Exploring Competitiveness of Nature-based Tourism Destinations Using Social Media Analytics: A Case Study of Jasper National Park

by

Farshid Mirzaalian

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Faculty of Kinesiology, Sport, and Recreation
University of Alberta

Abstract

The aim of this dissertation was to explore competitiveness of Jasper National Park as a nature-based tourism destination through an examination of social media conversations and consideration of macro and microenvironment factors introduced in the Tourism Destination Competitiveness model, namely, destination loyalty and climate change (environmental competitiveness). Social media analytics was the main data analysis approach in this dissertation to comprehend and analyze a total of 17,224 TripAdvisor online postings about Jasper National Park, and was framed into three separate studies:

The first study in this dissertation (Chapter 2) represents a pioneering effort to systematically review social media analytics in the hospitality and tourism context. This study presents a comprehensive review of hospitality and tourism studies that have utilized big data and social media analytics to collect, examine and interpret social media posts, and to better characterize this emerging research topic in hospitality and tourism by providing an integrated definition of social media analytics. For this purpose, study 1 identifies the dominant research questions that hospitality and tourism scholars have pursued through the application of social media analytics, as well as the most and least common social media analytical methods used to address them. Finally, the current knowledge gaps in the field are highlighted and potential research avenues for tourism and hospitality related social media data analysis are recommended.

The second study (Chapter 3) advances investigations of destination loyalty by presenting a novel and comprehensive approach that integrates different analytical techniques such as sentiment analysis, topic modeling, and text clustering to extract sentiments, topics of interest, and loyalty statements from tourists' conversational data on TripAdvisor. For this purpose, different

aspects of visitors' experiences shared on TripAdvisor about Jasper National Park are explored first, such as identifying themes and topics of online reviews about natural attractions and touristic locations, and documenting visitor sentiments and subjective evaluations of destination reviews. Next, and in order to determine antecedents of loyalty toward the destination, a loyalty keyword list is developed and applied to search for expressions of loyalty in online reviews. Practical implications for tourism providers and scholarly advancements in exploration of tourists' loyalty behaviors are presented and discussed.

The third study in this dissertation (Chapter 4) uncovers divergent themes regarding tourists' perceptions of climate change upon visiting Jasper National Park, and identifies public understanding and discursive construction of climate change in social media. Study 3 provides a toolset for tourism researchers to better understand tourists' climatic concerns from large conversational datasets by combining linguistic analysis and thematic discourse analysis. It also demonstrates how a qualitatively informed corpus-based approach can be employed for inductive analysis to gain greater insights about climate change-related perspectives by focusing on nature-based tourists' discourses on social media. A broad range of themes are discovered regarding tourists' perceptions of climate change, with the most significant discourses on climate grief, education and interpretation, pro-environmental behavior, and last-chance tourism. Findings of this study contribute to the existing research relating to public understanding of climate change and tourism. Practical implications and suggestions for tourism providers are presented and discussed. The overall findings, theoretical and practical implications, limitations of these studies, and future research avenues are summarized in the Chapter 5.

Preface

This dissertation is an original work by Farshid Mirzaalian. This dissertation is formatted in three publishable papers (Chapter Two, Three, and Four). I was the lead author and solely responsible for data collection, data analysis, and manuscript composition for all the three studies in this dissertation. Dr. Elizabeth A. Halpenny, Dr. Geoffrey M. Rockwell, and Dr. Ali Shiri were involved in the conceptualization of the theories and methods and contributed to manuscript edits. Study 1 was submitted to a special call from the *Journal of Hospitality and Tourism Technology* and was published on November 27, 2019. Study 2 was submitted to a special issue of "Advances in Destination Management & Marketing in the Era of Big Data & Smart Tourism" in the *Journal of Destination Marketing and Management* on December 07, 2019, and is accepted with minor revisions. Study 3 has been submitted to peer reviewed journal for publication consideration.

Dedications

This dissertation is dedicated to my soul mate, my wife Pariya, who has supported me throughout my life and in this academic journey. I am forever indebted to you and love you forever.

This work is also dedicated to my beloved family, my father Nemat, my mother Soheila, and my sister Farnoush, who have always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve.

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CHAPTER 1: Introduction

The rapidly growing tourism sector is a main source of income in many countries around the world, therefore it is with no surprise that studying destination competitiveness has attracted the attention of policy makers, as well as public and private organizations. Tourism researchers have been trying to identify destination competitiveness influencing factors and develop theoretical models that can explain relationships between these determinants and competitiveness (De Keyser & Vanhove, 1994; Dwyer & Kim, 2003; Hassan, 2000). First introduced by Crouch and Ritchie (1999), the model of Tourism Destination Competitiveness (TDC) suggests sociocultural, technological, ecological, and environmental strengths are all important when studying competitiveness of tourism destinations. The model also advocates simultaneous consideration of specific comparative (endowed resources) and competitive (deployment of resources) advantages.

User-generated content and electronic word of mouth posted by travelers online, provides a rich source of self-reported, publicly accessible, and unconstrained data, enabling researchers to explore tourists' thoughts and evaluations of a tourism destination (Berezan et al., 2015). Analyzing sentiments and exploring themes of online reviews can also help destinations understand the competitiveness of their brand in the minds of visitors, and whether the destination has been able to deliver its brand promise. Sentiment analysis of negative reviews, for instance, highlights where a destination has failed to deliver services that were claimed in its mission. On the other hand, analyzing the most enthusiastic reviews from loyal visitors can give Destination Marketing/Management Organizations (DMO) insights into how these visitors are inspired to

provide positive word of mouth reviews about the destination to others and revisit the destination themselves.

This dissertation aims to contribute to tourism literature by exploring the competitiveness of Jasper National Park as a nature-based tourism destination by considering macro and microenvironment factors introduced in the TDC model, namely, destination loyalty and environmental competitiveness. For this purpose, different aspects of visitors' experiences shared on TripAdvisor Jasper National Park (JNP) are explored first. This process includes identifying themes and topics of online reviews about natural attractions and touristic locations, documenting visitor sentiments and subjective evaluations of destination reviews, determining antecedents of loyalty toward the destination, and discovering visitors' discourse on climate change. Online reviews available on TripAdvisor for JNP were extracted and analyzed using social media analytical methods and procedures to answer research questions for each study.

The first, Study 1: "Social media analytics in hospitality and tourism: A systematic literature review and future trends," was submitted to a special call from the *Journal of Hospitality and Tourism Technology* and was published on November 27, 2019. This systematic literature review appears to be the first work that methodically reviews Social Media Analytics (SMA) in the hospitality and tourism domain. This study is a systematic review of hospitality and tourism studies that have utilized SMA to collect, examine and interpret social media big data, while highlighting advancements in analytical methods and recommending an expansion of approaches. The objectives of this systematic review were to: provide an integrated definition of SMA covering a wide range of current of research methods; identify the main research purposes that scholars have pursued through the application of SMA and map the methods most frequently used to address

them; document, over time, the most and least common social media analytical methods and recommend application of underutilized methods relevant to the advancement of the tourism sector; identify the disciplinary literature where tourism and hospitality SMA studies have been published, specifying the countries and industries of focus; and finally, highlight knowledge gaps and recommend research agendas for tourism and hospitality related SM data analysis. In order to characterize this emerging research topic in hospitality and tourism, I looked at SMA research from seven different perspectives: the overall growth, publication source, research regions, disciplinary home, SM types, types of analysis, and research purpose.

The second, Study 2: "Exploring destination loyalty: Application of social media analytics in a nature-based tourism setting," presents a novel and comprehensive approach that uses different analytical techniques such as sentiment analysis and topic modeling to extract sentiments and topics of interest from tourists' conversational data on TripAdvisor from 2002 to 2019, and also explore destination loyalty statements using a keyword clustering approach. Previous destination loyalty literature is used to develop a keyword list that is applied to search for expressions of loyalty in online reviews. The robustness of loyalty clusters and optimal number of clusters are also assessed prior to final analysis. This study was submitted to a special issue of "Advances in Destination Management & Marketing in the Era of Big Data & Smart Tourism" in the *Journal of Destination Marketing and Management* on December 07, 2019, and is accepted with minor revisions. Analyzing sentiments and exploring themes of online reviews can help tourism operators of JNP understand the value of the destination in the minds of their loyal visitors and advance researchers' exploration of tourists' loyalty behaviors.

Finally, Study 3: "Tourism-related climate change perspectives: Social media conversations about Canada's Rocky Mountain National Parks," provides a toolset for tourism researchers to better understand tourists' climatic concerns from large conversational datasets. One of the main objectives of this study is to investigate the public understanding and discursive construction of climate change in social media. This study combines linguistic analysis and thematic discourse analysis, using qualitatively-informed corpus-based analysis, to extend knowledge about how climate change is perceived in the sense-making practices of visitors to Jasper National Park. I argue that discursive explorations can provide important insights into the public debate on climate change, which can potentially inform tourism providers about how to improve their communication and align their discourse with the public. The following questions guide this research: what views do visitors of Jasper National Park express on TripAdvisor that are climate change related, and what can discussions about climate change in these online reviews tell us about how the subject is perceived and communicated to others?

The Comprehensive Model of Tourism Destination Competitiveness

Based on the comprehensive model of Tourism Destination Competitiveness (TDC) introduced by Crouch and Ritchie (1999), competitiveness of a destination should be determined by both tourism-specific factors and factors that influence the tourism providers in order to attract and satisfy potential tourists in the best way. The TDC model is the result of qualitative interviews with the CEOs of DMOs, located primarily in North America, asking about factors that determine the competitiveness and success of tourism destinations. Broadly, the model seeks to explore highly related comparative (based on resource endowments) and competitive (resource deployment) advantages. Comparative advantages of a destination refer to the distinct features of

a destination gathered and developed by society over time that can attract and satisfy tourists in the best way (e.g., historical and cultural resources, size of economy, knowledge resources, infrastructure and superstructure elements) (Ritchie & Crouch, 2011). Delivering these endowments in an effective and efficient way creates a competitive advantage and can lead to the growth and success of tourism destination. Having both comparative and competitive advantages together creates an edge for the destination in the tourism marketplace.

