teddlie & Tashakkori 2009, p. 21). Research methods are specific procedures to conduct a specific research, including sampling, data collection, analysis and interpretation (Teddlie & Tashakkori 2009).

3.2. Research Design

3.2.1. Paradigm, methods and methodology of the research

To address the research questions of developing (1) an understanding of the concept of astronomical tourism, astronomical tourist and dark-sky site image, (2) a comprehensive model of the proposed concepts in dark-sky site image formation, recreation specialisation and motivation and (3) a measurement tool to measure dark-sky site image, motivation and recreation specialisation in the astronomical tourism context, a combination of interpretivism (constructivism) and positivism paradigms has been used. This combined paradigm is called pragmatist (Teddlie & Tashakkori 2009).

In general, interpretivism and positivism are two popular paradigms in ontological and epistemological discussions. Ontology refers to the reality (Hudson & Ozanne 1988) and epistemology to the relationship between the researcher and reality (Carson et al. 2001). On the other hand, in a positivist paradigm, researchers believe that there is a single reality in the world for any research phenomenon regardless of the researcher's perspective (Hudson & Ozanne 1988). Therefore, researchers apply a structured approach in conducting research by

identifying a clear topic, proposing appropriate hypotheses, being detached from the participants and applying only statistical and mathematical techniques to reveal the reality behind the single phenomenon (Carson et al. 2001; Churchill, Brown & Suter 2010). Thus, a positivist paradigm is practised by quantitative researchers.

On the other hand, the interpretivists believe that reality is relative and depends on the systems of meaning (Hudson & Ozanne 1988; Neuman 2014). Interpretivists attempt to capture the meaning behind the complex nature of reality. Although they usually have a prior insight of a phenomenon under study, they assume their knowledge is insufficient to develop a comprehensive and fixed research design (Black 2006; Carson et al. 2001; Hudson & Ozanne 1988). Thus, an interpretivist paradigm is practised by qualitative researchers. It should be noted that interpretivist paradigm is also called a constructive paradigm (Hudson & Ozanne 1988).

During the past 20 years, the pragmatist paradigm has been added as a third approach that is interested in both qualitative and quantitative data and analyses. This paradigm is practised by mixed-methodologists, and it is defined as ‘a deconstructive paradigm that debunks concepts such as ‘truth’ and ‘reality’ and focuses instead on ‘what works’ as the truth regarding the research question under investigation’ (Teddlie & Tashakkori 2009, p. 8).

As mentioned earlier, mixed-methodologists are more interested in applying a pragmatist approach in their studies. The mixed-methods research approach originated in the late 1980s in various areas, such as management, education and sociology, although it is relatively new in business research (Creswell 2014). This method is involved with the process of collecting and analysing both qualitative and quantitative data (Creswell 2014; Harrison & Reilly 2011). Multimethod, mixed-methodology, integrating, synthesis, quantitative and qualitative methods are other terms when using both qualitative and quantitative data in a single study; however, mixed-methods has become the most common term (Bryman 2006; Johnson 2003; Teddlie & Tashakkori 2009). Mixed-methods has been defined as ‘research in which the investigator collects and analyses data, integrates the findings and draws inferences using both qualitative and quantitative approaches and methods in a single study or program of inquiry’ (Tashakkori & Creswell 2007, p. 4). Therefore, mixed-methods was chosen as the label in the current research.

In the current research, the researcher applied the pragmatist paradigm wherein the researcher attempts to understand and interpret the motives, meanings and reasons for astronomical

tourists participating in astronomical tours; and tried to be open to new knowledge and develop the idea of astronomical tourism and destination image formation in this context with the help of informants (interpretivist). Later, the researcher endeavoured to apply the positivist paradigm to see to what extent the findings from an interpretivist approach were accurate to generalise and predict the hypotheses within the astronomical tourism domain.

Therefore, mixed-methods approach was selected in the current research, because qualitative and quantitative data are combined to develop a deeper understanding of the research outcome and to overcome the limitations of each method (Creswell 2009). At a practical level, mixed-methods provide a sophisticated approach with access to both qualitative and quantitative data which is appealing to those interested in new research procedures (Creswell 2009). Moreover, at the procedural level, the mixed-methods approach provides a deeper and more complete understanding of the research problem (Creswell 2009); and it can simultaneously answer a range of exploratory and confirmatory research questions (Teddlie & Tashakkori 2009). The aim of using mixed-methods in the current research was to develop a better measurement instrument by first interviewing and analysing the qualitative data and then incorporating the specialised instrument to the study sample (Creswell 2009; Bryman 2006).

Regarding the typologies of mixed-methods research, several typologies are proposed in various disciplines (Creswell 2003; Sandelowski 2000; Tashakkori & Teddlie 1998, 2003; Teddlie & Tashakkori 2009). Although many typologies overlap in their terminologies and the logic for the steps of conducting mixed-methods research, choosing the best typology helps researchers to decide how to proceed and which paths are the most suitable for their research (Teddlie & Tashakkori 2009). For example, Harrison and Reilly (2011) have examined both the rationales for selecting a mixed-methods approach, and the type of designs: exploratory, explanatory, embedded, concurrent and hybrid in their analysis in the marketing field.

As suggested by previous studies, integrating qualitative and quantitative approaches leads to achieving deeper knowledge and understanding of the tourists' characteristics, attitudes and behaviours (Echtner & Ritchie 1993; Milman & Pizam 2005). In mixed-methods designs, qualitative and quantitative data can be applied in any combination, but they should be built on each other to achieve accurate findings (Creswell 2014; Mason, Augustyn & Seakhoa-King 2010; Pearce & Uk-Il 2005). Moreover, Johnson (2003, p. 299) asserts that 'methods should be mixed in a way that has complementary strengths and non-overlapping weaknesses', which is essential for mixed-methods research.

To select the specific research design for the current research, the researcher applied the typology proposed by Creswell and Plano Clark (2007) with the selection of an exploratory sequential mixed-methods design type. This typology selection was due to the clear aims and options that are proposed by Creswell and Plano Clark (2007). For example, in the typology proposed by Teddlie and Tashakkori (2009), they have not clearly mentioned what typology needs to be considered for the studies with instrument development purpose. Moreover, the studies that conduct qualitative interviews to design the quantitative instrument could be classified in either conversion design type (quantifying the qualitative data) or sequential mixed designs. Therefore, following a review of the mixed-methods design types proposed by Creswell and Plano Clark (2007), an exploratory sequential mixed-methods design was selected to enrich the current research because, first, applying this method with both qualitative and quantitative methods has helped the researcher answer the proposed questions and hypotheses with more accuracy (Bryman & Bell 2011). Second, because implementing the previous measures without evidence to new fields increases the bias of the measures to be 'out of context' (Pike & Page 2014, p. 216); the qualitative phase of the research permitted the researcher to develop the scale in the context of astronomical tourism (Bryman 2006). Third, the intent of the exploratory sequential mixed-methods is to develop better measurements by incorporating the data from a specific sample of the population in the qualitative phase. After designing the measurement, it can be determined whether those data from the qualitative phase can be generalised to a larger sample of the population in the quantitative phase (Creswell 2014). The notation for the current research is qual →QUAN = validate exploratory dimensions of the study by designing and testing the instrument.

Following the previous arguments, it is worth noting that the logic behind mixed-methods is both inductive and deductive logic and is described as the inductive–deductive research cycle. This cycle may be seen as moving from particular (e.g. observations, interview data) to general inferences (e.g. theory), then from the general (e.g. theory, conceptual framework) to the particular (e.g. hypotheses) (Teddlie & Tashakkori 2009) (Figure 3.2.1). In the current research, the researcher first built a conceptual framework based on the current literature, theories and intuition, which involved an inductive process (Teddlie & Tashakkori 2009). Then, based on the developed theoretical framework, the hypotheses were proposed and measured, which involved a deductive process.

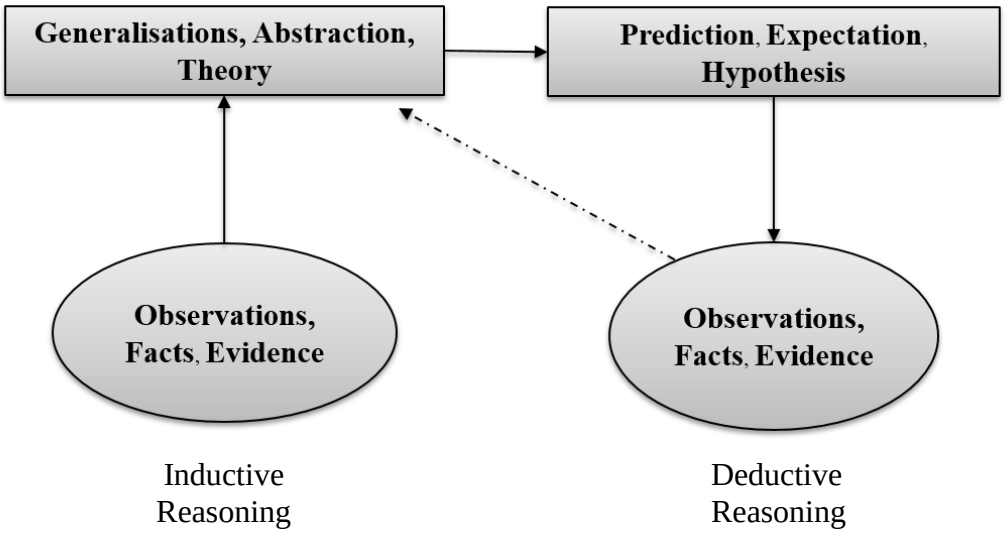


Figure 3.2.1. The inductive–deductive research cycle, Teddlie & Tashakkori (2009)

3.2.2. Sampling strategy of the research

In general, sampling means selecting a unit of analysis to help a researcher answer research questions in the study; and a unit of analysis refers to people, groups or settings that a researcher wants to express the results about when the study is completed (Teddlie & Tashakkori 2009). Following the definitions, in the current research, individual case studies (astronomical tourists) are the units of analysis. Moreover, the sequence qual → QUAN mixed-methods sampling has been applied in the current research. This sampling strategy was selected based on the research questions and hypotheses. Therefore, the sequential mixed-methods sampling in the the current research involves applying purposive sampling for the qualitative phase to draw rich information about destination image formation in astronomical tourism and its dimensions; and applying probability sampling for the quantitative phase to select a large number of astrotourists to be representative of the astronomical tourists' population. This approach helped the researcher generate the results with both 'depth and breadth' (Teddlie & Tashakkori 2009). Therefore, in the current research, the qualitative approach primarily has involved interviews with astronomical tourists; while the quantitative approach was conducted through the use of a survey. The sampling strategies for each phase are fully discussed later (see Section 3.3).

3.2.3. Data collection strategy of the research

In the current research, the mixed-methods data collection strategy has been applied. Johnson and Turner (2003) presented a typology of mixed-methods data collection strategy in which

observation, unobtrusive, focus groups, interviews, questionnaires and tests are categorised as data collection strategies. Then, each strategy is discussed in qualitative research, mixed-methods research and quantitative research. For example, in interviews, a researcher conducts an interview with each participant with a mixture of open-ended questions (e.g. the definition of an astronomical tourist) to achieve rich information and close-ended questions (e.g. classification of astronomical tourists) with predetermined responses (Johnson & Turner 2003, Tashakkori & Teddlie 2009). The data collection strategies for each phase are fully discussed later (see Section 3.2).

3.2.4. Determining data quality strategy of the research

Data quality in mixed-methods research is assessed using the separate standards for qualitative and quantitative research (Tashakkori & Teddlie 2009). When both phases have quality data, then the overall data has high quality (Tashakkori & Teddlie 2009). Therefore, regardless of the data collection process, the researcher needs to deal with two questions to assess the data quality:

First, 'To what extent am I truly measuring what I intend to?' in which the question assesses the measurement validity in quantitative research; or 'Have I truly understood the intention of the respondents' point of view in answering the questions, or it is my own comprehension?' in which the question assesses the credibility of the qualitative research (Tashakkori & Teddlie 2009). In mixed-methods research, because both measurement validity and credibility are assessed, the overall quality of the data is better captured (Tashakkori & Teddlie 2009). For example, in the current research, the researcher has identified the items in the measurement scales through interviews in which besides assessing the credibility of the qualitative data, the items have been tested again in the quantitative analysis to measure the data validity as well.

Second, 'Supposing I am measuring/understanding what I intend to, is my measurement/interview content consistent across all measures and contents with little error?' in which the question assesses the measurement reliability in quantitative data and dependability in qualitative data (Tashakkori & Teddlie 2009). Once more, applying both data quality procedures in a mixed-methods research led to better data quality (Tashakkori & Teddlie 2009).

Moreover, because most of the attributes in behavioural research cannot be observed directly, researchers' answers to these questions are often ambiguous (Tashakkori & Teddlie 2009). To

overcome this limitation, the researcher has to 'define the constructs in an observable and recordable manner' (Tashakkori & Teddlie 2009, p. 209). In addition, to determine if researchers' definitions and measurements are observable and recordable, researchers have to use face validity and experts' judgements, which refer to judgemental validation in quantitative research and peer debriefing in qualitative research (Tashakkori & Teddlie 2009). Therefore, the mentioned mixed-method data quality procedure has been applied in the current research and is discussed in detail in the following sections (see Sections 3.3, 3.4).

In summary, the following table outlines the procedure for data collection and the outcome of each step. To collect qualitative data, snowball sampling was used that resulted in 24 interviews with astronomical tourists. The interviews were undertaken by telephone and were recorded to obtain the audiotapes. Later, the interviews were transcribed and analysed through content analysis to develop items for the questionnaire. The questionnaire was also pilot tested and its reliability was measured. Finally, the data collection for the quantitative phase was undertaken, the results were analysed and discussed in their relevant chapters.

Table 3.2.1. Current research procedure

	Procedures	**Products**
qual data collection	Snowball sampling	Diverse sample (n = 24)
	One-on-one telephone interviews	Audiotapes
qual data analysis	Transcription	Transcribed texts
	Content analysis	Coded interviews
qual findings	Identified items for each variable with supporting quotes	Developed items
Instrument development	Developed survey instrument based on qualitative findings	Table of survey items for each variable
	Pilot-tested survey instrument	Survey instrument (50 questions)
QUAN data collection	Selected new sample	Representative sample (n = 657)
	Administered survey instrument electronically	Item scores
QUAN data analysis	Descriptive statistics	Means, standard deviations and internal consistency)
	Structural equation modelling analysis	Coefficients and ρ values
QUAN results	Reported statistical results	Summary tables
		ANOVA, SEM
QUAN discussion	Discuss and interpret what was learned overall	Discussion

3.3. Phase one: qualitative research design

Phase one of the current research consisted of semi-structured in-depth interviews with astronomical tourists who have participated in astronomical tours. This phase was needed to identify items for the survey instrument used in the quantitative phase (second phase). The

information of this phase will be used to confirm and select the most important words needed to measure the variables across astronomical tourism. This approach helps to reduce the number of unrelated questions that might be misinterpreted and poor responses due to the inappropriate length of the questionnaire (Saunders & Lewis 2012). The semi-structured interviews with astronomical tourists were used to gain a stronger understanding of their dark-sky site image in a detailed examination based on their specialisation continuum and how differences along the astronomical tourist motivation and demographic characteristics affect the relationships between the proposed variables. This understanding is valuable to distinguish core elements of each construct identified by astrotourists, hence allowing for more effective interpretation of research outcomes.

Table 3.3.1 outlines the differences between in-depth interviews, convergent interviews and focus groups. As it shows, the main objective of the in-depth interviews is to obtain rich and detailed information. Because definitions of astronomical tourism and appropriate destinations for sky observation needed to be operationalised, and to develop a questionnaire, detailed information about the constructs under the study were needed; the researcher has applied in-depth interviews to obtain rich knowledge about the concepts and detailed information to design the questionnaire items.

Table 3.3.1. Differences between qualitative data collection, Rao and Perry (2003)

Characteristics	**In-depth interviews**	**Convergent interviews**	**Focus groups**
Main objective	To obtain rich and detailed information	Narrow down research focus	Group interaction
Level of prior theory	Low	Low	To obtain insights into various ideas
Process	Flexible-unstructured to structured	Structured process with continuous refinement	Flexible-unstructured to structured
Content	Unstructured to structured	Unstructured	Unstructured
Strengths	Replication	Progressive	Synergistic effect in a group setting
Weaknesses	Results may be biased and are not for theory testing	Potential interviewers bias, requirement of interviewers knowledge and not sufficient on its own	Confirming effects of a group setting

3.3.1. Identify key themes for interview

Based on the recommendations in previous studies, the important literature in the marketing, tourism and tourism management fields was reviewed to develop the preliminary questions (Rao & Perry 2003). The literature review aimed to identify the destination image, recreation

specialisation and motivation dimensions used in previous studies. Although there was limited literature in the astrotourism area, sufficient literature in the destination image literature helped the researcher to develop the preliminary theoretical model and interview discussion guide before commencing the interviews. By interviewing the experts, the researcher could identify the new insights on how to address and measure the destination image in astrotourism destinations. These insights were assessed against the existing literature and with the themes that were investigated in the remaining interviews. The interview questions were also reviewed by academic staff and expert astrotourists to increase the validity in the study context.

3.3.2. Participants

For the qualitative phase of the the current research, the purposive-sampling technique was applied. Purposive sampling is associated with 'selecting a relatively small number of units because they can provide valuable information related to the research questions under examination' (Teddlie & Tashakkori 2009, p. 25). In addition, when applying a purposive-sampling method, it is important to select interview participants based on key characteristics (Bryman & Bell 2011). To select informants using this technique, the expert judgements of researchers and informants are required (Tashakkori & Teddlie 2009). Because purposive sampling focuses on achieving the depth of information from the participants (Tashakkori & Teddlie 2009), particular participants with specific knowledge about astronomical tourism were selected for the the current research. Moreover, to be more specific, it should be noted that Tashakkori and Teddlie (2009, p. 174) have classified the typology of purposive sampling into three basic families, namely:

Sampling to achieve representativeness or comparability; which means a sample is selected with the purpose of choosing the closest sample to a broader group or with the purpose of comparing different cases. This category includes six sampling techniques, typical case sampling, extreme and deviant case sampling, intensity sampling, maximum variation sampling, homogeneous sampling and reputational sampling.

Sampling special or unique cases in which the purpose is to sample a particular individual or group case. This category has four sampling techniques, revelatory case sampling, critical sampling, sampling politically and complete selection.

Sequential sampling in which the main aim of a researcher is to generate a theory or themes and the gradual selection of the samples is based on their relevance to the research aims. This

category has four sampling technique, theoretical sampling, confirming and disconfirming cases, opportunistic sampling and snowball sampling.

After a thorough literature review and considering the research questions of the study, snowball sampling has been selected as the sampling strategy for the qualitative phase of the current research. Snowball sampling is a 'chain referral sampling method that relies on referrals from initial subjects to generate additional subjects' (Johnston & Sabin 2010, p. 38).

While snowball sampling has a bias in regard to the generalisation of the findings (Bryman & Bell 2011), in the current research, the aim of the interviews was to generate the survey instrument. Moreover, snowball sampling is appropriate in qualitative research when considering a small and specialised population (Rao & Perry 2003). Therefore, by applying snowball sampling, the researcher could access the participants with an interest to be interviewed, select the appropriate participants based on their knowledge, expertise and experience and interview them.

The next step in the sampling strategy is to draw the sampling frame. The sampling frame is a resource that a researcher can select a smaller and qualified sample (Mason, Augustyn & Seakhoa-King 2010). Moreover, a purposive sample frame is usually informal and the selection is based on the researcher's judgement (Tashakkori & Teddlie 2009). Therefore, the sampling frame of this study was 32 astronomical societies' presidents in Australian states who were mainly identified through searching their societies' website. The researcher contacted them via telephone and email to obtain accurate information about their programs, their tours and the number of tour participants as well as confirmation to conduct the interviews. Moreover, to overcome the limitation of interviewing only advanced astrotourists, novice astrotourists who were not in charge of any astronomical tours were interviewed. After being contacted, 14 presidents confirmed their willingness to be interviewed and they introduced the other 10 astrotourists who were their societies' members. To select these astrotourists, the researcher participated in several seminars and tours to have direct contact with them and ask their willingness to participate in the interview. Upon their acceptance and participation in the study, the researcher requested if they can refer another astrotourist to be interviewed. It is worth noting that, although many of the astronomical societies' presidents were tour operators themselves, the researcher sought their views and answers as astronomical tourists; besides, the tour guides and operators, themselves, were still participating in many tours as astrotourists.

Regarding the sample size for qualitative research, reviewing previous literature showed rarely if ever do qualitative researchers justify their rationale to choose a sample size for the interviews; moreover, there is not any specific guideline to ensure the sample size estimation for qualitative interviews (Marshall et al. 2013). However, qualitative methodologists discussed that the number of interviews varies depending upon factors such as the quality of the interviews, sampling process and researcher experience (Marshall et al. 2013; Morse 2000; Patton 2015). After a comprehensive review of the qualitative interviews, Marshall et al. (2013) recommended between 20 and 30 interviews for grounded theory qualitative studies and Tashakkori and Teddlie (2009) suggested 6 to 24 sample size for the case studies of individuals. In addition, some qualitative researchers advised that the key to identifying enough interviews is when the researcher reaches saturation (Krueger & Casey 2009). In purposive sampling, saturation refers to the point when the researcher cannot achieve more new information to develop the themes by adding more units (Tashakkori & Teddlie 2009). Following the recommendation and considering the saturation point, 24 participants with an average of 14 years' experience were interviewed in the the current research, whose characteristics are shown in Table 3.3.2. Experience year was determined by asking how many years they had been a member of an astronomical society.

Table 3.3.2. Characteristics of interview participants

Interview Participants	Astronomical Society	Gender	State	Years of Experience
Arkaroola wilderness Sanctuary and Resort Owner and Astrotour Guide	Astronomical Society of South Australia	Male	South Australia	55
Astrophotographer and Astrotourist	Southern Astronomical Society Inc.	Male	Queensland	4
Astrotour guide	The Astronomical Society of NSW Inc. /The OzSky Star Safari	Male	New South Wales	25
Astrotourist 1	Astronomical Society of Western Australia	Female	Western Australia	5
Astrotourist 2	Astronomical Society of South Australia	Male	South Australia	10
Astrotourist 3	University of New England and Northern Tablelands Astronomical Society	Male	New South Wales	12
Astrotourist 4	Astronomy Group of Mount Isa	Male	Queensland	8
Astrotourist 5	Astronomical Society of South Australia	Male	South Australia	4
Astrotourist 6	Astronomical Society of South Australia	Male	South Australia	5
Astrotourist 7	Adelaide Planetarium's Supernova group	Female	South Australia	5
Astrotourist 8	University of New England and Northern Tablelands Astronomical Society	Female	New South Wales	20
Astrotourist 9	Perth Observatory Volunteer Group	Male	Western Australia	2
Astrotourist10	Astronomical Society of South Australia	Male	South Australia	10
Celestial Vision Owner	Astronomical Society of Western Australia	Male	Western Australia	30
Earthside Astronomy Founder and Astrotour guide	Astronomical Society of Western Australia	Male	Western Australia	6
Founder of SkyWatch Astronomy Education	Astronomical Society of South Australia	Male	South Australia	22
Planetarium Program Officer and Astrotour Guide	Sir Thomas Brisbane Planetarium	Male	Queensland	10
President 1	Monash University Astronomical Society	Male	VIC	4
President 2	Clarence Valley Astronomical Society	Male	New South Wales	5
President 3	Macarthur Astronomical Society	Male	New South Wales	13
President and Astrotour guide	Astronomical Society of South Australia	Male	South Australia	43
Stargazer Club Founder and Astrotour guide	Stargazer Club Western Australia	Female	Western Australia	10
Vice President 1	Astronomical Society of Western Australia	Male	Western Australia	12
Vice President 2	Astronomical Society of South Australia	Male	South Australia	6

3.3.3. Interview procedure

The overall qualitative data collection approach for the current research was to 'conduct the semi-structured interview, audiotape the interview and transcribe the interview' (Creswell 2009, p. 193).

Step 1: Contacting the respondents:

Once the initial sample had been identified, all participants were invited to participate in the research via email and/or telephone in January 2016. Following that, the participants received the information letter (Appendix A) explaining the purpose of the research, the question themes and their rights (regarding the confidentiality and anonymity issues). By sending the information sheet, the respondents were informed that the interview would be recorded, transcribed and the information would be used for the research. If requested by the respondents, a copy of the interview guide was sent via email before the interview. All respondents were also asked if they are willing to receive a summary of the findings. At the conclusion of the interviews, the researcher also asked about the quality of the questions. Many respondents were very interested in receiving the overall findings of the research and they indicated that the questions were great to understand more about astrotourists and develop astronomy in the tourism field.

Step 2: Time and setting:

Except for one face-to-face interview, all 23 interviews were conducted via telephone. The researcher selected telephone interviewing because the respondents were from the whole of Australia and face-to-face interviewing was almost impossible. In addition, because astronomy was considered as a recreation activity for many respondents, they preferred to be contacted outside working hours. The average length of interviews was 50 minutes, although the duration of the interviews was based on the experience of the respondents and their available time (total interview time ranged from 25 to 90 minutes).

Step 3: Establishing rapport and neutrality:

Before beginning each interview, the researcher introduced herself and provided a brief overview of her interest in the research and the research purpose. In addition, the researcher discussed the content of the information sheet (Appendix A), the consent form (Appendix B), the confidentiality matters and the outline of the questions. Participants were asked to omit any questions that they do not like to answer. None of the participants requested the omission of

questions. Then, consent forms were signed and permission to record the interviews obtained through email.

Step 4: Opening question:

The opening question was selected as a broad starting point to lead to further probing questions (Rao & Perry 2003). After asking about the demographic information of the interviewees, the opening questions were 'If someone says he/she is an astronomical tourist, rather than an ordinary tourist, what do you think he/she means?' and 'If someone says I am going to participate in an astronomical tour/sky observation tour, what elements or features do you think/expect that tour must have?'. These questions were considered to allow the participants to share their own opinions without any influence or pressure (Rao & Perry 2003).

Step 5: Interview questions:

Table 3.3.3 and 3.3.4 provide the example questions that were asked of the participants. To understand the phenomena of astronomical tourism, two sets of questions were asked. The first set of questions consisted of general questions to help the researcher in understanding astrotourism and validating the definitions used in the study (Table 3.3.3). The second set of questions was developed to help the researcher in identifying the themes to be used in the survey (Table 3.3.4). These questions were developed to identify the key themes in measuring each construct in the research framework.

Table 3.3.3. Examples of the general interview questions

General concepts	Questions
Astrotourism	-If someone says he/she is an astronomical tourist, rather than an ordinary tourist, what do you think he/she means? -If someone says I am going to participate in an astronomical tour/sky observation tour, what elements or features do you think/expect that tour must have?
Dark-sky site Image	If you want to choose a single name for destinations that are appropriate for sky observations, what would be that name? What about alternative names?
Conclusion	Is there anything that you would like to add to the questions of this interview to help you know more about astronomical societies and the sky-observation destinations?

Table 3.3.4. Examples of specific interview questions

Specific constructs	Questions
Motivations	What are the main reasons for you to participate in sky observation tours? What about other people? What do you think motivates them to participate in these tours?
Recreation specialisation	How do you classify astronomical tourists? Based on what criteria?
Cognitive DSS image	What features and attributes should an appropriate sky observation destination possess to be chosen to travel to?
Affective DSS image	Imagine you are on an astronomical tour and are observing the sky above you, what sort of feelings do you think the sky observation activity may invoke?
Conative DSS image	How do you behave when you encounter an appropriate sky observation destination?

Step 6. Concluding the interview:

The researcher thanks the participants at the end of the interview and advised that a copy of major themes or a copy of the transcription would be sent to them to check the accuracy.

3.3.4. Data generation skills

To conduct the interview, an interviewer is required to possess a set of generic and interpersonal skills to gain access, maintain prolonged contact with the informants and build trust in the research relationships. It is also the responsibility of the researcher to make an interview a worthwhile experience for the informant. Astronomical tourism is a very niche area in tourism, and the researcher is required to have the necessary information about basic knowledge of astronomy and astronomical tours. Because of the previous experience and knowledge of the researcher in organising astronomical tours, in many interviews, the depth of the interviews

transcended the discussion of interview questions to include the problems of astronomical societies memberships, attracting new members and astronomical tour products.

3.3.5. Interview data analysis

Interviews with astronomical tourists were recorded using a voice recorder with participants' consent. In regard to coding interview data, the researcher has been guided by the concepts in the literature and identify, interpret and record the most frequently used terms. This approach is known as content analysis; in which the research will identify key dimensions based on the frequency of the words (Gbrich 2007; Pope, Ziebland & Mays 2006; Vaismoradi, Turunen & Bondas 2013). This is an appropriate approach for operationalising constructs within a specific context, compared with other methodological approaches such as thematic analysis (Saunders & Lewis 2012; Saunders, Lewis & Thornhill 2007). Thematic analysis is more commonly used for developing abstract concepts (Vaismoradi, Turunen & Bondas 2013). The aim of the interview data in the the current research was not to develop abstract theory, but instead, the aim was to focus on operationalising the key items for the questionnaire. Thus, content analysis was selected as an appropriate analysis approach.

Each interview was professionally transcribed and analysed manually and by using Excel and NVivo 11 Pro software. The researcher manually coded the transcripts to create the parent nodes of the interview questions because they were representative of each specific dimension within the theoretical framework. Within each parent node, child nodes were identified and the respondents' answers were listed to seek the agreement or disagreement in the following interviews.

The researcher applied the following seven steps suggested by Tesch (1990, pp. 142–149) in forming the codes:

- read all the transcriptions to gain a sense of the whole ideas
- picked one interview and wrote the ideas for each question in the margin
- completed the previous task for several interview transcriptions, listed the topics and then clustered together similar topics. Within this process, major, unique and leftover topics have been identified.

- checked the list of topics with the data, abbreviated the topics as codes and wrote the codes in appropriate segments of the transcriptions. Within this process, new codes emerged.
- found the most descriptive phrase for the topics to group them into categories. Following that, the categories were reduced by grouping similar topics.
- decided on the abbreviation for each category.

According to Creswell (2009), there are three types of codes that should be considered during the coding process:

Expected codes, which the reader expected to find based on the previous literature and common sense

Surprising codes, which the reader did not anticipate at the beginning of the research

Unusual codes, which the reader found interesting from a conceptual point of view

Moreover, Creswell (2014) discussed three ways to develop codes; 1. Developing codes only based on the information that emerged from the interviews, 2. Using predetermined codes from the previous literature and then fit the data to these codes. 3. Using the combination of both emerging and predetermined codes. Following this discussion, the researcher applied the third approach in developing the codes in the the current research. For example, the researcher developed a code book from the studies about the motivations for nature-based tourism, and then when analysing the interviews, the researcher checked if these codes were also applicable for astrotourists' motivations and also searched for specific codes that are unique for astrotourists.

3.3.6. Data quality, reliability and validity procedures

In qualitative research, data quality refers to the 'the presence of depth, insight and explanation' (Colwell 1990, p. 20).

Qualitative reliability means that the researcher's approach is consistent among different researchers and projects (Creswell 2009; Gibbs 2007). Moreover, qualitative validity indicates the accuracy of the findings (corresponding with the constructs' definition) by implementing certain processes (Gibbs 2007; Neuman 2014). To obtain the validity for the qualitative research, the findings should be accurate from the researcher, the participant and the readers'

point of view (Creswell 2007). In previous research, trustworthiness, authenticity and credibility are other terms that address the validity in qualitative research (Creswell 2007).

In the current research, the triangulating and member-checking methods have been used to ensure the validity of the qualitative data. By applying these methods, final themes and codes from different data sources that were planned to be used in the survey were checked by interview participants in different Australian states with different levels of expertise and experience (Creswell 2009). This process helped the researcher to determine whether the themes were accurate (Creswell 2009). For example, one of the items of the survey was 'easy access road', after triangulating, the participants asked for more explanations, which resulted in a short sentence in the survey to express the meaning. Similarly, one of the items indicated 'a clear site' needed more explanation.

It should be noted that the data have been analysed by the researcher, which may result in the interpretations being *biased* by her gender, culture and demographic origin (Creswell 2009). However, the researcher attempted to reduce the bias by incorporating the academics' and astronomy experts' interpretations of the qualitative findings.

The researcher has spent *prolonged time* in the astrotourism field because of her background in organising astrotours in her home country (Iran). Spending prolonged time in the field helps the researcher to develop a stronger understanding of the study's phenomena (Creswell 2009). This understanding leads to more accurate and valid findings (Creswell 2009).

Moreover, to determine the reliability of the qualitative findings, the researcher implemented the following procedure suggested by Gibbs (2007) and Creswell (2009):

- checked the interview transcripts to prevent obvious mistakes during transcription
- checked the meaning of the codes and data to avoid a drift in the codes' definitions.
- coded all the transcripts to obtain consistent results.

3.4. Phase two: quantitative research design

3.4.1. Sampling and data collection

In the quantitative phase of the the current research, the researcher applied the probability sampling technique. This technique involves selecting samples randomly from a large number of units that represent the entire population (Tashakkori & Teddlie 2003, 2009). In probability sampling, the population refers to 'the totality of all elements, subjects, or members that possess a specified set of characteristics that define it' (Wiersma & Jurs 2009, p. 490). An accessible population is the members or subjects that the researcher has access to collect the data (Tashakkori & Teddlie 2009).

Moreover, to conduct the probability sampling, there are four techniques: (1) Random sampling, in which each sampling unit in an accessible population has an equal chance to be part of the sample, (2) Stratified sampling, in which several subgroups are identified and each selected unit belongs to one group, (3) Cluster sampling, in which the sampling unit is a group in the population, not an individual, (4) Multiple probability technique, in which the researcher combines the techniques (Tashakkori & Teddlie 2009).

Following the nature of the current research hypotheses, random sampling was selected to be the sampling technique of the research. The main advantage of random sampling is that the results can be generalised to the population (Tashakkori & Teddlie 2009). Although, it was timely and costly to access the units in random sampling because the units were spread over all Australian states (Tashakkori & Teddlie 2009), the researcher has overcome this limitation by contacting all 32 active astronomical societies and asking their permission to contact their members via email and social media. Different numbers of astronomical societies agreed to different sampling methods, which is discussed in detail.

Although it was hard to determine the accurate population size of the astronomical tourists in Australia, an estimate of the approximate population was based on the number of official members of the 14 astronomical societies that agreed to distribute the online questionnaire via email to their members' list. The total number of members of these astronomical societies and clubs was 6,952. As suggested by the astronomical societies' presidents during the interviews, many astronomical societies use social media such as Facebook as their official stream to update and be in contact with their members. Therefore, the researcher has also contacted the astronomical societies via their official Facebook pages to distribute the online questionnaire

via their official page. After receiving the agreement of the astronomical societies' presidents and administrators of official astronomical clubs' Facebook pages, the researcher sent the anonymous link to the presidents and administrators to distribute the online questionnaire. The first page of the questionnaire was the cover letter explaining the purpose of the research, the researcher's and supervisors' contact information, the ethics codes and the respondents' rights as being anonymous and confidential. As the researcher was already a member of the societies and Facebook pages, she could answer any inquiries that respondents presented.

Twenty-five astronomical clubs and societies with a total official and Facebook membership of 29,557 accepted to distribute the questionnaire via their official Facebook page. The researcher was aware of the social media members' bias, as one member of an astronomical society's Facebook page could be a member of other Facebook pages as well. Although data collection through social media had the advantage of including a wider range of astronomical tourists from casual to expert, the basis of the population size of astronomical tourists in the the current research was the official members of the astronomical societies with valid email addresses. Moreover, to prevent one astronomical tourist from participating in the online survey more than once, the researcher programmed the survey to assign one unique identification number to each computer to prevent the opening of the survey more than once.

Furthermore, previous scholars suggested that the minimum sample size for the population size of more than 3,000 should be at least 384 to reflect the population characteristics within (±5%) confidence level with 95% chance of accuracy (Tashakkori & Teddlie 2009). Moreover, Byrne (2005) stated that to achieve credible findings using Structural Equation Modelling, a minimum of 200 cases is recommended.

The researcher has launched the online questionnaire in May until July 2016 for a total of 69 days applying several streams to collect the data. First, the researcher asked the 14 astronomical societies' presidents to send the online survey link to their members' email list in three rounds with two weeks' gaps between each reminder. Second, the researcher asked the 25 administrators of official Facebook pages of the astronomical societies to post the online questionnaire link in the pages with the same two weeks' gaps between each reminder. After the acceptance of the respondents to participate in the online survey, the following screening question was asked to prevent random people entering the survey: 'This study is about people who have visited or participated in one of the following activities (please note these activities take any time between half a day to one week within a group or alone).

- Observatory

- Dark-sky site

- Stargazing (star party) night

- Astronomy events such as Eclipse or Meteor shower

- Astronomy tour

- Astronomy festival

- Astrophotography

It is worth mentioning that in each reminder; the researcher wrote the content of the email and Facebook post differently to attract as many respondents as possible. For example, in the first email, the researcher started the email by introducing herself and outlining the purpose of the study. In the second email, the researcher started with a quote that said 'Did you know that roughly one in three humans on earth cannot see the Milky Way?', and then briefly asked respondents to participate in the survey. By tracking the number of respondents after each reminder, this process showed that the first sentence should be eye-catching with either a famous quote or statistical evidence to engage and encourage respondents to participate in the survey and the email or the Facebook post should be as short as possible with only one line outlining the researcher details at the end.

Finally, of the 1056 astronomical tourists who participated in the online survey, 693 responded completely for a 66% completion rate. Based on the previous discussion on the required minimum sample size, the researcher was confident that the 693 samples represented and reflected the characteristics of the population within ±5%. The completion rate for the current research is calculated through the number of completed surveys divided by the number of respondents who entered the survey.

Table 3.4.1. Data collection procedure

Astronomical Society	Official Members	Social Media (Facebook) Members	Contacted via Email/Facebook
Astronomical Society of South Australia	500	NA	E
Astrofestival Western Australia	2,000	NA	E
Stargazers Club Western Australia	500	873	E, F
Skywatch	200	200	E, F
Astronomical Society of Victoria	900	NA	E
Astronomical Society of Western Australia	206	605	E, F
Perth Observatory	850	5771	E, F
Southern Astronomical Society	251	NA	E
Northern Sydney Astronomical Society	100	NA	E
Kingaroy Observatory	NA	830	F
Coffs Harbour Astronomical Society	50	NA	E
Monash Indigenous Astronomy	100	100	E, F
Melbourne University Astronomical Society	NA	1740	F
Astronomical Association of Queensland	500	NA	E
Sydney City Skywatchers	300	329	E, F
Tamar Valley Astronomical Group	NA	90	F
Mount Burnett Observatory Inc.	NA	1700	F
Gingin Observatory	NA	450	F
Shoalhaven Astronomers	NA	119	F
Monash Society of Physics, Astronomy and Mathematics–SPAM	495	513	E, F
Parramatta Park Astronomy Night	NA	80	F
Aboriginal Skies	NA	8,000	F
OzSky Safari	NA	299	F
Geraldton Astronomy Group	NA	654	F
Australian Indigenous Astronomy	NA	4,200	F
Monash Physics and Astronomy	NA	692	F
Mornington Peninsula Astronomical Society–MPAS	NA	460	F
Macarthur Astronomical Society	NA	450	F
Mars Society	NA	900	F
Astronomical Society of Geelong	NA	28	F
Northern Dark Skies Group	NA	100	F
Townsville Astronomy Group	NA	374	F
Total Members	**6,952**	**29,557**	

3.4.2. Data analysis procedure

In the the current research, the researcher applied the Statistical Package for Social Sciences (SPSS 21) as well as AMOS 24 software to analyse the data. To analyse the obtained results of the study, the Kolmogorov–Smirnov Test, two-sample *t*-test, single-factor analysis of variance, correlation, exploratory and confirmatory factor analysis and structural equation modelling have been used.

Regarding the nature of hypotheses and types of variables, the following statistical analyses were used in the current research:

- *Descriptive Statistics*

To analyse and compare the demographic data of the questionnaire, descriptive analysis was used in the the current research.

- *Kolmogorov–Smirnov Test*

To test the data distribution normality, the items of the questionnaire compared with a standard normal distribution. The hypotheses used in the study are:

H0: the distribution is normal.

H1: the distribution is not normal.

- *Exploratory factor analysis (EFA)*

One of the methods to analyse validity is factor analysis, which is of two kinds: confirmatory and exploratory factor analysis. These methods play an important role in recognising hidden variables. Cognitive, affective and conative dark-sky site image, as well as astronomical tourists' motivations, have been tested through exploratory factor analysis to examine the consistency of each construct and its items and to explore the dimensionality of each construct (Stevens 1996).

- *Confirmatory factor analysis (CFA)*

Confirmatory factor analysis (CFA) has then been used to confirm these determinants as underlying factors. CFA is an appropriate method to evaluate construct validity and to test the measurement model generated by the EFA (Stevens 1996).

It should be considered that in this study the combination of three standard models has been used in which confirmatory factor analysis is used as a tool to support the construct validity as well as a step to structural equation modelling.

- *Two-sample t-test*

This test is used for comparing the difference between two means in a distribution. To use this test, a quantitative variable and a categorical variable are needed. This test is used to determine the significant difference between men's and women's view of the variables of the study. The statistical hypotheses of two-sample *t*-test are:

H0: $\mu 1 = \mu 2$

H1: $\mu 1 \neq \mu 2$

- *Single-factor analysis of variance (ANOVA)*

ANOVA is used to compare two or more means (groups or variable) to test the statistical significance. The related hypotheses to analyse the differences among group means and their associated variables are as follows:

H0: $\mu 1 = \mu 2 = \mu 3 = \ldots$

H1: at least one of the means is not equal.

- *Correlation coefficient test*

To investigate the degree of relationship between the variables in this study, correlation analyses were used. It should be noted that in structural equation modelling, the desired model is the one with a high correlation between different dimensions of a variable, and a low correlation between that variable and the other variables under study.

- *Structural equation modelling (SEM)*

Structural equation modelling is a comprehensive way to quantify hypothetical modelling tests by interpreting the given relationship into testable mathematical models. Generally, a structural equation model is made of measurement modelling and structural modelling. Measurement modelling defines the method of analysing a hidden variable by using two or more variables; whereas the structural model represents the relationships between inner and outer hidden variables as well as the possible measurement of variables' direction and value (Byrne 2005).

SEM is used in a significant number of destination image studies to assess the relationship between destination image components and other constructs (Bigné, Sanchez & Sanchez 2001; Chen & Tsai 2007; San Martín & Rodríguez del Bosque 2008). Therefore, SEM is used in the the current research to examine the relationship between dark-sky site image determinants, overall dark-sky site image, astrotourists' specialisation segmentation groups and their motivations. SEM is a statistical set of techniques rather than the application of a single statistical test consisting of CFA of the measurement models and structural regression modelling (Kline 2011). The core capability of SEM is that it includes both latent and observed variables in the structural model (Byrne 2005).

3.5. Ethical consideration

Ethical approval was achieved from the University of South Australia Ethics Committee. The ethical research guidelines of the University of South Australia were incorporated while developing the methodology. The project reference number is 0000034751.

3.6. Conclusion

This chapter has provided an overview of the applied research design and methods in the current research. Theoretical consideration of the chosen design and data collection methods for each phase of the study alongside the data analysis methods has been discussed. The following chapter reports the findings of the study.

4 QUALITATIVE RESULTS

4.1. Introduction

Following the previous chapter, which discussed the methodology of the current research, this chapter presents the findings and analysis of the qualitative findings based on the 24 interviews with expert astronomical tourists as described in Chapter 3. The purpose of this phase was to gain an understanding of the astronomical tourists' motivations, cognitive dark-sky site image, affective dark-sky site image and conative dark-sky site image to develop the questionnaire in the context of astronomical tourism. Moreover, the results of this chapter led to the understanding of the definition of astronomical tourism and dark-sky site image. Therefore, the qualitative phase of the current research provides an answer for the following research questions:

1. **What are appropriate names and definitions for:**
    1.1. Tourists with a special interest in astronomical activities?
    1.2. Appropriate destinations for astronomical tours?
2. **What are astronomical tourists' characteristics in terms of their:**
    2.1. Demographic characteristics
    2.2. Motivations
    2.3. Specialisation
    2.4. Cognitive destination image
    2.5. Affective destination image
    2.6. Conative destination image

The findings of the qualitative phase are derived from qualitative analysis of the verbatim transcriptions of the interviews, following the procedure explained in the previous chapter. The specialised and general questions are shown in the previous chapter. Different methods are used to present the findings of the qualitative phase. Direct quotes, Excel tables, word tree and word cloud are among these methods. Excel tables show the count number of the themes; word

clouds display the 50 and 100 frequently occurring words and word trees display the visualisation of the words in the context. Word frequency is used to show the most frequently occurring words in the data source. In addition, word frequency is useful to identify themes and analyse them. Therefore, this chapter specifies the emergent themes that reflected the dimensions of dark-sky site image through exemplar statements from verbatim transcriptions of the interviews and content analysis of the interviews.

4.2. Understanding astronomical tourist and astronomical tourism definitions

According to Locke, Buffet and Rand (2003, p. 40), 'A definition is a statement that identified the nature of the units subsumed under a concept'. Therefore, to understand better the phenomenon of astronomical tourism, the researcher endeavoured to capture as many ideas as possible to choose the correct terms and definitions for describing an astronomical tourist, astronomical tourism and appropriate destinations for sky observation.

4.2.1. Proposed definition of an astronomical tourist by the interviewees:

In view of the importance of definition, as a first question, the researcher asked, 'If someone says he/she is an astronomical tourist, rather than an ordinary tourist, what do you think he/she means?'. This question was asked with the aim of understanding an astronomical tourist definition.

To answer this question, Astrotourist 1 described an astronomical tourist as anyone who is interested in anything related to astronomy:

> To my way of thinking, it means that they actively seek out interesting astronomical sites so if they were to go to India, they might seek out the Jaipur site …or they might actively seek out a stargazing night in the cities that they go to.

Celestial Vision owner confirmed with Astrotourist 1 by describing an astronomical tourist as someone 'who actively seeks out the night sky to experience'. He also added 'There are many tourists who visit remote national parks in Australia, many people will have some experience of the night sky, even if it's simply sitting around a campfire for example. That's a very simple experience. But for some people, that is a really good experience.'

Providing more depth to the discussion, Astrotourist 4 added that an astronomical tourist is someone who is 'travelling to a destination to see an astronomical event or an astronomical site'. He further explored what he meant by an astronomical event by saying 'an astronomical

event like solar eclipses, lunar eclipses, the annular eclipses or a particular transit of a planet or the occultation and the moon or an object in front of the star. There are tonnes of events that we're trying to see so you've got to be in a particular location at a particular time'. By an astronomical site, he explained that 'a location should be where you know that it has a dark sky, so you've got the best probability of being able to get good clear, dark skies at that time of the year.'

Stargazer club founder added the element of having fun and entertainment while doing an astronomical activity:

> I think that an astronomical tourist is interested in star gazing, and so looking through telescopes, finding more, a little bit more about Space and the Universe, but doing that though in a relaxed, fun, entertaining kind of way, like a normal tourist would go to a winery or a cafe or something like that when they're out and about.

Moreover, Astrotourist 3 mentioned the connection that an astronomical tourist needs to gain when visiting an appropriate place for sky observation:

> To me, an astronomical tourist is somebody who is visiting a site or place specifically because it has an astronomical connection. An astronomical tourist might visit an observatory or a planetarium or a site that provides a descriptive view of the sky.

Founder of Skywatch also mentioned the importance of observing different parts of the sky by some people, which leads to them travelling to different parts of the world:

> It's someone who has got an interest in astronomy and is looking for somewhere that they can see the sky perhaps, a different part of the sky or see the sky a bit better than from where they come from. So, for instance, if someone is from America, they may say 'look I'm an astronomical tourist, I want to come to South Australia and see the Southern skies' so that sort of thing, and it would be generally someone who has that pre-existing interest.

In another interview, Astrotourist 6 repeated the element of pursuing knowledge and enjoyment by astronomical tourists:

He/she means that the prime reason for them touring is to further their experience and enjoyment in astronomy and/or to increase their knowledge in astronomy.

Astrotour guide mentioned the differences between the skies in the two hemispheres, which lead people interested in astronomy to travel to see the sky in another hemisphere:

> An astronomical tourist is someone who is travelling to experience new skies–usually travelling to a darker sky than they are used to, or to a different hemisphere to see the other half of the sky. Quite often, Eclipse-chasers are seen as astronomical tourists.

In a very comprehensive definition, Astrotourist 9 tried to define an astronomical tourist with all the purposes that he/she might have to engage in astronomical tourism:

> Astronomical tourists would probably be going and seeing observatories, places of historical worth for astronomy, they might be going out and taking photographs of different parts of the sky–from Northern hemisphere, or Southern hemisphere, they might go on holiday just to see an eclipse somewhere around the world.

4.2.2. Proposed names for astronomical tourism by the interviewees:

To capture the best descriptor for the tours with sky observation purposes, the researcher asked, 'Do you have any specific names in mind for the tours with sky observation purposes?'. Interviewees suggested different names with their reason behind their choice. Some names have limited the focus of the astronomical tourism, for example:

Earthside Astronomy founder mentioned the names 'star gazing' or 'eclipse watching', although these names limit the broader aspects of astronomical tours in terms of watching not only the stars but the moons and events occurring during the day. In addition, 'eclipse watching' is believed to be part of astronomical tourism events, not the entire tour.

On the other hand, some names have broadened the concept of astronomical tourism, for example:

Astrophotographer suggested the name 'space tourism'. To defend the reason behind his choice, he said:

> Space tourism is that broad category for people who are interested in science and things, whereas astronomical is definitely more specific to people who are looking for telescope-based activity.

Moreover, 'sky sightseeing', 'Sky tours', and 'Night sky tours' were other names suggested by interviewees.

However, 'astronomical tourism' and its shorter form 'astrotourism' was common names recommended by the majority of the interviewees (nine) as the best name to capture the elements of the tours related to sky observation. For example:

> I would say, astronomical tourism would probably be very clear, everybody would understand it. The only other one I could think of might be night sky tours but then I would, I think that a night sky tour closes the definition down a little bit too much because night sky refers only to the night sky but there's a lot more in astronomy out there, there are lots of really interesting things to do with astronomy so you go to Greenwich, you go to the – at Ecuador and some of those other places I've mentioned and they have really interesting sites that are not related, they're related to the night

> sky but not in the dark, you see them in daylight if you know what I mean. I think astronomical tourism clearly defines that whole aspect of astronomy where if you start to narrow it down too much then I think you take out other aspects that could be very interesting and could also just add a little bit to the tour (Astrotourist 1).

Therefore, based on the results of the interviews, the proposed definitions for an astronomical tourist and astronomical tourism in the current research are discussed in the next section.

4.2.3. Proposed definition and name for an 'astronomical tourist' and 'astronomical tourism' in the current research:

Based on the interviews, discussions and analysis, three main themes that define an astronomical tourist emerged: Location, events and activities. Following the definition proposed by Bruwer and Lesschaeve (2012, p. 612) to define wine tourists, this definition in adjusted form is proposed in the current research, which has tried to capture a summary of the important achieved themes:

'An astronomical tourist (astrotourist) is a person with the needs to relate to both astronomical activities/events (e.g. stargazing, observing deep-sky objects, eclipses, etc.) and location (e.g. dark-sky site) where sky observation is feasible'.

Moreover, according to previous literature, tours with sky observation purposes were named as 'celestial ecotourism' by Weaver (2011). Although Weaver (2011) endeavoured to define and select a name to combine the sky and nature features of this niche tourism, this name has several limitations. First, it failed to present astronomical tourism as a special-interest tourism segment on its own. Second, it is not a comprehensible name to be captured easily by non-specialised individuals. Third, 'celestial ecotourism' has not been selected based on a thorough investigation by asking the specialised people in an astronomical field on how they define and name such a tour. Therefore, the researcher concludes that the names and definitions proposed in the current research are credible also to be applied in future studies.

According to the qualitative interview analysis, 'astronomical tourism' and its shorter form 'astrotourism' has thus been selected as the best name for the tours with sky observation purposes. Moreover, based on the confirmation of astronomical tourists and experts, the following definition is proposed in the current research:

'Astronomical tourism (astrotourism) is a special-interest tourism (SIT) market, in which travellers are motivated by sky-observation related experiences and their travel/destination choices are based on these experiences'.

4.3. Understanding the name and definition of appropriate destinations for sky observation purposes

Finding a general yet specific name to differentiate niche tourism destinations is one of the critical steps in developing a distinguished tourism market. Therefore, the researcher asked the interviewees 'If you want to choose a single name for destinations that are appropriate for sky observations, what would that name be?'. This question led to different recommendations and definitions, which are forthwith discussed:

Stargazer club founder suggested the name, 'Night Sky Observing Site' by adding a definition:

> It's a place where tourists can get away from that light, from the artificial light and experience that darker night sky or have the equipment accessible that they can do some solar observing

With a bit of alteration, Astrotour Guide also suggested the name 'Dark Sky Observing Site.'

Astrotourist 3 added several detailed options including 'Dark Sky Park' or a 'Dark Sky Conservation Area' or 'Dark Sky Reserve.'

Astrotourist 1 discussed that the name should include the precise name of the destination:

> I just give it its name I think. So, if I was going to the Pinnacles or at Kings Park, I'd say we're going to stargaze at the Pinnacle. I can't think of a general term unless you have it as a 'dark sky national park.'

Celestial vision owner recommended the name 'dark-sky site' and he explained how this name can be used both in general and in specific:

> I suggest Dark-Sky Site, you'll hear that term—dark-sky site—used in a common language meaning and then there is a more specific meaning where they're actually talking about a formally declared reserve that is specifically aiming to protect the dark night sky.

Adding more information, Astrophotographer stated that Dark Sky Park or Dark Sky Reserve are those designated areas that are internationally recognised and listed in the legislation to be preserved from artificial lights. Therefore, he also suggested Dark-Sky Site as a name to put on appropriate destinations for sky observation purposes.

Confirming the previous suggestions, Astrotourist 4 also selected 'Dark-Sky Site' by mentioning:

> I guess the astronomers often talk about a dark-sky site and the dark-sky site in that sense can be anywhere where the sky is dark enough to get a good view of all the stars.

> Yeah, I think that's the typical name, you know, so you're not specifying a location anywhere, you're saying, let's go to a dark-sky site.

Earthside Astronomy founder also indicated the similar name and a precise definition by saying:

> Normally you just talk about using a dark-sky site as being a really good place for observation, which is somewhere outside of the city glow. So, basically anywhere you don't have light pollution, so that's where you talk about a dark-sky site.

After a protracted discussion with Planetarium Program Officer, he classified appropriate destinations for astronomical purposes based on fixed/not fixed destinations and the purpose of an astronomical tour.

Planetariums: These are fixed locations and generally found in significant urban environments. They are usually patronised by people with little or no astronomical knowledge.

Observatories: These are fixed locations and if they are astronomically famous (Mars Hill in the USA is famous as the discovery site of Pluto) or the observatory may be old and provide cultural/heritage value (such as the observatory site in Jaipur, India). There will be a mixture of tourists at these sites with some having good astronomical knowledge.

Aurora: There are many locations from where aurora may be observed. These locations are fixed and again there will be a mix of tourists.

Meteorite impact craters: These are also fixed locations and are usually off the beaten track. The most famous (which has a Visitor's Centre) is Meteor Crater in Arizona.

Solar Eclipse sites: These are not fixed. A solar eclipse can occur across any part of the world, over land or water. The organised tours that create a tour around the eclipse are very popular amongst those with astronomical knowledge and there are a number of free, independent travellers who will also go to a specific location just to witness an eclipse.

Dark-Sky sites: These are fixed locations. These locations have no specific astronomical merit other than they are in an area with little to no light pollution. Tour operators at such locations may offer astronomical tours.

In addition to asking the suggested name for the appropriate destinations for sky observation purposes, in the next question, the researcher tried to identify the meaning of 'Skyscape' by asking: 'If you read or hear the word 'Skyscape', what does it mean to you in your own words?'.

A few examples of the responses in developing the meaning of the Skyscape and applying that in the definition of the dark-sky site is presented in the table below:

Table 4.3.1. Skyscape meaning

Interviewee	Skyscape Meaning
Stargazer club founder	Skyscape, to me, is seeing the Milky Way, the band of the Milky Way, the Moon and the landscape as well at the same time, like I always relate both to each other, I guess that's because, as Earth rotates things are always rising and falling, so you're always thinking about the land in there as well.
Astrotourist 3	To me 'skyscape' conveys good visibility of a large area of sky.
Founder of Skywatch	By hearing 'Skyscape' I'd be thinking certainly of being able to see the sky in a nice way, probably at night, to be able to have a good view of the Stars.
Astrotourist 4	When hearing 'Skyscape' I'd be imagining a wide-angle photograph or view with a horizon that you know, maybe there's something interesting on the horizon with a large, large dark sky and stars and galaxy.
Astrotourist 5	I guess a 'Skyscape' would be looking at the view out in the dark area where you can see the Milky Way and just looking at the night sky.
The astrotour guide	The word 'Skyscape' conjures up an image of a city skyline (or tree skyline) with stars (or clouds) in the background, and perhaps a setting sun.
Earthside Astronomy founder	Skyscape? I would say it's opposite to landscape, so anything from that horizon up. So, from horizon up in the sky, it just Skyscape so that's anything, stars, nebulas and planets.

4.3.1. Proposed name and definition of a dark-sky site in the current research:

As was discussed in the previous section, the name 'dark-sky site' was suggested by 12 astronomical tourists as the appropriate destinations for sky observation purposes. Moreover, the 'Skyscape' was interpreted as 'a good view of the sky especially at night'. Therefore, following the extracted themes in interview discussions and the definition proposed by Brown et al. (2015) to define 'eventscape', this definition is proposed in the current research incorporating 'Skyscape' to define a 'Dark-Sky Site'

'A dark-sky site *is a specific setting that facilitates the skyscape observation from the sites that are embedded to meet the astrotourists' needs and accommodate the celestial and physical structures/services requirements.'*

4.4. Generated themes to measure each construct

In this section, a discussion is presented to justify the reasons on how the researcher selected the items to measure specific constructs. For each construct, the question that was asked during the interview and the generated items are presented.

4.4.1. Motivation themes

Two questions were asked to capture the astronomical tourists' motivation. In the first question, the researcher asked: 'What are the main reasons for you to participate in sky observation tours?' The second question was asked about the motivations of other people, 'What about other people? What do you think motivates them to participate in these tours?' Fifteen themes emerged from the interviews were coded, categorised under a specific theme and counted in all 24 interviews. The results are summarised in the table below.

Table 4.4.1. Motivation themes

Motivation Themes	Count of Words
Scientific activity and learning	23
Enjoy looking at the sky	17
Sharing knowledge and passion	13
Being with like-minded people	11
Getting away from work	8
Working with equipment	7
Strengthening relationships among families	7
Doing astrophotography	6
Participate in special astronomical events	6
To have an adventure	5
Promote astronomy	4
Enjoy being in nature	3
Total	**110**

For each theme, some examples are extracted from the interviews that are explained in the subheadings:

Motivation theme 1. Scientific activity and learning

The main theme that emerged was 'Scientific activity and learning'. This theme refers to the willingness to learn more about general astronomy such as the night sky, the technical equipment, the universe, aboriginal astronomy, and to conduct professional research about celestial objects such as asteroids, comets, distant planets and meteor showers.

The interviews showed that the participants were heavily motivated by learning more about the universe. When asked what motivates him to go to astronomical tours, Founder of Skywatch said:

'I enjoy finding new things that I haven't seen before, or looking at objects a little more closely, that I've seen previously.'

For the same question, Astrotourist 3 narrowed down his interest to a more specific celestial object he plans to observe by responding as follows:

> Comets always fascinated me, especially bright comets, you know, the sort of things you never got to see very often, so they're rare occurrences, and some of the comet's that I've seen have been quite bright and spectacular. You maybe get one opportunity in a lifetime to see a really decent, bright comet, but I've been able to witness and document a few comets that blew me away.

On the other hand, Astrophotographer broadened his passion for learning about anything related to science and physics:

> The first reason I get is that I've just always had an interest and passion in science ever since I can remember. That could've been something I always enjoyed doing and asking questions about and being involved in science and I think I always knew that I just wanted to be a scientist and do some physics and astronomy so I kind of made that happen by doing astronomical activities.

Astrotourist 3 also emphasised how physical facts in astronomy absorb his attention:

> My main reason would be to learn and be amazed by the facts and figures. The distances, sizes, temperatures and pressures out there are all incredible compared with those we are used to on Earth**.**

To answer the second question about what motivates other people to participate in astronomical tours and observations, Founder of Skywatch indicated the attractiveness of working with telescopes for many people:

> A lot of people have never seen things through a telescope, they have never seen the planets, live, if you like, and I find, for instance, if somebody looks at Saturn through a telescope, they'll even take their head away from the eyepiece and say, you've got a photograph on the front of that, that's not real and they get quite excited about seeing something which they've never seen before.

To answer this question, President 2 mentioned the role of learning about astronomy in making people more inspired:

> I think it's the education, but the excitement as well, and to tell people what they're really looking at, how far these places are. Most people have got no concept of distance. Not even within Australia. Most Australians have probably no idea of the distance from

> one side of the country to the other. I mean, you tell them it's basically the size of the mainland of the United States and then 'Oh, really?' But then you start to look at the moon and you know how close that is. And they usually start the show with Alpha Centauri which is 4.2 light-years away—you get them to do the calculations, and it's just that mind-blowing for them. So, I think it's the excitement, education, they've obviously got to have an inquiring mind**.**

With a different point of view, Astrotourist 6 stated that dark sky itself motivates some people because by attending astronomical tours, tour participants can observe deep-sky objects in detail:

'People interested in astronomy seek locations that have very dark and very clear skies, so that they may observe deep-sky objects in as much detail as possible'.

President 4 mentioned the internal feeling of individuals that connect them to the sky and makes them want to know more about it:

> It's a fascination that people have with the night sky, in my 40 years of being involved in astronomy and public outreach I always find that even the person who appears the least interested still has an inherent interest and wonder about the sky**.**

With the same line of reasoning, Astrotourist 2 also emphasises on each person's curiosity, what makes them want to learn more about the universe:

'I think that just describes it, just curiosity. They're drawn to its uniqueness and maybe want to learn more about it, they enjoy it.'

Motivation theme 2: Enjoy looking at the sky

Enjoy looking at the sky is the second theme identified as a motivation by 17 astronomical tourists. This theme is related to how looking at the day and night sky is fascinating and exciting for astronomical tourists. Moreover, this item describes that one of the strong motivations of astronomical tourists (17 out of 24) to participate in astrotours is to enjoy looking at the night sky. Examples of the quotes about 'Enjoy looking at the sky' as part of the astronomical tourists' motivations are shown in the table below.

Table 4.4.2. Astrotourists' motivation quotes (1)

Participant	My Motivations
Founder of Skywatch	I just enjoy looking at the sky, looking at the Universe
Astrotourist 7	for me, it's more just enjoying the night sky and peaceful setting and just enjoying it instead of the setting in a busy city
President 4	Just a fascination with the night sky
Astrotourist 5	I've always loved like when you go camping, you're out in the bush somewhere. You get to actually see the Milky Way, I just find it overwhelmingly beautiful really.

Furthermore, the following quotes show that some participants believed what motivates other people to participate in astrotours is also enjoying the dark sky:

Table 4.4.3. Astrotourists' motivation quotes (1)

Participant	Others' Motivations
Founder of Skywatch	People do enjoy having a bit of a chance to look up and understand where the constellations are and how things change across the sky
Celestial vision owner	Some people enjoy camping under the stars and having some kind of an experience to do with the night sky
Astrotourist 6	I think that many other people have a latent fascination with the stars
Astrotourist 5	I've always loved like when you go camping, you're out in the bush somewhere. You get to actually see the Milky Way, I just find it overwhelmingly beautiful really.

Motivation theme 3: Sharing knowledge and passion

The interviews revealed that sharing astronomical knowledge and passion with adults and children were among the most important reasons for astronomical tourists (especially expert ones) to participate in an astronomical tour. The following quotes describe the actual answers of the interviewees.

Astrotourist 1 described her enjoyment of showing the celestial objects to people, especially for their first time:

> I really like watching people's faces when they look up at, say the Australian Milky Way for the first time and they really see it and you can give them some of the stories about Orion for example**.**

Similar to Astrotourist 1's quotes, Stargazer club founder described her feelings of sharing her knowledge in more detail:

> It was fantastic sharing the stories of the night sky and the science of the night sky with those people and to be able to show someone Saturn or the Moon, it would be their first time looking through a telescope and just to have that first time experience, I remember one gentleman particularly, he looked at Saturn through the telescope and he said to me, you've just fulfilled my lifelong dream to see Saturn through a telescope**.**

As a part-time teacher of astronomy, Founder of Skywatch also emphasised how he gets motivated by sharing his knowledge with others:

> I do enjoy showing people the stars, I've got a Planetarium, which I use during the daytime and that's something, whoever comes into that, they get very excited about, so it's very enjoyable in that sense, that people do get excited and are keen to learn more, quite often they will applaud at the end of the lesson, or they won't go if the bell goes, which is pretty unusual for teaching in general, so I know that they're engaged and they're enjoying it and you'll think, yeah, this is good, people are enjoying this and I'm doing something which makes a difference to the way they view the world around them too**.**

To answer the question of what motivates other people, Astrotourist 7 mentioned that some people enjoy sharing their knowledge with others:

> Some people like to go to astronomy classes to actually educate others as well, because we've got some people in the planetarium, well, passion from actually sharing their knowledge with other people**.**

Motivation theme 4: Being with like-minded people

The results showed that 11 out of 24 interviewees mentioned 'Being with like-minded people' is one of their own motivations or others' motivations to participate in an astronomical tour. Here are three examples emphasising the role of being with similar people:

> Others may be more motivated to observe in common interest groups, to learn from each other about the night sky and their technical equipment and also to socialise (e.g. partaking in celebratory drinks at sunset). (Astrotourist 6)

> One of my motivations is to meet new people with similar interests and foster new and existing friendships. (Astrotour guide)

> I think for myself it's been to meet people of like mind, the people that have similar interests. I guess I do it more for a networking opportunity. (Vice president 2)

Motivation theme 5: Getting away from work

'Getting away from work' was the other theme that interview respondents mentioned while they were talking about their motivations. Here are two examples of the quotes that were discussed in the interviews. In the first example, President 4 stated that how looking at the sky helps him to be relaxed and forget the day to day problems:

> Whilst you're gazing up at the night sky in wonder, it will remove you from all the daily grudge and problems and everything else, so to me, I find looking up at the night sky is my way of relaxing, of forgetting temporarily the day-to-day problems that we have.

With the same line of reasoning, Astrotourist 9 emphasised how being involved in astronomical activities refreshes his mind:

> I get away from work, I get away from having to deal with annoying clients or irritating clients, and for three to five hours I don't think of anything but astronomy and space, so yes, it's nice and peaceful, and relaxing.

Motivation theme 6: Working with equipment

Working with equipment such as telescopes was also identified as one of the motivations of astronomical tourists to participate in astronomical tours. In one of the interviews, Stargazer club founder considered technology as one of the tools that attract people into astronomy:

‘Some people are fascinated by space and astronomy science and technology, so some really like having a great pair of binoculars or having a telescope.’

President 2 also emphasised how some people are amazed when looking through telescopes:

‘People are amazed at what they can actually see through very small ’scopes even just to see the moon.’

Motivation theme 7: Strengthening relationships among families

Some of the interview participants also believed that one of the reasons among people to participate in astronomical tours is becoming more connected to each other. This connection was mentioned in different interviews with a different focus, some mentioned the connection between parents and their children, while others indicated it as a romantic activity for couples. For example, Astrotourist 1 said how parents and kids can share stories by participating in a similar activity such as astronomical activities:

> I also think that if you can get more people looking at the universe, it’s a unifying thing as well and it’s something that a lot of adults can do. There are no borders. That could also be a connecting factor with families because with the stargazers at one stage, we were saying that, parents could actually connect using Skype and a pair of binoculars or just looking up at the night sky while their kids are away looking at the night sky, so they’re comparing, they could say, look, this is what I’m seeing here, what are you seeing down there? So, they brought some connecting stories to share with each other.

Moreover, Earthside Astronomy founder indicated how participating in astronomical tours can be a romantic activity for couples by saying:

> We’ve actually got those young couples in the middle which come up for a sort of date, almost, who would enjoy coming up and doing something different to the everyday, going to the movies, going out for a coffee and it’s a really nice date environment for that.

Astrotourist 9 also broadened up Earthside Astronomy founder’s discussion regarding how astronomical tours can connect more family members including grandparents, which is one of the general public’s motivations to take part in such tours:

> Definitely earning Brownie points with the partner–whether it’s a boyfriend or girlfriend, wife or husband is one of the reasons. For a lot of grandparents, it’s more to do with bringing the grandchildren up and having some time with them.

Motivation theme 8: Doing astrophotography

The other theme that was captured as one of the astronomical tourists’ motivations was ‘doing astrophotography’. Astrophotography is referred to ‘the photography of celestial bodies used in astronomy’ (Collins 2012). Therefore, astrophotography itself can be the only reason for

travelling not only for those interested in astronomy but also for people interested in photography. The reason behind astrophotographers' travel is explained thoroughly by Charles (2000b, p. 117):

> Getting away from city lights is probably the most common reason astrophotographers travel, but other considerations such as getting an unobstructed horizon below an object of interest, finding an interesting foreground for a twilight photo, or dodging clouds can also bring about the need for travel. In more extreme cases, people travel to other countries to observe or photograph celestial objects at declinations which are not observable from their home latitude.

Accordingly, it is important that tourists found the sky sceneries photogenic, as photography has the power to reinforce the tourists' experience (Becken 2005). Furthermore, tourists show their pictures to family and friends, thus the photographs act as free promotion for the destination (Sontag 1979).

Here also there are a few examples on how interviewees of the current research explained about astrophotography being one of the motivations among astronomical tourists:

'One of my reasons to take part in tours is photography because I'm chasing particular photos of a particular object.' (Astrophotographer)

'There's just something amazing about getting spectacular photographs of a natural phenomenon in the universe. I just really enjoy doing that.' (Astrotourist 4)

'I'm really into photography so I'm really into the night time of sky photography.' (Astrotourist 7)

Motivation theme 9: Participate in special astronomical events

Astronomical events are phenomenon much like a show performed by the sun, moon, planets and certain stars, such as meteor showers, novae and supernovae, conjunctions of the moon and planets, occultation of stars or other objects by asteroids, major planets or the moon, and eclipses of the sun and moon (Charles 2000a). The astronomical events occur at a special time and they never repeat in exactly the similar way (Charles 2000a). Therefore, participating in an astronomical event has been mentioned as one of the astronomical tourists' motivations. Using NVivo 11 Pro, 'astronomical event' in general and 'eclipse' in particular have been searched to determine how interview participants have mentioned events in their whole interviews:

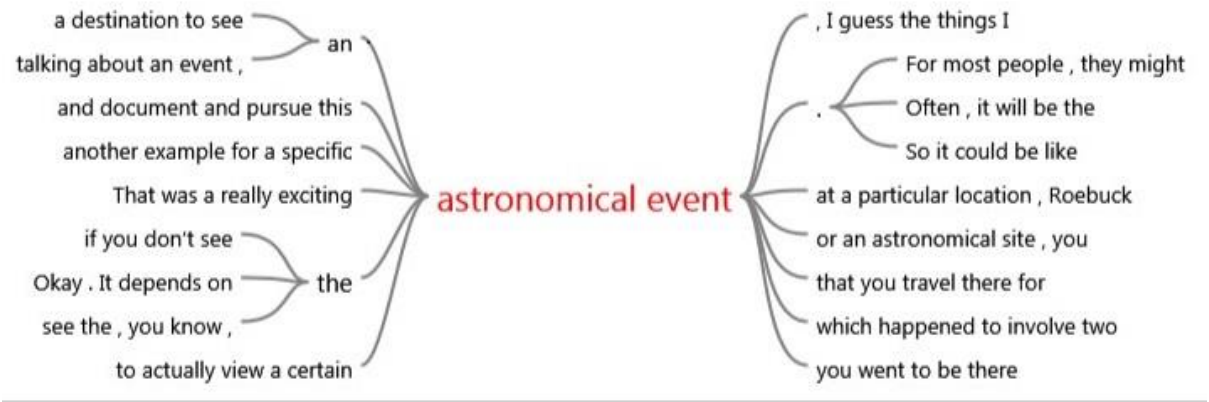


Figure 4.4.1. Astronomical event word tree

As depicted by the word tree, interview participants have responded to probing questions in naming the following topics:

- Defining an astronomical destination
- Documenting and pursuing astronomical events as one of their motivations
- Giving examples for a specific astronomical event at a particular location that attracted astronomical tourists
- Talking about an exciting astronomical event for most people
- Seeing an astronomical event that has been travelled for

Moreover, eclipse is one the astronomical events that has emerged in many interviews, this is shown in the following figure:

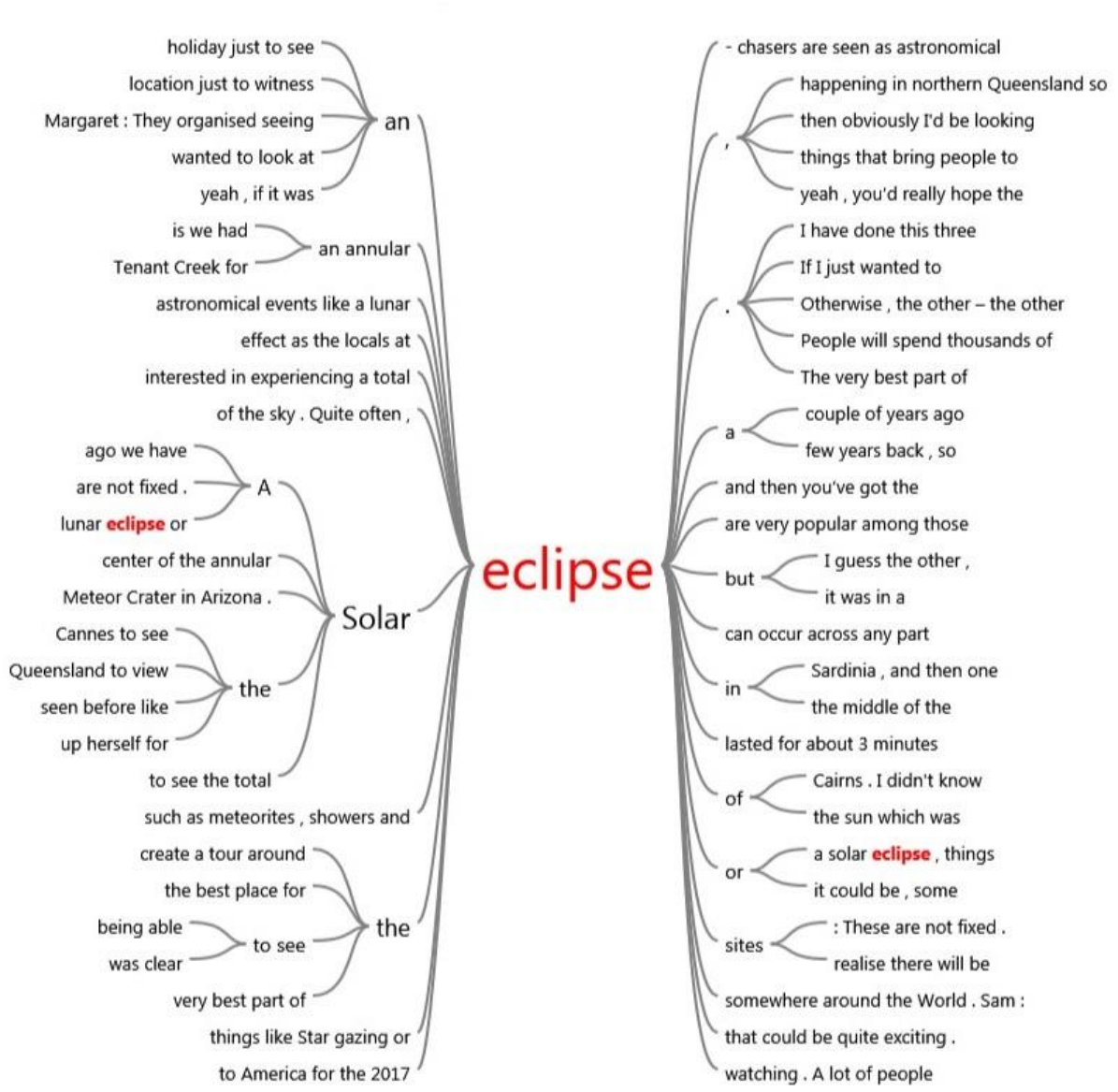


Figure 4.4.2. Eclipse word tree

Following the examples about the astronomical event, as indicated in the above word tree (Figure 4.4.2), just a few examples that were mentioned during the interviews are below:

Go on holiday just to see an eclipse somewhere around the world

Travel to a location just to witness an eclipse. I have done this three times myself

In astronomical society, they organised seeing an eclipse in Sardinia

I went to a tour on Tenant Creek for an annular eclipse a few years back

Astronomical events like a lunar eclipse or a solar eclipse bring people to go outside, motivate them to take part in the tours

Motivation theme 10: To have an adventure

Together with participating in a tour to see an astronomical event, some interview participants mentioned how having an adventure motivated them to take part in astronomical tours. For example, Astrotourist 4 explained how he has chosen a place to travel to see an eclipse not only because of the astronomical event but also because of other adventurous experiences:

> The location I chose was in fact probably the lowest probability of being able to see the eclipse but it was in a spectacular location and so it was a real adventure to get there because it was up in the mountains on the top of Norway and so it was very cold, it was icy, snow, a spectacular place I've never been before in my life that was absolutely an adventure that even if you don't see the astronomical event you went to be there for, you still have an incredible time seeing all this brand new stuff.

In another example, Astrotourist 8 said how she is interested in taking part in an astronomical tour in the middle of the ocean:

'I would be quite interested in experiencing a total eclipse in the middle of the ocean.'

Motivation theme 11: Promote astronomy

For four interview participants, promoting astronomy in the forms of public outreach or youth inspiration was mentioned among their motivations to participate in astronomical tours. Here are a few examples:

> One of my motivations is public outreach, and with public outreach I just think if I can get kids particularly but not exclusively … but I do hope to get kids really interested in science. (Astrotourist 1)

> I am aiming all of my astronomical activities mainly to inspire the youth. I see a real big gap in astronomical tourism, astronomical studies in it … Using astronomy, which kids like space and dinosaurs and astronomy is one of those things that can really, really engage the mind of the youth to get them more interested in science in general, that's why I do it. (Earthside Astronomy founder)

Motivation theme 12: Enjoy being in nature

The last theme that emerged from the interviews was 'enjoy being in nature' as one of the motivations for astronomical tourists. For example, Astrotourist 4 mentioned that 'experiencing the natural wonder of the place' is one of the motivations that he decides on when choosing an astronomical tour.

Therefore, these 12 themes were extracted after interviews' analysis to guide through designing the motivation scale of the questionnaire. In the following section, recreation specialisation among astronomical tourists is discussed.

4.4.2. Astrotourists' recreation specialisation themes

To capture astrotourists' recreation specialisation themes, the main question was asked as 'How do you classify astronomical tourists? Based on what criteria?'. After running the word frequency query with NVivo 11 Pro software, the following word cloud was extracted (Figure 4.4.3).



Figure 4.4.3. Astrotourists' recreation specialisation word cloud

The extracted word cloud demonstrated the 50 most repeated words in astrotourists' recreation specialisation discussion. As demonstrated, the words 'knowledge', 'activities', 'instrument/telescope', 'experience' and 'interest' are among the most repeated words. The results of the word cloud helped the researcher to code and finalise astrotourists recreation specialisation themes. After coding, counting and finalising the themes, Figure 4.4.4 shows these results.

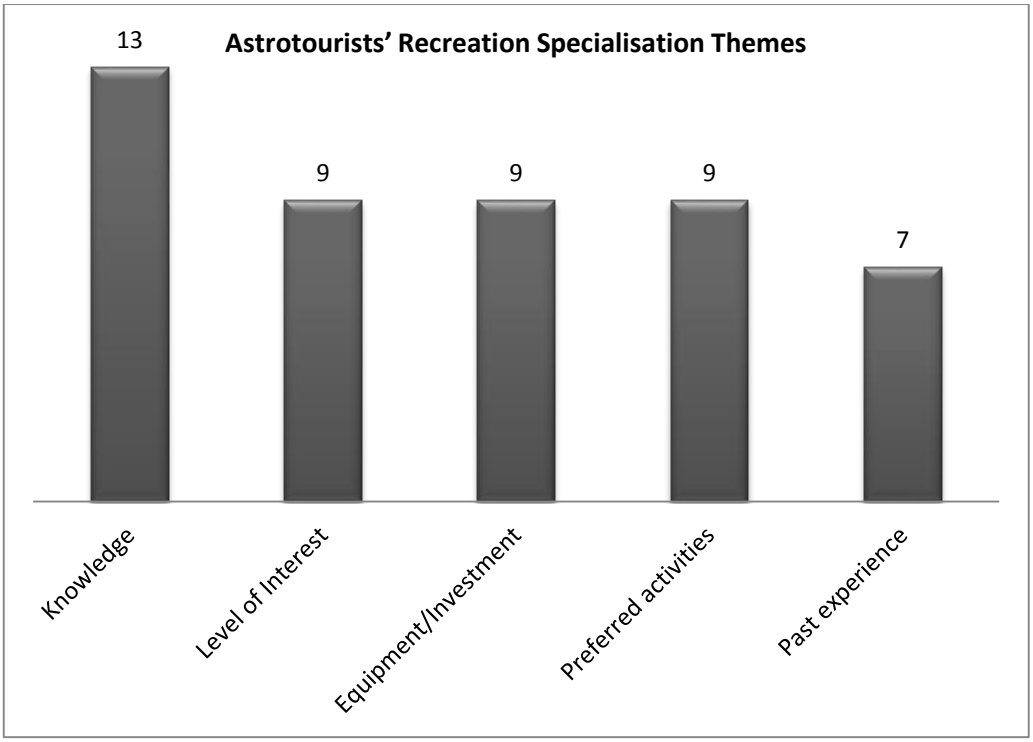


Figure 4.4.4. Astrotourists' recreation specialisation themes

One of the discussions regarding recreation specialisation was with Stargazer club founder which is presented here with underlining of the codes that were generated:

> So, an astronomer, of course, would have that professional degree and be perhaps working in the field. An amateur astronomer, I would expect would possibly have their own equipment, it might be just binoculars but it's probably a telescope and I would think that they would participate in projects, so there's a lot of physics and science projects around now where amateur astronomers can contribute to research, they might not be running the research project, although some might run their own. An amateur astronomer would meet with its group every month and have a bit more involvement in the Astronomical Science field. Whereas an astronomical tourist is just somebody who wants to touch astronomy, every now and then, some more than others, of course, but they just want to have that experience of looking through a telescope or lying down under a night sky or hearing about space information, just occasionally.

As shown above, Stargazer club founder mentioned the level of knowledge, equipment and level of interest/participation (working in the field, every month and occasionally) in her classification towards those interested in astronomy. Her discussion contrasts sharply with celestial vision owner's point, which emphasised the role of experience in astronomical tourists' classification:

> It's very common to hear people describe amateur astronomers and professional astronomers. I actually find those terms not ideal nowadays for the simple reason that those terms are actually sometimes misleading or not particularly relevant. Whether someone's professional or not is actually fairly irrelevant. It's actually about the experience that people gain from enjoying astronomy.

Consistent with Celestial Vision owner's discussions, Astrotourist 3 also mentioned that astronomical tourists range from all three classifications, as any of the mentioned spectra can participate in astronomical tours. For example, Astrotourist 3 classified astronomical tourists based on their various experience and knowledge:

> To me there are three levels of tourists: 'absolute beginner' with minimal knowledge and no past experience; 'novice' with some limited experience or knowledge; and, 'experienced' with lots of previous experience and/or knowledge.

Another captured theme emphasised the level of interest in astronomical tourists. For example:

> I think some people can take it really seriously, other people can take it like an aesthetic appeal, where I'm sort of a bit based, I take it seriously enough, but I don't try to let it rule my life. (Astrotourist 3)

Such episodes emphasised the beautiful visual aspects of the sky observation for some people that draw them to become astronomical tourists to only enjoy the skyscape; while participating in astronomical tours is considered more serious for some others who follow special goals.

Following the definition of recreation specialisation proposed by Bryan (1977, p. 175), this definition in adjusted form is proposed in the current research to define astrotourists' recreation specialisation and the captured themes were applied in designing the questionnaire items.

'Astrotourists' recreation specialisation is referred to a continuum of astrotourists' behaviour from the novice to the advanced, reflected by equipment, knowledge, level of interest and past experience used in astronomical activities and dark-sky site preferences.'

4.4.3. Cognitive dark-sky site image themes

To capture cognitive dark-sky site image among astronomical tourists, two questions were asked:

What features and attributes should an appropriate sky observation destination (skyscape) possess to be chosen to travel to?

What elements or features do you expect to choose for an astronomical tour?

These questions can broaden the discussion by including people's expectations not only for themselves but also from other astronomical tourists' points of view. As shown below, the results of the NVivo 11 Pro, 100 top words in the word cloud, led to this list: sky, dark, telescope, pollution, good, accommodation, lights, town, clear, observatory and facilities. Therefore, this list demonstrates what are the most common words and ideas that need to be

explored in detail. The extracted themes from the word cloud helped in identifying the cognitive dark-sky site themes that need to be used in the final survey instrument. As shown in the final Excel table, light pollution, clear sky, access to telescope and accommodation are among the finalised extracted themes to measure cognitive dark-sky site.



Figure 4.4.5. Cognitive dark-sky site image word cloud

Table 4.4.4 shows the coding and categorising of the themes related to cognitive dark-sky site image that are explored in detail.

Table 4.4.4. Astrotourists' motivation quotes (1)

Cognitive DSS Image Themes Them	**Count of Words**
Dark Sky/Less sky glow/No light pollution	24
Knowledgeable Tour Guide	15
Access to Equipment	15
Combined with Other Activities	11
Clear Sky (No Clouds)	10
Suitable weather (Dry air/Low humidity-dew)	10
Accommodation facilities	9
Access Road	9
General Amenities	8
Low Horizon (No tall building, hills, trees/flat)	8
High altitude	7
Site with a Planetarium/observatory	6
Close Enough to the City	5
Total	**137**

Cognitive DSS image theme 1: Dark Sky/Less sky glow/No light pollution

All astronomical tourists interviewed stated that dark sky is their most important criterion to choose a dark-sky site. This leads back to earlier discussed notions of the increasing problem of light pollution in the world (Charles 2000b). Although some celestial objects such as planets can be observed within light pollution, to have a great view of the sky and to observe fainter objects, a 100 kilometre distance between a dark-sky site and the nearest city of half a million people is recommended (Charles 2000b). Therefore, dark sky has been mentioned in all interviews as the starting step in choosing an appropriate destination for sky observation. For example, Astrotourist 3 has stated:

> Another obstacle to clearly viewing an object in the sky is light pollution, so the site should reflect the degree of difficulty in observing the object by being as far away from such pollution as necessary. For example, the Moon is visible from the middle of a floodlit arena, but it would be pointless to try to observe anything else from such a location. Other objects would require much darker conditions, and the faintest objects would require total darkness to be seen with any clarity.

Astrotourist 4 also emphasised the darkness of the sky by providing detailed information based on his experiences. He added the importance of the flatness of the destination, which is discussed later:

> The bigger the city, the more distance you need away from the site because the sky glows from all that scattered lighting. Sky glow covers a significant portion of the sky so like us here in Mount Isa for instance, we can travel about 60 kilometres outside of town and it just happens to be a nice, relatively flat location at that point where it's definitely dark enough to not have any effect from the lighting so the minimum distance should be usually at least 50 Ks, you just want it to be dark and relatively flat so you get a good view to the horizon in all directions.

The other episode captured by Founder of Skywatch that emphasised the dark sky as being his first criterion with more explanation on how lights prevent a good observation:

> When you look at something, whether you can see it sharply or whether it's bouncing around, you want to avoid things like any nearby lights or even in the distance you get what we call a light dome, which is a light scattering from a town or a city, which mucks up the sky, so for me, it's dark sky first of all.

Cognitive DSS image theme 2: Knowledgeable Tour Guide

The majority of astronomical tourists (15 out of 24) expressed the importance of 'Knowledgeable Tour Guide' in a selected tour. This knowledge has been referred to differently by the interview participants. For example, Astrotourist 1 stated very clearly what three different tours for various astronomical tourists can provide the required information. She

mentioned that as an experienced astronomical tourist, she expects tour guides that have technical knowledge:

> I expect a guide that has technical knowledge that could expand my own technical knowledge. I expect that the areas they had chosen would have some significance So I would be expecting that they had planned it out and they knew what was going to be there, you know, is the moon going to be in a particular position over the city or is the Milky Way going to be in a particular position across the Pinnacles.

She further explained what less experienced astronomical tourists would be expecting from the tour guides:

> If I was doing stargazing, I would expect that they would know the night sky, they would be able to give me some different stories about the different places in the night sky. Even things, say, just stories about Orion and its significance culturally across the world because that is one that is very–that's–from the northern and southern hemispheres and has been known over thousands of years. I would expect some general information so I knew what I was looking at, so I would expect to hear what a light-year was. I wouldn't expect them to say, oh, you know, 34.8 light-years away and I'm thinking what is a light-year? So, I would expect that they would've given me some very basic information.