An Overview of the TDC Model and its Components

Tourism is a multi-layered open system influenced by many factors outside the system itself. This macroenvironment is global in its scope and consists of a wide range of phenomena that affect not only travel and tourism industry, but all other activities taking place in a destination. Macroenvironmental factors are often categorized into six categories related to the economy, technology, ecology, political and legal developments, socio-cultural dimensions, and demographic setting. These global forces may consequently affect the destination in different ways such as market tastes and fluctuating destination attractiveness, the relative cost of travel to the destination, or relations between the host destination and other nations or cultures (Ritchie & Crouch, 2011). Since the global (macro) environment is constantly changing and can result in problems for the destination, it is a DMOs' responsibility to regularly monitor the environment and avoid any potential 'marketing myopia' (Ottman et al., 2006).

By comparison, the competitive or microenvironment factors are associated with the tourism system itself and are made up of proximal elements and forces that are placed within the destination's activities and competition. In general, these microenvironment factors have a more direct and instant impact on tourism destinations compared with global influences, and therefore

often grab managers' attention more frequently due to their consequences on the destination's ability to serve visitors and remain competitive (Ritchie & Crouch, 2011). Additionally, microenvironment factors can potentially affect not only the tourism destination itself, but a range of entities and organizations within and competing with the tourism system (the so-called travel trade which is based on the triangle of suppliers, competitors, and customers). These entities include tour packagers and retail travel agents, specialty distributors (e.g., meeting and convention planners), facilitators (i.e., of the flow of information, money, services, people), competing destinations, and most importantly, customers (Ritchie & Crouch, 2003).

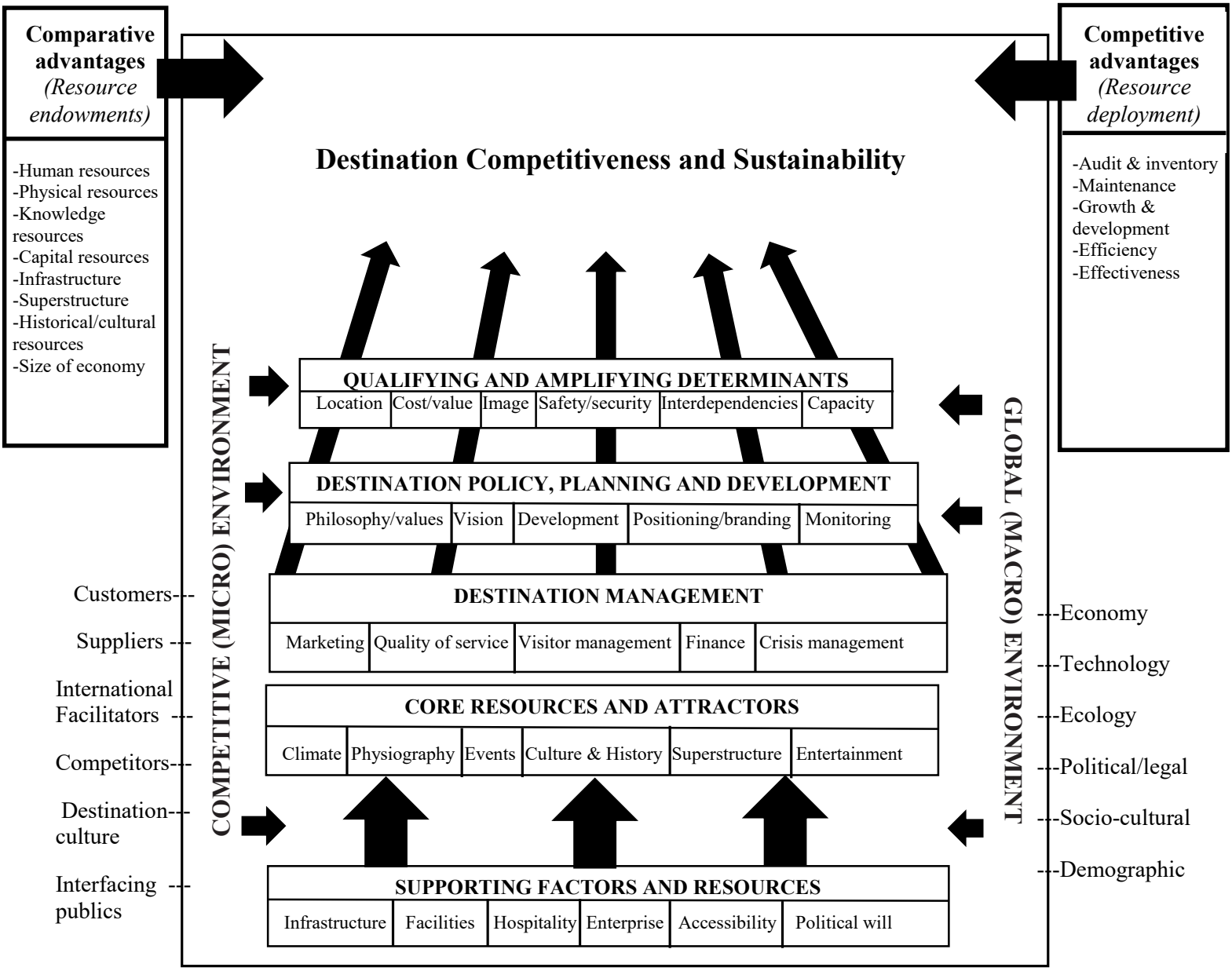

Figure 1. Conceptual model of destination competitiveness and sustainability (Adapted from Ritchie and Crouch, 2003)

The TDC model considers four major components of "core resources and attractors," "destination management," "destination policy, planning, and development," and "qualifying and amplifying determinants," that all are built on supporting factors and resources (Crouch & Ritchie, 1999). Supporting factors and resources support the competitiveness of a tourism destination and work as a foundation based on which a successful tourism industry can be established. One of the most important supporting factors is the infrastructure of a destination such as transportation services and facilities (e.g., highways, railways, bus services, airports, ferries, etc.), communication systems, public facilities, sanitation systems, etc. Another important factor in a successful tourism development is facilitating resources and services such as human knowledge and capital resources, education and research institutions, and financial institutions. The level of accessibility to and from a destination is another supporting element that is highly influenced by other factors such as economic, social, and political conditions. Examples are entry visas and permits, airport capacity, variety of airlines, and route connections at the point of entry, together with within a destination ease of access to beaches, mountains, national parks, or scenic locations. The hospitality sector has a significant impact on the competitiveness of a tourism destination and plays an important role in delivering a memorable tourism experience (Ritchie & Crouch, 2011).

The core resources and attractors are the main components that make up a destination image and inspire potential visitors to choose one destination over another, or in other words, visitors' key motivators for visiting a tourism destination. The supporting factors and resource components of the TDC model has its roots in generic business competitiveness studies and refers to the fundamental factors for building a successful tourism industry such as destination's infrastructure, educational establishments, and accessibility. These factors consist of seven categories of physiographical (landscape and climate), cultural, and historical elements along with

market ties (relationships with the residents of tourism destination), mix of activities, special events, entertainment and the tourism superstructure (accommodation and transportation facilities, food and beverage, major attractions, etc.) (Ritchie & Crouch, 2003). Together the landscape and climate are the physiographical characteristics, and the dominant and important contributors to destination competitiveness, because the majority of tourism experiences are directly associated with the physical resources of a destination. These elements not only define the nature of the environment that visitors expect and enjoy, but also characterize aesthetics and visual attractiveness of the destination. In other words, physiographical and climate components are the principal factors around which other factors must be productively developed (Ritchie & Crouch, 2011).

Another component of the TDC model is destination management, which plays the main role in making a balance between all other components. From maintaining and enhancing the core resources and attractors to strengthening of the supporting factors and adjusting with restricting constraints, the management component of competitiveness covers a wide range of activities such as marketing and development, finance and venture capital, visitor management, or resource stewardship (Crouch, 2011). The importance of the service experience in hotels, restaurants, attractions, and tours is also of great interest in destination management. Destination managers are trying to replace the total quality of service (QOS) with the quality of experience (QOE) approach for a better fulfillment of visitor satisfaction through ensuring a hassle-free coordination between all elements of the total travel experience (Crouch, 2011; Otto & Ritchie, 1995).

Tourism development of a destination is ideally based upon its specific economic, social, environmental and political goals, and this development can only happen through a strategic or

policy-driven framework for the planning and development of the destination. This tourism development policy is something that can be found in the destination vision and its mission statement, and is based upon an assessment of the destination and its attributes, strengths and weaknesses, opportunities and threats, past and current strategies, etc. Formulation of the policy framework for developing a tourism destination can be done through recognizing major attractions and resources of the destination and its existing visitors along with competitive and collaborative evaluation of how the destination relates to and compares with other competitors in the tourism market (Ritchie & Crouch, 2003).

Finally, the qualifying and amplifying determinants of the TDC model focus on factors that can negatively affect destination competitiveness (e.g., location, overall costs, natural disasters, climate change, and safety, that are normally beyond the control of the tourism sector), and can possibly limit a destination's ability to attract and satisfy tourists through influencing the other three components (Crouch & Ritchie, 1999; Enright & Newton, 2004). These qualifiers and amplifiers can be alternatively called "situational conditioners" because they can impact tourism demand (Ritchie & Crouch, 2011). An example is a destination's location and its degree of remoteness from world's major tourism markets and its potentials to attract tourists. The more a destination is physically remote from major originating markets, the more distinct disadvantage it has compared with another destination that is closer to major markets and has the advantage of familiarity and lower travel cost. Destination image is another factor that can qualify or amplify destination competitiveness. What visitors portray from a destination can take time to change whether it is a negative or positive image. Negative perceptions of a destination restrict improvements while positive perceptions work as a shield for problems such as crime or lack of safety and security (George, 2010; Ritchie & Crouch, 2003). Cost and value are also considered

as a qualifying and amplifying determinant and is influenced by factors such as the cost of commuting to and from the destination and the local cost of tourism products (Ritchie & Crouch, 2003). Having both generic business-related and tourism-specific factors at once, Crouch and Ritchie's competitiveness model provides destinations with a more thorough view compared to the other models that focus mainly on tourist product or merely on destination attractiveness (Formica, 2002; Porter, 1990).

Destination Loyalty and Competitiveness

As tourism destinations become more commercialized their ability to preserve the qualities that initially attracted visitors is reduced. A search for competitiveness must strive to ensure a strategic balance between development and conservation, and seek out long-term sustainability. This continuous change has led destinations to seek out tourism sustainability as a means of competitiveness and the ability to maintain their market position relative to competitors, simultaneously delivering value through sustaining their natural and cultural resources and achieving visitors' satisfaction tourism experience based on these same resources.

Discovering the authenticity of the place, which involves activities ranging from exploring the natural, socio-cultural, economic, and environmental heritage of the destination to interacting with local communities, is one of tourists' main reasons for visiting a nature-based tourism destination (Kim & Jamal, 2007). This quest for genuineness accompanied by the quality of environment in destinations where natural resources are the core product can not only increase tourists' willingness to pay more for their visit, it can also enhance profitability. Authentic, genuine experiences can be a pre-condition of building tourist loyalty (Akhoondnejad, 2016; Johnston & Tyrrell, 2005; Ramkissoon & Uysal, 2011).

Customer loyalty has been defined in a number of ways in marketing literature such as attitudinal loyalty (i.e., customers' overall attitude toward a product or service leading to an intention to repurchase) (Fournier, 1994), loyalty as behaviors (i.e., continued support and act of recommendation) (Yim & Kannan, 1999), and an integration of the two viewpoints, which distinguishes customer loyalty as the relationship between attitude and repeat patronage (Oliver, 1999; Zhang et al., 2014). If destination experience is considered as a product, then tourist loyalty is an extension of customer loyalty in tourism setting (Backman & Crompton, 1991; Yoon & Uysal, 2005). Tourist loyalty can be evaluated according to the visitor's intention to revisit a destination or his or her recommendations and positive references about the destination (Oppermann, 2000).

Having loyal visitors is a competitive edge for DMOs since these customers tend to have a lower sensitivity to price changes and stay/spend more within destination, providing them with an increased profit rate (Alegre & Juaneda, 2006; Gokovali et al., 2007). To develop, support and facilitate long-lasting and sustainable strategies based on destination loyalty, DMOs need to have a better understanding of how loyalty behaviors are formed and function, and which of these factors contribute most to destination loyalty. According to Kastenholz et al. (2006), having more loyal visitors is beneficial economically and socially, and supports the long-run success of a destination and its competitive positioning. Visitors' intentions to revisit and recommend to others can increase destination's revenue as well as potentially build societal support for the place. Nature-based tourism destinations are no exception. Increased visitation to protected areas presents a dual dilemma of protecting biological diversity while providing meaningful experience for visitors of nature-based settings. Loyal visitors can provide essential societal support for nature-based tourism destinations in a global economy where competition is becoming more and more

intense (Moore et al., 2015). Destination management should not only focus on resource stewardship that contributes to the quality of visitor's experience but also concentrate on keeping their current visitors satisfied and loyal, so that as the TDC model states, all of these can be consequently turned into a competitive advantage.

Tourism Destinations and Climate Change

The growing influence of climate change on destinations is having a potentially negative impact on the attainment of sustainable tourism. Long-term analyses of the effects of climate change on tourism systems have been a popular area of research in the past two decades (Elsasser & Bürki, 2002; Scott et al., 2016; Steiger et al., 2019; Weaver, 2011), however, the ability to understand tourists' behaviors and responses toward this environmental issue is vital as well. This requires the development of new approaches, to not only illustrate a clearer picture of tourists' thoughts, but also improve their understanding and reduce their level of uncertainty regarding changing climate.

Nature-based tourism is a major component of Canadian tourism; it is strongly influenced by climate, with a major impact on physical settings, associated outdoor recreation activities, and seasonality (Butler, 1994; Jones & Scott, 2006). National park visitation in Canada is highly seasonal with nearly 70% of annual visits occurring between May 1 and September 30 (Parks Canada, 2018). Global climate change has affected the length and quality of tourism seasons, and this has posed opportunities and risks for tourism providers through providing more revenues and economic opportunities for communities and businesses on one hand, but negatively affecting the ability to maintain ecological integrity on the other (Jones & Scott, 2006; Scott et al., 2004).

While some tourism destinations incorporate climate change into their strategic planning and tourism development, there are destinations that do not openly communicate climate change issues to their visitors and prefer to quietly adapt or deny its negative consequences, simply because they see broadcasting of such vulnerability as a risk to their competitiveness (Scott, 2011). Similarly, where a tourism destination considers competitive advantages, they again will not broadcast this to other competitors but use this insight as a strategic information to improve their position in the marketplace (Ebner, 2008; Scott, 2011). According to Wang (2011), as the global pressure on ecological concerns and climate change is intensified, DMOs must do their best to be "seen as green" (i.e., to appear to be taking the issues seriously and acting upon them) both short-term during the 'hype' phase and long-term through sustainable development and focusing on 'green conservation'. In general, destination competitiveness will be improved in places such as Canada, Northern Europe, and Russia because of changes in push-pull climatic factors (e.g., warmer climates as pull factors and adverse physical conditions at lower latitudes such as floods as push factors) influencing tourist travel choices. Tourism declines have been observed in many subtropical and tropical areas (Scott et al., 2012). A better understanding of tourists' perceptions of climate change can help DMOs to not only substantiate tourism climate indicators but to have a precise assessment of their destination's competitiveness and how to redistribute resources to address climate change impacts in the future.

Social Media and User-generated Content

Social Media (SM) refers to the collection of Web 2.0 online peer-to-peer communications channels, ranging from social networking and consumer review sites to online content communities and other types of information and communications technology tools that allow

people to create and exchange user-generated content (Kaplan & Haenlein, 2010; Zeng & Gerritsen, 2014). SM is currently recognized as one of the mega trends significantly affecting the hospitality and tourism domain (Xiang & Gretzel, 2010). SM has been extensively adopted by tourists allowing them to act as "media" in different consumer-to-consumer (C2C) communication including rating hotel room cleanliness and restaurant services, and opinion posting on the quality of tourism destination attractions (Leung et al., 2013). SM is also a place for business-to-customer (B2C) communication, enabling hospitality and tourism actors to initiate conversations with their consumers, draw inspiration for long-term strategies, promote their brands, and make better business decisions (Goh et al., 2013). Electronic word of mouth (eWOM) and online reviews, for instance, received huge attention from scholars in tourism in the last decade, although there is limited research on the use of SM in the business-to-business (B2B) sector, rather much of the research to date has focused on B2C and C2C communications (Dwivedi et al., 2020).

User-generated content (UGC) refers to any form of content (e.g., image, video, text) posted by online users on different SM platforms such as Social Networking Sites (SNS), discussion forums, media and content communities, and consumer review sites (Kaplan & Haenlein, 2010). In social networking sites such as Facebook and Twitter, public or semi-public users can connect with each other and share similar personal interests, lifestyle, or activities (Boyd & Ellison, 2007). Online discussion forums such as TripAdvisor Travel Forum are developed for people with common interests to share their knowledge and experience in different areas. Online users can share different types of content such as photos (Flickr and Panoramio) and videos (YouTube) in media and content communities. Finally, consumer review sites are SM platforms on which consumers can post comments and reviews on products and services.

Online review platforms in hospitality and tourism can vary from community-based platforms to transaction-based online travel sites. While in both types reviews are perceived as electronic word-of-mouth that can help travelers in their decision-making process, they have different socio-cultural and economic systems with distinctive business models (Gligorijevic, 2016). In fact, each of these platforms deals with specific user segments, and constructs its power distribution based on target groups in the online market (Jeacle & Carter, 2011; Scott & Orlikowski, 2012). An online review contains four basic elements including linguistic features, semantic features, sentiment, and its source (the reviewer's information). Linguistic features are related to the textual content of the review (e.g., amount of data, ease of understanding, timeliness, relevancy, and completeness), semantic features refer to the topics and themes of words, and their relationships between linguistic characteristics. Also, sentiment features are mainly valence measures (positive or negative) of an opinion (Xiang et al., 2017).

Different forms of user-generated content, from online consumer reviews to forum and blog posts, have been studied a lot in the hospitality and tourism (Crotts et al., 2009; Jin et al., 2018; Lu & Stepchenkova, 2015; Marine-Roig & Clavé, 2015). However, existing literature and available studies using review data tend to focus on representative samples related to the whole existing data. These studies extract describing features or measures to predict meaningful patterns for theoretical or practical implications. SM data grows so fast that special analytics, technological infrastructures, and tools are becoming necessary to tackle this so-called "big data." SMA is an emerging method that examines large amounts of available data on SM platforms through advanced analytical methods such as robust Natural Language Processing (NLP) and machine learning techniques and seeks to reveal hidden patterns and unspecified correlations not identifiable through traditional methods (Elgendy & Elragal, 2014). SMA has recently received

considerable attention in organizational level, and companies try to analyze collected data for business purposes by merging different methods such as computational linguistics, machine learning, and statistical analyzes. The goal of SMA is to track trendy topics and to find popular sentiments which in turn can be useful in identifying consumers' opinions and beliefs about products and services (Fan & Gordon, 2014; Lazer et al., 2009).

Social Media Analytics in Hospitality and Tourism

The emergence of online user-generated content and consumers' reviews has recently had a considerable effect on consumers' decision-making process. People include these user-generated content as a means to gather information about products, and on the other hand, companies try to collect these data to uncover consumer's opinion about their products and to make recommendations. The travel and tourism sector appears to be an excellent context for exploring the SMA. SMA is an interdisciplinary field of study designed to assist analyses of SM's structured and unstructured big data. In fact, SMA "is concerned with developing and evaluating informatics tools and frameworks to collect, monitor, analyze, summarize, and visualize SM data, usually driven by specific requirements from a target application'' (Zeng et al., 2010, p. 14). In other words, SMA combines a variety of techniques such as web crawling, computational linguistics, machine learning, and statistical methods to collect, analyze, and interpret SM data for different purposes such as tracking trending topics, opinion mining and sentiment analysis, or even spatial analysis of geo-referenced information (Xiang et al., 2017). It is vital for tourism organizations to recognize tourist trends so that they can deliver unique services and create a thrilling travelling experience for them. SM can also provide valuable sentiment (valence of an opinion) and semantic information, which is helpful in predictive analytics.