Furthermore, she discussed, as an international astronomical tourist what criteria she expects from the tour guides/organisers:

> If I was doing something international, then I would probably expect some historical sites or some different sites in there as well. I would expect that whoever is there has really good local knowledge so they can give you stories that you're not going to get just by reading, looking up on the internet. I would expect them to have a good knowledge of the night sky regardless of how much I knew, because if you're in a completely different country and you're looking up, you know, things like, you look up and you go, northern hemisphere, big dipper, we don't have that, so I would expect some interesting information or stories regarding constellations that are possibly not in the southern hemisphere. I'd also be looking at information, stories, local stories around common constellations, a different perspective from a different culture.

As clearly discussed by Astrotourist 1, different astronomical tours require different tour guide qualities. Confirming her point, Astrotourist 3 also emphasised the essential role of an expert tour guide to make the tour more meaningful:

> Such a tour should involve an expert showing the tourist significant objects visible in the sky and explaining them or giving facts about them. For example, the tourist could be gazing at the Moon with the expert pointing out its main features and their origins, or the expert could show the various constellations on view and the stories behind them. Without the expert on hand to explain things and answer questions, the tour makes no sense–the tourist might as well have stayed at home and looked at the sky from their back yard.

It is important to emphasise that interview participants expected different qualities, for example, in this statement, Astrotourist 5 expected someone to know the aboriginal interpretation of the constellations and know how to work with telescopes:

> I would be interested in somebody who showed me the constellations, pointed out the constellations, maybe pointed out some of the aboriginal interpretations of the night sky. I think I'd be looking for a couple of telescopes around the place with a lecturer or an expert pointing at some of the more spectacular objects that we can see through a telescope.

Cognitive DSS image themes 3, 4. Access to equipment, Site with an observatory

Access to equipment and site with an observatory were the other themes that were captured in the interviews. Although they seem overlapped, there is a distinction between them. Access to equipment indicates access to general observation facilities like telescopes or binoculars. Some other astronomical tourists indicated the importance of special facilities like a visit to a planetarium and an observatory. The following two episodes were selected as examples:

> The astronomical tour might also include visits to planetariums, observatory sites, optical and/or radio telescopes, tracking stations, etc. In which case, it is important to have either an excellent interpretative display area with possibly a theatre and/or an experienced astronomer on hand to explain the facilities being visited. (Astrotourist 6)

> I'd like to be able to do a tour in the daytime as well, like to see some Astronomical Observatories, which have multi-sensitive systems, so an Observatory just wasn't for looking at stars or cataloguing positions of stars, it did a multitude of other things, with navigation amongst them.

Cognitive DSS image theme 5. Combined with other activities

Some astronomical tourists who participated in interviews expressed how daytime activities are also important in their astronomical tour selection. For example, Founder of Skywatch explained clearly:

> I'd want to have a place that is quite nice during the daytime. So, as an example, we've got a couple of sites that we go to from the Astronomical Society, there's one up in the Northern Flinders Ranges and there's another one North of Bonnaroo, which is Southern Flinders, I much prefer the Northern one because I like the country a lot better, so while the seeing and the sky is probably just as good at both, I prefer to go to the one where the country is nicer, and where I can wander along the creek or go for a climb in the hills or whatever. So, the first thing is the sky, seeing the darkness of it but the bonuses would be things like, if there's a particular nature reserve nearby or even if there's an area where you can go hiking or I guess perhaps, even if it was near the sea, maybe you could go canoeing.

Some other tourists have expressed their opinion in contrast to Founder of Skywatch's point of view, which was combining an astronomical tour with other activities. For example,

Astrophotographer stated how problematic it would be if an astronomical tour is held in a shared recreational area:

> I guess it's harder to do astronomy in a shared recreational area where you have other families or other travellers who have light, for example. This is a chunk of light pollution. Or if there are encroaching trees in the boundary where you can't see certain parts of the sky or the aspects of the horizon, this can also be problematic. But also, that's different in star parties, when you have a full day of observation or photography and you just want to sleep for the rest of the morning and you might sleep until midday. But if you're in a shared recreational space you can't do that because people are out and it gets loud and noisy.

In summary, whilst his point was thought provoking, 11 out of 24 interview participants mentioned the importance of the combination of other activities when they are selecting a specific dark-sky site to travel to.

Cognitive DSS image themes 6, 7. Clear sky (no clouds), Suitable weather (dry air/low humidity-dew)

Appropriate destinations for sky-observation activities need to possess specific atmospheric criteria, including cloud cover, degree of water vapour, dust pollution, thermal emission from the atmosphere and atmospheric turbulence (Lawrence et al. 2004). Although all of the mentioned criteria are considered to the maximum extent in building massive observatories, some of them are still important in choosing an appropriate dark-sky site. Ten out of 24 astronomical tourists mentioned these criteria, as an example:

> 'That would be great if the site can be in a place that might have less cloud than another place.' (Stargazer club founder)

> 'Arkaroola is almost uniquely suitable for observing because it has dry air, generally, and dry air means that you're not looking through water vapour, which tends to break up the image.' (Wilderness sanctuary owner)

Cognitive DSS image themes 8–11, Accommodation facilities, Access road, General amenities, Close enough to city

From the outset, it is clear that the themes related to facilities and infrastructures are closely related. This connection is most noticeable in the below-extracted word tree. The following word combinations have been mentioned in the interviews before and after 'accommodation':

- Accessibility to infrastructure (roads)
- Easy access
- Power and internet
- Basic amenities

- Family friendly food

Moreover, it is also apparent at an initial glance, the astronomical tourists expressed their expectation of accommodation differently. For example, ‘a comfortable accommodation’, ‘family friendly accommodation’, ‘camping facilities’, ‘nearby motel/hotel accommodation’, ‘budget type accommodation’, ‘caravan-type accommodation’ are the word combinations that were stated by interview participants.



Figure 4.4.6. Accommodation word tree

Here are a few examples of the importance of the mentioned themes in the interviews:

Table 4.4.5. Accommodation facilities, access road, general amenities quotes

Interviewee	Accommodation facilities, Access Road, General Amenities
Astrotourist 1	A good access road … close enough to a town that has accommodation, food and family friendly accommodation, family friendly food because a lot of people who do astronomy tours have children with them
Stargazer club founder	It's always really nice if the accommodation and food is really good, that's a great asset to a site plus safety
Astrophotographer	Power and internet, mainly. Accommodation is good, too, not necessary. Camping is fine. But certainly somewhere that's drivable
Astrotourist 4	It depends on the length of the trip where you're staying. If it was only a day or two, you can camp out. If it was a week, you'd start to be looking for some sort of motel accommodation that has a shower
Founder of Skywatch	While I'm happy to go camping or something like that, it's nice to have a shower and toilet nearby

Cognitive DSS image theme 12. Low Horizon (No tall building, hills, trees/flat topography)

Another theme mentioned by astronomical tourists was 'a site with a low horizon'. A low horizon indicated a site with no tall buildings, hills or trees. In other words, it means a flat area so that the sky can be seen like a dome above the observer. Astrotourist 4 explained why a low horizon is important in sky observation:

> You definitely look to find somewhere with a very low horizon so in other words, a place with no close hills or trees, you want to be able to have as low an angle of elevation above the horizon and generally, pretty flat or at the top of the hill which is why they put observatories at the top of hills.

As Astrotourist 4 mentioned, big observatories are usually built on the top of hills. Besides having a clear view, high altitude is another important factor that needs to be considered. This factor is explained in the next theme.

Cognitive DSS image theme 13. High altitude

As a follow-up question, the researcher asked 'why the top of a hill can be an ideal option to build an observatory?'. According to Astrotourist 4's answer:

> It depends on how tall the hill is, how many metres above sea level. If it's a hill that is a hundred metres higher, that doesn't make much difference to the quality of the viewing but it gives you that lower horizon, there's no trees or buildings or anything in the way, the other reason they put observatories on the top of hills or mountains like in Hawaii or Chile where they've got those huge international consortiums is because when you get up to a significant altitude, like they're around 4,000 metres or so, the air density is much less and that means there is less interference in the atmosphere … which means you get a clearer picture and your stars look better and there's less sky glow because there's less air above you to be scattering any light anywhere and so you get a much better view but it does need to be a significantly high altitude to get those sorts of effects, ideally, a couple of thousand metres.

Adding more depth to the interview discussions, Wilderness sanctuary owner explained thoroughly about the effect of the atmosphere in sky observation quality. He further gave an example about one of the astronomical destinations in South Australia that is specifically designed for astronomical tours:

> Dry air, lack of cloud and higher altitude. I mean, all things being equal, a place like Manuaki, Hawaii, it's 4,000 metres above sea level and the atmosphere goes up to about 80 kilometres but in the first 4,000 metres they're above half of the Earth's total atmosphere, so the image quality is good, but in Australia, while we don't have high altitude, we do have clear skies … for observing you want clear skies and dry air and that's what we get, it's almost uniquely suitable for that reason. In addition, Arkaroola is almost uniquely suitable to have both qualities. We have an elevation of about 1,100 metres, and at that elevation, we're above the level of temperature inversions. If you're below the level of temperature inversion, on flat land then it's like lying on the bottom of a swimming pool and looking upward, so the image quality is very poor, whereas we don't have that problem at our observatories.

Following the definition of cognitive destination image proposed by Gartner (1993, p. 193), this definition in adjusted form is proposed in the current research to define astrotourists' recreation specialisation and the captured themes were applied in designing the questionnaire items.

'The sum of beliefs and attitudes of an appropriate dark-sky site expected by astrotourists leading to some internally accepted pictures of its attributes.'

4.4.4. Affective dark-sky site image themes

To capture the themes related to the astronomical tourists' affective dark-sky site image, the interview participants were asked about their evoked feelings when they are observing the sky. After running the word frequency to achieve a general idea of the answers, the 100 most repeated words showed the following: awe, peaceful, relaxing, amazing, small, change, massive. These words can be seen in the below-extracted word cloud in Figure 4.4.7.



Figure 4.4.7. Affective DSS image word cloud

After a thorough investigation on the number of repeated words that were coded, the following themes were extracted, which are shown in Table 4.4.6, are discussed further.

Table 4.4.6. Affective DSS image themes

Affective Dark-sky Site Image Themes	Count of Words
Awe	15
Humble	11
Peaceful	10
Relaxed	9
Excited	8
Connected to universe	7
Mindfulness	7
Impressed	5
Happy	4
Inspired	4
Appreciation of nature	3

Affective DSS image theme 1. Awe

As shown in Table 4.4.7, 'awe' was the most repeated word among astronomical tourists when asked about their feelings towards sky observation. Awe is a 'foundational human experience that defines the human existence' (Schneider 2011, p. 249). Despite limited research in this area, some scholars investigated the importance of the feeling of awe in tourists' memorable

experience towards building a stronger connection with the destination (Coghlan, Buckley & Weaver 2012; Shiota, Keltner & Mossman 2007). As shown in the word tree (Figure 4.4.8), 'awe' was repeated with words such as amazement, wonder, admiration, beauty, insignificance, satisfaction, inspiring and surprise.

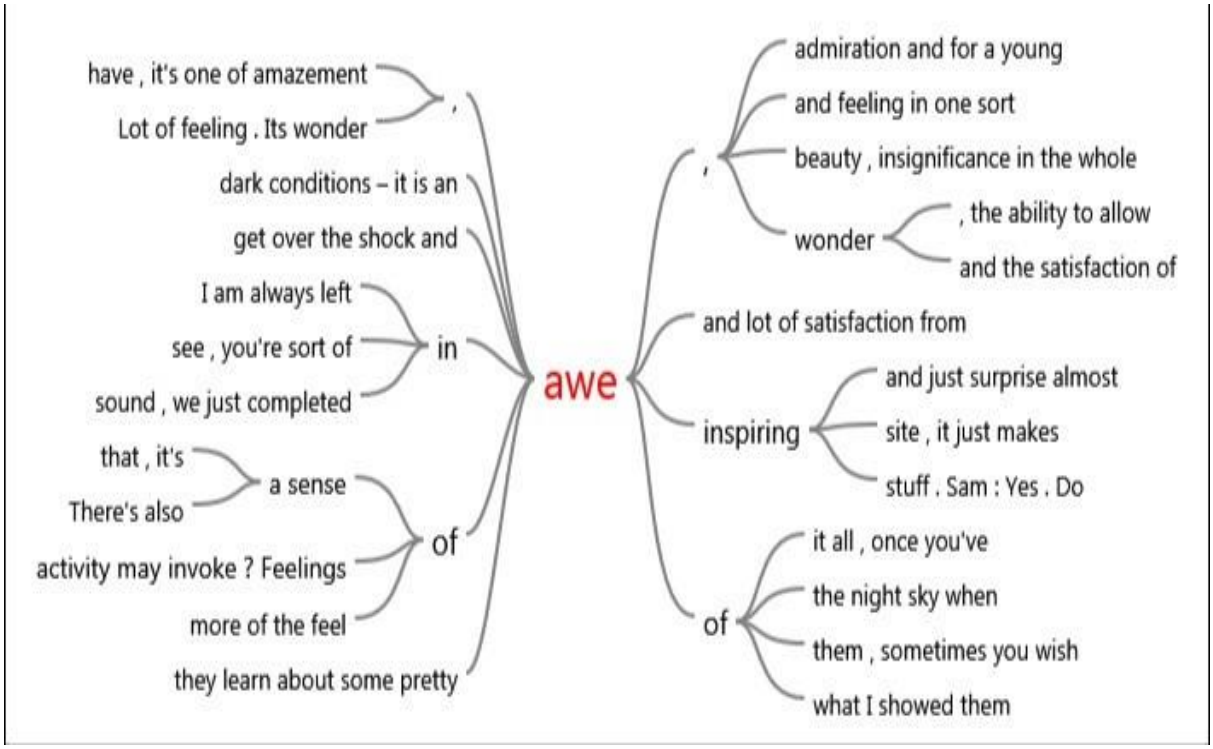


Figure 4.4.8. Awe word tree

The captured episodes relating to the 'awe' theme are presented in the following table with their supporting qualitative data:

Table 4.4.7. Awe quotes

Interviewee	**Supporting Qualitative Data representing 'Awe'**
Astrotourist 3	I am always left in awe of the night sky when I am observing
Vice president 1	You've got the whole sky to yourself and some things you see, you're sort of in awe of them, sometimes you wish you had a camera so you can show people what you've seen
Earthside Astronomy founder	There's also a sense of awe, and feeling in one sort of place in the universe to look out and see things so vast and so far away, the scale is actually, genuinely unimaginable

Affective DSS image theme 2. Humble and Small

Feeling humble and small was another theme apprehended in the interviews' analysis. This feeling is one of the unique feelings in tourists' experiences. This feeling is expressed quite uniquely for each individual and was hard to explain. The captured episodes relating to the 'humble and small' theme are presented in the Table 4.4.8 with their supporting qualitative data:

Table 4.4.8. Humble and small quotes

Interviewee	**Supporting Qualitative Data representing 'Humble and Small'**
Astrotourist 1	You look at it and you just think, we are but one tiny little planet swirling around out here
Wilderness sanctuary owner	Small, I'm very small in it and I love that … for me even the distance to the nearest star, apart from our Sun, Alpha Centauri, it's 4.3 light-years, which is 4.3 × 10 million, million kilometres, 10 million, million kilometres is 1 light-year and 1 light-year is beyond my comprehension
Astrophotographer	To me, personally, they call it existential nihilism, which is best described as the feeling that I get from it to just the idea of being completely insignificant in the universe
Astrotourist 4	I guess you do get a feeling of insignificance in some ways. It reminds you that, it's a really good reminder that you are not the centre of the universe or as human beings, we're not the centre of the universe
President 4	It just makes you feel so small in the universe
Astrotour guide	Insignificance in the whole scheme of things

Affective DSS image themes 3, 4. Peaceful, Relaxed

Peaceful and relaxed were the other two themes that were most closely followed by each other in most of the interviews. The following word tree of the word 'peaceful' demonstrates this fact (Figure 4.4.9).

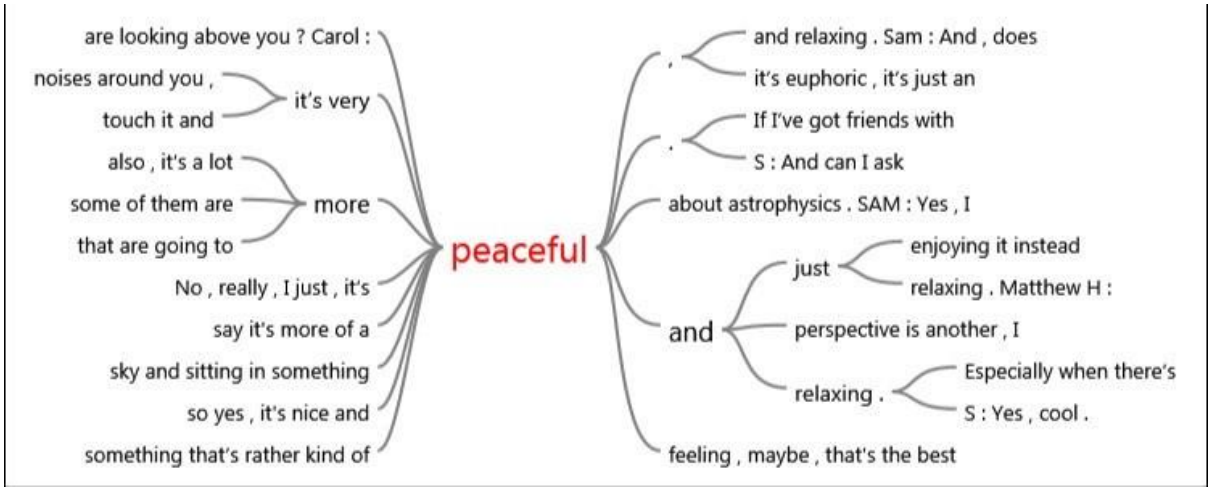


Figure 4.4.9. Peaceful and relaxed word tree

The quotes indicating the 'peaceful and relaxed' theme are presented in Table 4.4.9 with their supporting qualitative data:

Table 4.4.9. Peaceful and relaxed quotes

Interviewee	**Supporting Qualitative Data representing 'Peaceful and Relaxed'**
Astrotourist 1	When it's a really clear night and you've got the Milky Way going through, it feels, almost euphoric, it feels like you could stretch out and touch it and it's very peaceful
Astrotourist 7	When you sit back in a chair, a folding chair and just stare up in the sky when there's no other distracting noises around you, it's very peaceful and relaxing
Founder of Skywatch	It's something that I find is relaxing, I can switch off from the world a little bit, like if you're out in the middle of nowhere, you don't have to worry about the headlines or the paper and all sorts of strange things that are happening, so it's nice for me to be able to take a deep breath and feel that I can relax and enjoy what I'm looking at
Celestial Vision owner	A common experience is that when you're out in the night sky environment, often people will quieten down, they will stop speaking in a loud way, the chatter disappears. You're just mindful of the quietness of the landscape. For many people, how they respond to that is that they themselves become quiet. This experience can actually be also quite relaxing for many people as well. Disconnecting from all of the distraction on TV and internet and radio and music, all of that. That's one of the things that I've noted about that
President 4	The ability to allow me to relax and forget about the day-to-day problems

Affective DSS image theme 5. Excited

Getting 'excited' was the next theme that was captured through the following statements:

Table 4.4.10. Excited quotes

Interviewee	Supporting Qualitative Data representing 'Excited'
Astrotourist 1	When it's a really clear night and you've got the Milky Way going through, it feels, almost euphoric, it feels like you could stretch out and touch it
Earthside Astronomy founder	You definitely would get surprised almost every time from a truly dark site, because you get such an amazing view of the Milky Way
President 2	If it's something you haven't seen then it's stunning, it's amazing really. Some people get excited by it.
President 1	When there's some particularly interesting events such as meteorites, showers and eclipses that could be quite exciting

As demonstrated in Table 4.4.10, the occurred excitement among astronomical tourists has different reasons. The vastness of the universe, a truly dark-sky site, seeing a celestial object for the first time and interesting astronomical events were mentioned as the different sources of excitement for each individual.

Affective DSS image theme 6. Connected to universe

'Connected to universe' was another interesting and hard to express theme comprehended among the astronomical tourists' feelings. The supporting qualitative data for this theme is listed in Table 4.4.11:

Table 4.4.11. Connected to universe quotes

Interviewee	Supporting Qualitative Data representing 'Connected to universe'
Stargazer club founder	In a dark-sky site that hasn't got any buildings, you're just in the natural surroundings that feeling of peace and the connection to your natural surroundings would come back
Founder of Skywatch	Just the feeling of being at one with the universe
Astrotourist 4	It really does remind you how connected you are to the rest of the universe even though it's a huge massive place
Astrotourist 7	I actually feel really centred and that feeling that the world, and the universe are so massive. You actually get overwhelmed by how massive the universe is

Affective DSS image themes 7, 8. Mindfulness, Inspired

'Mindful', 'Perspective' and 'Inspired' were other related themes that were mentioned by astronomical tourists during the interviews. Mindfulness means a 'state of mind that results from drawing novel distinctions, examining information from new perspectives and being

sensitive to context' (Langer 1989, p. 44). These feelings were also hard to express and each participant mentioned different elements of their feelings. The related examples are listed in Table 4.4.12:

Table 4.4.12. Mindfulness and inspired quotes

Interviewee	Supporting Qualitative Data representing 'Mindfulness, Inspired'
Stargazer club founder	Perspective is another, I feel that it places my life in perspective because I'm looking at things that are so far away and that our Earth is so small, so that gives my life perspective
Astrotourist 3	I think it's important for people to maybe look up sometimes and get that perspective of exactly where they are. It makes your day job look pretty mediocre compared with what we could be doing and exactly what's out there
Vice president 1	You sort of think, there's a whole universe out there, maybe we should be looking after ourselves a bit more than we do and try not to let the small things worry you. I've read that a lot of astronauts that have actually been into space, they just come back with a totally different outlook on life and where we're all going and where we're all heading, sort of thing. So, it's one of the important things that you think of, especially in astronomy
Astrotourist 5	I think it also just makes you aware that there is more to life than just running around during the day doing things we do in our lives. It opens up the bigger picture
Earthside Astronomy founder	Sort of achievement inspires you to make more out of your life by just knowing how small and how short your life actually is

Affective DSS image theme 9. Impressed

Interview participants also indicated how they feel 'impressed' by the vastness of the sky, the overwhelming beauty of the night sky and the incredible magnitudes of the sky. These interesting quotes are presented in the table below:

Table 4.4.13. Impressed quotes

Interviewee	Supporting Qualitative Data representing 'Impressed'
Celestial vision owner	For example, at Lake Ballard, in the midnight, the landscape is huge, it's vast. It's an awesome place. The Milky Way is stretching right over the top, looking straight over. The heart of the Milky Way galaxy is right above us. I can see this in my mind right now, it's extremely quiet, it's incredibly quiet out there. It's dark, full of stars. It's cold, it's very cold. It's absolutely amazing, quite profound experience
Astrotourist 6	As always for me, it is the overwhelming beauty of the night sky (either with the natural eye or through a telescope), and the sheer vastness of the Universe itself that has me totally absorbed forever.
Astrotourist 5	I find that fascinating, when you're looking at the Milky Way and somebody points out that what you're looking at is the sort of dust clouds, the spiral, you're looking along the plane of our galaxy. I find that information interesting, and it is just overwhelmingly beautiful really
Astrotourist 9	For me personally, just seeing amazement, just seeing objects that are so far away so big, every night you will get someone go 'Wow', when they look at something like a cluster that has millions and millions of stars, and is thousands of light-years away

Affective DSS image theme 10. Happy

'Happiness' was another theme indicated by four astronomical tourists. In an interview, Astrotourist 6 described how he gets satisfied and happy with sky observation. He said, 'I am usually very satisfied if I observe something for the first time, but if I only look at wonderful objects I have seen before, I am still left happy'. Although Astrotourist 6 separated the feelings of satisfaction and happiness, the feeling of satisfaction was not common in astronomical tourists and was not mentioned anymore. This is why the 'happiness' descriptor which was repeated four times was included in the list.

Affective DSS image theme 11. Appreciation of nature

Although the sky is almost an overlooked part of nature, astronomical tourists explained how observing the sky presents them with the 'appreciation of nature'. Astrotourist 3 described his feeling precisely by saying:

> Just that feeling of being able to stand out in the middle of an open paddock and have no lights around you and just be you, and the sky above, the dark sky above you and see the universe for what it really is and appreciate its natural beauty.

Moreover, Astrophotographer explained how the appreciation of nature results in the deeper connection between people from different backgrounds:

> What I like about astronomy and astronomical clubs and star parties, is that the people there, I don't really go to talk to them about religion or politics or anything like that. We're both there to share an appreciation of the night sky regardless of gender, social, cultural or religious issues.

Following the definition of cognitive destination image proposed by (Stylos et al. 2017, p. 17) this definition in adjusted form is proposed in the current research to define astrotourists' recreation specialisation and the captured themes were applied in designing the questionnaire items.

'Astrotourists emotional responses or appraisals of the dark-sky site'

4.4.5. Conative dark-sky site image themes

To understand astronomical tourists' conative dark-sky site image, the interview participants were asked about their behaviours towards an appropriate dark-sky site. The results of the word frequency analysis demonstrated in the below word cloud listed the following words: recommend, encourage, visit, friends, promote, revisit, council.



Figure 4.4.10. Conative DSS image word cloud

After running the word frequency analysis, the interviews were carefully analysed to count the exact number of times that each theme was indicated. Table 4.4.14 shows the results:

Table 4.4.14. Conative DSS image themes

Conative Dark-sky Site Image	Count of Words
Recommend	14
Revisit	12
Positive Word of Mouth (WOM)	6
Propose it to local council to preserve that	5
Protect the site to preserve it	3
Promote the site in social media	3
Grand Total	**43**

The captured themes are presented in the following table with their supporting qualitative data:

Table 4.4.15. Conative DSS image quotes

Theme	Supporting Qualitative Data
Recommend	If it's a really good one I would recommend it. People say to me, where is a good place to take photos? I often say, let's go to the Pinnacles, it's close to the city, you've got the camp site at Cervantes, it's really handy, it's a nice camp site (Astrotourist 1)
Revisit	I certainly, if the light pollution is low, and it's a great, safe place, I've been back (Stargazer club founder)
Positive WOM	If I find a good observing site, I will certainly plan to revisit that and will always spread the word to other astronomers (Astrotourist 3)
Propose it to local council to preserve that	When I find a truly dark-sky site, if it is something in an area where I imagined that would be an issue, I would definitely talk to the council. In fact, I have previously done presentations based on preservation of dark sky and proper lighting utilisation to try educating, based on the fact that not only are we wasting money, but we're really destroying a natural resource by having overabundant light pollution (Earthside Astronomy founder)
Protect the site to preserve it	From an ecological point of view, I'm very careful, so if the site is not set up by a council and it doesn't have bins and things like that then I would make sure that everything that came in with me–went out with me (Astrotourist 1)
Promote the site in social media	So, the majority of us are on Facebook or on social media and post our photographs, 'This is what we saw here'. Instead of telling people about it, these days you can share with many people (President 2)

Following the definition of cognitive destination image proposed by (Stylos et al. 2017, p. 17) this definition in adjusted form is proposed in the current research to define astrotourists' recreation specialisation and the captured themes were applied in designing the questionnaire items.

'Astrotourists' active consideration of a dark-sky site as a potential travel destination to recommend, revisit, positive word-of-mouth, promote in social media and protect it.'

4.5. Conclusion

The qualitative findings presented in this chapter suggest the appropriate themes to use in recreation specialisation, cognitive, affective and conative dark-sky site image in an astronomical tourism context. The results are demonstrated through Excel tables, direct/indirect quotes of interview participants, NVivo 11 Pro word trees and word clouds. The extracted themes are used to design the measurement scales for the quantitative phase of the current research. Each theme has been compared with previously developed scales in the literature to decide whether the theme is new in the astrotourism context and can be used as an appropriate item. The mixed-method design of the current research required this exploratory phase to clarify and identify the concepts for conceptualisation and measurement of the astronomical tourism. The findings of the qualitative phase are summarised here:

- The concept of astronomical tourism, astronomical tourist and dark-sky site distinguished the current research from other special interest tourism literature.
- Eleven new items emerged to measure astronomical tourists' motivations (See Appendix E).
- Eleven new items emerged to measure cognitive dark-sky site image (See Appendix E).
- Twelve new items emerged to measure affective dark-sky site image (See Appendix E).
- Three new items emerged to measure conative dark-sky site image (See Appendix E).

Having identified the potential items to measure the above-mentioned constructs, the next chapter reports on survey instrument design for the quantitative phase.

5 QUANTITATIVE RESULTS

5.1. Introduction

Following the results of the qualitative phase of the study, this chapter presents the results of the questionnaire development and quantitative phase of the study. The methods for which results are presented are descriptive analysis, *t*-tests, factor analysis, structural equation modelling and analysis of variance. First, the demographic profile of the astronomical tourists is reported. This is followed by examining the influence of demographic and astrotourists' recreation specialisation levels on the various constructs by conducting *t*-tests and ANOVA. Following these, this chapter reports the results from structural equation modelling to test the hypotheses. Confirmatory factor analysis is conducted to verify the indicators of each latent variable. Afterwards, the model testing and modification process are undertaken and the final structural model with its goodness-of-fit indexes is presented. Finally, the final structural model is used to present the hypotheses results and a summary of the findings is presented. Therefore, the quantitative phase of the current research provides an answer for the following research questions:

1. What is the relationship among astronomical tourists' recreation specialisation, dark-sky site image components and future behavioural intentions?

2. How are the previously mentioned constructs moderated by motivational levels of astronomical tourists?

3. Are there significant differences among mentioned constructs based on the astronomical tourists' demographic profiles?

4. Are there significant differences among mentioned constructs based on the astronomical tourists' specialisation segments?

5.2. Questionnaire development

In this phase, a questionnaire survey for astrotourists will be conducted and used for the main findings of this research to validate and test the proposed model. This phase involves distributing self-administered questionnaire surveys to astrotourists via the mailing list, which will be provided by the astronomical societies nationally. The questionnaire statements will

cover the measurement of the key variables: specialisation segmentation, cognitive dark-sky site image, affective dark-sky site image, conative dark-sky site image, overall dark-sky site image, astrotourists' motivation and astrotourists' demographic characteristics.

As suggested by previous scholars, the domains of the study were defined based on the review of the literature to develop the research scale and conceptual framework (Gartner & Ruzzier 2011; Hosany, Ekinci & Uysal 2006; Konecnik & Gartner 2007; Oh, Fiore & Jeoung 2007). To enhance the validity of the research, clear definitions of the constructs are needed to 'compare and accumulate the findings' (Churchill Jr 1979, p. 67). In the current research, each construct's definition was selected from the literature and presented in Table 5.2.1. To develop the scale for the current research, the researcher followed the procedure by analysing the qualitative data, using quotes to write items for the scale, developing variables by assigning the codes to group the items, and using the themes to group the codes into scales (Creswell 2009).

Table 5.2.1. Defining the constructs within the conceptual framework

Construct	Definition	Source
Recreation specialisation	'Astrotourists' recreation specialisation is referred to a continuum of astrotourists' behaviour from the novice to the advanced, reflected by equipment, knowledge, level of interest and past experience used in astronomical activities and dark-sky site preferences.'	Followed Bryan 1977, p. 175
Cognitive DSS Image	'The sum of beliefs and attitudes of an appropriate dark-sky site expected by astrotourists leading to some internally accepted pictures of its attributes.'	Followed Gartner 1993, p. 193
Affective DSS Image	'Astrotourists emotional responses or appraisals of the dark-sky site'	Followed Stylos et al. 2017, p. 17
Conative DSS Image	'Astrotourists' active consideration of a dark-sky site as a potential travel destination to recommend, revisit, positive word-of-mouth, promote in social media and protect it.'	Followed Stylos et al. 2017, p. 18
Overall DSS Image	the positive, negative or overall evaluation of a product, brand or tourism destination	Beerli & Martín 2004a
Future behavioural intentions	an individual's strong intention to perform a certain behaviour in near future	Ajzen 1991

5.2.1. Questionnaire structure and items

There are two main types of quantitative questions, namely, attitude scales and personality inventories. In attitude scales, the questionnaire measures include attitudes, beliefs and intentions; while in personality inventories, the questionnaire is used to measure the personality attributes of the respondents (Tashakkori & Teddlie 2009).

Moreover, there are several response formats associated with attitude scales, including Likert scales, semantic differentials, checklists and rank orders (Tashakkori & Teddlie 2009). For example, Likert scales are 4- to 7-point scales to measure the level of respondents' attitudes towards multiple items measuring the construct under study (Tashakkori & Teddlie 2009).

To ask good survey questions, the researcher applied the guideline proposed by Dolnicar (2013). This guideline covers four areas to be considered before finalising the survey questions.

Using the in-depth interviewing technique with expert astrotourists, the researcher identified the appropriate items to measure the constructs within the astrotourism context. The researcher has also cross-referenced the item measures within the literature and the emerged items from the interviews to develop the scales.

The questionnaire included scales for each construct with multiple items that required the participants to respond. For each construct, the researcher first reviewed the previous literature to see how they have developed their scales and then wrote a general question to ask in the interview to identify how that construct can be measured in an astronomical tourism context. After the interview analysis, and based on the achieved themes, the researcher has coded the items that needed to be asked for each construct in the questionnaire. The researcher reviewed the literature again to determine the extent that the items that were developed are close to previously developed scales. Based on the results, the researcher determined the best statements for asking the questions and developing the scales for each construct. If the achieved items and themes from the qualitative results were similar to previously developed scales in the literature, the researcher considered them to develop the final scale. Based on the level of the similarity of the previous scales and the achieved items from the literature, the researcher decided to implement, modify, delete or add the items to the previously developed scales (see Appendix E). Each attitudinal scale to measure the constructs in the current research is discussed in detail:

- *Recreation specialisation:*

To measure the recreation specialisation in astronomical tourism, the researcher asked the astronomical experts based on what criteria they classify astronomical tourists. Consistent with the qualitative findings of the current research and previous research (McFarlane 2004; McIntyre & Pigram 1992; Needham et al. 2007; Scott et al. 2005; Scott & Shafer 2001; Scott & Thigpen 2003), recreation specialisation was measured by asking seven questions with a 5-

point Likert-type format ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). After an extensive review of the literature, the researcher selected a scale developed by Needham et al. (2007) as the closest scale to what was captured in qualitative analysis. In their research, Needham et al. (2007) examined the relationship between hunter specialisation and behavioural intention with the influence of chronic wasting disease.

Although Needham et al.'s (2007) scale was selected as the basis of the measurement, the researcher deleted the following items: 'Deer hunting is an annual tradition that has become important to me'; this item could not be part of the astronomical tourism because of its specific information related to hunting experience. 'If I could not deer hunt, I would …', and 'Experience years' were also deleted, because of the open-ended nature of the research questions that could not be included in a Likert scale.

- *Motivation*

To measure motivation in an astronomical tourism context, two questions from astronomical tourists and experts were asked to capture what they think motivates themselves to participate in astronomical tours and what they think motivates others to participate in astronomical tourism. Consistent with qualitative findings and previous research (Galloway 2010; Manfredo, Driver & Tarrant 1996), astronomical tourists' motivation was measured by asking 21 questions with a 5-point Likert-type format ranging from 1 (Not important at all) to 5 (Absolutely essential). Review of the previous literature showed that some of the 36 items developed in the Recreation Experience Preference (REP) scale (Manfredo, Driver & Tarrant 1996) are close to the findings of the current research. Galloway (2010) has also incorporated the same scale to measure motivations among New Zealand white-water kayakers. In the current research, the initially developed scale to measure the astronomical tourists' motivations included 25 items. After several triangulations and expert reviews, this was reduced to 21 items with 10 items adopted and modified from the REP scale and 11 newly developed items obtained from qualitative results.

- *Cognitive dark-sky site image*

In the current research, cognitive dark-sky site image items were captured by questioning the informants about the features they seek in a dark-sky site. The answers to this question can be categorised into two groups; the general features that have been discussed and measured in previous literature (e.g. Echtner & Ritchie 1993), and the specific features that were unique in

measuring the cognitive image of a dark-sky site. The initial scale included 23 items, which were reduced to 19 items after triangulation and expert reviews with 5-point Likert-type format ranging from 1 (Not important at all) to 5 (Absolutely essential). Moreover, the 19 items measuring the cognitive dark-sky site image included eight general items adopted and modified from the destination image scale developed by Echtner (1993) and 11 new specialised items captured from interview results.

- *Affective dark-sky site image*

To capture measurement items for affective dark-sky site image, the researcher asked what feelings astronomical tourists experience when they are in a dark-sky site observing the sky above them. The initial scale contained nine questions, which were expanded to 12 questions with 5-point Likert-type format ranging from 1 (Very untrue of me) to 5 (Very true of me). Adding three more items was due to the avoidance of double-barrelled queries of some items asking about two attributes in one statement (Dolnicar 2013). For example, in the initial scale, one statement was 'When I observe the sky during the astronomical tour activity, I feel connected to universe/nature and appreciate nature'. After triangulation, connected to the universe and appreciate nature were asked separately to avoid the double-barrelled queries. Moreover, the 12 items measuring affective dark-sky site image were newly captured from interview results.

- *Overall dark-sky site image*

The items for measuring the overall dark-sky site image were first tried to be captured by asking astronomical tourists about the most important features they seek when choosing a dark-sky site. To answer this question, 23 out of 24 informants answered that 'dark sky' is the most important feature for them to choose a dark-sky site. Because of this overlapping answer with cognitive dark-sky site image, the researcher tried to identify the measurement scales for overall image applied in the previous literature. The overall image measurement in previous literature is shown below in Table 5.2.2.

Table 5.2.2. Overall image measurement scales

Overall Image Measurement	Source
a single five-point rating item by asking respondents: 'How would you describe the image that you have of …?' The responses can range from highly unfavourable (1) to highly favourable (5)	Bigné, Sanchez and Sanchez (2001)
a single five-point rating item by asking respondents: 'How would you describe the image that you have of …?' The responses can range from highly unfavourable (1) to highly favourable (5)	Bigné Alcañiz, Sánchez García and Sanz Blas (2009)
a 7-point Likert scale with one item whose extreme values are very positive/very negative.	Beerli and Martín (2004b)
a 5 point Likert scale ranging from 1 (strongly negative [overall image]) to 5 (strongly positive)	Lin et al. (2007)
a 7-point scale with 1 being very negative and with 7 being very positive.	Qu et al. (2011)
'Please circle the number that best describes your overall perception of Greece as a tourist destination', anchored with '1 Very negative' and '7 Very positive'.	Stylos et al. (2016)
How would you describe the image that you have of Peñíscola? 1–5 Highly unfavourable–Highly favourable	Alcañiz et al. (2009)
a single-item (very positive–very negative image), seven-point semantic differential scale was included to assess the overall image of the museum.	Gil and Ritchie (2009)

As is shown in the Table 5.2.2 and discussed by previous scholars, if the construct being measured is adequately narrow, a single-item measure suffices (Wanous, Reichers & Hudy 1997). Moreover, review of the literature has supported that a single-item measure is preferable when measuring an overall aspect of a construct such as overall satisfaction or overall image (Scarpello & Campbell 1983; Wanous, Reichers & Hudy 1997). Therefore, in the current research, the overall dark-sky image was measured with a single-item question with 5-point Likert-type format ranging from 1 (Very unfavourable) to 5 (Very favourable).

- *Conative Dark-Sky Site Image*

To capture the items for conative dark-sky site image measurement, the researcher asked astronomical tourists about their behaviour towards a dark-sky site after their visit. Consistent with previous literature and the interview analysis, six items were selected to measure conative dark-sky site image with a 5-point Likert-type format ranging from 1 (Never) to 5 (Every time). Three items were selected based on the interview analysis and three items were adopted and modified from previous research (e.g. Agapito et al. 2013).

- *Future behavioural intentions (FBI)*

Measuring future behavioural intention is challenging because previous scholars have mixed the concepts of future behaviour, loyalty and willingness to pay by proposing similar items for their measurement. For example, revisit and recommendation intentions were suggested to

measure both future behaviour and loyalty constructs (Bigné, Sanchez & Sanchez 2001; Prayag 2009; Yoon & Uysal 2005).

Future behavioural intentions of astronomical tourists were measured by two developed items in the previous literature. The first question asked about the willingness of the astronomical tourist to participate in an astronomical tour in the next 12 months with a Juster 10-point probability scale. The second question was also asked about the willingness of the astronomical tourist to pay to participate in an astronomical tour in the next 12 months with a Juster 10-point probability scale.

- *Overall structure of the questionnaire*

In summary, the questionnaire began with an information sheet (Appendix D) that needed to be accepted by the participants. Then, a screening question helped to distinguish whether the respondents have participated in the targeted astronomical tourism activities. Following the screening question, the questionnaire contained two parts:

General questions: These questions were designed with the aim of collecting personal information and were used mainly for descriptive statistics. This section contains questions such as the following:

- Frequency of their astronomical tours
- The information sources about astronomical tours
- Details of the most recent astronomical tour
- Membership of astronomical societies
- Years of involvement in astronomical activities
- Preference in astronomical activities
- Demographic questions such as age, gender, education, occupational status and income

Specialised questions: These questions obtained information that the researcher needed to analyse to test the hypotheses or to answer the research questions. So, the researcher mainly deals with inferential statistics. The number of specialised questions in this study is 66 in which the questions relate to the variables of recreation specialisation, motivation, cognitive image, affective image, conative image and overall image and future behaviour (see Appendix D).

5.2.2. Review of the initial questionnaire by experts

Feedback from academics and experts in the field has been sought to improve the validity and reliability of the measurement used in the questionnaire. Aside from the researcher's three supervisors, feedback has been sought from two other expert academics in scale development from the Universities of Queensland and South Australia. One of the main problems of the first designed questionnaire was double-barrelled queries (Dolnicar 2013). For example, 'peaceful and relaxed' was considered as one item in measuring the affective component of the destination image. After expert review, they were treated as separate items as they would have caused bias in the final results. In addition, the astronomical tour providers and experts have reviewed the questionnaire for further clarification. The questions have been modified based on the experts and academic feedback to be as explicit and as accurate as possible. This approach has been used by multiple studies in the field of hospitality to confirm that the constructs and measures are suitable in the current situation (Chhetri, Arrowsmith & Jackson 2004).

Moreover, to reduce potential bias arising from poorly constructed questions and to check construct validity (Yin 2012), two astronomical experts and tourism academics reviewed the initial questions. In this process, based on the recommendations, the researcher identified and revised the ambiguity of the language and the wording. For example, one of the expert astrotour guides who had participated in the interview indicated that some items of the questionnaire such as 'clear site' need clarification for novice astrotourists. Clear site in astronomical observation has a technical meaning that shows a site with less fog and cloud intensity. Therefore, such modifications were applied to design a clear questionnaire.

5.2.3. Pilot study

A pilot study is conducted to collect a small number of subjects to test the procedure of the data collection, identify the problems and launch the actual data collection with more accuracy (Tashakkori & Teddlie 2009).

In the pilot test phase, the researcher sent the developed items to four native English speaker students to check the clarity of the questions' wording; and to four academic researchers to review the questions. During this phase, several items and rating scales were modified. The pilot test questionnaire of the the current research was distributed to a total of 60 astrotourists through non-random convenience sampling, which has been recommended for this type of research when surveying specialised participants (Rothgeb 2008). The pilot test allowed for

reliability test of the questionnaire survey. The pilot test involved astronomical tourists who were recommended by the interview participants to evaluate the appropriateness of the instrument. It has also provided a basis for the time the questionnaire takes to complete.

5.2.4. Preliminary data analysis

- Managing monotone, missing values and outlier

In quantitative research, it is crucial to analyse the data set before preforming the actual data analysis such as regression, ANOVA and structural equation modelling. To clean up the data set, forty seven cases with monotone responses were identified and deleted. Monotone responses have no variances and they have no value for the analysis (Hair et al. 2006). Moreover, 303 cases were identified and deleted due to their missing values and no outliers were identified. Missing values are responses with incomplete answers while outliers are significantly distant data from other responses. Thirteen cases were also identified with less than 25% missing values which were replaced with mean. Hence, after managing monotone, missing values and outliers, 693 out of 1057 remained as clean data. The data set was split into two halves to run EFA for the first half and CFA on the second half.