Chapter 2 (Study 1) is a review of SMA hospitality and tourism studies, where the research purposes of employing SMA are categorized into four categories: opinion mining, travel patterns, accuracy and performance testing, and visitation prediction. A majority of studies have applied social media analytical methods (i.e., most commonly text analysis, sentiment analysis, topic or cluster analysis, spatial analysis, and comparative analysis) mainly for opinion mining and analyzing judgments on aspects of hotels, destinations, or restaurants. These studies tried to reveal an image of given items (e.g., destination image), satisfaction, review helpfulness, and competitiveness analysis. A smaller portion of tourism studies attempted to identify travel patterns and tourist flow, popular tourist locations and desired tourism activities, accuracy testing and performance measurement of analytical methods, and visitation predictions of hotels, landmarks, and restaurants (Girardin et al., 2008; Ji et al., 2011; see particularly Mirzaalian & Halpenny, 2019).

TripAdvisor as a Case Study

Online review platforms and consumer-generated media (CGM) in hospitality and tourism context can be categorized into community-based websites and transaction-based online travel agencies (Gligorijevic, 2016). In the former case, online platforms like TripAdvisor, Yelp, and LonelyPlanet combine a variety of user data, information tools, and travel forums to represent different aspects of destinations, hotels, restaurant, etc. Examples of transaction-based platforms are Expedia and Bookings.com, where the focus is more on financial aspects of tourism and reviews are mainly considered as electronic word-of-mouth (Xiang et al., 2017). For the accuracy, representativeness, and quality of data in SM research in general, and online reviews in particular, differences between these data sources must be considered. For instance, data gathered about a

specific destination from social networking sites such as Facebook and Twitter are unstructured in nature, which makes the interpretation challenging, while exploring structured data collected from other online travel communities like TripAdvisor is more practicable.

TripAdvisor is one of the largest travel sites, the world's largest travel community of 463 million average monthly unique visitors, has over 860 million reviews and opinions of hotels, restaurants, attractions and tourism destinations (TripAdvisor, 2020). TripAdvisor has a unique feature of "Top Things to Do" for each specific tourism destination, which provides classified review-based information for the whole destination. Travelers can limit their search results based on different criteria and "Types of Attractions" such as "Nature and Parks," "Outdoor Activities," "Sights and Landmarks," etc. This destination-based feature has made TripAdvisor as an appealing avenue for hospitality and tourism studies, especially for outdoor tourism destinations such as national parks and natural attractions. For example, in a study of 5,000 TripAdvisor reviews of hotels in Texas, USA, relationships between sentiment, rating, volume and variation of reviews and hotel performance was examined; results revealed that overall and specific ratings, cleanliness, variation and volume of reviews, and the number of management responses were significantly associated with hotel performance (Xie et al., 2017). Another study of 373 TripAdvisor reviews of Costa Rica ecolodges found influential factors on ecotourists' satisfaction using exploratory content analysis and linear regression (Lu & Stepchenkova, 2012). Pearce and Wu (2018) also used an exploratory content analysis of 350 TripAdvisor reviews of entertainment performances at a China-based attraction. Their findings suggest that international tourists were generally positive toward the entertainment while sharing their experiences in TripAdvisor, and were mainly attracted to the culturally distinctive style of it (Pearce & Wu, 2018). Another study examined 20,000 TripAdvisor reviews of 106 attractions in New Orleans, USA. Using review readability,

reviewer characteristics, and review rating, factors that made a review to be judged as helpful were examined. Their results showed that review readability and reviewer characteristics are the most influential factors to affect the perceived value of reviews (Fang et al., 2016).

Xiang et al. (2017) divided elements of an online review into core components including linguistic features (characteristics related to textual content), semantic features (semantic relationships between linguistic entities), sentiment (subjective valence of an opinion), source of review (the reviewer information), rating, and review helpfulness. Linguistic components of online reviews are mainly used for measuring argument quality through looking at elements such as appropriate amount of data, ease of understanding, timeliness, relevancy, completeness, review length, word count, and readability (e.g., Fang et al., 2016). Semantic features refer to latent dimensions such as words and topics that are considered for identifying semantic relationships between linguistic entities. Sentiment features are widely used for valence identification (i.e., positive, negative, or neutral) and subjectivity analysis of online reviews (Pang & Lee, 2008). Review source contains demographic information of reviewer and represents the credibility of the information provider (Kusumasondjaja et al., 2012). Rating and helpfulness are the last two components of online reviews, with the rating as the reviewer's overall evaluation and level of satisfaction of the experience (e.g., Park & Nicolau, 2015; Xiang et al., 2015), and review helpfulness as the measure for review quality from a reader's point of view (e.g., Liu & Park, 2015).

Given the importance of SM in informing and sharing tourists' options and shaping the success of destinations, SM served as the data source for this dissertation. Specifically, TripAdvisor posts were examined to understand factors that predict loyalty to Jasper National Park

(including competitive advantages) and visitors' discourses relating to climate change and visitation to the Canadian Rocky Mountain national parks. To facilitate this, a strong understanding of best practices for extracting meaning from tourists' social media postings is necessary. This goal is addressed in Chapter 2 (Study 1). The rest of this dissertation is structured as follows: Chapters 2, 3, and 4 discuss 3 research studies of "systematic literature review of SMA in hospitality and tourism", "antecedents of loyalty toward JNP on TripAdvisor", and "tourism-related climate change perspectives: Social media conversations about Canada's Rocky Mountain National Parks", respectively. Chapter 5 is the conclusion section of the dissertation and includes a summary of the points and findings of each study.

Ethical Consideration in Web Data Extraction

Tourism online review websites represent a new way of word-of-mouth recommendations in which tourists can search for information, share their travel experience, and rate their overall evaluation of a destination. These UGC data exist in different forms such as text, photos, tags, audio, or video, and are publicly accessible to others. With the world covered by a network of "human sensors" and the rise in the amount of UGC, 'citizens as sensor' are now actively sharing their opinions, ideas, and information with each other and the online world (Goodchild, 2007). Automatically extracting information from web documents, what is referred to as web mining, aids DMOs and tourism providers to build detailed tourist profiles when used in a business setting. Mining data from web, however, raises significant ethical concerns such as privacy and individuality. From an ethical point of view, people should have control on consenting or withholding consent for the use of information that is being collected. Furthermore, this collected personal data could be misused for a purpose other than the primary reason for which it was

collected. Individuals do not fully understand how their personal data is currently used and, perhaps more problematically, they do not know how their data will be used in the future (Dwivedi et al., 2020).

Alternatively, some argue that the knowledge revealed through web-data mining is important in many ways and can bring many benefits such as improving the intelligence of search engines or advancing marketing intelligence through investigating online behaviors (Van Wel & Royakkers, 2004). By analyzing government records and useful web information, DMOs can identify potential visitors for their destinations and create categorized and clustered customer profiles, which can in turn contribute to their targeting strategy and competitiveness of their destination (Ritchie & Crouch, 2011). Web-data mining in tourism cannot only help DMOs to retain current visitors through providing personalized services, but can also contribute to the search for new visitors (Johnson et al., 2012).

Van Wel and Royakkers (2004) distinguished three forms of web-data mining to structurally analyze the many ways to mine the web; content mining (i.e., content data available in web documents such as images, audio file, text, etc.), structure mining (i.e., focuses on link information and the way in which different web documents are linked), and usage mining (i.e., also referred to as 'log mining', it involves with mining the web server logs such as transaction data and users' interactions with the web). Violation of individuals' information and protecting the privacy of Internet users is one of the most noticeable ethical concerns. Informational privacy refers to the ability to protect information about ourselves (Van Wel & Royakkers, 2004). Based on this definition, our privacy can be violated when information concerning us is acquired, used, or publicized, especially if this occurs without our knowledge and agreement.

In the case of web-data mining, peoples' privacy might be directly violated in the process of obtaining information. Discovered information is further classified and clustered into profiles for decision-making support purposes, and people may feel their privacy is violated. However, when the data is made anonymous before creating these profiles the discovered information no longer relates to distinct persons, and there is no direct sense of privacy violation because the produced profiles do not have 'real' personal data anymore (Custers, 2001). From an individualism point of view, group profiles produced from web-data mining can be applied as if they are personal data and may leads to the unfair judgement of people – what is referred to as deindividualization. If this is the case, Van Wel and Royakkers (2004) suggest extending the definition of privacy by denoting to categorical privacy, which would consider group characteristics as if they are individual characteristics and treated as personal data.

The use of Artificial Intelligence (AI) and Machine Learning (ML) models for research purposes raise many ethical concerns, which may vary depending on the focus and scope of the research project. Bechmann and Zevenbergen (2020) developed a set of guidelines for research ethics evaluation of Internet search studies, and suggested researchers to follow these steps and address some fundamental issues in the use of AI technology to datasets that contain data about humans or traces of human behavior (Bechmann & Zevenbergen, 2020). Looking at the possible misuse of web content and structure data, it seems there is little that can be done to limit the ethical issues other than to rely on legal measures that offer a baseline level for handling the problem. Another useful solution for this ethical dilemma would be to check websites' privacy enhancing technologies (PETs) and comply with the 'allow/disallow-mining standards,' as web mining of personal data is not often prevented by legal measures. Search engines use web agents, also known as robots, to create the indexes for their databases searches. The 'robots exclusion protocol' or

simply ‘robots.txt’ is a standard used by websites to interact with web crawlers and other web robots to specify which areas of the website should not processed, and how the site is to be catalogued. In other words, it is a text file that outlines what documents and/or directories are forbidden to be scrapped. For this purpose, “www.NAME.DOMAIN/robots.txt” will be navigated to scrape websites according with their scraping policy (e.g., “www.TripAdvisor/robots.txt” for checking TripAdvisor’s robots.txt). After checking TripAdvisor’s allow/disallow standards and directories, it was revealed that reviewers’ info (e.g., name, gender, age, origin, number of reviews, etc.) are disallowed for crawling, while reviews alone (textual contents) are allowed and completely accessible. TripAdvisor Content API is only available for consumer-facing travel websites and applications. TripAdvisor grants only a limited number of API keys and does not allow access to the Content API for purposes of data analysis, academic research, and any use other than a consumer-facing (B2C) travel website or application (TripAdvisor, 2019).

CHAPTER 2: Literature Review of Social Media Analytics in Tourism

Study 1: Social Media Analytics in Hospitality and Tourism: A Systematic Literature Review and Future Trends

Abstract

Purpose –This paper provides a review of hospitality and tourism studies that have employed social media analytics to collect, examine, summarize and interpret "big data" derived from social media. It proposes improved approaches by documenting past and current analytic practice addressed by the selected studies in social media analytics.

Design/methodology/approach – Studies from the last 18 years were identified and collected from five international electronic bibliographic databases. Social media analytics-related terms and keywords in the titles, keywords, or abstracts were used to identify relevant articles. Book chapters, conference papers, and articles not written in English were excluded from analysis. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guided the search, and Stieglitz and Dang-Xuan's (2013) social media analytics framework was adapted to categorize methods reported in each article.

Findings – The research purpose of each study was identified and categorized to better understand the questions social media analytics were being employed to address, as well as the frequency of each method's use. Since 2014, rapid growth of social media analytics was observed, along with an expanded use of multiple analytic methods, including accuracy testing. These factors suggest an increased commitment to and competency in conducting comprehensive and robust social media data analysis. Improved use of methods such as social network analysis, comparative analysis, and trend analysis is recommended. Consumer review networks and social networking sites were the main social media platforms from which data was gathered, simultaneous analysis of multi-platform/sources of data is recommended to improve validity and comprehensive understanding.

Originality/value – This is the first systematic literature review of the application of social media analytics in hospitality and tourism research. The study highlights advancements in social media analytics and recommends an expansion of approaches; common analytical methods such as text analysis and sentiment analysis should be supplemented by infrequently used approaches such as comparative analysis and spatial analysis.

Key words: social media analytics, user-generated content, topic modeling, sentiment analysis, spatial analysis, comparative analysis, text analytics

1. Introduction

Use of the Internet has profoundly changed the way tourists search for information, plan their trips, and even how they share travel experiences with others (Buhalis & Law, 2008; Hays et al., 2013; Xiang & Gretzel, 2010). The advent of Web 2.0 developed new channels for Internet users to communicate and cooperate with each other, and to share user-generated content such as forums, online reviews, photos, and videos throughout different social media platforms.

Social media is a group of Web 2.0 online tools, applications, platforms and media that allows people to create and exchange user-generated content in peer-to-peer communication channels, ranging from social networking and consumer review sites to online content communities, wikis, and other types of information and communications technology tools (Kaplan & Haenlein, 2010; Zeng & Gerritsen, 2014). Travelers can post their opinion about a diverse range of hospitality and tourism products, from hotel room cleanliness and restaurant and food services, to the quality of tourism destination attractions. These online comments and reviews in turn affect the perceptions and decision processes of other potential tourists. Social media is also a place for hospitality and tourism actors to initiate conversation with their consumers, draw inspiration for long-term strategies, promote their brands, and make better business decisions.

Early studies of social media and user-generated content tended to use small samples of data. However, datasets are growing so fast and are so complex that special analytics, technological infrastructures, and tools are becoming necessary to tackle this so-called "big data." SMA examines large amounts of available data on social media (SM) platforms through advanced analytical techniques, revealing hidden patterns and themes, and discovering unspecified correlations and other beneficial information not identifiable through traditional methods (Elgendy

& Elragal, 2014). SMA applies robust Natural Language Processing and machine learning techniques to collect and analyze data from SM websites. Tourism-related SM domains present a rich source of content for this growing analytics field (Xiang et al., 2017).

This paper reviews the hospitality and tourism studies applying a diversity of analytic tools and methods to collect, analyze, summarize, and interpret SM data. The main purposes of this systematic review are to: provide an integrated definition of SMA covering the wide range of research methods; identify the main research purposes that scholars have pursued through the application of SMA and map the methods most frequently used to address them; document, over time, the most and least common SMA methods and recommend application of underutilized methods relevant to the advancement of the tourism sector; identify the disciplinary literature where tourism and hospitality SMA studies have been published, specifying the countries and industries of focus; and finally, highlight knowledge gaps and recommend research agendas for tourism and hospitality related SM data analysis.

2. Social Media Analytics: An Integrated Definition

The tremendous growth of SM and the proliferation of Internet-based SM applications have redefined tourism and hospitality research and practice. Web 2.0 enabled SM platforms to provide vast amounts of user-generated content existing in microblogs, SNS, discussion forums, and multimedia sharing websites to practitioners and service providers who seek to understand, attract and satisfy their consumers. Knowledge derived from SM is a must for service providers who seek to identify hidden risks and potential opportunities, optimize their performance, and grow competitive advantage. However, gaining meaningful insights into SM's massive amount of

information, opinions and sentiments is complicated by the volume of the content generated daily and the number of users on a variety of platforms.

SMA is an interdisciplinary field of study designed to assist analyses of SM's structured and unstructured big data. In fact, SMA "is concerned with developing and evaluating informatics tools and frameworks to collect, monitor, analyze, summarize, and visualize social media data, usually driven by specific requirements from a target application'' (Zeng et al., 2010, p. 14). In other words, SMA combines a variety of techniques such as Web crawling, computational linguistics, machine learning, and statistical methods to collect, analyze, and interpret SM data for different purposes such as tracking trending topics, opinion mining and sentiment analysis, or even spatial analysis of geo-referenced information (Xiang et al., 2017). The main steps toward SMA are data collection, data preparation, pre-processing, and lastly evaluation of the results through a variety of analytical and visualization techniques including text summarization and classification, Natural Language Processing (NLP), and spatial clustering methods (Andrienko & Andrienko, 2013; Hippner & Rentzmann 2006). A range of analytic approaches have recently been applied in hospitality and tourism for different purposes such as: examining the underpinnings of satisfied versus unsatisfied hotel customers (Berezina et al., 2016); understanding preferred hotel attributes and main concerns of hotel customers through opinion mining and sentiment analysis of online reviews (He et al., 2017); investigating the co-creation process and travelers' knowledge-sharing behaviors in online communities (Edwards et al., 2017); and, analyzing geo-tagged Twitter messages for mapping global patterns of international travelers' mobility by country of residence (Hawelka et al., 2014). To guide this review of SM analytic techniques and trends in hospitality and tourism, definitions of the most common SM analytic approaches are provided below.

2.1. Text Analysis and Sentiment Analysis

While text analysis and text mining have a broad scope and generally aim to parse textual data in order to extract machine-readable facts, sentiment analysis is a specific form of text analysis for valence identification and subjectivity analysis of user-generated content. The overall contextual polarity of Web-based textual information and different forms of user-generated content, whether positive, neutral, or negative, can be measured through the application of sentiment analysis methods (Alaei et al., 2019). Drawn from progress in computing science, information technology, and linguistics, sentiment analysis reveals subjective opinions and feelings about a product or service through different analytical methods such as NLP, computational linguistics and text analysis.

Sentiment analysis can be used at three different levels: document-level, sentence-level, and aspect-based. The purpose of document-level sentiment analysis is to determine the overall opinion on a particular entity such as a product, service, hotel, or tourism destination. On the other hand, sentence-level sentiment analysis assumes that one document contains multiple opinions, and splits different sentences into phrases where the polarity of each subjective sentence can be further analyzed and classified into positive or negative classes. Finally, aspect-based sentiment analysis applies when a range of attributes are involved, and the goal is to recognize sentiment expressions and identify different opinions about one entity (Feldman, 2013). For example, Chang et al. (2019) proposed an integrated framework for sentiment analysis and category detection of Hilton hotel reviews and ratings from TripAdvisor, revealing the most negative terms being used by dissatisfied business travelers during their stay.

Two main approaches exist for valence classification of user-generated content -- the classic lexicon-based approach (also referred to as “unsupervised technique”), and the supervised

classification method. The lexicon-based approach compares the features of the text against pre-defined positive and negative sentiment lexicons, and determines whether the document has a more positive or negative tone. One potential challenge for the sentiment detection of online reviews through a lexicon-based approach is that this method is highly domain-dependent, so constructing domain-specific sentiment lexicons matching the hospitality and tourism context and reporting changes appears to be crucial (Xiang et al., 2015). In the supervised classification method, a training dataset is first developed to distinguish a document's characteristics, and is further applied to test data (Feldman, 2013). Both methods have been used for sentiment analysis of hospitality and tourism studies such as multi-dimensional sentiment analysis of restaurant reviews or the evaluation of online destination images through massive user-generated content (Gan et al., 2017; Marine-Roig & Clavé, 2015).

2.1.1. Supervised Machine Learning

Supervised learning refers to a machine learning classification technique that uses sample pairs of input-output data to learn a classification model, also known as labeled training dataset, to further determine the class labels for unobserved instances. This new set of input data predicts the output variables and class attributes for the unlabeled data by using one of the common classification algorithms (e.g., Support Vector Machine (SVM), Naïve Bayes (NB), Logistic Regression (LR), or K-Nearest Neighbors (KNN)) (Feldman, 2013; Pang et al., 2002).

Although supervised machine learning techniques have shown relatively better performance than unsupervised methods (Chaovalit & Zhou, 2005; Kirilenko et al., 2018), they are not widely used in hospitality and tourism research. One limitation could be the need for large expert annotated training data to be created from scratch, as the method may fail when training

data is insufficient. In one of the first attempts to apply the supervised classification method in hospitality and tourism, O'Mahony and Smyth (2010) tried to identify the most helpful TripAdvisor hotel reviews by comparing the performance of different classification techniques ("helpfulness analysis"). They proposed an automatic recommender system that suggests the most helpful reviews to end-users based on the classifier used. In another study by Ye et al. (2009) that reported sentiment classification and review mining of travel blogs for popular travel destinations in the US and Europe, three supervised machine learning algorithms, namely NB, SVM and N-gram model were compared. Their results indicated that the SVM and N-gram approaches outperformed the NB approach, while all three approaches reached acceptable accuracy levels when employed for larger training datasets.