- Normality check

A parametric analysis is preferred for a more powerful statistical analysis. Therefore, an assumption that the data is normally distributed necessitates the performance of a parametric analysis (Hair et al. 2006). Skewness and kurtosis test of normality are suggested for assessing the Likert-type survey formats. For Likert-type survey formats, it is suggested that Skewness fall within limits of ± 3 and kurtosis fall within ±5 (Hair et al. 2006). As mentioned in the previous section, the data set was split into two halves. Test of normality was performed for each question and for each variable before the analysis of each phase (EFA and CFA) and the results indicated that data were normally distributed (Appendix F and G)

5.3. Descriptive analysis

5.3.1. Demographic profile of astrotourists

In this section, the results related to the distribution of the statistical sample under study based on demographic profiles of the respondents are shown. The total size of the sample for the current research is the 694 astrotourists who have completed the designed online survey.

Table 5.3.1 shows that male respondents with 63% were the main participants of the survey compared with female respondents, who were 37%. The lowest number of respondents was in the age range higher than 85 years old (0.4 per cent) and the highest number of respondents were in the generation X of 45–54 years old (23 per cent). The lowest number of respondents had school leavers' certificate (4 per cent) and the highest number of them had a TAFE certificate or diploma (22 per cent). The highest number of respondents was married/de facto partner (62 per cent) and the lowest number of them was widowed (2 per cent). In terms of the average yearly income level, the highest number of respondents was above national median household income level between 100 and 149 thousand dollars (18 per cent) and that of the lowest number of respondents was more than 250 thousand dollars (3 per cent). The highest number of respondents was employed for a salary (48 per cent) and the lowest number of them was out of work but not currently looking for work (1 per cent). To answer about who usually accompanies them on an astronomical tour, the highest number of respondents selected 'alone' and 'partner' (25 per cent). The lowest number of them selected 'work colleagues' (4 per cent).

Table 5.3.1. Demographic profile of the sample

	Frequency	Per cent
Gender (N = 681)		
Male	427	62.7
Female	254	37.3
Age (N = 681)		
Under 18	4	.6
18–24	32	4.7
25–34	119	17.5
35–44	135	19.8
45–54	156	22.9
55–64	148	21.7
65–74	70	10.3
75–84	14	2.1
85 or older	3	.4
Education Level (N = 679)		
School Leavers' Certificate	25	3.7
High School Certificate (HSC)	71	10.4
TAFE Certificate or Diploma	150	22.0
Bachelor University Degree	110	16.2
Bachelor's degree	107	15.7
Graduate/Postgraduate Diploma	59	8.7
Master's degree	80	11.7
Doctorate degree (PhD, etc.)	45	6.6
Other	32	4.7
Marital Status (N = 673)		
Married/De facto partner	422	62.0
Widowed	11	1.6
Divorced	48	7.0
Separated	27	4.0
Single, Never married	146	21.4
Other	19	2.8
Income Level (N = 652)		
Less than $25,000	62	9.5
$25,000 to $39,999	58	8.9
$40,000 to $49,999	39	6
$50,000 to $59,999	56	8.6
$60,000 to $74,999	60	9.2
$75,000 to $99,999	118	18.1
$100,000 to $149,999	120	18.4
$150,000 to $199,999	42	6.4
$200,000 to $249,999	21	3.2
$250,000 or more	20	3.1
Other	56	8.6

Table 5.3.1-continued. Demographic profile of the sample

Occupational status (N = 638)		
Employed for a salary	325	59
Self-employed	85	13.3
Out of work and looking for work	25	3.9
Out of work but not currently looking for work	8	1.6
A homemaker	21	3.3
A student	58	9.1
Retired	105	16.5
Unable to work	13	2
Other	32	5
Astrotour Companion (N = 692)		
Alone	173	25
Partner	173	25
Partner and children	73	10.5
Friends	137	19.7
An organised tour	47	6.8
Other	65	9.4
Work colleagues	24	3.5

In summary, the demographic profile presented in the above table shows that astronomical tourists are mostly in the 45–54 age group, predominantly males with an annual household income in the medium to high category, who achieved at least diploma level. Astronomical tourists are also mainly married and employed for a salary. Astronomical tourists are mainly participating in an astrotour either alone or with their partner.

5.3.2. Astronomical tourists' travelling characteristics

In terms of astronomical tourists' travelling characteristics, the frequency of the respondents' participation in astronomical tours was asked. As is clear in the Table 5.3.2, the highest number of respondents selected 'less often than annually' (44 per cent) and the lowest number of them selected 'fortnightly' (3 per cent). Moreover, as is shown in the table below, the highest number of respondents selected '1–10' (65 per cent) to respond the number of astronomical tours that they have participated in the previous 12 months. In terms of astrotourists' membership in an astronomical society, the statistical results show that 40 per cent of respondents have announced their membership in one of the astronomical societies across Australia. Regarding astronomical tourists' interest in the combination of astronomical activities with other tourism activities in an astronomical tour, the highest number of respondents (59 per cent) selected

'maybe'. After selecting Yes/Maybe, the respondents were directed to the next question, which explores the other tourism activities that are interesting for astronomical tourists.

Table 5.3.2. Astrotourists' travelling characteristics

	Frequency	Per cent
Participation Frequency (N = 692)		
Weekly	31	4.5
Fortnightly	20	2.9
Monthly	101	14.6
Every Six Months	119	17.1
Annually	117	16.9
Less often than Annually	304	43.8
Astrotour Numbers in 12 months (N = 683)		
0	167	24.5
(1–10)	453	66.3
(11–20)	41	6
(21–30)	5	.7
(31–40)	4	.6
(41–50)	5	.7
(51–60)	2	.3
(61–70)	1	.1
(71–80)	1	.1
(81–90)	1	.1
(91–100)	3	.4
Astronomical Society Membership (N = 692)		
Yes	280	40.5
No	412	59.5
Other Tourism Activities (N = 685)		
Yes	140	20.4
Maybe	407	59.4
No	138	20.1

Astrotourists' information sources

This question addresses how astronomical tourists obtain the information related to astronomical tours. As is obvious in the Table 5.3.3, 14 options of information sources were determined and the respondents have selected their choices for each source. The highest and the lowest response frequency are shown for each information source in its related columns. Summarily, radio with 3 per cent and television with a slight difference have the lowest use for the astronomical tourists to achieve information. On the other hand, membership in one of the astronomical societies (26 per cent) provides the most information regarding astronomical tours. The mean of each question is also shown in Table 5.6, which is the basis for information source ordering. Identifying how astrotourists achieve their information regarding astrotours

helps destination marketers to invest in those sources to attract more astrotourists. In addition, previous research indicated that pre-visit destination image formation depends upon the information sources they use (Bruwer & Lesschaeve 2012). Therefore, it is important to identify the most frequent sources that astrotourists use to gain their information.

Table 5.3.3. Astrotourists' information sources

	Mean	Always		Sometimes		Never		Total	
		N	%	*N*	%	*N*	%	*N*	%
Television	2.69	22	3.2	122	17.6	387	55.8	531	76.5
Radio	2.68	20	2.9	130	18.7	384	55.3	534	76.9
Organised tour (Interstate or Foreign visitor)	2.65	29	4.2	131	18.9	377	54.3	537	77.4
Other	2.57	40	5.8	55	7.9	219	31.6	314	45.2
By sheer chance–driving past it	2.54	28	4	194	28	317	45.7	539	77.7
I live near the astronomical society	2.53	66	9.5	119	17.1	354	51	539	77.7
Visitor information centre	2.49	30	4.3	219	31.6	302	43.5	551	79.4
Advertisement in a newspaper of magazine	2.46	40	5.8	217	31.3	298	42.9	555	80
Poster or flyer that I saw	2.47	28	4	232	33.4	281	40.5	541	78
Official brochure of the tour	2.34	48	6.9	264	38	237	34.1	549	79.1
From an observatory	2.28	80	11.5	246	35.4	235	33.9	561	80.8
I am a member of the astronomical society	2.21	183	26.4	99	14.3	304	43.8	586	84.4
Social Media (Facebook, twitter, etc.)	2.12	114	16.4	285	41.1	181	26.1	580	83.6
Other people told me (word-of-mouth)	2.03	91	13.1	386	55.6	111	16	588	84.7
From astronomical society website	2.02	168	26.9	276	39.8	181	26.1	625	90.1

Astrotour activities

This question deals with respondents' interest in different kinds of astronomical activities to be conducted on an astronomical tour. Eight options have been determined that the respondents could have selected their level of interest to participate in each of them. As the table below (Table 5.3.4) shows, the frequency and frequency percentage of the interest in these activities are shown in the columns. In addition, the highest and lowest response frequencies are determined in each activity. Briefly, it can be stated that the lowest interest is in 'spotting new moons' (31 per cent) and the highest interest is in 'stargazing' (82 per cent). The mean of each question is also shown in the table below, which was the basis for their ordering. As astrotourism is still in its early development stages and there is no empirical research to discuss astronomical tourism products and to what extent these products and activities are important

for astrotourists, this question shows an important road map for niche tourism products' developers. These activities were recognised in the interviews when interview participants were explaining the programs they offer in their astronomical tours or the programs they like to experience during an astrotour. Therefore, the results of this question help in understanding astrotourists preferences when choosing an astronomical tour, and what facilities are needed in a dark-sky site to attract astrotourists.

Table 5.3.4. Interest in different astronomical activities

	Mean	Yes		Maybe		No		Total	
		N	%	*N*	%	*N*	%	*N*	%
Learning about telescopes	1.52	388	55.9	213	30.7	65	9.4	666	96.0
Solar watching	1.60	354	51.0	207	29.8	93	13.4	654	94.2
Astrophotography	1.69	325	46.8	210	30.3	124	17.9	659	95.0
Eclipse chasing	1.80	273	39.3	225	32.4	147	21.2	645	92.9
Spotting new moons	1.96	214	30.8	226	32.6	191	27.5	631	90.9
Stargazing	1.19	572	82.4	85	12.2	22	3.2	679	97.8
Observing meteor showers	1.39	441	63.5	171	24.6	42	6.1	654	94.2
Other (please specify)	2.26	119	17.1	44	6.3	219	31.6	382	55.0

Other tourism activities

According to the results in the table below, the highest number of respondents agreed with the combination of spectacular sceneries and astronomical activities (69 per cent) and the lowest number of them agreed with the combination of outdoor activities/sports (fishing, surfing, etc.) and astronomical activities (33 per cent). In line with the previous question, this question seeks to identify if an astrotour needs to be combined with other tourism activities, or if it can be offered on its own. Therefore, the findings presented in Table 5.3.5 show that astrotourism has the potential to be offered as a unique tour.

Table 5.3.5. Other tourism activities desired in an astrotour

Tourism Activities	Yes		No		Total	
	N	%	*N*	%	*N*	%
Wineries	279	40.2	248	35.7	527	75.9
Beach/coastline	323	46.5	200	28.8	523	75.4
Food experiences	321	46.3	197	28.4	518	74.6
Heritage/Arts/Culture	352	50.7	173	24.9	525	75.6
Rural/Natural Environment	468	67.4	69	9.9	537	77.4
Outdoor activities/sports (fishing, surfing, etc.)	230	33.1	293	42.2	523	75.4
Spectacular sceneries	477	68.7	62	8.9	539	77.7
Caravan and Camping	346	49.9	191	27.5	537	77.4
Others (please specify):	38	5.5	230	33.1	268	38.6

5.4. Exploratory factor analysis

Factor analysis allows social researchers to measure latent (unobserved) variables reflected by their corresponding observed variable. When performing factor analysis, Kaiser-Meyer-Olkin (KMO) Test and Bartlett's Test of Sphericity should be considered. In the current research, principal component analysis (PCA) was considered as an extraction method and Varimax rotation as a rotation method. In this method items are considered to be uncorrelated. Moreover item loadings and cross-loadings are also considered. Rotated solutions identify which item belongs to which component. Some scholars suggest that each observed variable belongs to a group when it is higher than others with minimum of 0.5 loading to meet the convergent validity and with the minimum of 0.3 difference with the next higher value to meet the discriminate validity (Bryne 2006).

Following these rules, the KMO value for all five variables was exceeding the minimum value of .6 and the Bartlett's Test of Sphericity reached statistical significance (.000). In the next step, EFA was run for all scales extracted from the qualitative stage to explore the dimensionality of each construct. The EFA results extracted one component for recreation specialisation and conative dark-sky site image; five components for motivation and cognitive dark-sky site image and two components for affective dark-sky site image (See Appendices H, I and J)

After conducting EFA, seven items of: view the sky scenery, experience an exciting adventure at a spectacular location, be close to nature, do astrophotography for fun, learn about constellations, participate in astrophotography competitions, I would like to attend special events in astronomy were deleted from tivation construct and the remaining 14 items were loaded into the five factors.

- Factor 1 (Learning): See deep sky object; Document distant planets, asteroids, comets and meteor showers; Develop my knowledge about the astronomy; Use different telescopes and binoculars.
- Factor 2 (Socializing): Share my astronomical knowledge with others, Lead others' astronomical activities.
- Factor 3 (Seeking peace): Get away from work and day-to-day problems temporarily; Experience peace and quietness.
- Factor 4 (Being with Family): Do a family activity through an astronomical tour; Have a romantic activity with my partner.

- Factor (Being mindful): Rebuild the world/universe in my mind by obtaining a new perspective of life; Understand better what my life is all about and who I am.

Four items of cognitive dark-sky site image were deleted and the remaining 14 items were loaded into following five dimensions:

- Factor 1 (Site Characteristic): Little or no artificial light pollution; A clear site with as little dust and fog as possible; A flat site with no surrounding hills or mountains; A site with no surrounding obstacles e.g. trees or long buildings.
- Factor 2 (Interpretation): Access to a tour guide with sufficient knowledge of astronomy; Access to a tour guide with sufficient knowledge of constellations' stories in different cultures; Access to a tour guide with sufficient knowledge of astrophotography; Access to relevant equipment such as telescopes and binoculars.
- Factor 3 (Site Location): A site with national parks; A site with opportunity for adventure activities e.g. wilderness activities; A site with other attractions like museums or historic site.
- Factor 4 (Service): Access to food; Access to amenities like bathrooms.
- Factor 5 (Accessibility): A site that is reasonably close to my location.

Six items of affective dark-sky site image were deleted and the remaining items were loading into following two dimensions:

- Factor 1 (Feeling Humble): Humble; Small in the universe.
- Factor 2 (Emotions): Peaceful; Relaxed; Excited; Happy.

Validity of the questionnaire

Variables of every study should be defined operationally to be measured and analysed. Therefore, the instruments for measuring validity and reliability of all studies are an important key that should be considered by the researcher.

Validity refers to how well an assessment tool measures what it is purported to measure. Further, reliability is the degree to which an assessment tool produces stable and consistent results. On the other hand, validity and reliability mostly relate to the information that a measurement tool gives rather the measurement tool itself.

In the current research, two types of validity are used to validate the assessment tool. First, *face validity* shows that every item of the questionnaire is related to the construct and appropriate and valid reasons are provided. In addition, to revise the items of the questionnaire, two scientific experts examined the items and decided what specific items are intended to measure the construct under study. So, the questionnaire of this study has been known as a valid one considering that the items are highly similar to the variables to be examined. Moreover, confirmatory factor analysis as a statistical tool is utilised to reveal more validity towards the construct measurements (see Section 5.6.1.)

Reliability of the questionnaire

After deleting the items the reliability analysis was again conducted for each scale. The reliability of a construct indicates the extent to which repeated measurements of the construct yield a similar result (Field 2005). Cronbach's alpha is a common way to estimate the reliability of a scale. Generally, it is agreed that the lower limit for the Cronbach's alpha is 0.6 (Field 2005). Because the obtained reliability of Cronbach's alpha is above 0.6 for all scales, it can be claimed that the questionnaire shows an acceptable level of consistency. Therefore, no item (s) was dropped from the scales through this process. In the same way, if the questionnaire is used by other researchers in the same condition (the same place and time), the same results will probably be obtained.

Common method bias is also a measurement error that threatens the validity of the measurement tool (Field 2005). Harman's single factor test is a statistical test that identify common method bias influence (Podsakoff et al. 2003). The results of this test indicate 27% variance which shows that the common method bias is not a major concern in the current research (less than 50% cut-off point). The results is achieved by performing unrotated, a single factor constraint of factor analysis (Appendix K).

5.5. Confirmatory factor analysis (measurement model)

To answer the question of whether each item of the questionnaire tests the related item or not, AMOS 24 software was used to test the following hypothesis and to accept or reject this hypothesis for every item.

$$\begin{cases} H_0 : \lambda_x = 0 \\ H_1 : \lambda_x \neq 0 \end{cases}$$

Construct validity is used to ensure that the measure actually measures what it is intended to measure. In this study, factor analysis (construct validity) is used for every variable of the research in which all questions of the questionnaire have a significant level in measuring the related variable. Correspondingly, the questionnaire possesses factorial validity.

In Figure 5.5.1 and Table 5.5.1, the standardised regression weights of every item are calculated that represent the impact factor of each item of the variables. The critical ratio (C.R.) of each item with the level of significance is measured that represents the acceptance or rejection of the null hypotheses. The critical ratio for regression weights, covariances, and variances should fall outside the threshold range of +/-1.96 (Byrne 2001, p. 76). Therefore, the obtained results show that the level of significance is lower than 0.05 for each item of the scales, which indicates rejection of the null hypotheses. Moreover, to meet the convergent validity of the construct, standardized regression weights should be greater than 0.5. Fortunately, all scale items meet these characteristics or that is to say, every designed item clearly could test the related construct. The following sections show the confirmatory factor analysis of every constructs used in the current research. The dimensions of the main variables were computed to represent the observed variable of the main constructs.

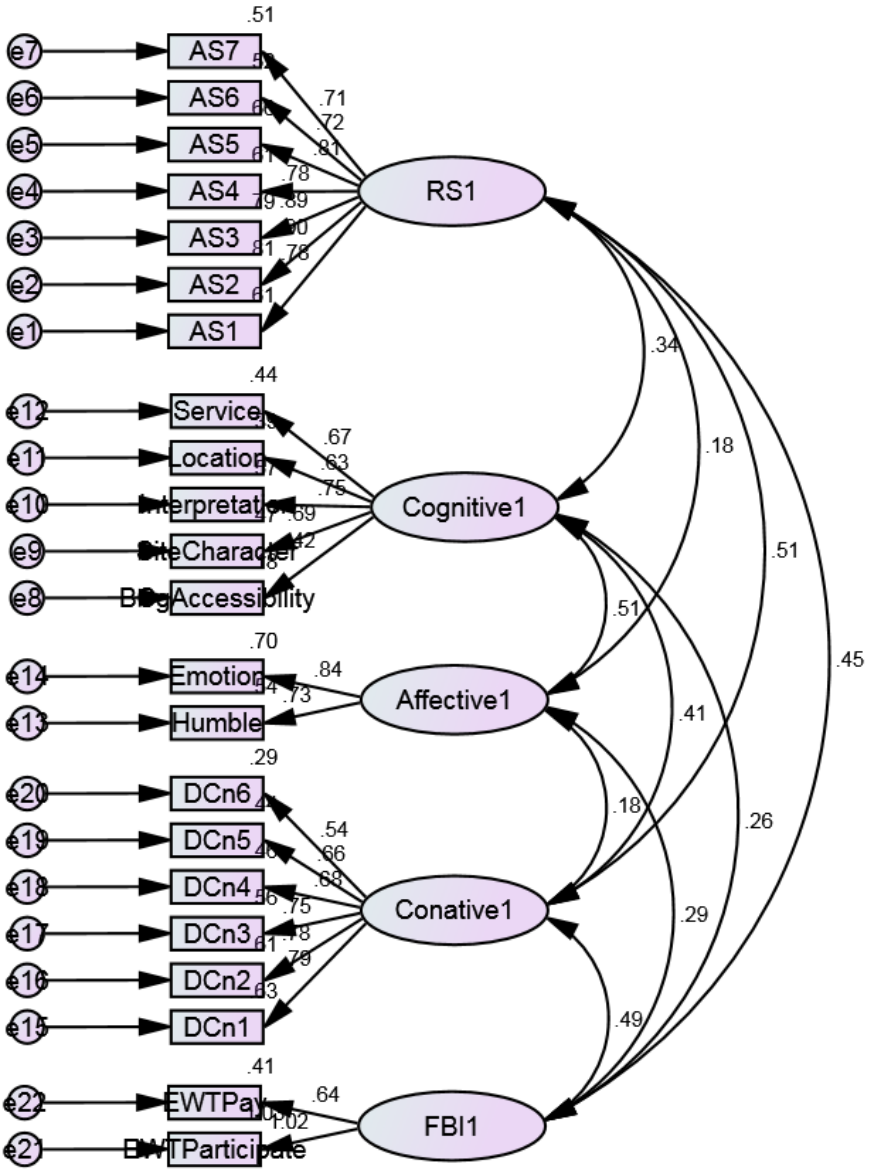


Figure 5.5.1. Initial measurement model with standardized estimates

Table 5.5.1. Initial measurement model results

Questions		Unobserved Variable	Estimate	S.E.	C.R.	P	Standardized Regression Weights	Squared Multiple Correlations (R2)	Questions Ranking
AS1	**<---**	**RS1**	1.000				.782	0.612	5
AS2	**<---**	**RS1**	1.080	.057	19.051	***	.899	0.809	1
AS3	**<---**	**RS1**	1.080	.058	18.762	***	.889	0.79	2
AS4	**<---**	**RS1**	.893	.056	15.926	***	.784	0.614	4
AS5	**<---**	**RS1**	.988	.059	16.692	***	.813	0.661	3
AS6	**<---**	**RS1**	.937	.065	14.420	***	.723	0.523	6
AS7	**<---**	**RS1**	.975	.069	14.209	***	.715	0.511	7
BCgAccessibility	**<---**	**Cognitive1**	1.000				.425	0.18	5
SiteCharacter	**<---**	**Cognitive1**	1.174	.170	6.904	***	.687	0.472	2
Interpretation	**<---**	**Cognitive1**	1.487	.210	7.095	***	.753	0.568	1
Location	**<---**	**Cognitive1**	1.265	.189	6.678	***	.627	0.393	4
Service	**<---**	**Cognitive1**	1.387	.203	6.831	***	.666	0.443	3
Humble	**<---**	**Affective1**	1.000				.734	0.539	2
Emotion	**<---**	**Affective1**	.968	.118	8.206	***	.838	0.703	1
DCn1	**<---**	**Conative1**	1.000				.791	0.626	1
DCn2	**<---**	**Conative1**	.942	.063	14.992	***	.783	0.613	2
DCn3	**<---**	**Conative1**	.980	.069	14.209	***	.747	0.558	3
DCn4	**<---**	**Conative1**	.997	.078	12.771	***	.680	0.463	4
DCn5	**<---**	**Conative1**	.850	.068	12.422	***	.664	0.441	5
DCn6	**<---**	**Conative1**	.623	.063	9.886	***	.541	0.293	6
EWTParticipate	**<---**	**FBI1**	1.000				1.016	1.033	1
EWTPay	**<---**	**FBI1**	.682	.079	8.675	***	.642	0.412	2

5.5.1. Measurement model estimation

The validity of the structural model of the current research was assessed by AMOS 24. The goodness-of-fit statistics (CMN/df. = 4.645, GFI = 0.771, RMSEA = 0.103, NFI = 0.794, CFI = 0.829, AGFI = 0.709) showed that goodness-of-fit indexes did not indicate a desirable status. Hence, it is necessary to do some modifications. These modifications are performed via examining the modification indexes (MIs) (Byrne 2010). The indexes estimate how much of the model's chi-square will be reduced if the parameter(s) which has (have) already been defined fixed is (are) released. As these indexes are a kind of estimation, the real value of the reduced chi-square can be greater or less. They are often free in adding the parameters and suggest which parameter or parameters can be released for estimation. Releasing of parameters is often associated with free parameters and sometimes it is related to fixed parameters (Byrne 2010). The modification indexes larger than 10 and parameters change larger than 0.10 have been selected. It should be noted that the modification indexes associated with the constructs have not selected to prevent any changes in the underlying indicators.

Having done the modifications in the above table, the model can be represented as below. It is notable that the numbers on one-way arrows show standard regression weights and the effect of one variable on the other variable. The numbers on two-way arrows show correlation coefficients between the variables.

5.5.2. Final measurement model

The final measurement model in standardised form, is shown in Figure 5.5.2.

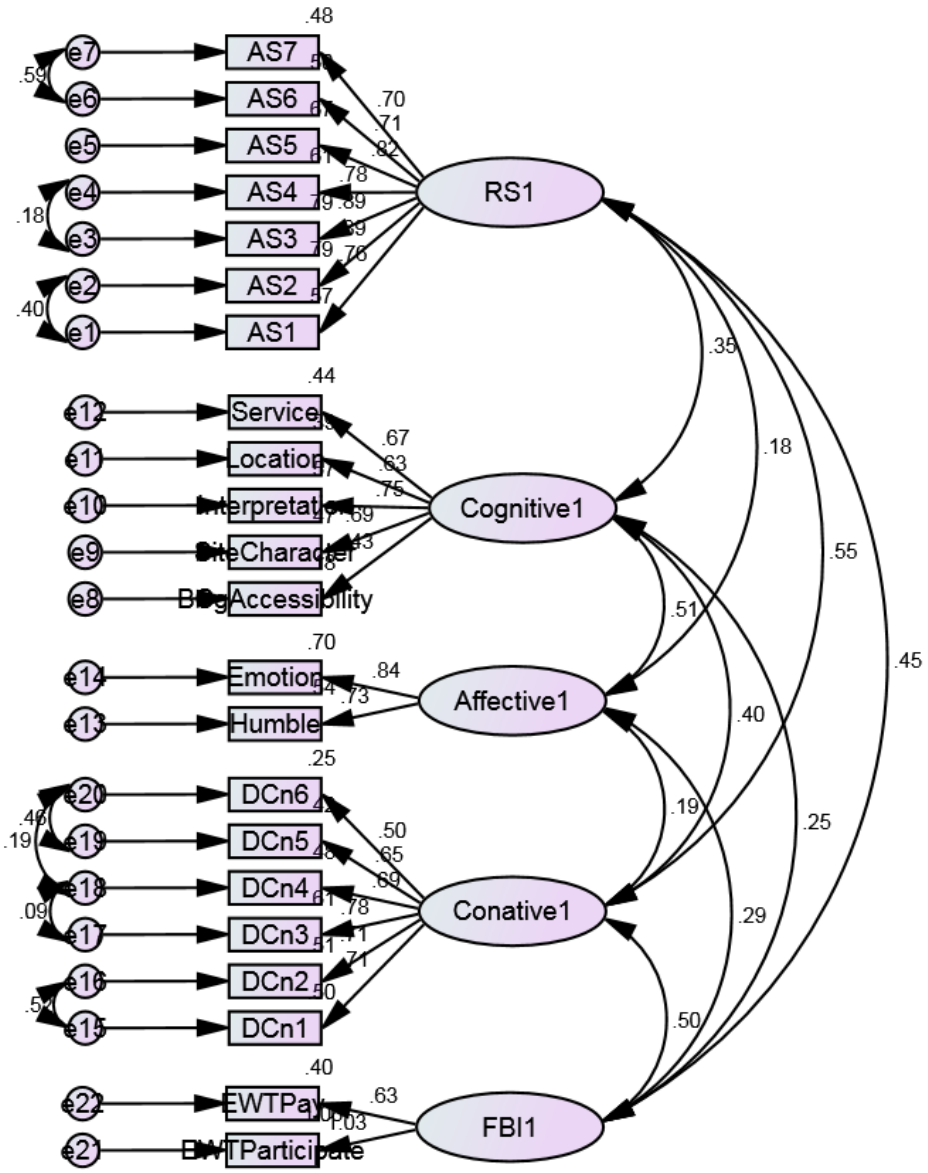


Figure 5.5.2. Final measurement model with standardized estimates

Table 5.5.2. Goodness-of-fit indexes

Index type	Index name	Acceptable goodness-of-fit	Value of goodness-of-fit
Absolute Fit Indexes	the level covered by chi-square (X^2)	greater than 5%	551.907/192
	Goodness-of-Fit Index (GFI)	0.8 ≤ GFI	0.854
	Adjusted Goodness-of-Fit Index (AGFI)	0.8 ≤ AGFI	0.808
Comparative Fit Indexes	Comparative Fit Index (CFI)	0.9 ≤ CFI	0.915
	Incremental Fit Index (IFI)	0.9 ≤ IFI	0.916
Parsimonious Fit Indexes	Parsimonious Normed Fit Index (NFI)	0.5 ≤ PNFI	0.877
	Root Mean Square Error of Approximation (RMSEA)	RMSEA≤ 0.08	0.074
	Normalised chi-square (CMIN/DF)	CMIN/DF<3	2.875

Considering the results in the above table, goodness-of-fit indexes show a desirable status.

Chi-square (χ^2) is regarded as the most generic and widely used fit index in structural equation modelling (Byrne 2010). In interpreting it, it can be stated, the smaller the value, the better the model's goodness-of-fit, so that a value of zero shows complete agreement. This value has been reduced in the above table after the model modification, which shows an acceptable goodness of the model.

The Adjusted Goodness-of-Fit Index (AGFI) index that is equal to Goodness-of-Fit Index (GFI) regulates GFI based on the model's degree of freedom. These two indexes 'compare the hypothesised model with no model at all' (Byrne 2010, p. 82). Indeed, the purpose of this index is to penalise the model into releasing an increased number of new parameters to the model, so that adding new parameters to the model has a low positive effect on improvement of the model's goodness (Byrne 2010). In addition, it should be borne in mind that this value is not increased with the increase of the sample size. The acceptable range for this index is valued greater than 0.80 (Byrne 2010). According to the results, the value in the above table (0.808) shows a suitable goodness-of-fit for the model (Kline 2011).

Comparative Fit Indexes (IFI, CFI) are a set of goodness-of-fit indexes that compare the hypothesised model against a null model with the values between zero and one and values more than 0.90 are also interpreted as acceptable values (Byrne 2010). These values in the above table (0.916 and 0.915) show acceptable goodness-of-fit of the model.

The Parsimonious Normed Fit Index (PNFI) is a ratio between the degrees of freedom of the proposed model and the independent model, which shows to what extent the researcher has restricted himself/herself in releasing parameters (Hoppers et al. 2008). The smaller values show the high cost that the researcher has spent on releasing parameters (Byrne 2010). Values equal to 0.50 and higher are acceptable for this index, although values more than 0.60 emphasise that the model has a good fit (Byrne 2010). This value in the above table (0.729) shows the acceptable goodness of the model.

Root mean square error of approximation (RMSEA) is applied as one of the most generic indexes for a total judgement about the proposed model. This index asks the question 'How sound the model would be, with unknown but optimally chosen parameter values, fit the population covariance matrix if it were available?' (Browne & Cudeck 1993, pp. 137-138). This index changes between zero and one (Byrne 2010). The smaller the value, the more acceptable is the proposed model (Byrne 2010). This index has a cut-off point equal to 0.05, so the proposed factor model reveals good fit and values as high as .08 show acceptable fit (Byrne 2010). The results of the proposed model in the current research represented a good fit with the value of 0.074.

The ratio of chi-square to the degrees of freedom ($\chi 2$/d.f.) or a normalised chi-square is referred to as relative chi-square (Byrne 2010). Values up to 5 are suitable for it and values close to 2 and 3 show an acceptable status for the model (Byrne 2010). The results of the the current research show 2.875, which represents an acceptable status for the model. Therefore, in the next section, the structural equation modelling is performed.

5.6. Structural equation modelling (SEM)

Previous research in destination image studies has applied structural equation modelling to examine the relationships between destination image and other components (Bigné, Sanchez & Sanchez 2001; Lee, Lee & Lee 2005; Stylos et al. 2016, 2017).

To test the hypotheses presented in this research, the researcher conducted structural equation modelling. Structural equation modelling is a 'statistical methodology that takes a confirmatory (i.e., hypothesis-testing) approach to the analysis of a structural theory bearing on some phenomenon' (Byrne 2010, p. 3). In structural equation modelling, there is a distinction between latent and observable variables. Latent variables are abstract constructs that cannot be observed directly (Byrne 2010). On the other hand, observed variables are the indicators that

make the measurement of the latent variable feasible (Byrne 2010). Having stated the question that each item can measure the research variables (dimensions), this question was proposed that whether or not the research variables can measure the latent and conceptual variables. To this end, the proposed variables were entered into the structural model as latent variables and then this question (does the represented model by data confirm the conceptual model or not?) was answered using analysis of structural equation modelling. To respond to this question, the primary task of the researcher was to 'determine the goodness-of-fit between the hypothesised model and the sample data' to show 'how well the observed data fit this restricted structure' (Byrne 2010, p. 7). Moreover, structural equation modelling has also been employed in responding to research hypotheses. According to Byrne (2010), the SEM model includes two sub-models; namely, a measurement model and a structural model. The measurement model shows the relations between latent (unobserved) and observed variables that are determined to measure the underlying construct, which represents the confirmatory factor analysis model. Conversely, the structural model identifies the relationship among latent variables in the model. As a result, the below measurement models have been extracted by means of structural equation modelling via software. In the following section, structural equation model in its standardised form is presented.

In this analytic technique, the relationship among the constructs is assigned based on the proposed hypotheses that represent the structural model of the current research. These relationships and their corresponding hypotheses are discussed in this section. The structural model shown in Figure 5.6.1 has been extracted by means of AMOS 24 software. In these models, circles show latent variables, rectangles represent observed variables, the numbers on every one-way arrow show standard regression weights and the impact of one variable on another variable (Byrne 2010).

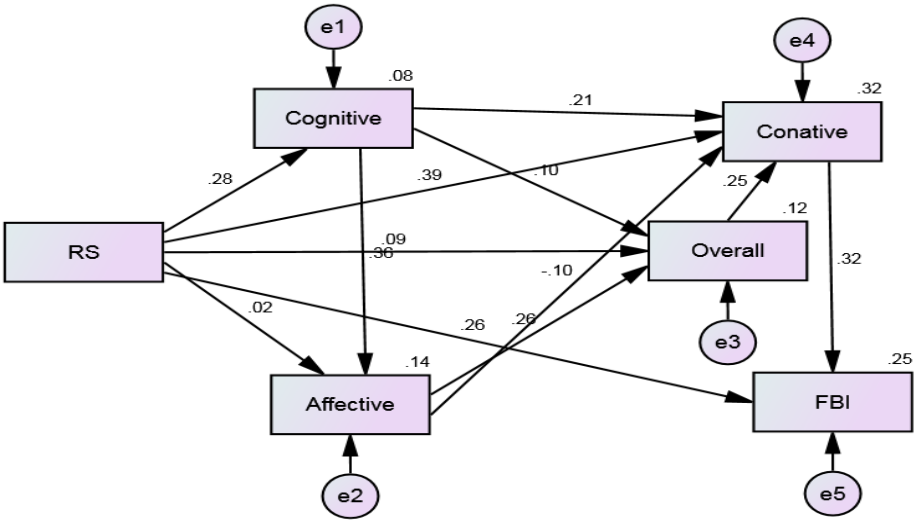


Figure 5.6.1. The structural model of the current research

The validity of the structural model of the current research was assessed by using AMOS 24. The goodness-of-fit statistics (CMIN/DF = 2.086, GFI = 0.994, RMSEA = 0.056, NFI = 0.983, CFI = 0.991, AGFI = 0.958) showed that goodness-of-fit indexes indicate a desirable status. Then, the research hypotheses should be examined, which are mentioned in Table 5.6.1:

Table 5.6.1. Results of the hypotheses

Hypotheses	**S Estimate**	**S.E.**	**C.R.**	***p*-value**	**Result**
Hypothesis 1 Specialisation → Cognitive	.190	.035	5.465	***	Accepted
Hypothesis 2 Specialisation → Affective	.014	.036	.381	.703	Rejected
Hypothesis 3 Specialisation → Overall	.082	.048	1.705	.088	Rejected
Hypothesis 4 Specialisation → Conative	.393	.047	8.428	***	Accepted
Hypothesis 5 Specialisation → FBI	.369	.074	4.998	***	Accepted
Hypothesis 6 Cognitive → Affective	.372	.053	6.986	***	Accepted
Hypothesis 7 Cognitive → Overall	.137	.076	1.800	.072	Rejected
Hypothesis 8 Cognitive → Conative	.308	.074	4.181	***	Accepted
Hypothesis 9 Affective → Overall	.348	.072	4.824	***	Accepted
Hypothesis 10 Affective → Conative	-.146	.072	-2.045	.041	Accepted
Hypothesis 11 Overall → Conative	.271	.052	5.242	***	Accepted
Hypothesis 12 Conative → FBI	.446	.073	6.087	***	Accepted

The research hypotheses are at the confidence level 95%. The significance level less than 0.05 shows that hypotheses 1 to 12 have been accepted, except for three hypotheses of 2, 3 and 7. Based on the achieved results, the results of the hypotheses are written as follows:

Hypothesis 1) Astrotourists' recreation specialisation has a significant influence on their cognitive dark-sky site image.

Hypothesis 2) The influence of astrotourists' recreation specialisation on their affective dark-sky site image is rejected because of high significance level.

Hypothesis 3) The influence of astrotourists' recreation specialisation on their overall dark-sky site image is rejected because of high significance level.

Hypothesis 4) Astrotourists' recreation specialisation has a significant influence on their conative dark-sky site image.

Hypothesis 5) Astrotourists' recreation specialisation has a significant influence on their future behavioural intentions.

Hypothesis 6) Astrotourists' cognitive dark-sky site image has a significant influence on their affective dark-sky site image.

Hypothesis 7) The influence of astrotourists' cognitive dark-sky site image on their overall dark-sky site image is rejected because of high significance level.

Hypothesis 8) Astrotourists' cognitive dark-sky site image has a significant influence on their conative dark-sky site image.

Hypothesis 9) Astrotourists' affective dark-sky site image has a significant influence on their overall dark-sky site image.

Hypothesis 10) Astrotourists' affective dark-sky site image has a significant influence on their conative dark-sky site image.

Hypothesis 11) Astrotourists' overall dark-sky site image has a significant influence on their conative dark-sky site image**.**

Hypothesis 12) Astrotourists' conative dark-sky site image has a significant influence on their future behavioural intentions.

5.7. Second-tier hypotheses testing

In the following hypotheses, the researcher has examined the moderating role of motivation. A moderator variable has a contingency effect on the relationship between the variables (Hayes 2013). It means that the presence of the third variable (moderator variable) changes the main expected relationship between the two variables. In the current research, the effect of astrotourists' motivation on the relationships between astrotourists recreation specialisation and astrotourists' affective, cognitive, conative and overall dark-sky site image were examined.

AMOS 24 software and multi-group structural equations were employed to test these hypotheses:

H13: The strength of the relationship between astrotourists' recreation specialisation and their cognitive dark-sky site image is moderated by astrotourists' motivation levels.

H14: The strength of the relationship between astrotourists' specialisation segmentation and their affective dark-sky site image is moderated by astrotourists' motivation levels.

H15: The strength of the relationship between astrotourists' specialisation segmentation and their overall dark-sky site image is moderated by astrotourists' motivation levels.

H16: The strength of the relationship between astrotourists' specialisation segmentation and their conative dark-sky site image is moderated by astrotourists' motivation levels

The hypotheses were tested as below:

First, the role of the moderator variable in the two groups of high motivation and low motivation was tested in structural equation modelling. The obtained regression coefficients referred to as beta are given in below figures.

Second, the role of the moderator variable in the two groups of high motivation and low motivation with the determined regression coefficients in hypotheses 15–18 were tested in structural equation modelling. The results are given below in terms of standardised estimates for low motivation and high motivation.

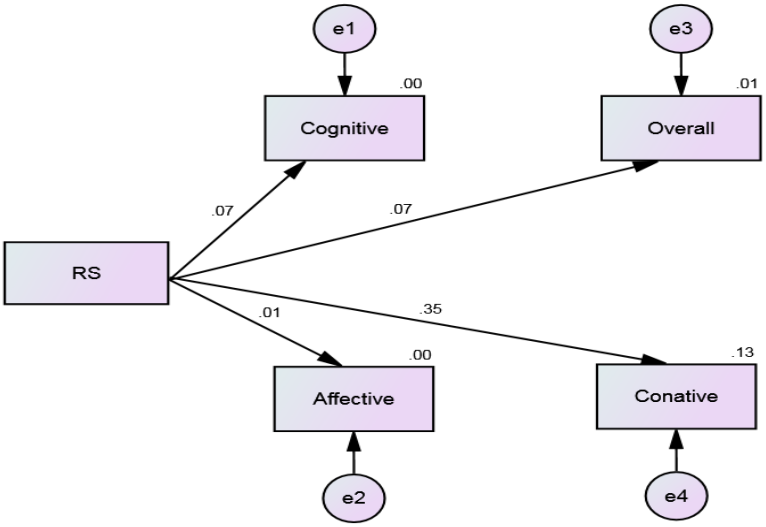


Figure 5.7.1. The structural model in High motivation group

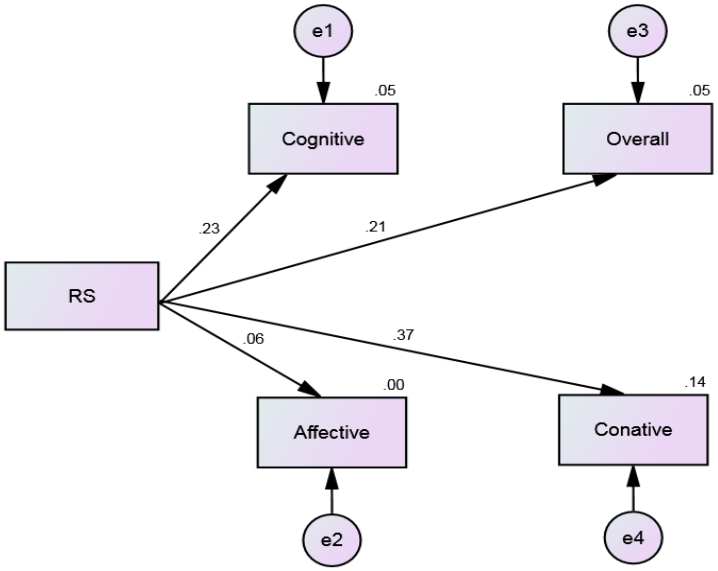


Figure 5.7.2. The structural model in Low motivation group

After implementing the previous models, the results are summarised as follows:

Table 5.7.1. Results of the moderation hypotheses

	Low Motivation		High Motivation			
Hypotheses	**Estimate**	**P**	**Estimate**	**P**	**z-score**	**P-value**
Hypothesis 13: Specialisation & Cognitive	0.044	0.353	0.163	0.004	1.603	0.0544
Hypothesis 14: Specialisation & Affective	0.008	0.885	0.040	0.493	0.400	0.344
Hypothesis 15: Specialisation & Overall	0.068	0.326	0.227	0.007	1.450	0.073
Hypothesis 16: Specialisation & Conative	0.359	0.000	0.379	0.000	0.202	0.419

As can be observed in the above Table 5.7.1 and Figures 5.7.1 and 5.7.2, astro-tourists motivation significantly influence on conative dark-sky site image for tourists with low motivation. However, for astrotourists with high motivation, recreation specialisation influences all dark-sky site images except affective dark-sky site image. Based on the significance levels, motivation has a moderating role for the influence of recreation specialisation on cognitive and overall dark-sky site image at p-value < 0.10.

5.8. Influence of astrotourists' recreation specialisation segments

This question explores the importance of astronomical activities in the respondent's life. The results of the mean and variance are shown in the table below (Table 5.8.1). As the results reveal, in astrotourism recreation specialisation scale, the respondents had the highest mean score for the statement 'If I stopped astronomical activities, an important part of my life would be missing'. And the lowest mean score was related to the statement 'Given the effort I have put into astronomy, it would be difficult to find a replacement activity'. However, the overall mean score of the respondents' answers to astrotourists' recreation specialisation scale is 2.58, which shows the tendency of the respondents' choice was the middle (Neither) of the scale. The item with the highest mean was measured to indicate the centrality of astrotourism in an individual's life. In addition, the item with lowest mean was measured to indicate the role of skill in an astrotourism specialisation level. Therefore, these findings reveal an important fact that specialisation level in an astrotourist's life is mainly based on the importance and centrality of this recreation activity in his/her life.

Table 5.8.1. Astrotourists' recreation specialisation

Items	Mean	Variance	Std. Deviation
If I stopped astronomical activities, an important part of my life would be missing	3.03	1.442	1.201
Testing/improving my astronomical-related skills is very important to me	2.67	1.272	1.128
Participation in astronomical activities is a large part of my life	2.57	1.303	1.142
Given the effort I have put into astronomy, it would be difficult to find a replacement activity	2.23	1.145	1.070
I have accumulated the necessary astronomical equipment	2.83	1.303	1.142
I have invested a lot of money in astronomical equipment	2.41	1.480	1.217
I feel that I am more skilled in astronomical activities than any other activities	2.32	1.640	1.281
Mean	**2.58**	**1.36**	

To segment astrotourists based on their recreation specialisation; an overall recreation specialisation score was calculated for the seven scale items, which gave the overall recreation specialisation revealing that the overall mean for the scale is 2.58 which means 'novice' level of recreation specialisation. Standard deviation determines to what extent the data are spread out from the mean. The higher value of the standard deviation shows the greater spread (Field 2005). The squared standard deviation is called variance which also reveals the spread of the data in relation to their mean (Field 2005). These measures of spread are indicators of how well the mean represent the data. Therefore, if these values are small, the mean is more representative of the data. In the other words, little variation is a positive sign (Pallant 2001).