2.1.2. Unsupervised Machine Learning

Unlike supervised learning, the unsupervised approach to SM analysis does not require prior training in order to classify the data, as only input data (X) is used. The lexicon-based method is a popular unsupervised method for determining the polarity and semantic orientation of SM statements that involves predefining lexicons of positive and negative words and phrases (Taboada et al., 2011; Turney, 2002). The vast majority of the hospitality and tourism studies apply an unsupervised approach of sentiment identification to investigate attributes and sentiments of SM data. Examples include a multidimensional sentiment analysis of restaurant online reviews for explaining differences in star ratings (Gan et al., 2017), comparing sentiments expressed on major online review platforms such as TripAdvisor, Expedia, and Yelp (Xiang et al., 2017), and analyzing travelers' perceptions of place through sentiment detection of DMOs' official websites,

user generated content from review blogs, and editorial content of Anglo-American news media sites (Költringer & Dickinger, 2015).

2.2. Computer-Assisted Content Analysis and Topic Modeling

Content analysis is a popular research method employed in the humanities, social sciences, and recently the engineering field for systematically studying, examining, and categorizing documents and written texts (Berelson, 1952). From an epistemological perspective, content analysis can be divided into qualitative and quantitative content analysis. In contrast to qualitative approaches where human readers examine text and images for patterns through repeated, systematic readings of the same data (e.g., see Halpenny & Blye, 2017; MacKay et al., 2017), quantitative content analysis uses statistical methods to infer from the text by applying substitution and correlational methods (Stepchenkova et al., 2009). Quantitative content analysis has received special attention in recent years due to the exponential growth of electronic and online data such as that found on SM platforms and virtual communities. This massive amount of easily-accessible textual data, along with the emergence of computer-based textual data analysis methods, has revolutionized the use of content analysis research in social sciences (Macnamara, 2005).

Topic modeling is a probabilistic method that employs statistical machine learning techniques such as Probabilistic Latent Semantic Analysis (pLSA) and Latent Dirichlet Allocation (LDA) to identify abstract patterns and hidden semantic structures in textual data (Blei et al., 2003). In hospitality and tourism, topic modeling has been used for different purposes such as comparative analysis of multiple online review platforms (Xiang et al., 2017), tourist satisfaction analysis of hotel visitors (Guo et al., 2017), consumer perceptions of hotel products and services

(Xu et al., 2017), and exploring TripAdvisor posts to document international tourists' experiences of a Chinese entertainment show (Pearce & Wu, 2018).

Cluster analysis is another classification method for grouping unknown categories and data based on a suitable measure of similarity and distance between two documents, commonly known as vectors. Cluster analysis and topic modeling are closely related. However, cluster analysis aims to create similar groups and to partition data into coherent sections through a range of clustering algorithms, while topic modeling seeks latent themes and topics in the corpus through the use of probabilistic generative models that identify similar words occurring in similar contexts (Grimmer & Stewart, 2013). As an example, Bassolas et al. (2016) used Twitter data to perform a hierarchical cluster analysis of group visitors at different tourist sites, and classified travelers by different factors such as country of residence and spatial networks. In another study by Jankowski et al. (2010), a spatial clustering was conducted to classify tourists' preferences for landmarks based on their photos posted on Flickr.

2.3. Trend Analysis

Trend analysis refers to techniques and methods for extracting, identifying, and predicting behavioural patterns and trends through analysis of time series and other longstanding statistical methods, from forecasting the growth of visits from a tourism destination to predicting the effectiveness of tourism marketing campaigns, which would otherwise be hidden because of noisy data (Fan & Gordon, 2014). Demand prediction and strategic decision-making support systems for tourism and hospitality have been demonstrated through analysing the photo-sharing SM platform, Flickr (Miah et al., 2017), predicting customer trends and needs for value creation of smart tourism destinations (Del Vecchio et al., 2018), exploring Google Trend data for trend identification in

travelers' hotel ratings and reviewing behaviours (Chang et al., 2019), and proposing a functional model for estimating destination tourists' future trends and preferences through TripAdvisor review analysis (Pantano et al., 2017).

2.4. Predictive Analytics

Predictive analytics seek to uncover patterns and predict future outcomes by applying a variety of regression and machine learning techniques to historical and current data (Gandomi & Haider, 2015). In practice, predictive analytics in hospitality and tourism can be applied to forecast travelers' and visitors' next moves based on where and when they go to a destination and what they say on SM. Studies are using regression methods to predict linear change in customer ratings for hotels based on change in customer sentiment polarity (Geetha et al., 2017), estimating hotel demand from user-generated data obtained from multiple SM sources (Ghose et al., 2012), exploring rating prediction accuracy of user reviews in tourism through the application of the Root Mean Squared Error (RMSE) technique (Rossetti et al., 2016), and proposing a decision support model to help independent tourists find satisfactory restaurants based on social information retrieved from TripAdvisor (Zhang et al., 2017).

2.5. Social Network Analysis

Social network analysis encompasses methods that uncover associations between actors (nodes) and their relationships (links) within a social network, from physical connections to intangible relationships such as information sharing, friendships, or their affiliations (Carrington et al., 2005). The application of social network analysis in the hospitality and tourism context is rare and very recent, but this method can provide comprehensive patterns and structures of ties

and relations between tourists within different SM platforms. In recent research by Edwards et al. (2017), the social network of the major contributors to TripAdvisor's Sydney Travel Forum was visualized, and knowledge structures of local experts and ambassadors of the destination were explored. A second study by Jin et al. (2018) used social network analysis to explore the temporal heterogeneity in tourist flow networks corresponding to length of trip.

2.6. Spatial Data Analysis: The Importance of Where

Tourism is a fundamentally spatial phenomenon. Geographically referenced (geo-tagged) photos on SM platforms such as Flickr, Twitter, or Facebook make tourists traceable, and allow their preferred destinations, landmarks, and routings to be easily revealed (Goodchild, 2007; Majid et al., 2013). DMOs, hospitality industries, and food service companies can investigate the spatial associations and relationships of popular tourism regions and territorial units using geographic information system (GIS) tools and spatial data analysis methods.

Spatial analysis refers to the process of turning geographical raw data into useful information through the application of analytical methods and techniques (Haining & Haining, 2003). Fischer and Wang (2011) suggest dividing spatial data based on discreteness of the variable values, resulting in four categories: point pattern data, field data (geo-statistical data), area data, and spatial interaction data, with the latter two categories as the most commonly used in hospitality and tourism-related research and elaborated on here. The focus of area data is on the analysis of object data (i.e., tourist) where the observations relate to areal units such as a tourist's movements or their information transmission, while in spatial interaction data an analysis of origin–destination flow is the main point of interest (Fischer & Wang, 2011).

Exploratory spatial data analysis (ESDA), mapping and geovisualization of the spatial area data helps suppliers and marketers describe the spatial distributions of popular tourism locations and predict high demand areas. It also helps to discover patterns of spatial clusters, as well as visualize and explore spatial interaction data such as daily tourists' traffic flow (Bassolas et al., 2016; Chua et al., 2016; Jin et al., 2018; Oender, 2017; Önder et al., 2016; Zhou et al., 2015).

Huang et al. (2017) proposed a model to describe the relationship between travelers' destination choice and characteristics of the environment by analyzing online check-in activities and geo-tagged SM data. They concluded that locations with greater diversity of services are more attractive to tourists, while locations with more similar types of services such as restaurants and recreational services can attract more mainstream visitors (i.e., mass tourism). In a study of Barcelona Airbnbs, Gutiérrez et al. (2017) analyzed geo-tagged SM photographs from sightseeing city spots and compared spatial patterns of hotels and peer-to-peer accommodations. Their results revealed spatial associations between tourists' accommodation and places visited, confirming that tourists tend to stay at locations close to attractions they wish to visit. In a relatively similar study Salas-Olmedo et al. (2018) examined Madrid tourists' SM posts. Three data sources, namely Panoramio for sightseeing components, Twitter for connectedness and accommodation, and Foursquare for interactions on the social networks were compared, and digital footprints and different activities of tourists were tracked. Their results strongly recommend that researchers compare results from multiple data sources in a complementary manner when analyzing the presence of tourists in a tourism destination.

2.7. Comparative Analysis

Comparison plays an important role in social science research, ranging from evaluating products and services in business settings, to contrasting individuals and groups within societal contexts. Comparative analysis refers to any direct, item-by-item comparison of two or more comparable alternatives such as methods, products, qualifications, datasets, etc. While closely related, comparative sentence mining differs from opinion mining and sentiment analysis. The main focus in sentiment analysis is on opinion extraction and sentiment classification of one entity based on the subjective opinion of the author into positive or negative. In contrast, comparative sentence mining is a type of comparative analysis of textual data (e.g., user-generated content, forum discussions, blogs) that seeks to mine comparative relations including extraction of entities, features being compared, and comparative keywords through classifying comparative sentences into harmonized groups (Jindal & Liu, 2006). Comparative opinions are normally provided by highly experienced customers and can help service providers understand their products or services in comparison to their competitors', the so-called "competitiveness analysis". Comparative relation mining enables businesses to analyze positioning and market structure, identify competitors, and recognize strengths and weaknesses. For example, in a study completed by Gao et al. (2018), a competitiveness analysis of competitor identification using comparative text mining and sentiment analysis was applied, through which strengths and weaknesses of Chinese restaurants against their competitors were compared. In another study by Chiu et al. (2015) comparing Chinese weblogs, sentiment classification performance of supervised semantic orientation was used to reveal customers' opinions about hotels. This mixed method approach produced more robust classification and forecasting performance.

With this overview of the diverse range of SM data types and related techniques and tools used for their analysis, the documentation of researchers' efforts to engage in SMA can now be discussed, along with the methods this paper uses to examine scholarly literature.

3. Research Methodology

This systematic review builds upon the 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA) guidelines, in an effort to systematically assess the quality and quantity of hospitality and tourism research employing SMA (Liberati et al. 2009; Moher et al., 2009). Inclusion and exclusion criteria at different stages are described in a reporting flowchart (see Fig. 2).

The review protocol, including search terms, databases, and screening criteria, was developed and guided by study objectives to conduct the literature search. First, an exploratory search in Google Scholar was conducted in order to identify relevant search terms such as "social media analytics," "opinion mining," "sentiment analysis," "text analysis," "predictive analytics," "topic modeling," "spatial analysis," and "comparative analysis." Search strings combining these search terms were used to identify studies that had employed SMA in hospitality and tourism related research. In order to reduce the number of search strings, wildcard symbols (e.g. *) were also employed when necessary. Combinations of two sets of keywords were used, with the first term being 'social media analytics' ('tourism and hospitality' were also added to ScienceDirect and Scopus databases), the second term being the rest of the keywords.