In addition, the percentage values method was used to allow the segmentation into three different categories. These segments are shown in the table below showing that the majority of astrotourists have 'intermediate' level of specialisation (49%), while the novice and advanced astrotourists' segments represent 35% and 16%. This recreation specialisation segmentation was also used in answering the research questions.

Table 5.8.2. Astrotourists' recreation specialisation segmentation

Recreation Specialisation	Category	Frequency	Per cent
1.00 (0.5–2)	Novice	121	34.9
2.00 (2.1–3.6)	Intermediate	170	49.0
3.00 (3.7–5.2)	Advanced	56	16.1
Total		**347**	100.0

As stated in Chapter 1, research question 6 sought to identify the influence of astrotourists' recreation specialisation levels (novice, intermediate, advanced) on their dark-sky site image components and future behavioural intentions. The ANOVA test was used to answer these questions. One-way ANOVA examines whether there are any statistically significant differences between two or more independent groups (Field 2005). In the following tables, these differences have been explored in detail and in different parts (Table 5.8.3 and 5.8.4).

To test these differences, the assumption of homogeneity of variances is tested using Levene's test for equality of variances.

Table 5.8.3. Test of homogeneity of variances (recreation specialisation)

	Levene Statistic	df1	df2	Sig.
Cognitive DSS image	4.569	2	344	.011
Affective DSS image	.782	2	344	.458
Overall DSS image	.114	2	344	.892
Conative DSS image	.096	2	344	.909
FBI	3.012	2	344	.051

In this test, the assumption of homogeneity of variance is tested. The results in the above table and sig value show that the assumption of homogeneity of variances is accepted in all variables except cognitive dark-sky site image. Following the Test of Homogeneity of Variances, the ANOVA results are shown in the table below. If the ANOVA is statistically significant (i.e., $p < .05$), it can be concluded that not all group means are equal in the population. In the other words, at least one group mean is different from another group mean. Alternatively, if $p > .05$, there are no statistically significant differences between the group means.

Table 5.8.4. ANOVA for RS segments differences among constructs

	Sum of Squares	df	Mean Square	*F*	Sig.
Cognitive DSS image	7.663	2	3.831	9.308	.000
Affective DSS image	2.720	2	1.360	3.044	.049
Overall DSS image	5.430	2	2.715	3.459	.033
Conative DSS image	70.512	2	35.256	46.486	.000
FBI	125.779	2	62.889	42.029	.000

Accordingly, the results of equality of means for different recreation specialisation segments can be observed in the above table. Equality of the mean of responding to cognitive, affective, overall, conative and future behavioural intention variables is rejected because the sig value is

less than 0.05, which indicates that the mean of responding in specialisation segments have a significant difference for the above-mentioned variables and recreation specialisation levels (novice, intermediate, advanced) have a significant effect in responding to these variables.

Because the null hypotheses are rejected and there are statistically significant differences between astrotourists' specialisation segments and their dark-sky site image components, the Tukey post hoc test is used in the following sections to determine where exactly the differences lie (Field 2005).

5.8.1. Influence of RS segments on cognitive DSS image

As mentioned earlier, there is a significant gap in the previous tourism literature that the influence of recreation specialisation segments on destination image components is not fully explored. Therefore, the Tukey post hoc test is recommended when the assumption of homogeneity of variances is not violated and other assumptions of the one-way ANOVA are met (Kirk 2012; Statistics 2015). As part of the Tukey post hoc test, the homogeneous subsets table is provided by SPSS to provide an alternative way of displaying the post hoc tests. These tables which show the subsets are considered more appropriate when group sizes are very different. The means for groups in homogeneous subsets show that these groups are not significantly different.

Accordingly, the following table shows that there are statistically significant differences between novice and intermediate/advanced astronomical tourists in terms of their cognitive dark-sky site image. However, intermediate astronomical tourists have similar cognitive dark-sky site image with advanced astrotourists.

Table 5.8.5. Post Hoc Test (Tukey) for RS segment differences in cognitive DSS image

Specialisation segments	*N*	Subset for alpha = 0.05	
		1	2
Novice	121	3.0140	
Intermediate	170		3.2477
Advanced	56		3.4351

5.8.2. Influence of RS segments on affective DSS image

Following the explanation in the previous section, the results of the influence of recreation specialisation segments on affective dark-sky site image are presented in the following table. The results of the post hoc test classify homogeneous groups in two distinguished subsets, which reveals that there are statistically significant differences between two segments of

novice, intermediate and advanced astrotourists in terms of their affective dark-sky site image. As is shown, the mean of the responses for novice and intermediate astrotourists is less than advanced astrotourists. Therefore, it can be concluded that advanced astrotourists possess stronger feelings towards a dark-sky site compared with the novice and intermediate astrotourists.

Table 5.8.6. Post Hoc Test (Tukey) for RS segment differences in affective DSS image

Specialisation segments	*N*	Subset for alpha = 0.05	
		1	2
Novice	121	3.9294	
Intermediate	170	3.9339	
Advanced	56		4.1719

5.8.3. Influence of RS segments on overall DSS image

The results of the Tukey post hoc test about the influence of astrotourists' segments on overall dark-sky site image show that there are two homogeneous groups. Similar to the results of the cognitive dark-sky site image, advanced astrotourists have a significant difference with novice astrotourists. However, intermediate astrotourists have similar overall image with novice and advanced astrotourists. Moreover, in both groups, the mean score is 3 and more, which shows that for all astrotourists overall dark-sky site image was rated as a favourable image. Therefore, these results indicate that advanced astrotourists have a more favourable overall DSS image compared with the other segments.

Table 5.8.7. Post Hoc Test (Tukey) for RS segment differences in overall DSS image

Specialisation segments	N	Subset for alpha = 0.05	
		1	2
Novice	121	3.86	
Intermediate	170	3.94	3.94
Advanced	56		4.23

5.8.4. Influence of RS segments on conative DSS image

Regarding the influence of astrotourists' recreation specialisation segments on conative dark-sky site image, the results of the Tukey post hoc test reveal that the three segments of astrotourists behave differently. As is shown in the table 5.8.8, the mean score of the advanced astrotourists is higher than for intermediate astrotourists and the mean score of the intermediate astrotourists is higher than for novice astrotourists. Therefore, these results suggest that the

more advanced, the more astrotourists behaved positively towards the appropriate dark-sky sites.

Table 5.8.8. Post Hoc Test (Tukey) for RS segment differences in conative DSS image

Specialisation segments	N	Subset for alpha = 0.05		
		1	2	3
Novice	121	1.9697		
Intermediate	170		2.5373	
Advanced	56			3.3095

5.8.5. Influence of RS segments on future behavioural intentions

Following the previous sections, in this section the influence of astrotourists' specialisation segments on their future behavioural intentions is discussed. As discussed earlier, in the current research, future behavioural intentions is measured through a probability Juster 10-point scale with questions asking about the willingness of astrotourists to participate in an astrotour in the next 12 months and their willingness to pay for such a tour. As shown in Table 5.8.9, all segments of astrotourists have significant differences and are classified under three distinct groups. The overall mean of the novice astrotourists shows that their probability to participate and pay for an astrotour is nearly neutral. On the other hand, intermediate and advanced astrotouristsindicate their higher willingness to participate and pay for an astrotour in the next 12 months. Therefore, the higher level of specialisation indicates more positive intentions towards future behaviours.

Table 5.8.9. Post Hoc Test (Tukey) for RS segment differences in FBI

Specialisation segments	N	Subset for alpha = 0.05		
		1	2	3
Novice	121	2.6198		
Intermediate	170		3.6324	
Advanced	56			4.2768

In summary, astrotourists segments based on their recreation specialisation influence on their dark-sky site image dimensions and their future behavioural intentions. Accordingly, there are significant differences between novice and advanced astronomical tourists in terms of their cognitive, affective and overall dark-sky site image. Moreover, there are significant differences among all three segments of novice, intermediate and advanced astronomical tourists in terms of their conative dark-sky site image and future behavioural intentions.

5.9. Influence of astrotourists' demographics

As stated in Chapter 1, research question 5 sought to identify the influence of astrotourists' demographic profiles (gender, age, education, marital status, income and occupational status) on various constructs such as astrotourists' recreation specialisation, dark-sky site image components and future behavioural intentions. *t*-tests and ANOVA were used to answer these questions. In the following, these items have been explored in detail and in different parts.

5.9.1. Influence of gender

In this section, the influence of gender on the mentioned constructs is discussed. The results of this test are presented in the Appendix L.The independent sample *t*-test is used in the current research to examine if there is a difference between the means of two independent groups and whether this difference is statistically significant or not (Field 2005). The mean of the male and female opinions regarding the research variables. According to the data, 181 males and 160 females answered the questions. The significance level (*p*-value) of Levene's test is used to determine if variances are equal in the population. In this test, a *p*-value greater than 0.05 ($p > .05$) indicates the homogeneity of variances and *p*-value less than 0.05 ($p < .05$) violates the assumption of homogeneity of variances (Field 2005). Therefore, the assumption of equality of means in male and female groups rejected in responding to the conative dark-sky site image. It is clear that mean response to the specialisation variable has been higher in males and it can be interpreted that specialisation of males who are interested in astronomical tourism is higher than for females. Similarly, the mean response to the affective variable is higher in females with a slight difference and it can be interpreted that affective perception of astronomical tourism in females is higher than males. The mean response to the conative variable is higher in males with a slight difference and it can be interpreted that males' tendency to revisit and recommend the dark-sky sites is higher than for females.

5.9.2. Influence of age

Are there any significant differences in the samples' point of view regarding astrotourists' specialisation segmentation, astrotourists' cognitive, affective, conative and overall dark-sky site image and future behavioural intentions based on their age?

Seven age groups were identified for the current research. The results of this test are presented in the Appendix M. In this test, the assumption of homogeneity of variances is tested. The results show that the assumption of homogeneity of variance is accepted except for cognitive dark-sky site image. Sig value is greater than 0.05, which indicate that the mean of responding in different age groups does not have a significant difference for the above-mentioned variables and age range does not have any effect in responding to these variables.

But it is obvious and the sig value shows, the assumption of respondents' equality of means is rejected for cognitive dark-sky site image. That is to say, mean response between the age groups is not equal for the cognitive dark-sky site image. Then, the Post Hoc Test (Tukey) is used to determine if these mean differences are statistically significant. Therefore, the mean of responding to cognitive dark-sky site is shown in the table below for each age group in ascending order (Table 5.9.1). However, the Post Hoc Test identified one subset for different age groups answering to the cognitive dark-sky site image. This identification is based on the mean scores of each age groups. According to the Table 5.9.1, the mean score is between 3 and 3.5 which does not indicate significant differences between age groups.

Table 5.9.1. Post Hoc Test (Tukey) for age differences among Cognitive DSS image

Cognitive DSS Image		
Age groups	***N***	**Subset for alpha = 0.05**
18 - 24	19	3.0193
25 - 34	72	3.2049
35 - 44	66	3.0760
45 - 54	71	3.3667
55 - 64	67	3.1868
65 - 74	38	3.0991
75 - 84	6	3.5417

5.9.3. Influence of education level

Are there any significant differences in the samples' point of view regarding astrotourists' specialisation segmentation, astrotourists' cognitive, affective, conative and overall dark-sky site image and future behavioural intentions based on their education levels?

In this test, the assumption of homogeneity of variance is tested. Sig value shows that the assumption of homogeneity of variance is accepted. The mean of responding to all variables is accepted because sig value is greater than 0.05. The results indicate that the mean of responding for different education groups does not have a significant difference for the above-mentioned variables and education does not have any effect in responding to these variables. Because there is no significant difference between the mean of responding in various education groups, Tukey's test will not be carried out for comparison of means.

5.9.4. Influence of marital status

Are there any significant differences in the samples' point of view regarding astrotourists' specialisation segmentation, astrotourists' cognitive, affective, conative and overall dark-sky site image and future behavioural intentions based on their marital status?

In this test, the assumption of homogeneity of variance is tested. The results of *sig* value show that the assumption of homogeneity of variance is accepted. Mean of responding to all variables except the overall dark-sky site image is accepted because sig value is greater than 0.05. It means that mean of responding in different groups of respondents does not have a significant difference in the above-mentioned variables and marital status do not have any effect in responding to these variables. But as is obvious from the sig value, the assumption of respondents' mean equality is rejected for the overall dark-sky site image variable. That is to say, the mean response among different marital status groups is not equal for the above-mentioned variable. However, the Tukey post hoc test show that even for overall dark-sky site image, there is only one subset which indicate for overall dark-sky site image, all astrotourists with different marital status have neutral to favourable overall image.

5.9.5. Influence of the income and occupational status

Are there any significant differences in the samples' point of view regarding astrotourists' specialisation segmentation, astrotourists' cognitive, affective, conative and overall dark-sky site image and future behavioural intentions based on their income and occupational status?

In this test, the assumption of homogeneity of variance is tested. The results of sig value show that the assumption of homogeneity of variance is accepted. The results of equality of means for different income groups showed that the mean of responding to all variables is accepted because the sig value is greater than 0.05. It means that the mean of responding in different income groups does not have a significant difference for the above-mentioned variables and income status does not have any effect in responding to these variables.

Regarding the influence of occupational status, the assumption of homogeneity of variance is tested. The results of the sig value show that the assumption of homogeneity of variance is accepted. The mean of responding to all variables is accepted because the sig value is greater than 0.05. These results indicate that mean of responding in different job groups does not have a significant difference for the above-mentioned variables and job does not have any effect in responding to these variables.

In summary, astrotourists' gender influence on their specialisation level, affective dark-sky site image and conative dark-sky site image. Astrotourists age influence on their cognitive dark-sky site image. However, education level, marital status, income and occupational status have not any significant influence on astrotourists recreation specialisation and their dark-sky site image dimensions.

5.10. Conclusion

In this chapter, quantitative findings of the current research are presented. Descriptive statistics indicated the similarities and differences in the responses of astrotourists for each construct. Three segments of novice, intermediate and advanced astrotourists were identified based on their recreation specialisation. Then, the ANOVA test was used to reveal the extent of the influence of astrotourists demographic profiles and their level of specialisation on various dark-sky site image components. Following that, confirmatory factor analysis was used to measure the construct validity. SEM was applied to test the theoretical model of the research. Consequently, the proposed hypotheses were tested and the results were presented. In the following chapter, the findings of the current research, in line with their theoretical and practical contributions, are discussed.

6 DISCUSSION AND CONCLUSION

6.1. Introduction

This chapter discusses the research's findings and the interpretation of results. The findings are related to the research objectives presented in the first chapter. The conceptualisation of a dark-sky site image within the astronomical tourism context is discussed through the relationships between the tourists, places and tourists' behaviours. As suggested by the mixed-method approach adopted in this research, a critical component is to present and discuss the mixed results (Creswell 2014). Therefore, the key findings of the qualitative and quantitative phases are presented and discussed in this chapter. The chapter then discusses the theoretical and practical contribution of the research. Thereafter, the limitations and suggestions for further research are provided.

6.2. Restatement of purpose and questions of the research

6.2.1. Purpose of the research

The purpose of the current research was to understand the astronomical tourism market by providing necessary definitions to establish the theoretical roots of this concept; and to conceptualise tourism destination image in the context of astronomical tourism. Moreover, the current research sets out to enrich the current knowledge of the relationship between recreation specialisation, destination image components and future behavioural intentions in light of the moderating effect of astrotourists' motivational levels.

6.2.2. Research questions

- What are appropriate names and definitions for tourists with special interest in astronomical activities' and 'Appropriate destinations for astronomical tours
- What are astronomical tourists' characteristics in terms of their demographic, specialisation, motivations, cognitive, affective and conative destination image?
- What is the relationship among astronomical tourists' recreation specialisation, dark-sky site image components and future behavioural intentions?

- How are the previously mentioned constructs moderated by motivational levels of astronomical tourists?
- Are there significant differences among mentioned constructs based on the astronomical tourists' demographic profiles?
- Are there significant differences among the mentioned constructs based on the astronomical tourists' specialisation segments?

6.3. Astronomical tourism development

Previous scholars have noted that tourism destinations depend on their unique products to attract tourists rather than general products such as accommodation and transportation (Benur & Bramwell 2015). However, tourism studies have mostly neglected the importance of the sky in creating a memorable experience for tourists (Collison & Poe 2013; Huang, Li & Cai 2010). Therefore, targeting sky features of a destination combined with the earth facilities to attract tourists is one of the new opportunities to deliver unique products. To develop these destinations, the first step is to offer clear descriptors and definitions.

The qualitative findings of the current research found the most appropriate names and definitions for the tours with astronomically driven purposes. Astronomical tourism and dark-sky sites have been defined based on the qualitative findings (see Chapter 4). One of the challenges in choosing an appropriate name for astronomical tourism was its closeness to that of space tourism. Some studies have used both space tourism and astrotourism interchangeably without distinguishing their differences (Cater 2010; Rodrigues, Rodrigues & Peroff 2015).

According to the qualitative findings, despite other new tourism products such as golf and wellness/health tourism that do not consider as the prominent motive of the tourists (McKercher & Chan 2005), astronomical tourism has the potential to be offered both dependently and independently in a tour package. The quantitative findings confirm the qualitative results because 20% of the respondents selected 'Yes' to show their interest in the combination of astronomical activities with other tourism activities in an astronomical tour; and, equally 20% of the tourists selected 'No'. The other 59% selected 'Maybe' with their preferences about different tourism activities that can be offered with astronomical tour simultaneously.

The findings of the current research can be utilised to serve the purpose of developing astronomical tourism as a new medium in conceptualising tourism destination image by combining earth features as well as sky features. Moreover, to gain a better understanding of the astrotourists' characteristics, all questions pertain to a specific time frame of 12 months before or after participation in astronomical tours. Sixty-five per cent of the astrotourists have participated at least one time in an astronomical tour during the last 12 months.

In addition, similar to the findings of other studies in nature-based and niche tourism (Huang 2012; MacKay & Fesenmaier 1997), astronomical tourists selected 'spectacular sceneries' as their favourite feature to be included in an astronomical tour. The advanced astronomical tourists are interested in being in a quiet dark-sky site to concentrate on their sky observation, while 59 per cent of the respondents selected 'maybe' to their willingness to combine an astronomical tour with other tourism attractions. The findings of this question are in line with previous studies, which suggested destination marketers to segment tourists based on their activity preferences (Lehto, O'Leary & Morrison 2004). Extending this line of thinking, of seven proposed astronomical activities, astrotourists' top three preferences were stargazing, observing meteor showers and learning about telescopes. These results confirm the conclusion by previous destination scholars that to deliver high-quality experiences, destination marketers need to offer a range of different activities to satisfy the motives and preferences of a special tourism segment (Nadeau et al. 2008).

6.4. Recreation specialisation in the astronomical tourism context

Although previous studies have not investigated the relationship between recreation specialisation and destination image components, some studies discussed the relationship between tourists' level of experience and their destination image. For example, Shields (1991) discussed that because British tourists are more experienced tourists than Russians in visiting Greece, the cognitive aspects of the destination are more important for them. Moreover, the direct relationship between recreation specialisation and motivation has been discussed in previous research (Galloway 2010).

On the other hand, some studies discussed the relationship between recreation specialisation and preferences for site attributes. For example, Lee, Graefe and Li (2007) found recreation specialisation influence on the site attribute preferences of paddlers. Because, in their studies, measurement of the site attributes are in line with cognitive image measurement, the results of the current research confirm their findings in terms of the significant relationship between

recreation specialisation and cognitive destination image. Accordingly, the results of the current research fill a theoretical gap in understanding the relationship between recreation specialisation and destination image components.

6.4.1. Recreation specialisation segmentation and its influence

Market segmentation is an important approach in planning appropriate marketing management by segmenting a heterogeneous market into homogeneous groups (Park & Yoon 2009). Accordingly, each homogeneous group has specific needs and expectations that need to be identified and addressed by tourism marketers to deliver high quality experiences (Park & Yoon 2009). Therefore, the following results of market segmentation and the different characteristics of each segment divide the total astrotourism market into segments for more cost-effective marketing to deliver specific products that satisfy the needs of each group (Park & Yoon 2009). Previous literature has focused mainly on the segmentation of tourists based on their demography, geography, behaviour, lifestyle, personality, attributes for vacation, benefits sought and motivation (Cha, McCleary & Uysal 1995; Crask 1981; Davis, Allen & Cosenza 1988; Gitelson & Kerstetter 1990; Jang, Morrison & O'Leary 2004; Mo, Havitz & Howard 1994; Park & Yoon 2009; Shih 1986; Yuksel 2003). However, there has been limited research on recreation specialisation segments. Therefore, based on the necessity needs of the astrotourism market to explore the characteristics of its segments based on their level of specialisation, this approach has been utilised in the current research.

Accordingly, three segments were identified in the astronomical tourism market based on their recreation specialisation segmentation. These segments are novice, intermediate and advanced. This segmentation was in line with previous studies, which have mainly classified the recreationists and tourists in other markets such as paddlers, bird-watchers, kayakers and canoeists into levels of 'low', 'medium' and 'high' specialisation levels (Ditton, Loomis & Choi 1992; Donnelly, Vaske & Graefe 1986; Virden & Schreyer 1988; Wellman, Roggenbuck & Smith 1982).

To answer the question regarding the influence of astrotourists' recreation specialisation, the results of the current research indicate there are significant differences between astrotourists' specialisation segments in their dark-sky site image formation and their future behavioural intentions.

Concerning the cognitive dark-sky site image, there are significant differences between advanced and novice astronomical tourists. Because cognitive image relates to the knowledge and beliefs about a destination, these results support that the more specialised an astrotourist is, the more knowledge regarding a dark-sky site he/she has. These results are also in line with the interview findings, as advanced astrotourists were more interested in the technical features of a destination like the level of darkness; however, the novice astrotourists were more interested in easy access road and accommodation. The understanding of these differences is important as destination managers can target astrotourists based on their level of specialisation and offer dark-sky site features based on their expectations.

Regarding the affective dark-sky site image, the results of the current research reveal that advanced astrotourists possess stronger feelings compared with the intermediate and novice astrotourists; and intermediate astrotourists have stronger feelings compared with novice astrotourists. These results were also found in interviews because advanced astrotourists indicate not only they enjoy visiting a dark-sky site, but also those travels make them more mindful of their life, and feel deeply peaceful. These findings are very important in dark-sky site development because targeting advanced astrotourists requires marketers to focus both on the physical features of a dark-sky site and satisfying astrotourists affections at the same time.

Regarding the influence of the astrotourists' specialisation segments on overall dark-sky site image, the results show the advanced astrotourists have a favourable image compared with other segments, although, all three segments reflect their overall image as a favourable one. Understanding these results is important because they show how all segments of the astrotourists enjoyed their travel to a dark-sky site; which reflects the attractiveness of the dark-sky sites.

For the conative dark-sky site image, the results of the current research reveal that advanced astrotourists behaved more responsibly compared with the intermediate and novice astrotourists. Therefore, the level of specialisation has a significant influence on how astrotourists behaved. These results of the interviews also showed that the more advanced astrotourists behave more passionately and responsibly. For example, preserving the dark-sky sites and asking the council to protect that area were among the suggestions that mainly advanced astrotourists indicated when talking about how they behaved previously. The implication of these findings helps destination managers to involve advanced astrotourists in their tours; and to conduct the tours mainly based on their expectations as advanced

astrotourists are more active in promoting an appropriate dark-sky site via social media or word-of-mouth and revisiting the site.

Finally, the results of the current research reveal that the astrotourists' specialisation segments have significant influence on their future behavioural intentions towards an astrotour. The advanced astrotourists are highly interested to participate and pay for an astrotour in the next 12 months. These results are extremely important for destination marketers to target advanced astrotourists primarily because advanced astrotourists are willing to behave more positively in the near future and based on the conative image, they are actively involved in promoting, recommending and preserving a dark-sky site if their expectations are met.

The importance of these findings is indicated in previous research. For example, Mehmetoglu (2005) found that important behavioural differences occurred between activity generalists and specialists in the context of nature-based tourism. Therefore, understanding these differences helps to stabilise the developed activities because tourists showed strong evidence for the stability of their preferred activities and experiences (Crouch & Oppewal 2016).

6.5. Cognitive dark-sky site image

For cognitive dark-sky site image, the findings of the current research revealed that of 19 dark-sky site attributes, little or no artificial light pollution, a clear site with as little dust and fog as possible, safe and secure environment and access to relevant equipment such as telescopes and binoculars were the five most important features. These attributes would enable destination marketers to focus on the priority features in dark-sky site development. Moreover, these features can be utilised in promotional images to attract more astronomical tourists (Prayag 2012; Muller & O'Cass 2001)

The current research also investigated the relationship between the cognitive component of dark-sky site image and other components (affective, conative, overall among astronomical tourists. In concomitant with the hypothesised relationships, the findings revealed a strongly significant relationship between all predicted relationships except the influence of the astrotourists' cognitive dark-sky site image on their overall dark-sky site image. The results of the three hypothesised relationships are as follows:

Hypothesis 6) Astrotourists' cognitive dark-sky site image has a significant influence on their affective dark-sky site image.

Hypothesis 7) The influence of astrotourists' cognitive dark-sky site image on their overall dark-sky site image is rejected because of high significance level.

Hypothesis 8) Astrotourists' cognitive dark-sky site image has a significant influence on their conative dark-sky site image.

The findings of the current research confirm the relationships developed in the previous destination image literature. First, cognitive image has been confirmed as an antecedent of the affective, conative and overall destination image (Baloglu & McCleary 1999; Bigné Alcañiz, Sánchez García & Sanz Blas 2009; Boo & Busser 2006; Gallarza, Saura & Garcia 2002; Gartner 1993; Heidegger 1971; Kim & Yoon 2003; Pike & Ryan 2004; Ryu, Lee & Kim 2012). Second, the findings confirm the importance of adopting a qualitative approach in understanding the functional, psychological and behavioural impressions associated with destinations (Bachelard & Jolas 1994; Echtner & Ritchie 1991, 1993; Heidegger 1971; Jenkins 1999). Third, the confirmation of the relationship between cognitive image and future behavioural intentions supports findings of previous studies (Bigné, Sanchez & Sanchez 2001; Bigné Alcañiz, Sánchez García & Sanz Blas 2009; Hosany, Ekinci & Uysal 2006; Kim & Yoon 2003; Ryu, Lee & Kim 2012; Woodside & Lysonski 1989). More specifically, Stylos et al. (2017) confirmed that British and Russian tourists' cognitive destination image has a positive direct influence on their intention to revisit a destination. Woodside and Lysonski (1989) indicated the positive relationship between destination image and purchase decisions.

Contrary to the findings of some previous research, which indicated that cognitive image predicts the overall image (Baloglu 1997), the findings of the current research do not support the relationship between cognitive and overall image. However, because there is a positive relationship between cognitive and affective image; as well as affective and overall image; the results of the current research confirm the previous findings in showing the mediating role of affective image in the relationship between cognitive and overall image (Baloglu & McCleary 1999a, b). In addition, in line with Rainwater's (1966) reasoning, a possible justification for the rejection of the relationship between cognitive and overall image is a general measurement of dark-sky sites without indicating any specific destination with a distinct identity. Another possible explanation is that as cognitive images are often more stable, the overall image is mostly under the influence of affective image (Ley & Samuels 1978).

6.6. Affective dark-sky site image

With regard to the astronomical tourists' dark-sky site affective image, the following two hypothesised relationships were strongly significant.

Hypothesis 9) Astrotourists' affective dark-sky site image has a significant influence on their overall dark-sky site image.

Hypothesis 10) Astrotourists' affective dark-sky site image has a significant influence on their conative dark-sky site image.

In line with previous studies' findings, the results of the current research confirm the importance of affect in destination image formation (Agapito, Oom Do Valle & Da Costa Mendes 2013; Kim & Yoon 2003). Several authors have advocated that affective components of a destination image have more influence on their conative and overall image compared with the cognitive image (Agapito, Oom Do Valle & Da Costa Mendes 2013; Li et al. 2010; Stylos et al. 2017).

The findings of the current research are also consistent with previous studies' results that suggest the predictive role of affective image on overall destination image (Baloglu & McCleary 1999; Stylos et al. 2017), the influence of the affective component of destination image on overall as well as conative dark-sky site image (Ateljevic & Doorne 2002; Baloglu & McCleary 1999; Beerli & Martín 2004b; Bigné, Sanchez & Sanchez 2001; Bigné Alcañiz, Sánchez García & Sanz Blas 2009; Dann 1996; Gartner 1993; Hosany, Ekinci & Uysal 2006; Hu & Ritchie 1993; Kim & Yoon 2003; Konecnik 2004; Lin et al. 2007; Pike & Ryan 2004; Ryu, Lee & Kim 2012; Tasci, Gartner & Cavusgil 2007; Um & Crompton 1990).

6.7. Overall dark-sky site image, conative dark-sky site image and future behavioural intentions

Concerning the relationship between conative and overall dark-sky site image as well as future behavioural intentions, two hypotheses were proposed and supported:

Hypothesis 11) Astrotourists' overall dark-sky site image has a significant influence on their conative dark-sky site image**.**

Hypothesis 12) Astrotourists' conative dark-sky site image has a significant influence on their future behavioural intentions.

Based on qualitative findings of the current research, three new items were found to measure conative dark-sky site image among astrotourists (i.e., protect the site to preserve it, promote the site in social media and propose it to the council as a proper dark-sky site). These items were utilised to measure conative dark-sky site image with previously suggested items (i.e., say positive things about the site, recommend the site and revisit the site) (Agapito, Oom Do Valle & Da Costa Mendes 2013). It is noteworthy that the results of the current research emphasise the explanatory power of mixed-methods research in measuring the constructs that have been measured solely based on the previously developed scales. Moreover, the results would greatly contribute to theoretical advances in differentiating specific tourists' conative image in different tourism markets.

The results derived from the current research provide further empirical support for the relationship between destination image components and future behavioural intentions. These results confirm the findings of previous research (Baloglu & McCleary 1999; Bigné, Sanchez & Sanchez 2001; Castro, Armario & Ruiz 2007; Chi & Qu 2008; Hallab & Kim 2006; Kozak & Rimmington 2000; Yancey 1971; Young & Willmott 1957). In fact, the findings of the current research support the argument advanced by researchers that conceptualising overall image as an attitude provides more insights in measuring, understanding and evaluating the effect of destination image components on future behavioural intentions (Bruwer, Gross & Lee 2016; Rainwater 1966; Young & Willmott 1957). More specifically, the current research confirms the findings by Yancey (1971), which indicated destination image has the most significant relationship with behavioural intentions.

Concerning the relationship between conative image and future behavioural intentions, the results of the current research contradict the suggestions of other scholars that considered conative image is similar to future behaviour; or neglected its effect when investigating images (Bachelard & Jolas 1994; Bender 2002; Bigné Alcañiz, Sánchez García & Sanz Blas 2009; Cartier & Lew 2005; Gartner 1993; Harvey & Braun 1996; Heidegger 1971; Keith & Pile 1993; Lee 2009; Lin et al. 2007; Massey 2006; Murphy, Johnson & Haarmann 2000; Myers 1991; Ryden 1993; Sack 1988; San Martín & Rodríguez del Bosque 2008; Weiner 1991; Young & Willmott 1957). The current research has followed the similar reasoning as Stylos et al. (2016) in differentiating between conative image and future behavioural intentions. This

differentiation would help destination marketers to take more reliable actions in their planning for future tourists. Therefore, in the current research conative dark-sky image reflects how astronomical tourists behaved towards their visited dark-sky site in the past and how they are willing to behave in the near future towards an astronomical tour in general in terms of their participation and willingness to pay. Based on the results of the current research, the positive relationship between astrotourists dark-sky site image components their future behavioural intentions reveal positive destination image not only effect on the positive behaviours towards a specific destination, but also towards participating in an astronomical tour in other tourism destinations.

Finally, in the development of the new destination (brand) image theoretical models, one of the closest models to the current research was developed by Qu, Kim and Im (2011). In their model, a unique image was proposed as a new component in consonance with the cognitive and affective image measuring behavioural intentions through the overall image. The current research findings challenge this model in two parts: First, in their research behavioural intentions are composed of intention to revisit and intention to recommend a destination. In previous research, conative image was also measured by the same items of intention to revisit and recommend. Therefore, to present a unifying model, in the current research, the conative image was proposed to represent the past behaviour and future behavioural intentions as an ultimate construct measuring astrotourists' actual behaviour in the near future.

Second, as indicated by Qu, Kim and Im (2011) themselves, some of the items to measure unique and cognitive image were similar. This similarity shows the lack of qualitative research in contextualising cognitive image measurement. Therefore, the current research argues that instead of adding another component (unique image) to add more variety and confusion in destination image models, cognitive image measurement needs to be tailored specifically to reflect the specific features of a destination.

6.8. Astrotourists' motivations

Based on the qualitative findings of the current research, 10 new items have been found to measure astrotourists' motivations. These results confirm Galloway's (2012) argument that motivations vary among different activities, leading participants to choose tour type and tour destination for various reasons.

The findings of the current research indicate that the five main motives for astrotourists were viewing the sky scenery, experiencing peace and quietness, developing knowledge about astronomy, seeing deep-sky objects and being close to nature. Previous research has been discussed that tourism experiences are of a visual nature (Osborne 2000; Urry 1990). Most often, attractive visuals are experienced through pleasant aesthetics—colour and style of an object—and this leads tourists to become attracted and interested in the scene or object viewed (Willson & McIntosh 2007). Although viewing beautiful scenery has always been among the important factors in motivational studies (Prayag 2012), adding the 'sky' feature specifically has measured its importance for astrotourists.

In contrast, the findings of the current research show differences between astrotourists' motivations and other tourists. For example, Wong, Lee and Lee (2016) found escape/relax, novelty, relationship and self-development as the most important factors of motivational patterns, which are somehow different in an astrotourism context. Noteworthy, some of the astrotourists' motivations are similar to other recreational activities (i.e., getting away from work, spending time with my friends, meeting new people and developing knowledge) (Calantone & Johar 1984; Crompton 1979; Wong, Lee & Lee 2016; Woodside & Jacobs 1985).

Comparing the results of the motivation patterns among birders and astrotourists, similar results were found. 'Enjoy nature' was the most important motivation of the birders; and 'see bird species' and 'to improve my birding skills' were rated in the five first important motives of birders (Scott 2005). Similarly, in astrotourism context, 'view the sky scenery', 'be close to nature', 'develop my skill' were rated as the five first important motives of the astrotourists.

In addition, Laing and Crouch (2005, pp. 210, 214) categorised motivations of the 'frontier tourists' who 'experiences life on the edge, beyond the everyday experience, the comfort zone and the staged activity or event' into Intellectual curiosity, Childhood influences, Challenge/goal-setting, Self-actualisation/Prestige, Fun/Novelty, Learning, Cultural influences, Fantasy, Educating others, Risk/ Escape and Spirituality/Environment/Adventure. Among these motivations, develop knowledge; document distant planets, asteroids, comets and meteor showers; experience peace and quietness; experience an exciting adventure at a spectacular location; learn about constellations; do astrophotography for fun; share my astronomical knowledge with others; rebuild the world/universe in my mind by obtaining a new perspective of life; understand better what my life is all about and who I am; lead others' astronomical activities in an astrotourism context reflect the motivations in a space tourism

context. Moreover, the prestige factor is in line with the social component of the leisure activities, which underlines the importance of the social reasons for individuals to take part in a leisure activity (Beard & Ragheb 1983; Cater 2010; Laing & Crouch 2005). In addition, in the current research, others, friends and partner was recognised in six items, which shows the importance of social element in the astrotourism context. Similarly, 'stimulus avoidance' has been treated in some previous studies as 'escape' in which 'show the need for some individuals to avoid social contacts, to seek solitude and calm conditions; for others it is to seek rest and to unwind themselves' (Beard & Ragheb 1983, p. 225). As the findings of the current research reveal, this escape does not necessarily indicate physical relaxation, but mental relaxation. As stated by Ryan (2002, p. 39) 'the very action of physical exertion can itself be mentally restful even while, paradoxically, the mind is focused on a specific task'. However, childhood influences, cultural influences and fantasy were not found in the current research. Understanding these differences is important to identifying how tourists with somehow similar background interests (i.e., astronomy) have different motivations that need to be discussed in their specific context.

In the quantitative phase of the current research, motivation has been examined as a moderator in the relationships between recreation specialisation and destination image. The results indicated that motivation play a moderating role in the relationship between recreation specialisation and cognitive as well as overall dark-sky site image.

In the tourism literature, motivation has been adopted as one of the fundamental indicators in developing an intrinsic desire for tourists to visit a destination (Bansal & Eiselt 2004; Bieger & Laesser 2002; Devesa, Laguna & Palacios 2010; Nadeau et al. 2008). In general, previous research has investigated the effect of motivation on destination image components as a predictor variable (Beerli & Martín 2004a; Bruwer, Gross & Lee 2016; Pike & Page 2014), as a response variable (Nadeau et al. 2008) or as a mediator (Phillips & Jang 2007), but not as a moderator.

Previous research in destination image found a weak relationship between cognitive image, affective image and motivation (Baloglu & McCleary 1999; Beerli & Martín 2004a). Moreover, the findings of the qualitative phase of the current research show that some items of astrotourists' motivations such as 'be close to nature', 'Get away from work and day-to-day problems temporarily' and 'experience peace and quietness' are closely related to astrotourists' affective dark-sky site image items (peaceful, relaxed, appreciate nature). These findings are

in line with the previous studies that suggested the psychological motivations are related to affective images (Dann 1996; Gartner 1993). As Lockshin and Lee (2011, pp. 68–69) note, 'There is no action and no thought that is not affectively motivated … Motivation underpins agency and motivation is always emotional'.

In addition, previous research has examined the direct relationship between recreation specialisation and motivation, which showed that recreation specialisation would partially influence the motivational patterns among river-based and fishing activities (Galloway 2010; Ji & Wall 2011; Kuentzel & McDonald 1992; Lee et al. 2008; Nadeau et al. 2008).

Considering motivation as a moderator, the results of the current research show that the effect of astrotourists' recreation specialisation on cognitive and overall dark-sky site image is enhanced when the strength of motivation is relatively high. However, this effect is reduced on affective and conative dark-sky site image, as if the effect of astrotourists' recreation specialisation on these dark-sky site images is not stronger for those with high motivations versus those with low motivation. These findings suggest that, for astronomical tourists, the high level of specialisation is likely to exert a more positive cognitive and overall dark-sky sites image among astrotourists with high motivations than on those with low motivation. Thus, as hypothesised, astrotourists' motivation does regulate the relationship between the recreation specialisation and destination image components. These findings denote that astrotourists with high motivation are more likely to be more affected by their level of specialisation when they possess a strong cognitive and overall image. On the other hand, astrotourists with high motivation are more likely to be less affected by their level of specialisation when they possess a strong affective and conative dark-sky site image. Finally, because motivation has a significant effect on tourists' destination image formation, its effect needs to be further incorporated in tourism studies with different approaches.

6.9. Astrotourists' demographics characteristics and their influence on other constructs

Regarding the astrotourists' demographic profile, one of the interesting findings of the current research reveals that astrotourists mainly participate in an astronomical tour 'alone' or with their 'partner'. This result indicates how astrotourism is treated as a recreational activity for those who want to participate in a tour with their families or on their own.

Concerning the impact of gender on other constructs; the findings suggest that gender influences the level of recreation specialisation. Male astrotourists have a higher level of recreation specialisation than female astrotourists. These results are consistent with other special interest tourism results (Gertner 2010; Kim & Perdue 2011; Lee et al. 2008; Scott & Godbey 1994) For example, male respondents were more motivated than female respondents in space tourism (Crouch et al. 2009). However, another range of studies found that for some special interest tourism segments such as birders, there was no significant group differences (Eubanks, Stoll & Ditton, 2004). The results of the current research show that astronomical tourists are predominantly male. The male predominance was also obvious in the interview process because only 4 out of 24 respondents were females. The reasons behind this issue were discussed in the interviews. The respondents believed that astronomy is among one of the sciences fields such as geology that are heavily male dominated; although one of the female respondents asserts that she never had any barrier in doing astronomy.

On the other hand, as anticipated, the affective perception of dark-sky site image in females is higher than in males. This result was in line with the suggestion of one of interview participants as he advised to emphasise the beauty of the night sky rather than technical details to attract more women. He said that 'women just love being shown the Jewel Box'. The Jewel Box is one of the most beautiful constellations of the night sky.

Regarding the conative dark-sky site image, males have revisited and recommended the dark-sky sites more than females. Taken together, the findings of the current research provide some guidelines for destination marketers to fine tune their strategies based on the social-demographic differences in special-interest tourism markets.

The results of the current research show that astrotourists' age does not have any significant influence on their affective, conative dark-sky site image and future behavioural intentions. These findings confirm previous findings in terms of the influence of age on destination image in general (Boo & Busser 2006), and the specific influence of age and educational level on tourists' cognitive and affective image (Baloglu & McCleary 1999). However, the findings of the current research are in contrast with some other studies, which concluded the significant role of age in destination image formation (Kutzner & Wright 2010; Moscardo & Pearce 1999; Ryan & Huyton 2000). These differences justify the importance of investigating the influence of tourists' demographic characteristics on destination image components in specific contexts such as astronomical tourism. The results of the current research advocate that dark-sky sites

are attractive tourism destinations regardless of the age range. Therefore, dark-sky sites can be promoted among different ages of tourists.

However, in terms of overall dark-sky site image and recreation specialisation, there are significant differences between baby boomers (65–74) and Millennials. These findings are not surprising for recreation specialisation because previous studies have also found that level of specialisation advances with age (Hvenegaard 2002). Hence, it is interesting that although age did not influence affective image, it has influenced cognitive dark-sky site image. This result indicates that more studies are needed to understand differences in generations in terms of the formation of a favourable overall image.

6.10. Conclusion

The current research was based on six main research questions that informed the theoretical model. The items to measure the constructs under study were identified and developed based on the literature review and findings of the qualitative phase of the research. Following that, the proposed theoretical model was tested to identify the relationships between the constructs in the astronomical tourism context. The current section summarises the answers to the questions and their contribution in tourism literature.

6.10.1. Research question one

The first question was: What are appropriate names and definitions for 'Tourists with special interest in astronomical activities' and 'Appropriate destinations for astronomical tours'?

Proposing a clear definition is very important for each tourism market because a specific tourism market needs to be treated as an identifiable market to facilitate its measurement in tourism economics (Fredman & Tyrväinen 2010). This facilitation helps to monitor the changes to obtain sustainable development of a specific market (Fredman & Tyrväinen 2010).

Therefore, the findings of the qualitative phase of the current research suggest the appropriate names and definitions for these two questions (see Sections 4.2 and 4.3). These definitions help destination marketers to identify this special interest tourism market and facilitate astronomical tours based on the needs, expectations and interests of astrotourists.

6.10.2. Research question two

The second research question was ‘what are astronomical tourists’ characteristics in terms of their demographic, specialisation, motivations, cognitive, affective and conative destination image?’

The majority of respondents are middle-aged (45–54 years old), male and married. They are relatively well educated with diploma, employed for a salary and have above average household income. Three segments of astronomical tourists are identified using recreation specialisation segmentation. These three segments are novice, intermediate and advanced astrotourists. The majority of astrotourists in the current research have an intermediate level of specialisation. The first three motivations of astrotourists to visit a dark-sky site and attend an astrotour are related to sky scenery, peace experience and knowledge development. In addition, the first three important features of a dark-sky site for an astrotourist are little light pollution, little dust and fog and a secure site. The majority of astrotourists feel impressed and in awe when they observe the sky in a dark-sky site; and, they appreciate nature for such beauties. Astrotourists behave mainly similar to other tourists when they visit a dark-sky site. They say positively, recommend and revisit the appropriate dark-sky site.

So far, few studies have investigated the characteristics of astronomical tourists. Understanding the similarities and differences of astrotourists compared with other tourists can advance the theoretical and practical knowledge in this specialised tourism segment because special interest tourists’ preferences differ based on their motivations and desired experiences. Some expect their tour to be an educational and thought-provoking experience; while others regard it as an enjoyable experience (Poria et al. 2009). Thus, understanding the characteristics of astrotourists leads to development of desired tours in an appropriate dark-sky site. This understanding plays an important role in the success of this market to deliver tours that meet the needs of astrotourists in terms of advancing their knowledge and experiencing peaceful moments while satisfying their astronomical and natural-related interest.

In addition, the results of the current research reveal the significant differences between appropriate tourism destinations for astrotourists compared with other tourist segments. Astrotourists are interested in destinations with less light pollution, which is unique. These results advance the destination image theory by suggesting the necessity of contextualising and examining tourism destinations based on their capabilities to deliver specific tourism products.