Five academic databases were identified from prior hospitality and tourism review publications and searched for this review. They included: SAGE, EBSCOhost, Google Scholar,

Science Direct, and Scopus (Leung et al., 2013; Yang et al., 2017). To safeguard the quality of this review, it considered only original research articles published in English-language peer-reviewed journals from 2000 to 2018 that contained the aforementioned search terms in the title, abstract, or keywords. Book chapters, conference papers, and articles not written in English were excluded. Additional filters were used in certain databases, such as EBSCOhost and Scopus, that provide options to limit the search to Hospitality and Tourism Complete, Social Science, or Business, Management, and Accounting. Publications were selected from 2010 onwards, since that is when SMA began to emerge in the academic and business communities.

As of March 1st, 2018, the literature search against the five databases resulted in 1973 records. These were exported to RefWorks reference management software for further analysis. After removing 1379 duplicate references, the remaining 594 records were screened against the literature selection criteria. As the assessment progressed, each paper was independently reviewed by each author to determine its relevance. Abstracts were read first, and the full text of articles was assessed when additional clarity was needed. Further, studies were discarded due to the methodological analysis technique employed (e.g., qualitative, human coding of text). Additionally, studies were rejected that employed the use of crawlers and scraping services, which use analytic tools to extract data but not analyze it. Articles that did not have a sufficient tourism or hospitality focus (e.g., travel related to daily commuting rather than tourism) were similarly eliminated. The screening process yielded 146 records, of which the full texts were carefully reviewed for eligibility in the final analysis. Only 82 studies were identified as eligible. During this stage, the reference lists of eligible articles were also independently cross-checked by the author to identify papers that might have been overlooked. This hand-search revealed three additional studies, bringing the total to 85 studies for the final analysis. Figure 2 outlines the

number of studies screened and excluded at different stages of the literature review. The reporting flowchart was in accordance with the PRISMA Statement with minor adjustments (Moher et al., 2009).

3.1. Classification Framework

In this study, the SMA process proposed by Stieglitz and Dang-Xuan (2013) was used to inform the classification framework (Figure 3). Based on this widely accepted SM analytical framework (Stieglitz et al., 2014; Stieglitz et al., 2018), the process of analyzing SM content included three steps: tracking, preparation, and analysis. After a thorough review of SMA methods used to achieve these processes, relevant scholarly journal articles were categorized and evaluated based on the application of the following SM analytical methods: (a) text analysis, (b) sentiment analysis, (c) content analysis, (d) trend analysis, (e) predictive analytics, (f) social network analysis, (g) spatial analysis, and (f) comparative analysis.

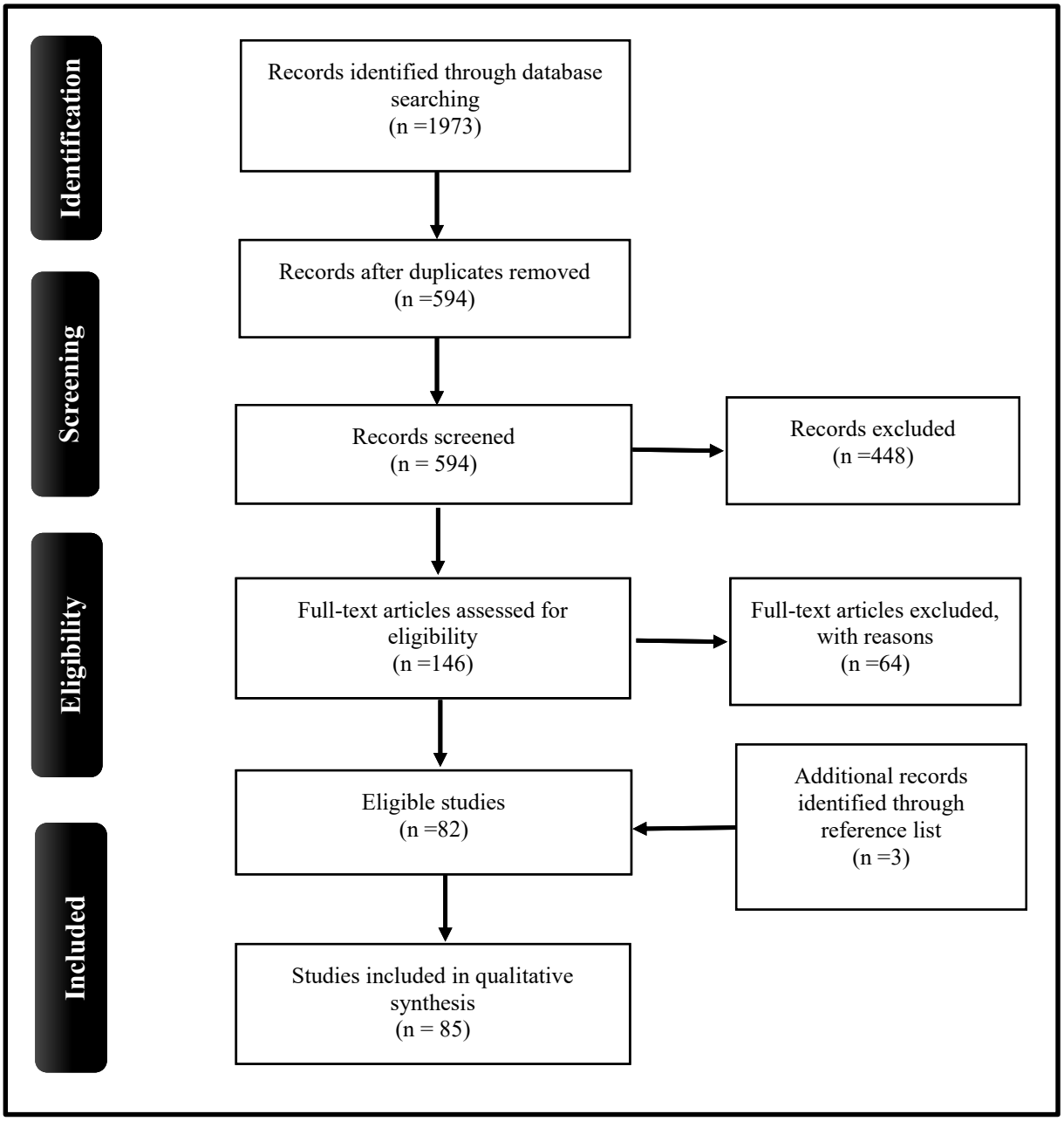

Figure 2. PRISMA Flowchart, adapted from Moher et al. (2009)

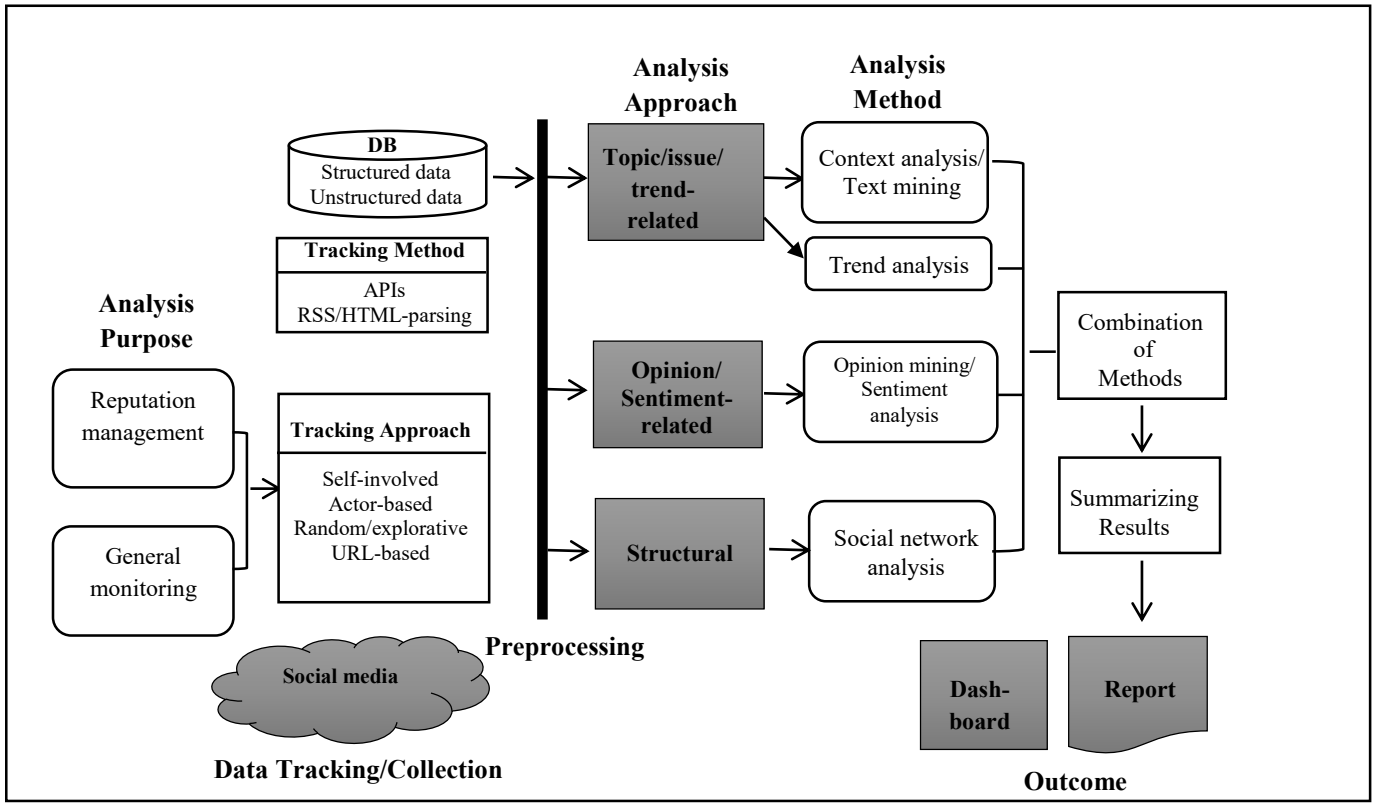

Figure 3. Social media analytics framework adapted from Stieglitz and Dang-Xuan (2013)