Therefore, tourism destinations need to be examined and treated specifically based on their unique features that satisfy different needs of tourists.

6.10.3. Research question three

The third question postulates: what is the relationship among astronomical tourists' recreation specialisation, dark-sky site image components and future behavioural intentions?

The findings suggest that a significant influence of astronomical tourists' recreation specialisation on other constructs exists that indicate specialisation is a strong driver in destination image formation in a specialised context. Therefore, these findings contribute to unravel the silence in the literature on the role of specialisation in creating positive cognitive, affective, overall and conative destination image. In addition, the significant role of tourists' specialisation on their future behavioural intentions indicates the importance of exploring specialisation in different special interest tourism segments and planning based on their interest to encourage them to participate and pay in the assigned tours. Therefore, one of the substantial contributions of the current research was the identification of the significant relationship between recreation specialisation and destination image components.

6.10.4. Research question four

The fourth research questions was: how are the previously mentioned constructs moderated by motivational levels of astronomical tourists?

The findings reveal that motivation plays a significant moderating role between astrotourists' recreation specialisation and destination image components. Astrotourists with a high level of specialisation and high level of motivation have stronger feelings (affective image), behaviour (conative image) and final favourable image. On the other hand, astrotourists who are not highly specialised but have a high level of motivation possess stronger beliefs (cognitive image). These results are important because they address the second gap in the previous literature. For example, previous tourism studies examined the positive relationship between recreation specialisation and place attachment. However, they failed to examine the moderation effect of motivation. These results provide guidelines for the destination marketers to target astrotourists considering both levels of motivation and levels of specialisation. For example, for those who are novice but have high motivation to participate in an astrotour, the emphasis should take place on their cognitive image by providing facilities and features that make their tour distinguishable. To elaborate more, advanced astrotourists may visit a dark-sky site that

does not have access to proper accommodation. However, for novice astrotourists who are motivated to visit a dark-sky site, access to accommodation should be outlined and promoted. Therefore, confirming the moderation role of motivation in the current research reveals the necessity of more research to understand a phenomenon.

6.10.5. Research question five

The fifth research question asked: are there significant differences among mentioned constructs based on the astronomical tourists' demographic profiles?

The results suggest different demographic characteristics of astrotourists influence each construct differently. Astrotourists gender influences their specialisation level and conative dark-sky site image in which male astrotourists are more specialised and have higher conative image than females. On the other hand, female astrotourists have higher affective dark-sky site image. In addition, age as one of the examined factors has partial influence on astrotourists' recreation specialisation and their cognitive dark-sky site image. In particular, Generation X and baby boomers has higher specialised level and overall dark-sky site image compared with Millennials. For other astrotourists' demographic profiles such as education level, income and occupational status, no significant differences were found. These results indicate the importance of identifying differences among a special interest tourism market to target them specifically. For example, destination marketers need to focus on affective image of a dark-sky site to promote it among female astrotourists. Following this line of reasoning, other implications of the results can also enhance an astronomical tourism market and the experience of astrotourists.

6.10.6. Research question six

The final question asked: are there significant differences among the mentioned constructs based on the astronomical tourists' specialisation segments?

The results indicated advanced astrotourists with a high level of specialisation differed from novice astrotourists with low specialisation in the rated importance of selected cognitive, affective, overall and conative dark-sky site image as well as their behavioural intentions. In all cases, advanced astrotourists rated higher than intermediate and particularly novice astrotourists. These results indicate the significant influence of recreation specialisation in destination image formation of special interest tourism markets that cannot be neglected. Tourism destination image scholars have also incorporated the role of recreation specialisation

in their conceptualisations to advance the theoretical understanding of recreation specialisation in destination image tourism context.

6.11. Theoretical contributions

Following the results discussion, the important theoretical contributions of the current research are summarised.

Sky as a tourism resource has been discussed in few case study papers with sustainable tourism focus (Edensor 2013; Rodrigues, Rodrigues & Peroff 2015). These studies discussed the recent awareness of preserving dark-sky sites as sustainable tourism resources and the importance of this niche tourism product in a sustainable approach to benefit local people (Rodrigues, Rodrigues & Peroff 2015). However, findings of previous studies were limited to case studies, a small number of interviews and auto-ethnographic approach, lacking strong empirical results and astrotourists' perspective that can be referred and utilised in future research (Collison & Poe 2013; Edensor 2013; Rodrigues, Rodrigues & Peroff 2015). Moreover, they have not explored the conceptualisation of astronomical tourism to develop unified and reliable definitions. Extending this line of thinking, the current research has made an important theoretical contribution by developing and presenting the concept of astronomical tourism and dark-sky site image in a more detailed way. Moreover, the frameworks drawn from the tourism destination image, recreation specialisation and tourists' motivational patterns literature have provided an appropriate foundation to develop this niche market. Therefore, the results of the current research contribute to the special-interest tourists' motivation literature by providing empirical results of astrotourists' motives to visit a dark-sky site. These findings offer insights into the importance of contextualising the previous measurement scales by incorporating an interpretivist approach to understanding motivational differences in each market.

Another theoretical contribution is that the relationship among recreation specialisation and destination image components has not been investigated in previous research. In addition, previous studies focused more on the three-component structure for destination image (Baloglu & McCleary 1999; Dann 1996; Echtner & Ritchie 1993; Gallarza, Saura & Garcia 2002; Gartner 1993; Pike & Ryan 2004; Tasci, Gartner & Cavusgil 2007; Young & Willmott 1957). By contrast, this research investigated the relationship among recreation specialisation, components of destination image (cognitive, affective, conative, overall), and motivation and future behavioural intentions in an astronomical tourism context. The findings of this research extend previous limited evidence integrating four components of destination image in one

holistic model and exploring their relationship with their specialisation (Bigné Alcañiz, Sánchez García & Sanz Blas 2009; Qu, Kim & Im 2011; Rainwater 1966; Shields 1991).

Furthermore, a few studies investigated the influence of destination image on tourists' behaviour after their destination visit (Tasci & Gartner 2007). In addition, the role of the conative image has been neglected in the majority of tourism studies when predicting the future behavioural intentions (Gallarza, Saura & Garcia 2002; Liu, Lin & Wang 2012; Rainwater 1966; Sahin & Baloglu 2011). Few studies have investigated the role of cognitive and affective image in predicting the conative destination image (Agapito, Oom Do Valle & Da Costa Mendes 2013; Sack 1988). In a similar vein, the overall image has been less investigated as an antecedent of the conative image. Therefore, by examining the relationship between overall image and conative image, conative image and future behavioural intentions; as well as the relationship between cognitive, affective and conative image, the current research has greatly advanced the theoretical understanding of destination image theory. In the current research, future behavioural intentions have been investigated after astronomical tourists' visitation of a dark-sky site, which highlights how different destination image components related to their future behaviour.

Indeed, by distinguishing between conative image and future behavioural intentions, the current research contributed to advancing the understanding of past behaviour and persistent intentions of the tourists to participate and pay for a designated tour. In fact, considering willingness-to-pay (WTP) and willingness to participate in a specific timeframe to measure future behavioural intention would add a theoretical contribution in line with the suggestions of previous studies (Faullant, Matzler & Füller 2008; Gutman 1966; Jackson 1994).

Finally, by incorporating motivation as a moderator, the results of the current research show that the effects of recreation specialisation on cognitive, affective, conative and overall dark-sky site image differ between astrotourists with high and low motivation levels. These results help in understanding dark-sky site image formation process in light of the recreation specialisation, differentiating between astrotourists with low and high motivational patterns. Most significantly, the moderating role of motivation has not been explored in the mentioned relationships, which can particularly advance the theoretical understanding of the image formation process.

6.12. Practical contributions

One of the key success factors in tourism marketing is to target a specific market (Gunn 1988). Astronomical tourism as a new niche market segment can be understood and targeted specifically under the recreation specialisation, destination image and motivation umbrella. Therefore, destination marketers would benefit from the findings of the current research to promote dark-sky sites more efficiently. Following, the practical contribution of the current research is discussed in more detail:

As regards cognitive image, endeavours to improve necessary attributes of a dark-sky site such as 'no artificial lights', 'access roads' and 'access to amenities' would facilitate a favourable overall image. Subsequently, astrotourists' favourable overall image led them to revisit and recommend the dark-sky site and increase their willingness to pay and participate in an astrotour in the near future. Therefore, marketing actions could attempt to offer the dark-sky sites' resources in line with specific characteristics of astronomical tourists.

Given that the affective component of the dark-sky site, image is significant in creating a conative and overall image, and future behavioural intentions; destination managers need to focus more on the emotional side of their services, communications and advertisements (Agapito, Oom Do Valle & Da Costa Mendes 2013; Rainwater 1966). For example, as suggested by previous studies, destination marketers can develop emotional advertising films and audio-visual products to shape the affective image, motivation and behavioural intentions of the tourists (Cartier & Lew 2005; Shields 1991; Stylos et al. 2016, 2017).

Next, adopting a qualitative methodology to explore astrotourists' conative image revealed their active role in engaging with a dark-sky site not only by revisiting and recommending that but also by protecting and promoting that in social media. This identification ensures dark-sky site managers' ability to utilise enormous approaches in engaging astrotourists to promote a dark-sky site. Stimulating word-of-mouth communication over the internet and using personal experiences in advertisements are some approaches suggested by previous scholars; which can be adopted in astrotourism (Rainwater 1966). These mentioned strategies can invoke motivations for potential tourists (Rainwater 1966) and encourage previous astrotourists to participate in an astrotour again.

In a similar vein, future behavioural intentions towards destinations and tourism products reveal 'a deeply held commitment' (Oliver 1997, p. 392) and are discussed more in the loyalty

literature (Heidegger 1971; Prayag 2009; Yoon & Uysal 2005). However, identifying the factors that enhance tourists' intentions is timely from a practical perspective (Shields 1991). Accordingly, by distinguishing between past behaviour (conative image) and future behavioural intentions, the current research demonstrated a road-map for tourism marketers clearly to predict astrotourists' behavioural responses.

Another practical contribution of the current research is that it is essential for the destination marketers to concentrate on the most critical astrotourists' motivations, such as viewing the sky scenery, experiencing peace and quietness, developing knowledge about astronomy and seeing deep-sky objects to promote a dark-sky site. Indeed, by identifying the preferred activities and interests of the astrotourists, destination marketers have the opportunity to incorporate more diverse advertising media to promote astrotourism products. In addition, based on the evidence on the moderating role of motivation, it appears that for astrotourists with high motivation, special emphasis should be given to their specialisation to improve their dark-sky site affective, conative and overall image. Moreover, segmentation of the astrotourists with respect to their motivation could take place to offer extra insights into different groups of astrotourists. Such understanding leads to appropriate destination planning to satisfy astrotourists' motivations.

In addition, another marketing strategy is to incorporate the demographic findings of the current research to plan for astronomical tourism development. The most important demographic factor influencing recreation specialisation, affective and conative dark-sky site image was gender. The other influential factors were age affecting recreation specialisation and overall image and marital status affecting affective image. Hence, such understanding provides some guideline for destination marketers to offer more specific features of dark-sky sites based on astrotourists' demographic profiles.

Dark-sky sites does have the potential to become a long-term, sustainable tourism attraction. It also has the potential to provide to raise awareness about the importance of clear dark sky on human life and adverse effects of light pollution. By providing a unique identity for astronomical tourism, dark-sky sites can attract more tourists which leads to growth of tourism industry.

The results of the current research provide a platform for a new product development in tourism industry. For example, the importance of a knowledgble tour guide in forming cognitive dark-sky site image for astrotourists indicates the necessity of educational component in an

astronomical tour. Such educational programs raise the awareness of protecting dark-sky sites as being part of nature. Therefore, to conduct a comprehensive astrotour, knowleagble tour guides and access to equipment should be considered. Besides, in the current research, different astronomical tourism products are proposed and the importance of each product were examined. Stargazing, observing meteor showers, solar watching and astrophotography were four astrotour products with high priority, in which stargazing was the most favourite one. On the other hand, spectacular sceneries and rural/natural environment were two top tourism activities to be combined with an astrotour. In addition, research about the information sources of astrotourists to particitipate in an astrotour provides a basis for conducting advertising strategies to attract more novice astrotourists. By incorporating these results, tourism industry can invest on developing astrotourism as a niche tourism product to address the needs and expecations of astrotourists and economic growth of Australia.

To conclude, measuring motivation, destination image component and recreation specialisation among astrotourists offers destination marketers some insights to understand this tourism market better. Moreover, they achieve the opportunity to emphasise the right motives and features to attract astronomical tourists. As a result, the findings of the current research would be useful for destination marketers to segment and target astrotourists based on their specific expectations and motivations.

6.13. Limitations and future research recommendations

Stating the contributions in the previous section, it is important to acknowledge the limitations. Similar to other mixed-methodology research, this research faced conceptual and methodological limitations. From a conceptual point of view, lack of studies in astronomical tourism, their destination image formation process, recreation specialisation and motivations led the researcher to 'borrow' literature from different areas. Therefore, future studies need to test the applicability of the developed scales in the current research in different settings and contexts.

Regarding the conceptualisation of destination image formation, it would be desirable for future research to compare different models of the destination image formation process to achieve a deeper understanding of advantages and disadvantages of each model. Because the dimensionalities of the main constructs (recreation specialisation, cognitive image, affective image and motivation) are not discussed in this research, further research is needed to investigate each construct independently in the context of astronomical tourism.

Although care was taken to ensure the reliability and validity of the qualitative and quantitative phases, the issue of different interpretations of the questions by the respondents still exists.

This research does not distinguish between astrotourists who have participated in an astrotour one time or more. Putting it differently, the first-timers and repeat astrotourists are not distinguished, although previous scholars pointed the differences that may exist between their attitudes (Heidegger 1971; Jackson 1994).

While the current research attempts to develop and test the relationships between several constructs (recreation specialisation, destination image components, motivation and future behavioural intentions), there are other factors such as involvement, tour/service quality and place attachment that might influence the investigated constructs within this research. These relationships could be incorporated in future studies to provide further insights into the destination image formation process.

From the methodological point of view, the length of the questionnaire, online approach and the item generation had some limitations; which attempted to be complemented by providing in-depth understanding from the qualitative phase. Moreover, the method of data collection has the limitation of not collecting equal numbers of respondents from each state; although the purpose of the current research was not comparing Australian states, it would be interesting for future studies to investigate astronomical tourism market in each state, individually.

Previous research discussed that although future behavioural intentions have been reported as a good approximation of the actual behaviour, it cannot be guaranteed that the intentional behaviour and actual behaviour necessarily happen (Gutman 1966; Shields 1991). However, the current research has tried to minimise the uncertainty of the actual behaviour by asking about the tourists' willingness-to-pay and participate in an astrotour in a one-year time frame. Therefore, a longitudinal study can check the actual behaviour of the astrotourists who intended to participate and pay for an astrotour in one year. Moreover, future behavioural intentions presented within this research needs to be examined in other tourism contexts.

Another limitation of the current research is that the hypothesised relationships within the current research have only been examined among astronomical tourists. Future research could also test them among other nature-based tourism markets to allow greater in-depth understanding of tourists' destination image formation process. In other words, there is no basis to generalise the findings of the current research to other special-interest tourism markets or

other astronomical tourists' populations. Hence, further research on different activities, populations and geographic areas would be needed.

In summary, the results reveal that there is a significant relationship among all components although cognitive dark-sky site image does not have a direct influence on overall dark-sky site image. Moreover, the influence of three astronomical tourist segments (novice, intermediate, advanced) and the influence of their demographic profiles on other constructs are explored. The results indicate significant differences among all segments of astrotourists based on their specialisation level. In addition, the findings reveal the partial influence of astronomical tourists' gender and age on their recreation specialisation, cognitive, affective, overall and conative dark-sky site image. Finally, astrotourists' motivational levels play a significant moderating role among the mentioned relationships. Examining these relationships provides important insights for destination marketers and managers who are offered suggestions to develop this niche market. These implications are discussed and theoretical contributions are highlighted.

References

Aaker, DA 1996, *Building strong brands*, Free Press, New York.

Aaker, J 1997, 'Dimensions of Brand Personality', *Journal of Marketing Research*, vol. 34, no. 3, pp. 347.

Agapito, D, Oom Do Valle, P & Da Costa Mendes, J 2013, 'The cognitive–affective–conative model of destination image: A confirmatory analysis', *Journal of Travel & Tourism Marketing*, vol. 30, no. 5, pp. 471–81.

Alaeddinoglu, F & Can, AS 2010, 'Destination image from the perspective of travel intermediaries', *Anatolia*, vol. 21, no. 2, pp. 339–50.

Allport, GW 1935, 'Attitudes', in C Murchison (ed), *A handbook of social psychology*, Clark University Press, Worcester, MA, pp. 798–844.

Alvarez, M & Campo, S 2011, 'Controllable versus uncontrollable information sources: effects on the image of turkey', *The International Journal of Tourism Research*, vol. 13, no. 4, p. 310.

Anand, P, Holbrook, MB & Stephens, D 1988, 'The formation of affective judgments: The cognitive–affective model versus the independence hypothesis', *Journal of Consumer Research*, vol. 15, no. 3, pp. 386–91.

Andereck, K, Bricker, KS, Kerstetter, D & Nickerson, NP 2006, 'Connecting experiences to quality: understanding the meanings behind visitors' experiences', in G Jennings & N Nickerson (eds), *Quality Tourism Experiences*, Elsevier's Butterworth-Heinemann, Oxford, UK, p. 82.

Andreu, L, Bigné, JE & Cooper, C 2000, 'Projected and perceived image of Spain as a tourist destination for British travellers', *Journal of Travel & Tourism Marketing*, vol. 9, no. 4, pp. 47–67.

——Kozak, M, Avci, N & Cifter, N 2006, 'Market segmentation by motivations to travel: British tourists visiting Turkey', *Journal of Travel & Tourism Marketing*, vol. 19, no. 1, pp. 1–14.

Ashwell, J 2015, 'Going bush? Factors which influence international tourists' decisions to travel to remote Australian destinations', *Tourism Management*, vol. 46, pp. 80–3.

Assael, H 1998, *Consumer behaviour and marketing action*, 6th edn, South-Western College Pub., Cincinnati, Ohio.

Assaf, AC & Josiassen, A 2011, 'Identifying and ranking the determinants of tourism performance: A global investigation', *Journal of Travel Research*, vol. 51, no. 4, pp. 388–399.

Assaker, G, Vinzi, VE & O'Connor, P 2011, 'Examining the effect of novelty seeking, satisfaction, and destination image on tourists' return pattern: A two factor, non-linear latent growth model', *Tourism Management,* vol. 32, no. 4, pp. 890–901.

Ateljevic, I & Doorne, S 2002, 'Representing New Zealand: Tourism imagery and ideology', *Annals of Tourism Research,* vol. 29, no. 3, pp. 648–67.

Ajzen, I 1991, 'The theory of planned behavior', *Organizational Behavior and Human Decision Processes,* vol. 50, no. 2, pp. 179–211.

Bachelard, G & Jolas, M 1994, *The poetics of space,* Beacon Press, Boston.

Bagozzi, RP, Tybout, AM, Craig, CS & Sternthal, B 1979, 'The construct validity of the tripartite classification of attitudes', *Journal of Marketing Research,* vol. 16, no. 1, February, pp. 88–95.

Baloglu, S & Brinberg, D 1997, 'Affective images of tourism destinations', *Journal of Travel Research,* vol. 35, no. 4, pp. 11–5.

——& McCleary, KW 1999, 'A model of destination image formation', *Annals of Tourism Research,* vol. 26, no. 4, pp. 868–97.

——& Mangaloglu, M 2001, 'Tourism destination images of Turkey, Egypt, Greece, and Italy as perceived by US-based tour operators and travel agents', *Tourism Management,* vol. 22, no. 1, February, pp. 1–9.

Bansal, H & Eiselt, HA 2004, 'Exploratory research of tourist motivations and planning', *Tourism Management,* vol. 25, no. 4, August, pp. 387–96.

Barros, CP, Butler, R & Correia, A 2010, 'The length of stay of golf tourism: A survival analysis', *Tourism Management,* vol. 31, no. 1, pp. 13–21.

Barroso, FL, Pinto-Correia, T, Ramos, IL, Surová, D & Menezes, H 2012, 'Dealing with landscape fuzziness in user preference studies: Photo-based questionnaires in the Mediterranean context', *Landscape and Urban Planning,* vol. 104, no. 3–4, 3/15/, pp. 329–42.

Beard, J, & Ragheb, M 1983, 'Measuring leisure motivation', *Journal of Leisure Research,* vol. 15, no. 3, pp. 219–28.

Becken, S 2005, 'The role of tourist icons for sustainable tourism', *Journal of Vacation Marketing,* vol. 11, no. 1, pp. 21-30.

Beerli, A & Martín, JD 2004a, 'Tourists' characteristics and the perceived image of tourist destinations: a quantitative analysis—a case study of Lanzarote, Spain', *Tourism Management,* vol. 25, no. 5, pp. 623–36.

——& Martín, JD 2004b, 'Factors influencing destination image', *Annals of Tourism Research,* vol. 31, no. 3, pp. 657–81.

Bello, DC & Etzel, MJ 1985, 'The role of novelty in the pleasure travel experience',

Journal of Travel Research, vol. 24, no. 1, pp. 20–6.

Bender, B 2002, 'Time and landscape', *Current Anthropology*, vol. 43, no. S4, pp. S103–12.

Benur, AM & Bramwell, B 2015, 'Tourism, product development and product diversification in destinations', *Tourism Management*, vol. 50, Oct, pp. 213–24.

Bieger, T & Laesser, C 2002, 'Market segmentation by motivation: The case of Switzerland', *Journal of Travel Research*, vol. 41, no. 1, pp. 68–76.

Bigné, JE, Sánchez, MI & Sánchez, J 2001, 'Tourism image, evaluation variables and after purchase behaviour: Inter-relationship', *Tourism Management*, vol. 22, no. 6, pp. 607–16.

Bigné Alcañiz, E, Sánchez García, I & Sanz Blas, S 2009, 'The functional–psychological continuum in the cognitive image of a destination: A confirmatory analysis', *Tourism Management*, vol. 30, no. 5, pp. 715–23.

Biran, A, Poria, Y & Oren, G 2011, 'Sought experiences at (dark) heritage sites', vol. 38, no. 3, pp. 820–41.

Black, I 2006, 'The presentation of interpretivist research', *Qualitative Market Research: An International Journal*, vol. 9, no. 4, pp. 319–24.

Blamey, R & Hatch, D 1998, 'Profiles and motivations of nature-based tourists visiting Australia', Bureau of Tourism Research, *Occasional Paper* 25.

Boo, S & Busser, JA 2006, 'The hierarchical influence of visitor characteristics on tourism destination images', *Journal of Travel & Tourism Marketing*, vol. 19, no. 4, pp. 55–67.

Bramwell, B & Rawding, L 1996, 'Tourism marketing images of industrial cities', *Annals of Tourism Research*, vol. 23, no. 1, pp. 201–21.

Bricker, K & Kerstetter, D 2000, 'Level of specialisation and place attachment: An exploratory study of whitewater recreationists', *Leisure Sciences*, vol. 22, no. 4, pp. 233–57.

Brown, G 2006, 'Mapping landscape values and development preferences: a method for tourism and residential development planning', *International Journal of Tourism Research*, vol. 8, no. 2, pp. 101–13.

——Lee, IS, King, K & Shipway, R 2015, 'Eventscapes and the creation of event legacies', *Annals of Leisure Research*, pp. 1–18.

Bruwer, J 2013, 'Service quality perception and satisfaction in a New Zealand festivalscape: buying behaviour effects', *Tourism Analysis*, vol. 18, no. 1, pp. 61–77.

——Gross, MJ & Lee, HC 2016, 'Tourism destination image (TDI) perception within a regional winescape context', *Tourism Analysis*, vol. 21, no. 2, pp. 173–87.

——& Lesschaeve, I 2012, 'Wine tourists' destination region brand image perception and antecedents: conceptualization of a winescape framework', *Journal of Travel & Tourism Marketing*, vol. 29, no. 7, pp. 611–28.

Bryan, H 1977, 'Leisure value systems and recreational specialisation: The case of trout fishermen', *Journal of Leisure Research*, vol. 9, pp. 174–87.

——1979, *Conflict in the great outdoors*, Birmingham Publishing Company, Birmingham.

——2000, 'Recreation specialisation revisited', *Journal of Leisure Research*, vol. 32, no. 1, p. 18.

Bryman, A 2006, 'Integrating quantitative and qualitative research: how is it done?', *Qualitative research*, vol. 6, no. 1, pp. 97–114.

——& Bell, E 2011, *Business research methods*, 3rd edn, Oxford University Press, Oxford.

Burns, PM, & Novelli, M 2008. *Tourism development: growth, myths, and inequalities*, CABI Publishing, Wallingford, Oxon.

Burr, SW & Scott, D 2004, 'Application of the recreational specialisation framework to understanding visitors to the Great Salt Lake bird festival', *Event Management*, vol. 9, no. 1-1, pp. 27–37.

Buttimer, A 1976, 'Grasping the dynamism of lifeworld', *Annals of the association of American geographers*, vol. 66, no. 2, pp. 277–92.

—— 1980, 'Home, reach, and the sense of place', in A Buttimer & D Seamon (eds), *The human experience of place and space*, St. Martin's Press, New York.

Byrne, BM 2005, 'Factor analytic models: viewing the structure of an assessment instrument from three perspectives', *Journal of Personality Assessment*, vol. 85, no. 1, pp. 17–32.

——2010, *Structural equation modeling with AMOS: basic concepts, applications, and programming*, 2nd edn, Routledge, New York.

Caber, M & Albayrak, T 2016, 'Push or pull? Identifying rock climbing tourists' motivations', *Tourism Management*, vol. 55, pp. 74-84.

Cai, LA 2002, 'Cooperative branding for rural destinations', *Annals of Tourism Research*, vol. 29, no. 3, pp. 720-742.

Cai, L, Wu, B & Bai, B 2004, 'Destination image and loyalty', *Tourism Review International*, vol. 7, no. 3–4, pp. 153–62.

Calantone, RJ & Johar, JS 1984, 'Seasonal segmentation of the tourism market using a benefit segmentation framework', *Journal of Travel Research*, vol. 23, no. 2, Fall, pp. 14–24.

Carson, DJ, Gilmore, A, Perry, C & Gronhaug, K 2001, *Qualitative marketing research*, SAGE Publications, London.

Carter, J, Dyer, P & Sharma, B 2007, 'Dis-placed voices: sense of place and place-identity on the Sunshine Coast', *Social & Cultural Geography,* vol. 8, no. 5, pp. 755–73.

Cartier, CL & Lew, AA 2005, *Seductions of place: geographical perspectives on globalization and touristed landscapes*, Psychology Press, London.

Castro, CB, Armario, EM & Ruiz, DM 2007, 'The influence of market heterogeneity on the relationship between a destination's image and tourists' future behaviour', *Tourism Management,* vol. 28, no. 1, pp. 175–87.

Cater, CI 2010, 'Steps to space; opportunities for astrotourism', *Tourism Management,* vol. 31, no. 6, pp. 838–45.

Cha, S, McCleary, KW & Uysal, M 1995, 'Travel motivations of Japanese overseas travelers: a factor-cluster segmentation approach', *Journal of Travel Research,* vol. 34, no. 1, pp. 33–9.

Charles, JR 2000a, 'Photographing astronomical events', *Practical Astrophotography*, Springer London, London, pp. 209–38.

——2000b, 'Travel and astrophotography', *Practical Astrophotography*, Springer London, London, pp. 117–33.

Chen, CF & Cheng, WC 2016, 'Sustainability SI: exploring heterogeneity in cycle tourists' preferences for an integrated bike-rail transport service', *Networks and Spatial Economics*, vol. 16, no. 1, pp. 83-97.

——& Phou, S 2013, 'A closer look at destination: Image, personality, relationship and loyalty', *Tourism Management*, vol. 36, no. 1, pp. 269-278.

Chen, J 2003, 'Market segmentation by tourists' sentiments', *Annals of Tourism Research,* vol. 30, no. 1, pp. 178–93.

——Gursoy, D 2001, 'An investigation of tourists' destination loyalty and preferences', *International Journal of Contemporary Hospitality Management,* vol. 13, no. 2, pp. 79–85.

Chen, JS 2001, 'A case study of Korean outbound travelers' destination images by using correspondence analysis', *Tourism Management,* vol. 22, no. 4, August, pp. 345–50.

——& Hsu, CHC 2000, 'Measurement of Korean tourists' perceived images of overseas destinations', *Journal of Travel Research,* vol. 38, no. 4, May, pp. 411–6.

Chen, PJ & Kerstetter, DL 1997, 'International students' image of rural Pennsylvania as a travel destination', *Journal of Travel Research,* vol. 37, no. 3, pp. 256–66.

Chhetri, P, Arrowsmith, C & Jackson, M 2004, 'Determining hiking experiences in nature-based tourist destinations', *Tourism Management,* vol. 25, no. 1, pp. 31–43.

Chi, CGQ & Qu, H 2008, 'Examining the structural relationships of destination image, tourist satisfaction and destination loyalty: an integrated approach', *Tourism Management,* vol. 29, no. 4, pp. 624–36.

Chon, KS 1990, 'The role of destination image in tourism', *Tourism Review,* vol. 45, no. 2, pp. 2–9.

Churchill, GA, Brown, TJ & Suter, TA 2010, *Basic marketing research,* 7th edn, South-Western, Mason, Ohio.

Churchill Jr, GA 1979, 'A paradigm for developing better measures of marketing constructs', *Journal of Marketing Research,* vol. 16, no. 1, pp. 64–73.

Coghlan, A, Buckley, R & Weaver, D 2012, 'A framework for analysing awe in tourism experiences', *Annals of Tourism Research,* vol. 39, no. 3, pp. 1710–4.

Collins, W 2012, *Astrophotography,* HarperCollins Publishers.

Collison, F & Poe, K 2013, ''Astronomical tourism': The astronomy and dark sky program at Bryce Canyon National Park', *Tourism Management Perspectives,* vol. 7, pp. 1–15.

Colwell, J 1990, 'Qualitative market research: A conceptual analysis and review of practitioner criteria', *Journal of the Market Research Society,* vol. 32, no. 1, pp. 13–36.

Cowell, DK & Green, GP 1994, 'Community attachment and spending location: The importance of place in household consumption', *Social Science Quarterly,* vol. 75, no. 3, pp. 637–55.

Crask, MR 1981, 'Segmenting the vacationer market: identifying the vacation preferences, demographics, and magazine readership of each group', *Journal of Travel Research,* vol. 20, no. 2, pp. 29–34.

Creswell, JW 2003, *Research design: qualitative, quantitative, and mixed methods approaches*, 2nd edn, Sage Publications, Thousand Oaks, California.

——2007, *Qualitative inquiry & research design: choosing among five approaches*, 2nd edn, Sage Publications, Thousand Oaks, California.

——2009, *Research design: qualitative, quantitative, and mixed methods approaches*, 3rd edn, Sage Publications, Thousand Oaks, California.

——2014, *Research design: qualitative, quantitative, and mixed methods approaches*, 4th edn, SAGE Publications, Thousand Oaks.

——& Plano Clark, VL 2007, *Designing and conducting mixed methods research*, SAGE Publications, Thousand Oaks, Calif.

Crompton, JL 1979, 'An assessment of the image of Mexico as a vacation destination and the influence of geographical location upon that image', *Journal of Travel Research,* vol. 17, no. 4, pp. 18–23.

——1979, ‘Motivations for pleasure vacation’, *Annals of Tourism Research,* vol. 6, no. 4, pp. 408–24.

Crouch, GI & Ritchie, JRB 1999, ‘Tourism, competitiveness, and societal prosperity’, *Journal of Business Research,* vol. 44, pp. 137–52.

——Huybers, T & Oppewal, H 2016, ‘Inferring future vacation experience preference from past vacation choice: A latent class analysis’, *Journal of Travel Research*, vol. 55, no. 5, pp. 574-587.

——Devinney, TM, Louviere, JJ & Islam, T 2009, ‘Modelling consumer choice behaviour in space tourism’, *Tourism Management,* vol. 30, no. 3, pp. 441–54.

D'Auria, T 2012, *2013 winter star party*, Southern Cross Astronomical Society (SCAS) Inc., viewed 6 July 2015, <http://www.scas.org/wsp.html>.

Dadgostar, B & Isotalo, RM 1992, ‘Factors affecting time spent by near-home tourists in city destinations’, *Journal of Travel Research,* vol. 20, no. 2, pp. 34–9.

Damijanić, A & Sergo, Z 2013, ‘Determining travel motivations of wellness tourism’, *Ekonomska Misao i Praksa*, vol. 22, no. 1, pp. 3–19.

Dann, GMS 1996, ‘Tourists’ images of a destination: an alternative analysis’, *Journal of Travel & Tourism Marketing*, vol. 5, no. 1/2, pp. 41–55.

Davis, D, Allen, J & Cosenza, RM 1988, ‘Segmenting local residents by their attitudes, interests and opinions toward tourism’, *Journal of Travel Research,* vol. 27, no. 2, pp. 2–8.

Deutsch, K, Yoon, SY & Goulias, K 2013, ‘Modeling travel behaviour and sense of place using a structural equation model’, *Journal of Transport Geography,* vol. 28, pp. 155–63.

Devesa, M, Laguna, M & Palacios, A 2010, ‘The role of motivation in visitor satisfaction: Empirical evidence in rural tourism’, *Tourism Management,* vol. 31, no. 4, pp. 547–52.

Ditton, RB, Loomis, DK & Choi, S 1992, ‘Recreation specialisation: re-conceptualization from a social worlds perspective’, *Journal of Leisure Research,* vol. 24, no. 1, pp. 33–51.

Dixon, J & Durrheim, K 2000, ‘Displacing place-identity: a discursive approach to locating self and other’, *British Journal of Social Psychology*, vol. 39, no. 1, pp. 27–44.

Dobni, D & Zinkhan, G 1990, 'In search of brand image – A foundation analysis’, *Advances In Consumer Research,* vol. 17, pp. 110-119.

Dolnicar, S 2013, ‘Asking good survey questions’, *Journal of Travel Research*, vol. 52, no. 5, pp. 551–74.

Donnelly, MP, Vaske, JJ & Graefe, AR 1986, ‘Degree and range of recreation specialisation: toward a typology of boating related activities’, *Journal of Leisure Research,* vol. 18, no. 2, pp. 81–95.

Driver, BL & Tocher, SR 1970, 'Toward a behavioural interpretation of recreational engagement, with implications for planning', in BL Driver (ed), *Elements of outdoor recreation planning*, University Microfilms, Ann Arbor, Michigan.

Dunn, EL & Iso-Ahola, SE 1991, 'Sightseeing tourists' motivation and satisfaction', Annals of Tourism Research, vol. 18, no. 2, pp. 226-237.

Duncan, JS, & Ley, D 1993, *Place/culture/representation*, Routledge, London; New York.

Eagle, D 2014a, *From casual stargazer to amateur astronomer: How to advance to the next level*, Springer Science & Business Media, New York.

——2014b, 'Basic Astrophotography', *From casual stargazer to amateur astronomer*, Springer, New York, pp. 209–22.

Echtner, CM & Ritchie, JRB 1991, 'The meaning and measurement of destination image', *Journal of Tourism Studies*, vol. 2, no. 2, pp. 2–12.

——& Ritchie, JRB 1993, 'The measurement of destination image: an empirical assessment', *Journal of Travel Research*, vol. 31, no. 4, pp. 3–13.

——Ritchie, JRB 2003, 'The meaning and measurement of destination image', *The Journal of Tourism Studies*, vol. 14, no. 1, pp. 37–48.

Edensor, T 2013, 'Reconnecting with darkness: gloomy landscapes, lightless places', *Social & Cultural Geography*, vol. 14, no. 4, pp. 446–65.

Editors, Sky & Telescope 2006, *View of the march 29th solar eclipse*, Sky and Telescope Magazine, viewed 22 July 2015, <http://www.skyandtelescope.com/astronomy-news/observing-news/views-of-the-march-29th-solar-eclipse/3311251.html>.

Elliot, S, Papadopoulos, N & Kim, SS 2011, 'An integrative model of place image: Exploring relationships between destination, product, and country images', *Journal of Travel Research*, vol. 50, no. 5, pp. 520–34.

Entrikin, JN 1989, 'Place, region, and modernity', in J Angew & JS Duncan (eds), *The power of place*, Unwin Hyman, London, pp. 30–43.

Essam, EI & Gill, J 2005, 'A positioning strategy for a tourist destination, based on analysis of customers' perceptions and satisfactions', *Marketing Intelligence & Planning*, vol. 23, no. 2, pp. 172–88.

Fayos-Sola, E, Marin, C & Jafari, J 2014, 'Astrotourism: no requiem for meaningful travel', *Pasos*, vol. 12, no. 4, pp. 663–71.

Faggi, A, Breuste, J, Madanes, N, Gropper, C & Perelman, P 2013, 'Water as an appreciated feature in the landscape: a comparison of residents' and visitors' preferences in Buenos Aires', *Journal of Cleaner Production*, vol. 60, pp. 182–87.

Fakeye, PC & Crompton, JL 1991, 'Image differences between prospective, first-time, and repeat visitors to the Lower Rio Grande Valley', *Journal of Travel Research*, vol. 30, no. 2, pp. 10–6.

Farnum, J, Hall, T & Kruger, LE 2005, 'Sense of place in natural resource recreation and tourism: an evaluation and assessment of research findings', *General Technical Report-Pacific Northwest Research Station, USDA Forest Service*, no. PNW-GTR-660.

Faullant, R, Matzler, K & Füller, J 2008, 'The impact of satisfaction and image on loyalty: the case of Alpine ski resorts', *Managing Service Quality*, vol. 18, no. 2, pp. 163–78.

Feld, S & Basso, KH 1996, *Senses of place*, School of American Research Press, Santa Fe, NM.

Field, A 2005, *Discovering statistics using SPSS*, 2nd edn, Sage Publications, London.

Field, AM 1999, 'The college student market segment: A comparative study of travel behaviours of international and domestic students at a southeastern university', *Journal of Travel Research*, vol. 37, no. 4, pp. 375–81.

Florek, M, Insch, A & Gnoth, J 2007, 'City Council websites as a means of place brand identity communication', *Place Branding*, vol. 2, no. 4, pp. 276.

Fluker, MR & Turner, LW 2000, 'Needs, motivations, and expectations of a commercial whitewater rafting experience', *Journal of Travel Research*, vol. 38, pp. 380-389.

Fodness, D 1994, 'Measuring tourist motivation', *Annals of Tourism Research*, vol. 21, no. 3, pp. 555–81.

Fredman, P & Tyrväinen, L 2010, 'Frontiers in nature-based tourism', *Scandinavian Journal of Hospitality and Tourism*, vol. 10, no. 3, pp. 177–89.

Frias, DM, Rodriguez, MA & Castaneda, JA 2008, 'Internet vs travel agencies on pre-visit destination image formation: an information processing view', *Tourism Management*, vol. 29, no. 1, pp. 163–79.

Gallarza, MG, Saura, IG & Garcia, HC 2002, 'Destination image: towards a conceptual framework', *Annals of Tourism Research*, vol. 29, no. 1, pp. 56–78.

Galloway, S 2010, 'Recreation specialisation among New Zealand whitewater kayakers: A study of motivation and site preference', *Annals of Leisure Research*, vol. 13, no. 3, pp. 523–40.

Gardner, BB & Levy, SJ 1955, 'The product and the brand', *Harvard business review*, vol. 33, pp. 33-9.

Gartner, WC 1989, 'Tourism image: attribute measurement of state tourism products using multidimensional scaling techniques', *Journal of Travel Research*, vol. 28, no. 2, pp. 16–20.

——1993, ‘Image formation process’, *Journal of Travel & Tourism Marketing*, vol. 2, no. 2/3, pp. 191–215.

——& Ruzzier, M 2011, ‘Tourism destination brand equity dimensions: Renewal versus repeat market’, *Journal of Travel Research*, vol. 50, no. 5, pp. 471–81.

Gbrich, C 2007, *Qualitative data analysis: An introduction*, Sage Publications, London.

Gee, CY, Makens, JC & Choy, DJL 1997, *The travel industry*, 3rd edn, Van Nostrand Reinhold, New York.

Gertner, RK 2010, ‘Similarities and differences of the effect of country images on tourist and study destinations’, *Journal of Travel & Tourism Marketing*, vol. 27, no. 4, pp. 383–95.

Gibbs, G 2007, *Analysing qualitative data*, SAGE, Los Angeles, CA; London.

Gil, M & Ritchie, JRB 2009, ‘Understanding the museum image formation process’, *Journal of Travel Research*, vol. 47, no. 4, pp. 480–93.

Gitelson, RJ & Kerstetter, DL 1990, ‘The relationship between sociodemographic variables, benefits sought and subsequent vacation behaviour: a case study’, *Journal of Travel Research*, vol. 28, no. 3, pp. 24–8.

Gobster, P, 1996, ‘Forest aesthetics, biodiversity, and the perceived appropriateness of ecosystem management practices’, *USDA Forest Service - General Technical Report PNW*, vol. PNW_GTR, no. 369, pp. 77–97.

——Nassauer, J, Daniel, T & Fry, G 2007, ‘The shared landscape: what does aesthetics have to do with ecology?’, *Landscape Ecology*, vol. 22, no. 7, pp. 959–72.

Graefe, AR 1981, ‘The relationship between level of participation and selected aspects of specialisation in recreational fishing’, *Dissertation Abstracts International*, vol. 41, no. 10.

Gross, M & Brown, G 2008, ‘An empirical structural model of tourists and places: progressing involvement and place attachment into tourism’, *Tourism Management*, vol. 29, no. 6, pp. 1141–51.

Gunn, CA 1972, *Vacationscape: designing tourist regions*, Bureau of Business Research, Austin, University of Texas.

——1988, *Vacationscape: designing tourist regions*, 2nd edn, Van Nostrand Reinhold, New York.

Gustafson, P 2001, ‘Meanings of place: Everyday experience and theoretical conceptualizations’, *Journal of Environmental Psychology*, vol. 21, no. 1, pp. 5–16.

Gutman, R 1966, ‘Site planning and social behaviour’, *Journal of Social Issues*, vol. 22, no. 4, pp. 103–15.

Hall, M & Weiler, B 1992, 'What's special about special-interest tourism?', in C Hall & B Weiler (eds), *Special-interest tourism*, Belhaven Press, London.

Hallab, Z & Kim, K 2006, 'US travelers' images of the state of Mississippi as a tourist destination', *Tourism Analysis*, vol. 10, no. 4, pp. 393–403.

Hammitt, W & McDonald, C 1983, 'Notes: Past on-site experience and its relationship to managing river recreation resources', *Forest Science*, vol. 29, no. 2, pp. 262–6.

——& Backlund, EA 2003, 'Past use history and place bonding among avid trout anglers', *Northeastern Recreation Research Symposium*, Bolton Landing, New York.

Han, H, Hsu, LT & Lee, JS 2009, 'Empirical investigation of the roles of attitudes towards green behaviours, overall image, gender, and age in hotel customers' eco-friendly decision-making process', *International Journal of Hospitality Management*, vol. 28, no. 4, pp. 519–28.

Harrison, RL & Reilly, TM 2011, 'Mixed methods designs in marketing research', *Qualitative Market Research: An International Journal*, vol. 14, no. 1, pp. 7–26.

Harvey, D & Braun, B 1996, *Justice, nature and the geography of difference*, Blackwell, Oxford.

Heidegger, M 1971, *The origin of the work of art, Poetry, language, thought, Albert Hofstadter*, Harper & Row, New York.

Herzog, TR, Herbert, EJ, Kaplan, R & Crooks, R 2000, 'Cultural and developmental comparisons of landscape perceptions and preferences', *Environment and Behaviour*, vol. 32, no. 3, pp. 323–46.

Heylen, JP, Dawson, B & Sampson, P 1995, 'An implicit model of consumer behaviour', *Journal of the Market Research Society*, vol. 37, no. 1, pp. 51-68.

Hirschman, EC & Holbrook, MB 1982, 'Hedonic consumption: emerging concepts, methods and propositions', *Journal of Marketing*, vol. 46, no. 3, pp. 92–101.

Holbrook, MB 1978, 'Beyond attitude structure: Towards the informational determinants of attitude', *Journal of Marketing Research*, vol. 15, no. 4, pp. 545–56.

——& Schindler, RM 1996, 'Market segmentation based on age and attitude towards the past: Concepts, methods, and findings concerning nostalgic influences on customer tastes', *Journal of Business Research*, vol. 37, no. 1, pp. 27–39.

Hosany, S, Ekinci, Y & Uysal, M 2006, 'Destination image and destination personality: an application of branding theories to tourism places', *Tourism Management*, vol. 59, no. 5, pp. 638–42.

——Ekinci, Y & Uysal, M 2007, 'Destination image and destination personality', *International Journal of Culture, Tourism and Hospitality Research*, vol. 1, no. 1, pp. 62-81.

——& Gilbert, D 2010, 'Measuring tourists' emotional experiences towards hedonic holiday destinations', *Journal of Travel Research*, vol. 49, no. 4, pp. 513–26.

——Prayag, G, Deesilatham, S, Causevic, S & Odeh, K 2015, 'Measuring tourists' emotional experiences: Further validation of the Destination Emotion Scale', *Journal of Travel Research*, vol. 54, no. 4, pp. 482-495.

Hsu, C, Killion, L, Brown, G, Gross, MJ & Huang, S 2008, *Tourism marketing: an Asia-Pacific perspective*, John Wiley & Sons Australia, Brisbane, Queensland.

——L & Li, M 2010, 'Expectation, motivation, and attitude: a tourist behavioral model', *Journal of Travel Research*, vol. 49, no. 3, pp. 282-296.

Hsu, TK, Tsai, YF & Wu, HH 2009, 'The preference analysis for tourist choice of destination: A case study of Taiwan', *Tourism Management*, vol. 30, no. 2, pp. 288–97.

Hu, B & Yu, H 2007, 'Segmentation by craft selection criteria and shopping involvement', *Tourism Management*, vol. 28, no. 4, pp. 1079–92.

Hu, Y & Ritchie, JRB 1993, 'Measuring destination attractiveness: a contextual approach', *Journal of Travel Research*, vol. 32, no. 2, pp. 25–34.

Huang, J, Li, M & Cai, L 2010, 'A model of community-based festival image', *International Journal of Hospitality Management*, vol. 29, no. 2, pp. 254–60.

Huang, S & Gross, MJ 2010, 'Australia's destination image among Mainland Chinese travellers: an exploratory study', *Journal of Travel & Tourism Marketing*, vol. 27, no. 1, pp. 63–81.

——& Hsu, CH 2009, 'Effects of travel motivation, past experience, perceived constraint, and attitude on revisit intention', *Journal of Travel Research*, vol. 48, no. 1, pp. 29–44.

Huang, SCL 2012, 'Visitor responses to the changing character of the visual landscape as an agrarian area becomes a tourist destination: Yilan County, Taiwan', *Journal of Sustainable Tourism*, vol. 21, no. 1, pp. 154–71.

Hudson, L & Ozanne, J 1988, 'Alternative ways of seeking knowledge in consumer research', *Journal of Consumer Research*, vol. 14, no. 4, p. 508.

Hudson, S 2008, *Tourism and hospitality marketing: a global perspective*, Sage, London.

Hull, RB, Stewart, WP & Yi, YK 1992, 'Experience patterns: capturing the dynamic nature of a recreation experience', *Journal of Leisure Research*, vol. 24, no. 3, pp. 240–52.

Hummon, DM 1992, 'Community attachment: Local sentiment and sense of place', in I Altman & S Low (eds), *Place attachment*, Plenum Press, New York.

Hung, JY, Lin, FL, Yang, WG & Lu, KS 2012, 'Construct the destination image formation model of Macao: The case of Taiwan tourists to Macao', *Tourism and Hospitality Management*, vol. 18, no. 1, pp. 19–35.

Hunt, J 1975, 'Image as a factor in tourism development', *Journal of Travel Research*, vol. 13, no. 3, pp. 1–7.

Jackson, JB 1994, *A sense of place, a sense of time*, Yale University Press, New Haven, CT.

Jamaludin, M, Johari, S, Aziz, A, Kayat, K & Yusof, ARM 2012, 'Examining structural relationship between destination image, tourist satisfaction and destination loyalty'. *International Journal of Independent Research and Studies*, vol. 1, no. 3, pp. 89–96.

Jang, SC, Morrison, AM & O'Leary, JT 2004, 'A procedure for target market selection in tourism', *Journal of Travel & Tourism Marketing*, vol. 16, no. 1, pp. 17–31.

Jenkins, OH 1999, 'Understanding and measuring tourist destination images', *The International Journal of Tourism Research*, vol. 1, no. 1, pp. 1–15.

Jett, JS 2007, 'Boater compliance behaviour in manatee conservation zones: recreation specialisation, attitudes and situational factors', PhD thesis, University of Florida, USA.

Ji, S 2011, 'Projected and perceived destination images of Qingdao, China', PhD thesis, University of Waterloo, Canada.

——& Wall, G 2011, 'Visitor and resident images of Qingdao, China, as a tourism destination', *Journal of China Tourism Research*, vol. 7, no. 2, pp. 207–28.

Jin, N, Lee, S & Huffman, L 2012, 'Impact of restaurant experience on brand image and customer loyalty: Moderating role of dining motivation', *Journal of Travel & Tourism Marketing*, vol. 29, no. 6, pp. 532–551.

Johnson, B & Turner, LA 2003, 'Data collection strategies in mixed methods research', in ATCT (eds), *Handbook of mixed methods in social & behavioural research*, SAGE Publications, London, pp. 297–319.

Johnston, LG & Sabin, K 2010, 'Sampling hard-to-reach populations with respondent driven sampling', *Methodological Innovations Online*, vol. 5, no. 2, pp. 38–48.

Joppe, M, Martin, DW & Waalen, J 2001, 'Toronto's image as a destination: a comparative importance-satisfaction analysis by origin of visitor', *Journal of Travel Research*, vol. 39, no. 3, pp. 252–60.

Jorgensen, BS, Nowacek, D, Stedman, RC & Brasier, K 2005, 'People in the forested lake district', in JJ Magnuson, TK Kratz & BJ Benson (eds), *Long-term dynamics of lakes in the landscape*, Oxford University Press, New York.

Josiassen, A, Assaf, AC, Woo, L, & Kock, F, 2015, 'The imagery-image duality model: An integrative review and advocating for improved delimitation of concepts', *Journal of Travel Research*, vol. 55, no. 6, pp. 789-803.

Kapferer, JN 1992, *Strategic Brand Management. New Approaches to Creating and Evaluating Brand Equity*, Kogan Page Limited, London.

Kaplan, R & Kaplan, S 2011, 'Well-being, reasonableness, and the natural environment', *Applied Psychology: Health and Well-Being*, vol. 3, no. 3, pp. 304–21.

——Kaplan, S & Brown, T 1989, 'Environmental preference: A comparison of four domains of predictors', *Environment and Behaviour*, vol. 21, no. 5, p. 509.

Kaplanidou, K, Jordan, J, Funk, D & Rindinger, L 2012, 'Recurring sport events and destination image perceptions: Impact on active sport tourist behavioural intentions and place attachment', *Journal of Sport Management*, vol. 26, no. 3, p. 237.

Kearney, AR, Bradley, GA, Petrich, CH, Kaplan, R, Kaplan, S & Simpson-Colebank, D 2008, 'Public perception as support for scenic quality regulation in a nationally treasured landscape', *Landscape and Urban Planning*, vol. 87, no. 2, pp. 117–28.

Keith, M & Pile, S 1993, *Place and the Politics of Identity*, Taylor and Francis, Routledge, Hoboken London; New York.

Keller, K 1993, 'Conceptualising, measuring, and managing customer-based brand equity', *Journal of Marketing*, vol. 57, no. 1, pp. 1-22.

Keller, W 2010, 'Amateur astronomy's southwestern frontier ', *Sky and Telescope*, vol. 120, no. 2, pp. 36–9.

Kesić, T & Pavlić, I 2011, 'Tourism destination image formation–The case of Dubrovnik, Croatia', *Tržište/Market*, vol. 23, no. 1, pp. 7–25.

Kim, AK & Jogaratnam 2003a, 'Travel motivations: A comparative study of Asian international and domestic American college students', *Journal of Travel & Tourism Marketing*, vol. 13, no. 4, pp. 61–82.

——& Jogaratnam 2003b, 'Activity preferences of Asian international and domestic American university students: An alternate basis for segmentation', *Journal of Vacation Marketing*, vol. 9, no. 3, pp. 260–70.

——& Brown, G 2012, 'Understanding tourist perspectives on geotourism experience: implications for destination development', *Tourism Review International*, vol. 16, no. 1, pp. 45–57.

——Keuning, J, Robertson, J & Kleindorfer, S 2010, 'Understanding the birdwatching tourism market in Queensland, Australia', vol. 21, no. 2, pp. 227–47.

Kim, D & Perdue, RR 2011, 'The influence of image on destination attractiveness', *Journal of Travel & Tourism Marketing*, vol. 28, no. 3, pp. 225–39.

Kim, H & Richardson, SL 2003, 'Motion picture impacts on destination images', *Annals of Tourism Research*, vol. 30, no. 1, pp. 216–37.

Kim, S & Yoon, Y 2003, 'The hierarchical effects of affective and cognitive components on tourism destination image', *Journal of Travel & Tourism Marketing*, vol. 14, no. 2, pp. 1–22.

Kim, SS, Lee, C & Klenosky, DB 2003, 'The influence of push and pull factors at Korean national parks', *Tourism Management*, vol. 24, no. 2, pp. 169-180.

Kirk, RE 2012, *Experimental design: Procedures for the behavioural sciences*, 4th edn, SAGE Publications, Thousand Oaks, CA.

Kline, RB 2011, *Principles and practice of structural equation modeling*, Guilford Press, New York.

Kneafsey, M 1998, 'Tourism and place identity: A case-study in rural Ireland', *Irish Geography*, vol. 31, no. 2, pp. 111–23.

Kock, F, Josiassen, A & Assaf, AG 2016, 'Advancing destination image: The destination content model. *Annals of Tourism Research*, vol. 61, pp. 28-44.

Konecnik, M 2004, 'Evaluating Slovenia's image as a tourism destination: a self-analysis process towards building a destination brand', *Brand Management,* vol. 11, no. 4, pp. 307–16.

——& Gartner, WC 2007, 'Customer-based brand equity for a destination', *Annals of Tourism Research,* vol. 34, no. 2, pp. 400–21.

Koo, TTR, Wu, CL & Dwyer, L 2010, 'Ground travel mode choices of air arrivals at regional destinations: The significance of tourism attributes and destination contexts', *Research in Transportation Economics,* vol. 26, no. 1, pp. 44–53.

Kotler, P, Haider, DH & Rein, I 1993, *Marketing places: attracting investment, industry, and tourism to cities, states, and nations*, The Free Press, New York.

Kozak, M 2001, 'Repeaters' behaviour at two distinct destinations', *Annals of Tourism Research,* vol. 28, no. 3, pp. 784–807.

——2002,'Comparative analysis of tourist motivations by nationality and destinations', *Tourism Management*, vol. 23, no. 3, pp. 221–32.

——& Rimmington, M 2000, 'Tourist satisfaction with Mallorca, Spain, as an off-season holiday destination', *Journal of Travel Research,* vol. 38, no. 3, pp. 260–9.

Krause, CL 2001, 'Our visual landscape: Managing the landscape under special consideration of visual aspects', *Landscape and Urban Planning,* vol. 54, no. 1, pp. 239–54.

Kramer, B 2012, *Eclipse chasers log*, Eclipse Chasers Log Summary, viewed 6 November 2015, <http://www.eclipsechasers.com/tseChaserLogSums.php>.

Krco, M 2005, *Curious about astronomy?*, Ask an Astronomer, viewed 6 July 2015, <http://curious.astro.cornell.edu/question.php?number=657>.

Krider, RE, Arguello, A, Campbell, C & Mora, J-D 2010, 'Trait and image interaction: In ecotourism preference', *Annals of Tourism Research,* vol. 37, no. 3, pp. 779–801.

Krueger, RA & Casey, MA 2009, *Focus groups: a practical guide for applied research*, 4th edn, Sage Publications, Thousand Oaks, CA.

Kruja, D & Gjyrezi, A 2011, 'The special interest tourism development and the small regions', *Turizam*, vol. 15, no. 2, pp. 77-89.

Krupat, E 1983, 'A place for place identity', *Journal of Environmental Psychology*, vol. 3, pp. 343–4.

Kuentzel, WF & Heberlein, TA 1997, 'Social status, self-development, and the process of sailing specialisation', *Journal of Leisure Research*, vol. 29, no. 3, pp. 300–19.

——& Heberlein, TA 2006, 'From novice to expert? A panel study of specialisation progression and change', *Journal of Leisure Research*, vol. 38, no. 4, pp. 496–512.

——& Heberlein, TA 2008, 'Life course changes and competing leisure interests as obstacles to boating specialisation', *Leisure Sciences*, vol. 30, no. 2, pp. 143–57.

——& McDonald, CD 1992, 'Differential effects of past experience, commitment, and lifestyle dimensions on river use specialisation', *Journal of Leisure Research*, vol. 24, no. 3, pp. 269–87.

Kutzner, D & Wright, PA 2010, 'An investigation into key market segments for aboriginal tourism in Northern British Columbia, Canada', *Journal of Vacation Marketing*, vol. 16, no. 2, pp. 97–110.

Kyle GT, Graefe, A, Manning, R & Bacon, J 2003, 'An examination of the relationship between leisure activity involvement and place attachment among hikers along the Appalachian Trail', *Journal of Leisure Research*, vol. 35, no. 3, p. 249.

——Mowen, A & Tarrant, M 2004, 'Linking place preferences with place meaning: An examination of the relationship between place motivation and place attachment', vol. 24, no. 4, pp. 439–54.

Laarman, JG & Durst, PB 1987, 'Nature travel in the tropics', *Journal of Forestry*, vol. 85, no. 5, pp. 43–6.

Laing, JH & Crouch, GI 2005, 'Extraordinary journeys: An exploratory cross-cultural study of tourists on the frontier', *Journal of Vacation Marketing*, vol. 11, no. 3, pp. 209–23.

Langer, EJ 1989, *Mindfulness*, Addison-Wesley, Reading, MA.

Lawrence, JS, Ashley, MCB, Tokovinin, A & Travouillon, T 2004, 'Exceptional astronomical seeing conditions above Dome C in Antarctica', *Nature*, vol. 431, no. 7006, p. 278.

Lazarus, RS & Ebrary, I 1991, *Emotion and Adaptation*, Oxford University Press, New York.

Lee, CK, Lee, YK & Lee, B 2005, 'Korea's destination image formed by the 2002 World Cup', *Annals of Tourism Research*, vol. 32, no. 4, pp. 839–58.

Lee, JH & Scott, D 2004, 'Measuring birding specialisation: A confirmatory factor analysis', *Leisure Sciences,* vol. 26, no. 3, pp. 245–60.

Lee, SH, Chang, SC, Hou, JS & Lin, CH 2008, 'Night market experience and image of temporary residents and foreign visitors', *International Journal of Culture, Tourism and Hospitality Research,* vol. 2, no. 3, pp. 217–33.

——Graefe, AR & Li, CL 2007, 'The effects of specialisation and gender on motivations and preferences for site attributes in paddling', *Leisure Sciences,* vol. 29, no. 4, pp. 355–73.

Lee, TH 2009, 'A structural model to examine how destination image, attitude, and motivation affect the future behaviour of tourists', *Leisure Sciences,* vol. 31, no. 3, pp. 215–36.

Lehto, XY, O'Leary, JT & Morrison, AM 2004, 'The effect of prior experience on vacation behaviour', *Annals of Tourism Research,* vol. 31, no. 4, pp. 801–18.

Leiper, N 1990, 'Tourist attraction systems', *Annals of Tourism Research,* vol. 17, no. 3, pp. 367–84.

——2003, *Tourism management*, 2nd edn, Pearson SprintPrint, Sydney.

Leisen, B 2001, 'Image segmentation: the case of a tourism destination', *Journal of Services Marketing,* vol. 15, no. 1, pp. 49–64.

Lew, A & McKercher, B 2006, 'Modeling tourist movements: a local destination analysis', *Annals of Tourism Research,* vol. 33, no. 2, pp. 403–23.

——1987, 'A framework of tourist attraction research', *Annals of Tourism Research,* vol. 14, no. 4, pp. 553–75.

Ley, D & Samuels, MS 1978, *Humanistic geography*, Croom Helm, London.

Li, M, Cai, LA, Lehto, XY & Huang, J 2010, 'A missing link in understanding revisit intention—the role of motivation and image', *Journal of Travel & Tourism Marketing,* vol. 27, no. 4, pp. 335–48.

Li, X & Stepchenkova, S 2012, 'Chinese outbound tourists' destination image of America', *Journal of Travel Research,* vol. 51, no. 3, pp. 250–66.

Lin, CC 2012, 'Sense of place, protected areas and tourism: Two Tasmanian case studies', PhD Thesis, Department of Environmental Planning, University of Tasmania, Tasmania.

Lin, CH, Morais, D, Kerstetter, D & Hou, JS 2007, 'Examining the role of cognitive and affective image in predicting choice across natural, developed, and theme-park destinations', *Journal of Travel Research,* vol. 46, no. 2, pp. 183–94.

Lin, YH, Chen, CC & Park, CW 2012, 'The salient and organic images of Taiwan as perceived by Mainland Chinese tourists', *Asia Pacific Journal of Tourism Research,* vol. 17, no. 4, pp. 381–93.

Little, BR 1976, ‘Specialisation and the varieties of human experience: Empirical studies within the personality paradigm’, in S Wapner, SB Cohen & B Kaplan (eds), *Experiencing the environment*, Plenum Press, New York.

Litvin, S & Kar, G 2003, ‘Individualism/collectivism as a moderating factor to the self-image congruity concept’, *Journal of Vacation Marketing*, vol. 10, no. 1, pp. 23–32.

Liu, CR, Lin, WR & Wang, YC 2012, ‘From destination image to destination loyalty: Evidence from recreation farms in Taiwan’, *Journal of China Tourism Research*, vol. 8, no. 4, pp. 431–49.

Llewellyn-Smith, C & McCabe, VS 2008, ‘What is the attraction for exchange students: the host destination or host university? Empirical evidence from a study of an Australian university’, *International Journal of Tourism Research*, vol. 10, no. 6, pp. 593–607.

Locke, EA, Buffet, W & Rand, A 2003, ‘Good definitions: The epistemological foundation of scientific progress’, in J Greenberg (ed.), *Organizational behaviour: The state of the science*, Erlbaum, Mahwah, NJ.

Lockshin, L & Lee, R 2012, ‘Reverse country-of-origin effects of product perceptions on destination image’, *Journal of Travel Research*, vol. 51, no. 4, pp. 502–11.

——& Lee, RYM 2011, ‘Halo effects of tourists’ destination image on domestic product perceptions’, *Australasian Marketing Journal*, vol. 19, no. 1, pp. 7–13.

Loureiro, SK 2013, ‘The impact of islands’ image on tourists’ satisfaction and place identity’, *Journal of International Business and Entrepreneurship Development*, vol. 7, no. 1, pp. 52–62.

Low, GS & Jr, CW 2000, 'The measurement and dimensionality of brand associations', *Journal of Product & Brand Management*, vol. 9, no. 6, pp. 350-370.

Low, SM & Altman, I 1992, *Place attachment*, Springer, New York, pp. 1–12.

MacCannell, D 1992, *Empty meeting grounds: The tourist papers*, Routledge, London.

MacKay, KJ & Fesenmaier, DR 1997, ‘Pictorial element of destination image formation’, *Annals of Tourism Research*, vol. 24, no. 3, pp. 537–65.

MacRobert, A 2012, *How to start right in astronomy*, Sky and Telescope Magazine, viewed on 18 July 2016, <http://www.skyandtelescope.com/howto/basics/How_to_Start_Right_in_Astronomy.html>.

Manfredo, M, Driver, B & Tarrant, M 1996, ‘Measuring leisure motivation: A meta-analysis of the Recreation Experience Preference Scales’, *Journal of Leisure Research*, vol. 28, no. 3, p. 188.

Manzo, LC 2003, ‘Beyond house and haven: towards a revisioning of emotional relationships with places’, *Journal of Environmental Psychology*, vol. 23, no. 1–3, pp. 47–61.

——2005, ‘For better or worse: Exploring multiple dimensions of place meaning’, *Journal of Environmental Psychology,* vol. 25, no. 1, pp. 67–86.

Mariné Roig, E & Anton Clavé, S 2013, ‘From the projected to the transmitted image: the 2.0 construction of tourist destination image and identity in Catalonia’, PhD thesis, Departament de Geografia, Universitat Rovira i Virgili.

Marshall, B, Cardon, P, Poddar, A & Fontenot, R 2013, ‘Does sample size matter in qualitative research?: A review of qualitative interviews in IS research’, *The Journal of Computer Information Systems,* vol. 54, no. 1, pp. 11–22.

Martínez, E & Pina, JM 2003, 'The negative impact of brand extensions on parent brand image', *Journal of Product & Brand Management*, vol. 12, no. 7, pp. 432-448.

——& Chernatony, LD 2004, 'The effect of brand extension strategies upon brand image', *Journal of Consumer Marketing*, vol. 21, no. 1, pp. 39-50.

Maslow, AH 1943, ‘A theory of human motivation’, *Psychological Review,* vol. 50, no. 4, p. 370.

Mason, P, Augustyn, M & Seakhoa-King, A 2010, ‘Exploratory study in tourism: designing an initial, qualitative phase of sequenced, mixed methods research’, *International Journal of Tourism Research,* vol. 12, no. 5, pp. 432–48.

Massey, D 2006, ‘The geographical mind’, in D. Balderston (ed), *Secondary Geography Handbook,* Geographical Association, Sheffield, pp. 46–51.

Mayo, E 1975, ‘Tourism and the national parks: a psychographic and attitudinal study’, *Journal of Travel Research,* vol. 14, no. 1, pp. 14–8.

McFarlane, BL 2004, ‘Recreation specialisation and site choice among vehicle-based campers’, *Leisure Sciences,* vol. 26, no. 3, pp. 309–22.

McIntyre, N 1989, ‘The personal meaning of participation: enduring involvement’, *Journal of Leisure Research,* vol. 21, no. 2, pp. 167–79.

——& Pigram, JJ 1992, ‘Recreation specialisation reexamined: the case of vehicle-based campers’, *Leisure Sciences,* vol. 14, no. 1, pp. 3–15.

McKercher, B 1998, ‘The effect of market access on destination choice’, *Journal of Travel Research,* vol. 37, no. 1, pp. 39–47.

——& Chan, A 2005, ‘How special is special-interest tourism?’, *Journal of Travel Research,* vol. 44, no. 1, pp. 21–31.

Mehmetoglu, M 2005, ‘A case study of nature-based tourists: Specialists versus generalists’ *Journal of Vacation Marketing*, vol. 11, no. 4, pp. 357-369.

Meng, F, Tepanon, Y & Uysal, M 2008, 'Measuring tourist satisfaction by attribute and motivation: The case of a nature-based resort', *Journal of Vacation Marketing,* vol. 14, no. 1, pp. 41–56.

Mertens, DM 2003, *Mixed methods and the politics of human research: the transformative emancipatory perspective,* Sage Publications, Thousand Oaks, CA.

Milman, A & Pizam, A 2005, 'The role of awareness and familiarity with a destination: the Central Florida case', *Journal of Travel Research,* vol. 33, no. 3, pp. 21–7.

Mo, CM, Havitz, ME & Howard, DR 1994, 'Segmenting travel markets with the International Tourism Role (ITR) Scale', *Journal of Travel Research,* vol. 33, no. 1, pp. 24–31.

Molina, A, Gómez, M & Martín-Consuegra, D 2010, 'Tourism marketing information and destination image management', *African Journal of Business Management,* vol. 4, no. 5, pp. 722–8.

Morgan, M, Lugosi, P & Ritchie, JRB 2010, *The tourism and leisure experience,* Channel View Publications, Bristol, Buffalo.

——& Soucy, J 2009, 'Use of recreation specialisation to understand resource knowledge of trout anglers', *Applied Environmental Education & Communication,* vol. 7, no. 4, pp. 155–63.

Morse, J 2000, 'Determining sample size', *Qualitative Health Research,* vol. 10, no. 1, pp. 3–5.

Moscardo, G, Morrison, AM, Pearce, PL, Lang, C-T & O'Leary, JT 1996, 'Understanding vacation destination choice through travel motivation and activities', *Journal of Vacation Marketing,* vol. 2, no. 2, pp. 109–22.

——& Pearce, PL 1986, 'Historical theme parks: An Australian experience in authenticity', *Annuals of Tourism Research,* vol. 13, no. 3, pp. 467–79.

——& Pearce, PL 1999, 'Understanding ethnic tourists', *Annals of Tourism Research,* vol. 26, no. 2, pp. 416–34.

Murphy, AB, Johnson, DL & Haarmann, V 2000, *Cultural encounters with the environment: enduring and evolving geographic themes,* Rowman & Littlefield.

Murphy, L 1999, 'Australia's image as a holiday destination: perceptions of backpacker visitors', *Journal of Travel & Tourism Marketing,* vol. 8, no. 3, pp. 21–45.

Myers, N 1991, 'Tropical forests: present status and future outlook', *Tropical Forests and Climate,* vol. 19, pp. 3–35.

Nadeau, J, Heslop, L, O'Reilly, N & Luk, P 2008, 'Destination in a country image context', *Annals of Tourism Research,* vol. 35, no. 1, pp. 84–106.

Needham, MD, Sprouse, LJ & Grimm, KE 2009, 'Testing a self-classification measure of recreation specialisation among anglers', vol. 14, no. 6, pp. 448–55.

——& Vaske, JJ 2013, 'Activity substitutability and degree of specialisation among deer and elk hunters in multiple states', *Leisure Sciences,* vol. 35, no. 3, pp. 235–55.

——Vaske, JJ, Donnelly, MP & Manfredo, MJ 2007, 'Hunting specialisation and its relationship to participation in response to chronic wasting disease', *Journal of Leisure Research,* vol. 39, no. 3, pp. 413–37.

Neuman, WL 2014, *Social research methods: qualitative and quantitative approaches*, 7th edn, Pearson Education Limited, Boston.

Nghiêm-Phú, B 2014, 'A review of destination image studies from 2008 to 2012', *European Journal of Tourism Research,* vol. 8, pp. 35–65.

Nicolau, JL & Más, FJ 2006, 'The influence of distance and prices on the choice of tourist destinations: The moderating role of motivations', *Tourism Management*, vol. 27, no. 5, pp. 982-996.

Novelli, M 2005, *Niche tourism contemporary issues, trends and cases*, Butterworth-Heinemann, NY and London.

Osborne, P 2000, Travelling light, photography, travel and visual culture. Manchester University Press, Manchester.

Oh, CO & Ditton, R 2008, 'Using recreation specialisation to understand conservation support', *Journal of Leisure Research,* vol. 40, no. 4, pp. 556–73.

——Sorice, MG & Ditton, RB 2010, 'Exploring progression along the recreation specialisation continuum using a latent growth approach', *Leisure Sciences,* vol. 33, no. 1, pp. 15–31.

——Sutton, S & Sorice, M 2013, 'Assessing the role of recreation specialisation in fishing site substitution', *Leisure Sciences,* vol. 35, no. 3, pp. 256–72.

Oh, H, Fiore, A & Jeoung, M 2007, 'Measuring experience economy concepts: Tourism Applications', *Journal of Travel Research,* vol. 46, no. 2, pp. 119–32.

Oh, LS & Hammitt, W 2012, 'Predictive linkages between recreation specialisation and place attachment', *Journal of Leisure Research,* vol. 44, no. 1, pp. 70–87.

Oliver, RL 1997, *Satisfaction: a behavioural perspective on the consumer*, McGraw-Hill, New York.

Ozretic-Dosen, D, Skare, V & Krupka, Z 2007, 'Assessments of country of origin and brand cues in evaluating a Croatian, western and eastern European food product', *Journal of Business Research,* vol. 60, no. 2, pp. 130–6.

Pallant, J 2001, *SPSS survival manual: a step by step guide to data analysis using SPSS for Windows (Versions 10 and 11)*, Open University Press, Berkshire, UK.

Palmer, JF & Hoffman, RE 2001, 'Rating reliability and representation validity in scenic landscape assessments', *Landscape and Urban Planning,* vol. 54, no. 1, pp. 149–61.

Panchal, J & Pearce, P 2011, 'Health motives and the travel career pattern (TCP) model', *Asian Journal of Tourism and Hospitality Research* vol. 5, no. 1, pp. 32–44.

Paris, CM & Teye, V 2010, 'Backpacker motivations: A travel career approach', *Journal of Hospitality Marketing & Management,* vol. 19, no. 3, pp. 244–59.

Park DB, Yang, X, Lee, B, Jang, H-C & Stokowski, PA 2002, 'Segmenting casino gamblers by involvement profiles: a Colorado example', *Tourism Management,* vol. 23, no. 1, pp. 55–65.

——& Yoon, YS 2009, 'Segmentation by motivation in rural tourism: A Korean case study', *Tourism Management,* vol. 30, no. 1, pp. 99–108.

Patton, MQ 2015, *Qualitative research & evaluation methods: integrating theory and practice,* 4th edn, SAGE, Thousand Oaks, CA.

Pearce, PL 1988, *The Ulysses factor: evaluating visitors in tourist settings*, Springer-Verlag, New York.

——1993, 'Fundamentals of tourist motivation', in DG Pearce & RW Butler (ed), *Tourism research: Critiques and challenges,* Routledge, London, pp 113-134.

——2005, *Tourist behaviour: Themes and conceptual schemes*, Channel View Publications, Clevedon, Buffalo.

——& Caltabiano 1983, 'Inferring travel motivation from travellers' experiences', *Journal of Travel Research,* vol. 22, no. 2, pp. 16–20.

——& Panchal, J 2010, 'The integration of health as a travel motive in the travel career pattern (TCP) model', *Asia Pacific Tourism Research Association Conference, Macau*, pp. 37–40.

——& Lee, UI 2005, 'Developing the travel career approach to tourist motivation', *Journal of Travel Research,* vol. 43, no. 226, pp. 226–37

Petrick, JF 2004, 'The roles of quality, value, and satisfaction in predicting cruise passengers' behavioural intentions', *Journal of Travel Research,* vol. 42, no. 4, May, pp. 397–407.

Phillips, W & Jang, SS 2007, 'Destination image and visit intention: examining the moderating role of motivation', *Tourism Analysis,* vol. 12, no. 4, pp. 319–26.

Pike, S 2002, 'Destination image analysis: a review of 142 papers from 1973 to 2000', *Tourism Management,* vol. 23, no. 5, pp. 541–9.

——2009, 'Destination brand positions of a competitive set of near-home destinations', *Tourism Management,* vol. 30, no. 6, pp. 857–66.

——& Page, SJ 2014, 'Destination marketing organizations and destination marketing: A narrative analysis of the literature', *Tourism Management,* vol. 41, pp. 202–27.

——& Ryan, B 2004, 'Destination positioning analysis through a comparison of cognitive, affective, and conative perceptions', *Journal of Travel Research,* vol. 42, no. 4, pp. 333–42.

Pine, BJ & Gilmore, JH 1999, *The experience economy, Work is theatre & every business a stage,* Harvard Business School Press, Boston, Massachusetts.

Pope C, Ziebland, S & Mays, N 2006, 'Analysing qualitative data', in C Pope & N Mays, (eds), *Qualitative research in health care*, vol. 3, Blackwell Publishing, Oxford, pp. 63–81.

Poria, Y, Biran, A & Reichel, A 2009, 'Visitors' preferences for interpretation at heritage sites', *Journal of Travel Research,* vol. 48, no. 1, pp. 92–105.

Prayag, G 2009, 'Tourists' evaluations on destination image, satisfaction, and future behavioural intentions–The case of Mauritius', *Journal of Travel & Tourism Marketing,* vol. 26, no. 8, pp. 836–53.

——& Ryan, C 2012, 'Antecedents of tourists' loyalty to Mauritius', *Journal of Travel Research,* vol. 51, no. 3, pp. 342–56.

Prebežac, D & Mikulić, J 2008, 'Destination image and key drivers of perceived destination attractiveness', *Tržište/Market,* vol. 20, no. 2, pp. 163–78.

Proshansky, HM, Fabian, AK & Kaminoff, R 1983, 'Place-identity: Physical world socialization of the self', *Journal of Environmental Psychology,* vol. 3, no. 1, pp. 57–83.

Qu, H, Kim, LH & Im, HH 2011, 'A model of destination branding: Integrating the concepts of the branding and destination image', *Tourism Management,* vol. 32, no. 3, pp. 465–76.

Quintal, VA & Polczynski, A 2010, 'Factors influencing tourists' revisit intentions', *Asia Pacific Journal of Marketing and Logistics,* vol. 22, no. 4, pp. 554-578.

——Thomas, B & Phau, I 2015, 'Incorporating the winescape into the theory of planned behaviour: Examining 'new world' wineries', *Tourism Management,* vol. 46, pp. 596-609.

Raadik, J, Cottrell, SP, Fredman, P, Ritter, P & Newman, P 2010, 'Understanding recreational experience preferences: application at fulufjället national park, Sweden', *Scandinavian Journal of Hospitality and Tourism,* vol. 10, no. 3, pp.231–47.

Rainwater, L 1966, 'Fear and the house-as-haven in the lower class', *Journal of the American Institute of Planners,* vol. 32, no. 1, pp. 23–31.

Rao, S & Perry, C 2003, 'Convergent interviewing to build a theory in under-researched areas: principles and an example investigation of Internet usage in inter-firm relationships', *Qualitative Market Research: An International Journal,* vol. 6, no. 4, pp. 236–47.

Relph, E 1976, *Place and placelessness,* Pion, London.

Rittichainuwat, BN, Qu, H & Brown, TJ 2001, 'Thailand's international travel image: mostly favourable', *Cornell Hotel and Restaurant Administration Quarterly,* vol. 42, no. 2, pp. 82–95.

Robinson, P, Heitmann, S & Dieke, PU 2011, *Research themes for tourism*. CABI, Oxfordshire, UK.

Rodrigues, ALO, Rodrigues, A & Peroff, DM 2015, 'The sky and sustainable tourism development: a case study of a dark sky reserve implementation in Alqueva', *International Journal of Tourism Research,* vol. 17, no. 3, pp. 292–302.

Rodríguez, DB, San Martín, H, Collado, J & De los Salmones, MM 2009, 'A framework for tourist expectations', *International Journal of Culture, Tourism and Hospitality Research,* vol. 3, no. 2, pp. 139–47.

Rothgeb, J 2008, 'Pilot test', in J Paul (ed.), *Encyclopedia of Survey Research Methods.* Sage Publications, Inc., Thousand Oaks, CA.

Russell, JA & Hogan, R 1980, 'A circumplex model of affect', *Journal of Personality and Social Psychology,* vol. 39, no. 6, pp. 1161–78.

——& Snodgrass, J 1987, 'Emotion and environment', in D Stockols & I Altman (eds), *Handbook of environmental psychology* John Wiley and Sons, New York, NY, pp. 245–80.

Ryan, C, 1998, 'The travel career ladder: An appraisal', *Annuals of Tourism Research,* vol. 25, no. 1, pp. 936–57.

——2002, 'From motivation to assessment', in C Ryan (ed.), *The Tourist Experience,* vol. 2, Continuum, London, pp. 58–77.

——& Cave, J 2005, 'Structuring destination image: A qualitative approach', *Journal of Travel Research,* vol. 44, no. 2, pp. 143–50.

——& Huyton, J 2000, 'Aboriginal tourism: a linear structural relations analysis of domestic and international tourist demand', *International Journal of Tourism Research,* vol. 2, no. 1, pp. 15–29.

Ryden, KC 1993, *Mapping the invisible landscape: Folklore, writing, and the sense of place,* University of Iowa Press, Iowa city, USA.

Ryu, K, Lee, HR & Kim, WG 2012, 'The influence of the quality of the physical environment, food, and service on restaurant image, customer perceived value, customer satisfaction, and behavioural intentions', *International Journal of Contemporary Hospitality Management,* vol. 24, no. 2, pp. 200–23.

Sack, RD 1988, 'The consumer's world: Place as context', *Annals of the Association of American Geographers,* vol. 78, no. 4, pp. 642–64.

Sahin, S & Baloglu, S 2011, 'Brand personality and destination image of Istanbul', *Anatolia,* vol. 22, no. 1, pp. 69–88.

San Martín, H & Rodríguez del Bosque, IA 2008, 'Exploring the cognitive–affective nature of destination image and the role of psychological factors in its formation', *Tourism Management*, vol. 29, no. 2, pp. 263–77.

Sandelowski, M 2000, 'Combining qualitative and quantitative sampling, data collection, and analysis techniques in mixed-method studies', *Research in Nursing & Health*, vol. 23, no. 3, pp. 246–55.

Sarbin, TR 1983, 'Place identity as a component of self: An addendum', *Journal of Environmental Psychology*, vol. 3, no. 4, pp. 337–42.

Saunders, M & Lewis, P 2012, *Doing research in business management: An essential guide to planning your project*, Pearson Education Limited, Harlow, Essex.

——Lewis, P & Thornhill, A 2007, *Research methods for business students*, Pearson Education Limited, Harlow, Essex.

Scarpello, V & Campbell, JP 1983, 'Job satisfaction: Are all the parts there?', *Personnel Psychology*, vol. 36, no. 3, pp. 577–600.

Schneider, KJ 2011, 'Awakening to an awe-based psychology', *The Humanistic Psychologist*, vol. 39, no. 3, pp. 247–52.

Schofield, P & Thompson, K 2007, 'Visitor motivation, satisfaction and behavioural intention: the 2005 Naadam Festival, Ulaanbaatar', *International Journal of Tourism Research*, vol. 9, pp. 329-344.

Schreyer, R 1984, 'Characterizing the influence of past experience on recreation behaviour', *Journal of Leisure Research*, vol. 16, no. 1, pp. 34–50.

Scott, D, & Lee, JH 2010, 'Progression, stability, or decline? Sociological mechanisms underlying change in specialisation among birdwatchers', *Leisure Sciences*, vol. 32, no. 2, pp. 180–94.

——Ditton, R, Stoll, J & Eubanks, TL 2005, 'Measuring specialisation among birders: Utility of a self-classification measure', *Human Dimensions of Wildlife*, vol. 10, no. 1, pp. 53–74.

——& Thigpen, J 2003, 'Understanding the birder as tourist: Segmenting visitors to the Texas Hummer/Bird Celebration', *Human Dimensions of Wildlife*, vol. 8, no. 3, pp. 199–218.

——& Shafer, CS 2001, 'Recreation specialisation: a critical look at the construct', *Journal of Leisure Research*, vol. 33, no. 3, pp. 319–43.

——& Godbey, G 1994, 'Recreation specialisation in the social world of contract bridge', *Journal of Leisure Research*, vol. 26, no. 3, pp. 275–95.

Selwyn, T 1996, *The tourist image: myths and myth making in tourism*, John Wiley, Chichester; New York.

Shields, R 1991, *Places on the margin: alternative geographies of modernity*, Routledge, London.

Shih, D 1986, 'VALS as a tool of tourism market research: the Pennsylvania experience', *Journal of Travel Research*, vol. 24, no. 4, pp. 2-11.

Shiota, MN, Keltner, D & Mossman, A 2007, 'The nature of awe: Elicitors, appraisals, and effects on self-concept', *Cognition & Emotion*, vol. 21, no. 5, pp. 944–63.

Sirakaya, E, Sonmez, SF & Choi, HS 2001, 'Do destination images really matter? Predicting destination choices of student travellers', *Journal of Vacation Marketing*, vol. 7, no. 2, pp. 125–42.

——& Woodside, AG 2005, 'Building and testing theories of decision-making by travellers', *Tourism Management*, vol. 26, no. 6, pp. 815–32.

Smith, S 1994, 'The tourism product', *Annals of Tourism Research*, vol. 21, pp. 582–94.

Sontag, S 1979, *On photography*, Penguin, Harmondsworth.

Statistics, L 2015, *One-way ANOVA using SPSS Statistics*, <https://statistics.laerd.com/>.

Stedman, RC 2002, 'Towards a social psychology of place predicting behaviour from place-based cognitions, attitude, and identity', *Environment and Behaviour*, vol. 34, no. 5, pp. 561–81.

Stepchenkova, S & Mills, JE 2010, 'Destination image: A meta-analysis of 2000–2007 research', vol. 19, no. 6, pp. 575–609.

——& Morrison, AM 2008, 'Russia's destination image among American pleasure travelers: Revisiting Echtner and Ritchie', *Tourism Management*, vol. 29, no. 3, pp. 548–60.

Stern, E & Krakover, S 1993, 'The formation of a composite urban image', *Geographical Analysis*, vol. 25, no. 2, pp. 130–46.

Stevens, J 1996, *Applied multivariate statistics for the social sciences*, 3rd edn, Lawrence Erlbaum Associates., Mahwah, NJ.

Storksdieck, M, Dierking, L, Wadman, M, & Jones, M 2002, *Amateur astronomers as informal science ambassadors: results of an online survey*, Astronomical Society of the Pacific, viewed on 22 July 2015, <www.astrosociety.org/education/resources/AAISASurveryResults.pdf>.

Stylos, N, Bellou, V, Andronikidis, A & Vassiliadis, CA 2017, 'Linking the dots among destination images, place attachment, and revisit intentions: A study among British and Russian tourists', *Tourism Management*, vol. 60, pp. 15–29.

——Vassiliadis, CA, Bellou, V & Andronikidis, A 2016, 'Destination images, holistic images and personal normative beliefs: Predictors of intention to revisit a destination', *Tourism Management*, vol. 53, pp. 40–60.

Symons, M 1999, 'Gastronomic authenticity and sense of place', *CAUTHE 1999: Delighting the Senses; Proceedings from the Ninth Australian Tourism and Hospitality Research Conference*.

Talcott, R 2009, *Teach yourself visually: Astronomy*, NJ: Wiley, Hoboken.

Tapachai, N & Waryszak, R 2000, 'An examination of the role of beneficial image in tourism destination selection', *Journal of Travel Research*, vol. 39, no. 1, pp. 37–44.

Tasci, ADA & Gartner, WC 2007, 'Destination image and its functional relationships', *Journal of Travel Research*, vol. 45, no. 4, pp. 413–25.

——Gartner, WC & Cavusgil, ST 2007, 'Conceptualization and operationalization of destination image', *Journal of Hospitality & Tourism Research*, vol. 31, no. 2, pp. 194–223.

Tashakkori, A & Creswell, JW 2007, 'Editorial: Exploring the nature of research questions in mixed methods research', *Journal of Mixed Methods Research*, vol. 1, no. 3, pp. 207–11.

——& Teddlie, C 1998, *Mixed methodology: combining qualitative and quantitative approaches*, Sage Publications, Thousand Oaks, CA.

——& Teddlie, C (eds) 2003, *Handbook of mixed methods in social & behavioural research*, Sage Publications, Thousand Oaks, CA.

Teddlie, C & Tashakkori, A 2009, *Foundations of mixed methods research: integrating quantitative and qualitative approaches in the social and behavioural sciences*, Sage Publications, Thousand Oaks, CA.

Terkenli, TS 2002, 'Landscapes of tourism: Towards a global cultural economy of space?', *Tourism Geographies*, vol. 4, no. 3, pp. 227–54.

Tesch, R 1990, *Qualitative research: analysis types and software tools*, Falmer Press, New York, NY.

Thapa, B, Graefe, AR & Meyer, LA 2005, 'Moderator and mediator effects of scuba diving specialisation on marine-based environmental knowledge-behaviour contingency', *The Journal of Environmental Education*, vol. 37, no. 1, pp. 53–67.

Thommes, J 2012, *Jim's astrophotography*, Astrophotography by Jim Thommes, viewed on 18 July 2015, <http://www.jthommes.com/Astro>.

Thyne, M & Lawson, R 2001, 'Research note: addressing tourism public policy issues through attitude segmentation of host communities', *Current Issues in Tourism*, vol. 4, no. 2–4, pp. 392–400.

Todd, S 1999, 'Examining tourist motivation methodologies', *Annuals of Tourism Research,* vol. 26, no. 4, pp. 1022–24.

Trauer, B & Ryan, C 2005, 'Destination image, romance and place experience—an application of intimacy theory in tourism', *Tourism Management,* vol. 26, no. 4, pp. 481–91.

Tsaur, SH & Liang, YW 2008, 'Serious leisure and recreation specialisation', *Leisure Sciences,* vol. 30, no. 4, pp. 325–41.

Tuan, F 1979, 'Space and place: humanistic perspective', in S Gale & G Olson (eds), *Philosophy in geography*, D. Reidel, Dordrecht.

Tuan, YF 1974, *Topophilia: a study of environmental perception, attitudes, and values*. Prentice Hall, Englewood Cliffs, NJ.

——1977, *Space and place: The perspective of experience*, U of Minnesota Press, Minneapolis, MN.

Tung, VWS & Ritchie, JRB 2011, 'Exploring the essence of memorable tourism experiences', *Annals of Tourism Research,* vol. 38, no. 4, pp. 1367–86.

Twigger-Ross, CL & Uzzell, DL 1996, 'Place and identity processes', *Journal of Environmental Psychology,* vol. 16, no. 3, pp. 205–20.

Ulrich, RS 1993, 'Biophilia, biophobia and natural landscapes', in SR Kellert & EO Wilson (eds), *The Biophilia hypothesis,* Island Press/Sherwater Books, Washington DC, pp. 73–137.

Um, S & Crompton, JL 1990, 'Attitude determinants in tourism destination choice', *Annals of Tourism Research,* vol. 17, no. 3, pp. 432–48.

Urry, J 1990, 'The consumption of tourism', *Sociology*, vol. 24, no. 1, pp. 23-35.

——1995, *Consuming places*, Routledge, London.

Vaismoradi, M, Turunen, H & Bondas, T 2013, 'Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study', *Nursing & Health Sciences*. vol. 15, no. 3, pp. 398–405.

Vengesayi, S 2008, 'Destination attractiveness: Are there relationships with destination attributes?', *The Business Review,* vol. 10, no. 2, pp. 289–94.

Virden, RJ & Schreyer, R 1988, 'Recreation specialisation as an indicator of environmental preference', *Environment and Behaviour,* vol. 20, no. 6, pp. 721–39.

Walmsley, DJ & Jenkins, JM 1993, 'Appraisive images of tourist areas: application of personal constructs', *Australian Geographer,* vol. 24, no. 2, pp. 1–13.

——& Young, M 1998, 'Evaluative images and tourism: the use of personal constructs to describe the structure of destination images', *Journal of Travel Research,* vol. 36, no. 3, pp. 65–9.

Wang, Y & Pizam, A 2011a, *Destination marketing and management: theories and applications*, CAB International, Wallington, Oxfordshire, UK, Cambridge, MA.

——& Pizam, A 2011b, *Tourism destination marketing and management: Collaborative strategies*, CABI, Oxfordshire, UK.

Wanous, JP, Reichers, AE & Hudy, MJ 1997, 'Overall job satisfaction: how good are single-item measures?', *Journal of applied Psychology*, vol. 82, no. 2, p. 247.

Weaver, D 2011, 'Celestial ecotourism: New horizons in nature-based tourism', *Journal of Ecotourism*, vol. 10, no. 1, pp. 38–45.

Weaver, PA & McCleary, KW 1984, 'A market segmentation study to determine the appropriate ad/model format for travel advertising', *Journal of Travel Research*, vol. 23, no. 1, pp. 12–6.

Weekley, G 2002, 'Recreation specialisation and the recreation opportunity spectrum: A study of climbers', PhD thesis, Davis College of Agriculture, Forestry, and Consumer Sciences, West Virginia University, Morgantown, WV.

Wellman, JD, Roggenbuck, JW & Smith, AC 1982, 'Recreation specialisation and norms of depreciative behaviour among canoeists', *Journal of Leisure Research*, vol. 14, no.4, pp. 323.

Weiner, JF 1991, *The empty place poetry, space, and being among the Foi of Papua New Guinea*, Indiana University Press, Bloomington, AL.

Willson, GB & McIntosh, AJ 2007, 'Heritage buildings and tourism: An experiential view', *Journal of Heritage Tourism*, vol. 2, no. 2, pp. 75-93.

White, CJ 2004, 'Destination image: to see or not to see?', *International Journal of Contemporary Hospitality Management*, vol. 16, no. 5, pp. 309–14.

Wiersma, W & Jurs, SG 2009, *Research methods in education: an introduction*, 9th edn, Pearson, Boston, MA.

Wong, JY, Lee, SJ & Lee, WH 2016, ''Does it really affect me?' Tourism destination narratives, destination image, and the intention to visit: Examining the moderating effect of narrative transportation', *International Journal of Tourism Research*, vol. 18, no. 5, pp. 458–68.

Woodside, AG & Jacobs, LW 1985, 'Step two in benefit segmentation: learning the benefits realized by major travel markets', *Journal of Travel Research*, vol. 24, no. 1, pp. 7–13.

——& Lysonski, S 1989, 'A general model of traveler destination choice', *Journal of Travel Research*, vol. 27, no. 4, pp. 8–14.

Xu, JB & Chan, S 2016, 'A new nature-based tourism motivation model: Testing the moderating effects of the push motivation', *Tourism Management Perspectives*, vol. 18, pp. 107-110.

Yancey, W 1971, ‘Architecture, interaction, and social control: ‘The case of a large-scale public housing project’, *Environment and Behaviour,* vol. 3, no. 1, p. 3.

Yin, R 2012, *Applications of case study research*, 3rd edn, Sage Publications, Thousand Oaks, CA.

Yoon, Y & Uysal, M 2005, ‘An examination of the effects of motivation and satisfaction on destination loyalty: a structural model’, *Tourism Management,* vol. 26, no. 1, pp. 45–56.

Young, M & Willmott, P 1957, *Family and kinship in East London*, Routledge & Kegan Paul (1972 printing), London.

Yuksel, A 2003, 'Shopping experience evaluation: a case of domestic and international visitors', *Tourism Management*, vol. 25, no. 6, pp. 751-759.

Zografos, C & Allcroft, D 2007, *The environmental values of potential ecotourists: A segmentation study*, *Journal of Sustainable Tourism,* vol. 15, no. 1, pp. 44–66.

Zube, EH & Pitt, DG 1981, ‘Cross-cultural perceptions of scenic and heritage landscapes’, *Landscape Planning,* vol. 8, no. 1, pp. 69–87.

——Sell, JL & Taylor, JG 1982, ‘Landscape perception: Research, application and theory’, *Landscape Planning,* vol. 9, no. 1, pp. 1–33.

Zufan, J & Koklarova, B 2014, ‘The attitudes and perception of hotel school teachers towards their further education in the hospitality field’, *Czech Hospitality & Tourism Papers,* vol. 10, no. 21, pp. 27–35.

Appendices

Appendix A: Information sheet for interview participants

University of South Australia
School of Marketing and School of Management

Title of the Research Study:
'Reconceptualisation of Tourism Destination Image in an Astronomical Tourism Context'

Samaneh Soleimani BA, MBA, Doctoral Candidate in
Tourism Marketing and Management

You are invited to participate in a research study that explores the topic of Destination Image in an Astronomical Tourism Context. Simply, the study is exploring 'How to think of an image of a sky observation place as a tourism destination?'

The University of South Australia funds the current research. The research seeks to gather data to develop and examine a method for measuring Tourism Destination Image in an Astronomical Tourism Context.

This research is proposed to assist destination management organisations to offer distinguished and competitive tourism products to the special-interest tourism market based on understanding the astronomical tourism perspectives about the appropriate destination, their motivations and level of expertise. In addition to being published in the thesis form, the research outcomes will seek to introduce and develop astronomical tourism as a new special-interest tourism market. We believe by promoting astronomical tourism, we can protect the night sky as a great natural resource.

Samaneh Soleimani, a PhD candidate in Tourism Marketing and Management in the School of Marketing and School of Management, is conducting the current research. Professor Johan Bruwer, Doctor Michael Gross and Doctor Richard Lee form the supervision team in this research study.

If you agree to participate in the current research, you will be invited to participate in an interview at a time, location and by any communication tool (online, telephone) that is convenient for you. The objectives for the interview session are:

1. Defining astronomical tourism

2. Understanding motivations of astronomical tourists

3. Understanding the demographic characteristics of astronomical tourists

4. Understanding different levels of astronomical tourists, based on their expertise and knowledge

5. Identifying the features of appropriate destinations for sky observation tours

6. Assigning a specific name for sky observation destinations

7. Understanding how dark-sky site image is formed

The interview will take approximately an hour, and will be audiotaped and later transcribed.

Your participation in the current research is entirely voluntary and you are of course free to refuse to answer any questions or to withdraw from the study at any time. In return for your participation, you will receive a summary report and any published results upon your request.

All records containing personal information will remain confidential and no information, which could lead to the identification of any individual, will be released, unless required by law. Audiotapes of interviews will be destroyed following transcription, and notes, data and results will be stored securely on compact disc in the school office of the School of Marketing, the University of South Australia for five years, and then destroyed, and only the research supervisors and the researcher will have access to them.

If you have any questions about the study or your involvement, please contact:

- Samaneh Soleimani, PhD Student, School of Marketing, University of South Australia, Phone: +61 8 8302 7733, Mobile: +61 404 595 830, Email: samaneh.soleimani@mymail.unisa.edu.au
- Professor Johan Bruwer, School of Marketing, University of South Australia, Phone: +61 8 8302 0135, Mobile: +61 420 645 876, Email: johan.bruwer@unisa.edu.au
- Doctor Michael Gross, School of Management, University of South Australia, Phone: + 61 8 830 20350, Email: Michael.Gross@unisa.edu.au
- Doctor Richard Lee, School of Marketing, University of South Australia, Phone +61 8 830 27120, Email: Richard.lee@unisa.edu.au

This project has been approved by the University of South Australia's Human Research Ethics Committee. If you have any ethical concerns about the project or questions about your rights as a participant please contact the Executive Officer of this Committee, Tel: +61 8 8302 3118; Email: vicki.allen@unisa.edu.au'

Many thanks for your contribution to this research

Appendix B: Consent form for interview participants

This project has been approved by the University of South Australia's Human Research Ethics Committee. If you have any ethical concerns about the project or questions about your rights as a participant please contact the Executive Officer of this Committee, Tel: +61 8 8302 3118; Email: Vicki.Allen@unisa.edu.au

Study Title: Reconceptualisation of Tourism Destination Image in an Astronomical Tourism Context

Researcher's name: Samaneh Soleimani, Doctoral candidate at University of South Australia

Supervisor's name: Professor Johan Bruwer
University of South Australia

- I have read the Information Sheet, and the nature and the purpose of the research study have been explained to me. I understand and agree to take part.
- I understand that I may not directly benefit from taking part in the study.
- I understand that I can withdraw from the study at any stage and that this will not affect my status now or in the future.
- I understand that I will be audiotaped during the study.
- I understand that the tape will be destroyed following transcription, and notes, data and results will be stored securely on compact disc in the school office of the School of Marketing, the University of South Australia for five years, and then destroyed, and only the research supervisors and the researcher will have access to them. All records containing personal information will remain confidential.

Name of Participant .....

Signed .....

Dated .....

I have explained the study to the participant and consider that he/she understands what is involved.

Researcher's signature and date .

Appendix C: Interview Discussion Guide

Title: 'How to think of an image of a sky observation place as a tourism destination?

- **Demographic and general questions:**

- Name:
- Are you? □ Male □ Female
- What is your age?
- What is your highest educational qualification?
- Which astronomical societies/associations are you a member of and for how many years?
- Is your current or previous job related to astronomy?
- Had your family (parents/siblings) any role in your interest in astronomy?
- Is your family, that you live with, interested in astronomical activities because of you?

- **Astronomical tourism**

- If someone says he/she is an astronomical tourist, rather than an ordinary tourist, what do you think he/she means?
- If someone says I am going to participate in an astronomical tour/sky observation tour, what elements or features do you think/expect that tour must have?
- Do you have any other names in mind for the tours with sky observation purposes?
- This question will be asked depending on the level of discussion: I have described astronomical tourism as 'a special-interest tourism (SIT) market, in which travellers are motivated by sky-observation related activities and their

travel/destination choice are based on these activities'. Do you want to add/edit anything in this definition?

- **Motivations**

- What are the main reasons for you to participate in sky observation tours?

- What about other people? What do you think motivates them to participate in these tours?

- **Recreation specialisation**

- How do you classify astronomical tourists?

- Why is this classification important? How does it effect on the members to select the astronomical activities?

- If you have an astronomical tour group for three days, what kind of activities can you offer them?

- **Dark-sky site image**

- If you read or hear the word 'skyscape' somewhere. Would you please let me know what does it mean to you in your own words?

- I have defined an appropriate setting for astronomical tour observation as 'a specific setting that facilitates the sky observation from sites that are embedded to meet the astrotourists' needs and accommodate physical structures and services'. Do you want to add/edit anything in this definition?

- If you want to choose a single name for destinations that are appropriate for sky observations, what would be that name? What about other alternative names?

- **Cognitive dark-sky site image**

- What features and attributes should an appropriate sky observation destination possess to be chosen to travel to?

- Explanation (if needed): To be more specific, when we want to discuss a tourist destination image dimension, we discuss what natural resources, (weather, beaches), general infrastructure (e.g. roads), tourists' infrastructure (hotels), social environment, a destination has. Now if you want to discuss an appropriate sky observation site, what are the important dimensions to be considered?

- **Affective dark-sky site image**

- Imagine you are on an astronomical tour and are observing the sky above you, what sort of feelings do you think the sky observation activity may invoke?

- **Conative dark-sky site image**

- How did you behave when you encountered an appropriate sky observation destination?

- **Conclusion**

- Is there anything that you would like to add to the questions of this interview to help you know more about the astronomical societies and the sky-observation destinations?

- May I email you a copy of the summary of the findings to ask your opinion on the accuracy of my interpretation of the data?

Note: *Because of the semi-structured nature of the interviews, the above questions form a guideline for the researcher in the interviews. Possible probe and follow-up questions may be used based on the discussion.*

Appendix D. Quantitative survey

You are invited to participate in a research study about your motivations, needs and expectations about certain experiences.

Your help by participation is greatly appreciated.

The current research is being carried out by researchers at the University of South Australia in compliance with university ethics requirements. Professor Johan Bruwer, Doctor Michael Gross and Doctor Richard Lee form the supervision team in this research study.

Your participation in the current research is entirely voluntary and you are free to refuse to answer any questions or to withdraw from the study at any time.

All the information you provide will be used only for research purposes and will remain strictly confidential and anonymous. This project has been approved by the University of South Australia's Human Research Ethics Committee. If you have any ethical concerns about the project or questions about your rights as a participant please contact the Executive Officer of this Committee, Tel: +61 8 8302 3118; Email: vicki.allen@unisa.edu.au.

Samaneh Soleimani PhD Scholar University of South Australia, City West campus, Adelaide SA 5000 Phone: +61 8 8302 7733 Mobile: +61 404 595 830 Email: Samaneh.soleimani@mymail.unisa.edu.au

Ethics Approval Code: 0000034751

I have read the information above and I give my consent to be involved in this research.

- ❍ Yes
- ❍ No

Please Note: There is no correct or wrong answer. Please read carefully and express what you believe to be the closest answer to reflect your opinions/feelings.

The current research is about people who have visited or participated in one of the following activities (please note these activities take anytime between half a day to one week within a group or alone). – Observatory – Dark-sky site – Stargazing (starparty) night – Astronomy events such as Eclipse or Meteor shower – Astronomy tour – Astronomy festival – Astrophotography

Q1 According to the above explanation, have you ever visited or participated in one of the mentioned activities/tours in the last three years? (Please select all that apply)

- ❑ Observatory
- ❑ Visit a zoo
- ❑ Dark-sky site
- ❑ Stargazing (star party night)
- ❑ Astronomy events such as Eclipse or Meteor Shower
- ❑ Astronomy tour
- ❑ Visit an aquarium
- ❑ Astronomy festival
- ❑ Astrophotography
- ❑ None of the above

Q2 How often do you participate in astronomical tours? (A tour can take anytime between half a day to one week)

- ❍ Weekly
- ❍ Fortnightly
- ❍ Monthly
- ❍ Every Six Month
- ❍ Annually
- ❍ Less than Annually

Q3 How many astronomical tours have you participated in in the last 12 months?

Q4 Who usually accompanies you on an astronomical tour?

- ❍ Alone
- ❍ Partner
- ❍ Partner and children
- ❍ Friends
- ❍ An organised tour
- ❍ Work colleagues
- ❍ Other _____

Q5 How do you obtain the information about astronomical tours? (Tick all that apply)

	Always	Sometimes	Never
From astronomical society website	❍	❍	❍
By sheer chance - driving past it	❍	❍	❍
Other people told me (word-of-mouth)	❍	❍	❍
Official brochure of the tour	❍	❍	❍
Advertisement in a Newspaper of Magazine	❍	❍	❍
Television	❍	❍	❍
Radio	❍	❍	❍
I live near the astronomical society	❍	❍	❍
I am a member of the astronomical society	❍	❍	❍
Poster or flyer that I saw	❍	❍	❍
Visitor information centre	❍	❍	❍
Organised tour (Interstate or Foreign visitor)	❍	❍	❍
From an observatory	❍	❍	❍
Social Media (Facebook, twitter, etc.)	❍	❍	❍
Other …….	❍	❍	❍

Please recall the most recent astronomical tour you have attended and answer the following questions accordingly:

Q6 Please write the details of the most recent astronomical tour that you have attended:
Location:
Year:
Name (if any):

Q7 How long did the tour last? (Fill in as applicable)
Hours:
Days:

Q8 How many person(s) accompanied you on your most recent astronomical tour?

Q9 Are you a member of any astronomical society?
❍ Yes
❍ No

Q10 Please give us some more details about your membership:
How many astronomical societies are you a member of?
Please name it/them:

Q11 For How long have you been involved in astronomical activities?
Years:
Months:
Days:

Q12 What kind of astronomical activities do you like to engage in as part of an astronomical tour?

	Yes	Maybe	No
Learning about telescopes	❍	❍	❍
Solar watching	❍	❍	❍
Astrophotography	❍	❍	❍
Eclipse chasing	❍	❍	❍
Spotting new moons	❍	❍	❍
Stargazing	❍	❍	❍
Observing meteor showers	❍	❍	❍
Other (please specify)	❍	❍	❍

Q13 The following questions ask you about the importance of astronomical activities in your life and your astronomical level of knowledge. Please rate them from ‘Strongly Disagree’ to ‘Strongly Agree’.

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
If I stopped astronomical activities, an important part of my life would be missing	❍	❍	❍	❍	❍
Participation in astronomical activities is a large part of my life	❍	❍	❍	❍	❍
Given the effort I have put into astronomy, it would be difficult to find a replacement activity	❍	❍	❍	❍	❍
I feel that I am more skilled in astronomical activities than any other activities	❍	❍	❍	❍	❍
Testing/improving my astronomical-related skills is very important to me	❍	❍	❍	❍	❍
I have accumulated the necessary astronomical equipment	❍	❍	❍	❍	❍
I have invested a lot of money in astronomical equipment	❍	❍	❍	❍	❍

Q14 How important are each of the following reasons/motivations to you for participating in an astronomical tour?

	Not important at all	Of little importance	Of average importance	Very important	Absolutely essential
View the sky scenery	❍	❍	❍	❍	❍
See deep-sky objects	❍	❍	❍	❍	❍
Document distant planets, asteroids, comets and meteor showers	❍	❍	❍	❍	❍
Experience an exciting adventure at a spectacular location	❍	❍	❍	❍	❍
Develop my knowledge about astronomy	❍	❍	❍	❍	❍
Learn about constellations	❍	❍	❍	❍	❍
Be close to nature	❍	❍	❍	❍	❍
Share my astronomical knowledge with others	❍	❍	❍	❍	❍
Lead others' astronomical activities	❍	❍	❍	❍	❍
Spend time with my friends	❍	❍	❍	❍	❍
Meet new people with similar astronomical interest	❍	❍	❍	❍	❍
Get away from work and day-to-day problems temporarily	❍	❍	❍	❍	❍
Experience peace and quietness	❍	❍	❍	❍	❍
Use different telescopes and binoculars	❍	❍	❍	❍	❍
Do a family activity through an astronomical tour	❍	❍	❍	❍	❍
Have a romantic activity with my partner	❍	❍	❍	❍	❍
Do astrophotography for fun	❍	❍	❍	❍	❍
Participate in astrophotography competitions	❍	❍	❍	❍	❍
Generally, I would like to attend special events in astronomy e.g. eclipses, meteor showers, etc.	❍	❍	❍	❍	❍
Rebuild the world/universe in my mind by obtaining a new perspective of life	❍	❍	❍	❍	❍
Understand better what my life is all about and who I am	❍	❍	❍	❍	❍

Q15 When you choose a dark-sky site, how important are each of the following features to you? A dark-sky site is a place that is specifically allocated for astronomical activities.

	Not important at all	Of little importance	Of average importance	Very important	Absolutely essential
Little or no artificial light pollution	❍	❍	❍	❍	❍
Access to a tour guide with sufficient knowledge of astronomy	❍	❍	❍	❍	❍
Access to a tour guide with sufficient knowledge of constellations' stories in different cultures	❍	❍	❍	❍	❍
Access to a tour guide with sufficient knowledge of astrophotography	❍	❍	❍	❍	❍
Access to relevant equipment such as telescopes and binoculars	❍	❍	❍	❍	❍
A site with national parks	❍	❍	❍	❍	❍
A site with opportunity for adventure activities e.g. wilderness activities	❍	❍	❍	❍	❍
A site with advanced observatory facilities	❍	❍	❍	❍	❍
A site with other attractions like museum or historic site	❍	❍	❍	❍	❍
A clear site with as little dust and fog as possible	❍	❍	❍	❍	❍
A site with accommodation facilities	❍	❍	❍	❍	❍
Easy access road to the site (no need to have a 4WD or travel far off the main road)	❍	❍	❍	❍	❍
A site that is reasonably close to my location	❍	❍	❍	❍	❍
Safe and secure environment	❍	❍	❍	❍	❍
Access to food	❍	❍	❍	❍	❍
High latitude to have lower air density with fewer interferences in the atmosphere	❍	❍	❍	❍	❍
Access to amenities like bathrooms	❍	❍	❍	❍	❍
A flat site with no surrounding hills or mountains	❍	❍	❍	❍	❍
A site with no surrounding obstacles e.g. trees or tall buildings	❍	❍	❍	❍	❍

Q16 Would you like the astronomical tour you are attending to be combined with any other tourism attractions/activities?

- ❍ Yes
- ❍ Maybe
- ❍ No

Q17 Which attractions/activities?

	Yes	No
Wineries	❍	❍
Beach/coastline	❍	❍
Food experiences	❍	❍
Heritage/Arts/Culture	❍	❍
Rural/Natural Environment	❍	❍
Outdoor activities/sports (fishing, surfing, etc.)	❍	❍
Spectacular sceneries	❍	❍
Caravan and Camping	❍	❍
Others (please specify):	❍	❍

Q18 How does it make you feel when you are observing the sky during the astronomical tour/activity?

	Very untrue of me	Untrue of me	Neutral	True of Me	Very true of me
In awe	❍	❍	❍	❍	❍
Humble	❍	❍	❍	❍	❍
Small in the universe	❍	❍	❍	❍	❍
Peaceful	❍	❍	❍	❍	❍
Relaxed	❍	❍	❍	❍	❍
Excited	❍	❍	❍	❍	❍
Connected to the universe	❍	❍	❍	❍	❍
Appreciate nature	❍	❍	❍	❍	❍
Mindfulness of life	❍	❍	❍	❍	❍
Impressed	❍	❍	❍	❍	❍
Happy	❍	❍	❍	❍	❍
Inspired	❍	❍	❍	❍	❍

Q19 How would you describe the overall image of the most recent dark-sky site you have visited?

- ❍ Very unfavourable
- ❍ Somewhat unfavourable
- ❍ Neutral/Unable to judge
- ❍ Somewhat favourable
- ❍ Very favourable

Q20 Have you taken any of the actions below towards the appropriate dark-sky site?

	Never	Occasionally	Sometimes	Frequently	Every time
Recommend the site	❍	❍	❍	❍	❍
Say positive things about the site	❍	❍	❍	❍	❍
Revisit the site	❍	❍	❍	❍	❍
Protect the site to preserve it	❍	❍	❍	❍	❍
Promote the site in social media	❍	❍	❍	❍	❍
Propose it to the council as a proper dark-sky site	❍	❍	❍	❍	❍

Q21 How likely are you to participate in an astronomical tour in the next 12 months?
- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7
- ❍ 8
- ❍ 9
- ❍ 10

Q22 Why are you not willing to participate in an astronomical tour?

Q23 How likely are you to pay to participate in an astronomical tour in the next 12 months?
- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7
- ❍ 8
- ❍ 9
- ❍ 10

Q24 How much do you think is a reasonable price for a one-night overnight astronomical tour?

(AU Dollars)

Please answer the following questions about yourself:

Q25 Gender?
- ❍ Male
- ❍ Female

Q26 Your age?
- ❍ Under 18
- ❍ 18–24
- ❍ 25–34
- ❍ 35–44
- ❍ 45–54
- ❍ 55–64
- ❍ 65–74
- ❍ 75–84
- ❍ 85 or older

Q27 What is your highest educational qualification to date?
- ❍ School Leavers' Certificate
- ❍ High School Certificate (HSC)
- ❍ TAFE Certificate or Diploma
- ❍ Bachelor University Degree
- ❍ Bachelor's degree
- ❍ Graduate/Postgraduate Diploma
- ❍ Master's University Degree
- ❍ Doctorate degree (PhD, etc.)
- ❍ Other _____

Q28 What is your marital status?
- ❍ Married/De facto partner
- ❍ Widowed
- ❍ Divorced
- ❍ Separated
- ❍ Single, Never married
- ❍ Other _____

Q29 What is your annual household income?
- ❍ Less than $25,000
- ❍ $25,000 to $39,999
- ❍ $40,000 to $49,999
- ❍ $50,000 to $59,999
- ❍ $60,000 to $74,999
- ❍ $75,000 to $99,999
- ❍ $100,000 to $149,999
- ❍ $150,000 to $199,999
- ❍ $200,000 to $249,999
- ❍ $250,000 or more
- ❍ Other _____

Q30 Are you currently?

- ❍ Employed for a salary
- ❍ Self-employed
- ❍ Out of work and looking for work
- ❍ Out of work but not currently looking for work
- ❍ A homemaker
- ❍ A student
- ❍ Retired
- ❍ Unable to work
- ❍ Other _____

Thank you for filling our survey. If you like to participate in other surveys, please leave us at least your email address.

Name
Email
Phone
Mailing address

Appendix E: Quantitative survey source

Table 6.13.1. Scale items' sources

Dimensions	Scale Item (Questionnaire Statement)	Source
Astrotourists' Recreation Specialisation	If I stopped astronomical activities, an important part of my life would be missing	Needham et al. (2007)
	Participation in astronomical activities is a large part of my life	Needham et al. (2007)
	Given the effort I have put into astronomy, it would be difficult to find a replacement activity	Needham et al. (2007)
	I feel that I am more skilled in astronomical activities than any other activities	Needham et al. (2007)
	Testing/improving my astronomical-related skills is very important to me	Needham et al. (2007)
	I have accumulated the necessary astronomical equipment	Needham et al. (2007)
	I have invested a lot of money in astronomical equipment	Needham et al. (2007)
Astrotourists' Motivation	View the sky scenery	New
	See deep-sky objects	New
	Document distant planets, asteroids, comets and meteor showers	New
	Experience an exciting adventure at a spectacular location	New
	Develop my knowledge about astronomy	Manfredo, Driver and Tarrant (1996)
	Learn about constellations	New
	Be close to nature	Manfredo, Driver and Tarrant (1996)
	Share my astronomical knowledge with others	Manfredo, Driver and Tarrant (1996)
	Lead others' astronomical activities	Manfredo, Driver and Tarrant (1996)
	Spend time with my friends	Manfredo, Driver and Tarrant (1996)
	Meet new people with similar astronomical interest	Manfredo, Driver and Tarrant (1996)
	Get away from work and day-to-day problems temporarily	Manfredo, Driver and Tarrant (1996)
	Experience peace and quietness	New
	Use different telescopes and binoculars	New
	Do a family activity through an astronomical tour	Manfredo, Driver and Tarrant (1996)
	Have a romantic activity with my partner	New
	Do astrophotography for fun	New
	Participate in astrophotography competitions	New
	Generally, I would like to attend special events in astronomy e.g. eclipses, meteor showers	New
	Rebuild the world/universe in my mind by obtaining a new perspective of life	Manfredo, Driver and Tarrant (1996)
	Understand better what my life is all about and who I am	Manfredo, Driver and Tarrant (1996)

Dimensions	Scale Item (Questionnaire Statement)	Source
Cognitive DSS Image	Little or no artificial light pollution	New
	Access to a tour guide with sufficient knowledge of astronomy	New
	Access to a tour guide with sufficient knowledge of constellations' stories in different cultures	New
	Access to a tour guide with sufficient knowledge of astrophotography	New
	Access to relevant equipment such as telescopes and binoculars	New
	A site with national parks	Echtner and Ritchie (1993)
	A site with opportunity for adventure activities e.g. wilderness activities	Echtner and Ritchie (1993)
	A site with advanced observatory facilities	New
	A site with other attractions like museums or historic site	Echtner and Ritchie (1993)
	A clear site with as little dust and fog as possible	New
	A site with accommodation facilities	Echtner and Ritchie (1993)
	Easy access road to the site (no need to have a 4WD or travel far off the main road)	Echtner and Ritchie (1993)
	A site that is reasonably close to my location	New
	Safe and secure environment	Echtner and Ritchie (1993)
	Access to food	Echtner and Ritchie (1993)
	High altitude to have less air density with fewer interferences in the atmosphere	New
	Access to amenities like bathrooms	Echtner and Ritchie (1993)
	A flat site with no surrounding hills or mountains	New
	A site with no surrounding obstacles e.g. trees or tall buildings	New
Affective DSS Image	In awe	New
	Humble	New
	Small in the universe	New
	Peaceful	New
	Relaxed	New
	Excited	New
	Connected to the universe	New
	Appreciate nature	New
	Mindfulness of life	New
	Impressed	New
	Happy	
	Inspired	New
Overall DSS Image	How would you describe the overall image of the most recent dark-sky site you have visited?	Alcañiz et al. (2009)
Conative DSS Image	Recommend the site	Agapito et al. (2013)
	Say positive things about the site	Agapito et al. (2013)
	Revisit the site	Agapito et al. (2013)
	Protect the site to preserve it	New
	Promote the site in social media	New
	Propose it to council as a proper dark-sky site	New
Future Behavioural Intentions	How likely are you to participate in an astronomical tour in next 12 months?	New
	How likely are you to pay to participate in an astronomical tour in the next 12 months?	New

Appendix F: Test of normality for each question before EFA

Table 6.13.2. Each items' normality test results

Items	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
If I stopped astronomical activities, an important part of my life would be missing	347	-1.171	.131	.838	.261
Participation in astronomical activities is a large part of my life	347	-.463	.131	-.718	.261
Given effort I have put into astronomy, it would be difficult to find a replacement activity	347	-.230	.131	-.964	.261
I feel that I am more skilled in astronomical activities than any other activities	347	.162	.131	-.908	.261
Testing/improving my astronomical related skills is very important to me	347	-.871	.131	.315	.261
I have accumulated the necessary astronomical equipment	347	-.360	.131	-1.102	.261
I have invested a lot of money in astronomical equipment	347	-.261	.131	-1.285	.261
View the sky scenery	347	-.730	.131	.771	.261
See deep sky objects	347	-.773	.131	.675	.261
Document distant planets, asteroids, comets and meteor showers	347	.176	.131	-.473	.261
Experience an exciting adventure at a spectacular location	347	-.579	.131	.158	.261
Develop my knowledge about the astronomy	347	-.754	.131	.710	.261
Learn about constellations	347	-.127	.131	-.332	.261
Be close to nature	347	-.602	.131	.067	.261
Share my astronomical knowledge with others	347	-.442	.131	-.417	.261
Lead others' astronomical activities	347	.096	.131	-.902	.261
Spend time with my friends	347	-.507	.131	-.153	.261
Meet new people with similar astronomical interest	347	-.596	.131	-.087	.261
Get away from work and day-to-day problems temporarily	347	-.536	.131	-.394	.261
Experience peace and quietness	347	-.623	.131	.096	.261
Use different telescopes and binoculars	347	-.300	.131	-.417	.261
Do a family activity through an astronomical tour	347	-.015	.131	-.848	.261
Have a romantic activity with my partner	347	.454	.131	-.742	.261
Do astrophotography for fun	347	-.436	.131	-.741	.261
Participate in astrophotography competitions	347	.896	.131	.075	.261

Generally, I would like to attend special events in astronomy e.g. eclipses, meteor showers, etc.	347	-.517	.131	-.059	.261
Rebuild the world/universe in my mind by obtaining a new perspective of life	347	-.158	.131	-.959	.261
Understand better what my life is all about and who I am	347	-.083	.131	-.987	.261
Little or no artificial light pollution	347	-1.626	.131	3.914	.261
Access to a tour guide with sufficient knowledge of astronomy	347	-.047	.131	-.976	.261
Access to a tour guide with sufficient knowledge of constellations' stories in different cultures	347	.139	.131	-.786	.261
Access to a tour guide with sufficient knowledge of astrophotography	347	.050	.131	-.732	.261
Access to relevant equipment such as telescopes and binoculars	347	-.804	.131	.011	.261
A site with national parks	347	.030	.131	-.473	.261
A site with opportunity for adventure activities e.g. wilderness activities	347	.167	.131	-.644	.261
A site with advanced observatory facilities	347	-.183	.131	-.512	.261
A site with other attractions like museums or historic site	347	.003	.131	-.730	.261
A clear site with as little dust and fog as possible	347	-1.403	.131	2.558	.261
A site with accommodation facilities	347	-.210	.131	-.597	.261
Easy access road to the site (not need to have a 4WD or travel far off the main road)	347	-.572	.131	-.286	.261
A site that is reasonably close to my location	347	-.141	.131	-.179	.261
Safe and secure environment	347	-.798	.131	.751	.261
Access to food	347	-.007	.131	-.719	.261
High altitude to have less air density with less interferences in the atmosphere	347	.005	.131	-.275	.261
Access to amenities like bathrooms	347	-.528	.131	-.202	.261
A flat site with no surrounding hills or mountains	347	-.121	.131	-.220	.261
A site with no surrounding obstacles e.g. trees or long buildings	347	-.360	.131	-.209	.261
In awe	347	-1.425	.131	3.131	.261
Humble	347	-.807	.131	.245	.261
Small in the universe	347	-1.042	.131	.758	.261
Peaceful	347	-.754	.131	.661	.261

Relaxed	347	-.810	.131	.360	.261
Excited	347	-.635	.131	.016	.261
Connected to the universe	347	-.913	.131	.738	.261
Appreciate the nature	347	-1.156	.131	2.374	.261
Mindfulness of life	347	-.551	.131	-.024	.261
Impressed	347	-.773	.131	.604	.261
Happy	347	-.626	.131	.713	.261
Inspired	347	-.735	.131	.244	.261
Recommend the site	347	-.461	.131	-.621	.261
Say positive things about the site	347	-.892	.131	.479	.261
Revisit the site	347	-.324	.131	-1.021	.261
Protect the site to preserve it	347	.163	.131	-1.426	.261
Promote the site in social media	347	.338	.131	-1.309	.261
Propose it to council as a proper dark-sky site	347	2.115	.131	3.481	.261
How likely are you to participate in an astronomical tour in next 12 months?	347	-1.208	.131	.518	.261
How likely are you to pay to participate in an astronomical tour in next 12 months?	347	-.367	.131	-1.324	.261
How likely are you to pay to participate in an astronomical tour in next 12 months? (Binned)	347	-.465	.131	-1.376	.261
How likely are you to participate in an astronomical tour in next 12 months? (Binned)	347	-.996	.131	-.104	.261
Specialisation	347	-.624	.131	-.145	.261
Motivation	347	-.495	.131	1.420	.261
Cognitive	347	-.560	.131	1.697	.261
Affective	347	-.585	.131	1.660	.261
Conative	347	-.296	.131	-.362	.261
How would you describe the overall image of the most recent dark-sky site you have visited?	347	-1.296	.131	2.362	.261
Future.Behaviour	347	-.772	.131	-.510	.261
Valid N (listwise)	347				

Appendix G: Test of normality for each variable before EFA

Table 6.13.3. Each variable's normality test results

Variables	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Recreation Specialisation	347	.123	.131	-.754	.261
Cognitive DSS Image	347	-.513	.131	.714	.261
Affective DSS Image	347	-.663	.131	.891	.261
Overall DSS Image	347	-.608	.131	.024	.261
Conative DSS Image	347	.149	.131	-.506	.261
Future behavioural intentions	347	-.224	.131	-.984	.261
Motivation	347	-.135	.131	-.242	.261

Appendix H: EFA results for motivation

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
View the sky scenery	.317	-.001	.558	-.060	.257
See deep sky objects	.700	.222	.274	-.069	-.005
Document distant planets, asteroids, comets and meteor showers	.688	.101	-.108	.187	.190
Experience an exciting adventure at a spectacular location	.211	.112	.433	.284	.232
Develop my knowledge about the astronomy	.730	.179	.206	.112	.179
Learn about constellations	.480	-.024	.163	.139	.453
Be close to nature	.025	.066	.596	.107	.353
Share my astronomical knowledge with others	.202	.818	.065	.033	.154
Lead others' astronomical activities	.069	.853	-.009	.086	.166
Spend time with my friends	.146	.662	.248	.262	.016
Meet new people with similar astronomical interest	.266	.695	.261	.147	.038
Get away from work and day-to-day problems temporarily	.135	.220	.732	.211	.019
Experience peace and quietness	.098	.134	.859	.109	.048
Use different telescopes and binoculars	.580	.290	.206	.190	.063
Do a family activity through an astronomical tour	.106	.042	.188	.718	.132
Have a romantic activity with my partner	-.072	.111	.106	.724	.311
Do astrophotography for fun	.423	.126	.189	.540	-.160
Participate in astrophotography competitions	.303	.356	-.025	.611	-.024
Generally, I would like to attend special events in astronomy e.g. eclipses, meteor showers, etc.	.337	.208	.204	.287	.277
Rebuild the world/universe in my mind by obtaining a new perspective of life	.214	.158	.161	.132	.817
Understand better what my life is all about and who I am	.080	.156	.209	.088	.813

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 6 iterations.

Figure 6.13.1. EFA results for motivation

Appendix I: EFA results for cognitive dark-sky site image

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
Little or no artificial light pollution	.092	.706	.100	-.062	-.195
Access to a tour guide with sufficient knowledge of astronomy	.128	-.045	.871	.139	.049
Access to a tour guide with sufficient knowledge of constellations' stories in different cultures	.083	-.041	.824	.242	.173
Access to a tour guide with sufficient knowledge of astrophotography	.126	.118	.726	.158	.048
Access to relevant equipment such as telescopes and binoculars	.188	.318	.611	-.084	-.391
A site with national parks	.118	.136	.202	.760	.085
A site with opportunity for adventure activities e.g. wilderness activities	.034	.053	.070	.835	.026
A site with advanced observatory facilities	.406	.162	.320	.373	-.442
A site with other attractions like museums or historic site	.317	-.068	.247	.632	-.128
A clear site with as little dust and fog as possible	.179	.754	.101	-.042	.039
A site with accommodation facilities	.676	.231	-.056	.418	-.035
Easy access road to the site (not need to have a 4WD or travel far off the main road)	.620	.213	.093	-.004	.385
A site that is reasonably close to my location	.299	.165	.228	.027	.701
Safe and secure environment	.607	.321	.184	-.045	.193
Access to food	.730	.032	.105	.300	.006
High altitude to have less air density with less interferences in the atmosphere	.213	.487	.090	.353	-.146
Access to amenities like bathrooms	.780	.155	.222	.078	-.042
A flat site with no surrounding hills or mountains	.111	.678	.015	.137	.197
A site with no surrounding obstacles e. g. trees or long buildings	.131	.778	-.087	.119	.162

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 6 iterations.

Figure 6.13.2. EFA results for cognitive dark-sky site image

Appendix J: EFA results for affective dark-sky site image

Rotated Component Matrix[a]

	Component	
	1	2
In awe	.477	.589
Humble	.285	.755
Small in the universe	-.002	.798
Peaceful	.777	.235
Relaxed	.787	.113
Excited	.657	.317
Connected to the universe	.486	.566
Appreciate the nature	.541	.454
Mindfulness of life	.435	.571
Impressed	.614	.380
Happy	.819	.150
Inspired	.664	.431

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 3 iterations.

Figure 6.13.3. EFA results for affective dark-sky site image

Appendix K: Common method bias

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.632	27.264	27.264	13.632	27.264	27.264
2	5.229	10.457	37.721			
3	3.275	6.550	44.271			
4	2.506	5.012	49.282			
5	2.278	4.555	53.838			
6	1.518	3.037	56.875			
7	1.436	2.871	59.746			
8	1.305	2.611	62.357			
9	1.180	2.360	64.717			
10	.957	1.914	66.630			
11	.931	1.862	68.493			
12	.917	1.833	70.326			
13	.865	1.729	72.055			
14	.835	1.671	73.726			
15	.815	1.630	75.356			
16	.748	1.496	76.853			
17	.721	1.441	78.294			
18	.687	1.373	79.667			
19	.659	1.319	80.986			
20	.563	1.127	82.112			
21	.522	1.044	83.156			
22	.517	1.035	84.191			
23	.495	.990	85.181			
24	.474	.948	86.129			
25	.465	.930	87.060			
26	.451	.903	87.963			
27	.420	.840	88.803			
28	.409	.817	89.620			
29	.389	.777	90.397			
30	.372	.745	91.142			
31	.358	.715	91.857			
32	.324	.649	92.506			
33	.309	.618	93.124			
34	.303	.607	93.731			
35	.292	.584	94.314			
36	.285	.571	94.885			
37	.260	.520	95.405			
38	.251	.502	95.907			
39	.231	.463	96.370			
40	.213	.425	96.795			
41	.206	.412	97.207			
42	.204	.408	97.615			
43	.182	.365	97.980			
44	.173	.346	98.326			
45	.163	.326	98.652			
46	.155	.310	98.962			
47	.140	.280	99.242			
48	.138	.276	99.518			
49	.132	.263	99.782			
50	.109	.218	100.000			

Extraction Method: Principal Component Analysis.

Figure 6.13.4. Common method bias test result

Appendix L: Results of the influence of gender

Group Statistics

	Gender?	N	Mean	Std. Deviation	Std. Error Mean
RS	Male	181	2.6164	.96192	.07150
	Female	160	2.5304	.99174	.07840
Cognitive	Male	181	3.1896	.67753	.05036
	Female	160	3.1995	.64145	.05071
Affective	Male	181	3.9662	.66964	.04977
	Female	160	3.9766	.68195	.05391
How would you describe the overall image of the most recent dark-sky site you have visited?	Male	181	3.95	.896	.067
	Female	160	3.96	.900	.071
Conative	Male	181	2.4880	.91068	.06769
	Female	160	2.4427	1.05956	.08377
FBI	Male	181	3.3923	1.33260	.09905
	Female	160	3.3844	1.39205	.11005

Figure 6.13.5. Influence of gender result 1

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
RS	Equal variances assumed	.003	.959	.813	339	.417	.08606	.10591	-.12226	.29438
	Equal variances not assumed			.811	331.129	.418	.08606	.10611	-.12267	.29479
Cognitive	Equal variances assumed	.603	.438	-.138	339	.890	-.00988	.07171	-.15094	.13117
	Equal variances not assumed			-.138	337.393	.890	-.00988	.07147	-.15046	.13070
Affective	Equal variances assumed	.667	.415	-.142	339	.887	-.01040	.07329	-.15457	.13376
	Equal variances not assumed			-.142	332.306	.887	-.01040	.07338	-.15474	.13394
How would you describe the overall image of the most recent dark-sky site you have visited?	Equal variances assumed	.002	.967	-.061	339	.951	-.006	.097	-.198	.186
	Equal variances not assumed			-.061	333.562	.951	-.006	.097	-.198	.186
Conative	Equal variances assumed	6.311	.012	.425	339	.671	.04532	.10670	-.16456	.25520
	Equal variances not assumed			.421	315.586	.674	.04532	.10770	-.16657	.25722
FBI	Equal variances assumed	.500	.480	.053	339	.957	.00789	.14766	-.28256	.29834
	Equal variances not assumed			.053	329.782	.958	.00789	.14806	-.28338	.29916

Figure 6.13.6. Influence of gender result 2

Appendix M: Results of the influence of age groups

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
RS	.349	6	332	.910
Cognitive	2.431	6	332	.026
Affective	1.521	6	332	.170
How would you describe the overall image of the most recent dark-sky site you have visited?	1.353	6	332	.233
Conative	1.958	6	332	.071
FBI	.670	6	332	.674

Figure 6.13.7. Influence of age result 1

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
RS	Between Groups	8.007	8	1.001	1.053	.396
	Within Groups	315.557	332	.950		
	Total	323.564	340			
Cognitive	Between Groups	4.750	8	.594	1.376	.206
	Within Groups	143.307	332	.432		
	Total	148.057	340			
Affective	Between Groups	4.907	8	.613	1.360	.213
	Within Groups	149.760	332	.451		
	Total	154.667	340			
How would you describe the overall image of the most recent dark-sky site you have visited?	Between Groups	3.708	8	.464	.571	.802
	Within Groups	269.541	332	.812		
	Total	273.249	340			
Conative	Between Groups	6.453	8	.807	.833	.574
	Within Groups	321.503	332	.968		
	Total	327.957	340			
FBI	Between Groups	9.230	8	1.154	.619	.762
	Within Groups	618.535	332	1.863		
	Total	627.765	340			

Figure 6.13.8. Influence of age result 2