The reviewed articles were also sorted by context: (a) hospitality, (b) travel and tourism, and (c) food and beverage. Depending on the types of SM platforms on which each study focused, articles were also sorted into the following categories: (a) social networking sites (SNS), (b) media and content communities, (c) discussion forums, and (d) consumer review sites. SNS refers to web-based applications and services such as Facebook, Twitter, or Sina Weibo (China's equivalent of Twitter), where public or semi-public users can connect with each other and share similar personal interests, lifestyle, or activities based on the nature of the site (Boyd & Ellison, 2007). While SNSs are mainly organized around people rather than interests, publicly accessible online discussion forums such as TripAdvisor Travel Forum were developed so that people with common interests can share their knowledge and experience in different areas. Media and content communities refer to web and mobile applications which enable their users to share particular

kinds of content such as photos (Flickr and Panoramio) and videos (YouTube). Finally, consumer review sites refer to platforms on which consumers can post content on products and services. Online review platforms in hospitality, tourism, and food services can vary from community-based platforms such as TripAdvisor and Yelp, to transaction-based online travel sites like Expedia and Bookings.com. While both types of review sites are perceived as electronic word-of-mouth, different sociocultural and economic systems with distinctive business models are followed by each (Xiang et al., 2017). Initial coding effort results were compared, and disagreements were clarified through several meetings between the co-researchers. At the end of this process, research articles were coded using a collaboratively agreed upon coding approach (Creswell & Creswell, 2018; Wamba et al., 2015).

4. Results

4.1. Descriptive Analysis of Articles by Overall Growth, Publication Source, and Research Regions

Descriptive analysis of published articles on hospitality, tourism, and food services using SMA revealed that application of these methods is still at an early stage of development (Figure 4). A strong growth trend between 2014 and 2017 was observed, with 27 publications documented in 2017.

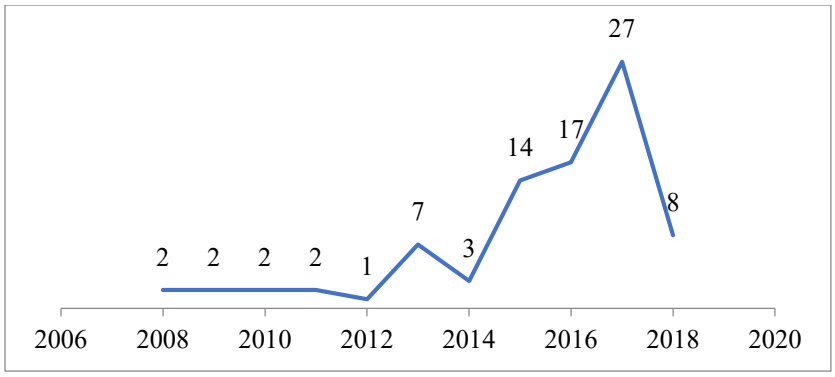

Figure 4. Distribution of articles by year of publication (only 6 months of 2018 included in analysis)

Articles were published in 39 different journals affiliated with the following disciplinary subject areas: hospitality and tourism management; business, management, and marketing; computer science, information technology, and artificial intelligence; and transportation, geography and environmental science. Results show the willingness of a variety of journals to publish studies from the multidisciplinary hospitality and tourism research area (Figure 6). Among them, top journals were *Tourism Management* (17 publications), *Information Technology and Tourism* (6), *International Journal of Hospitality Management* (6), *Journal of Travel Research* (5), *Information and Management* (4), *International Journal of Information Management* (3), and *Expert Systems with Applications* (3) (Figure 5).

Figure 5. Distribution of articles by the publication source (journals with single articles are not reported)

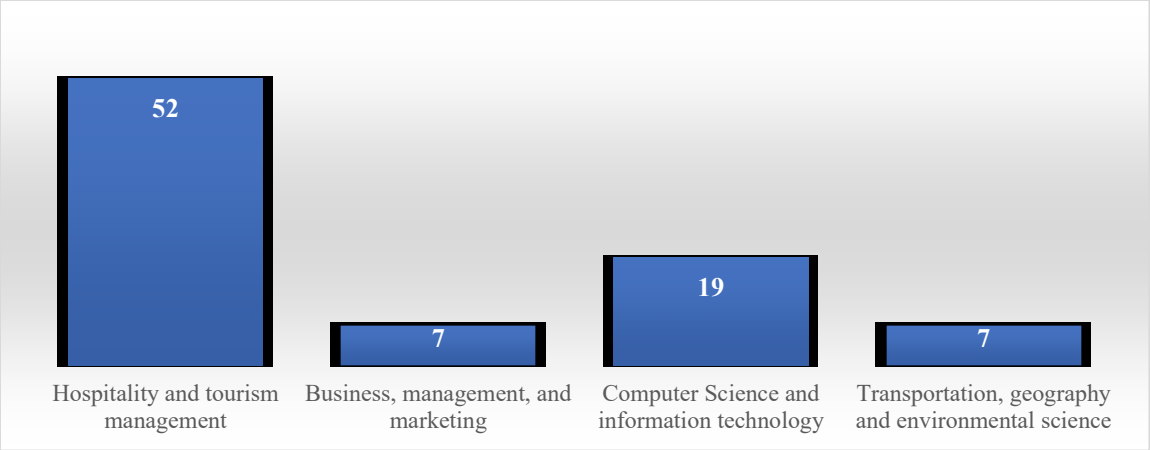

Figure 6. Distribution of articles by the area of research

Studies were based in Asia, Europe, North and South America, and Oceania, with North America and Asia serving as the most frequent study settings (Figure 7). The USA was the leading study context with 29 studies, followed by China with 10 studies, and Australia and Italy with six. Also, 12 articles used a combination of different locations mainly for the purpose of comparative analysis, while seven studies didn't report where the research was based.

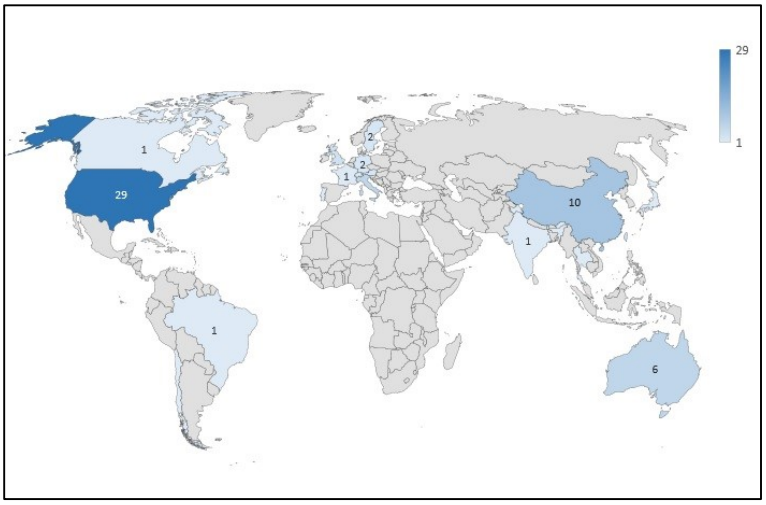

Figure 7. Distribution of articles by country of study context (Retrieved form www.Bing.com).

4.2. Distribution of Articles by the Area of Study

Hospitality and tourism experience is a multi-dimensional phenomenon in which different elements such as eating, sleeping, and even transportation play important roles. Food, an essential component of the travel and tourism experience, has become a popular subject area of study in recent years (Vu et al., 2019; Zhang et al., 2011), and this was parceled out as a separate subject matter when categorizing the selected articles. Since early SMA research in the hospitality and tourism domain targeted hotel industries for their case studies, it is not surprising that the highest number of publications in SMA focuses on hotels in the collection of articles (38 publications). Travel and tourism destinations and attractions ranked second with 37 articles, followed by 15 studies on food and beverage sectors. Only five studies considered a combination of different domains mainly for comparative analysis or quality assurance purposes.

4.3. Distribution of Articles by the Type of Social Media

As was discussed earlier in this chapter, SM platforms were divided into four main categories including SNS, media and content communities, discussion forums, and consumer review networks (Table 1). The largest number of articles examined user-generated content and online reviews from a variety of consumer review networks such as TripAdvisor or its Chinese equivalent Daodao.com (34 publications), Booking.com and Expedia (9 each), and Yelp (3). The second largest group of articles featured SNS data mainly from web-based applications such as Twitter or its Chinese equivalent Sina Weibo (14) and Facebook (4). Following close behind, media and content community platforms were most commonly used for SMA by hospitality and tourism scholars. Flickr was one of the most used content communities in 11 publications, mainly used for its geospatial analysis due to its geo-referencing feature, followed by a discontinued geo-tagged photo-sharing web application named Panoramio. Finally, the use of discussion forum data

for SMA in hospitality and tourism studies ranked last by having only five cases drawing from TripAdvisor Travel Forum and Yahoo Travel Forum. While around 20% of the articles (18 publications) used multiple platforms mainly from the same type of SM platforms (e.g., TripAdvisor and Booking.com, or Travelblog and other related blogs), only four studies considered a combination of two or more types of SM platforms for their analysis such as Twitter and TripAdvisor, or Twitter, Facebook, and Instagram (i.e., Kirilenko et al., 2018; Del Vecchio et al., 2018; Salas-Olmedo et al., 2018; Gutiérrez et al., 2017).

Table 1. *Distribution of articles by the type of social media.*

Social Media types	Number of articles	Percentage of articles (total=85)
Social Networking Sites (SNS)	16	19%
Media/Content Communities	15	18%
Discussion Forums	5	6%
Consumer Review Networks	53	62%
Combination	4	5%

The top five SM platforms reported on in the articles were: TripAdvisor or its Chinese equivalent Daodao.com (35 publications), Twitter and its Chinese equivalent platform Sina Weibo (14), Flickr (11), and Booking.com (6). The first two aforementioned platforms are among the most popular SM platforms especially in hospitality and tourism, with TripAdvisor having over 600 million reviews and opinions, and Twitter having approximately 320 million monthly active users worldwide (Statista.com, 2018).

One of the challenges of overreliance on a single source of data in SMA research is sampling bias due to the unique sociocultural characteristics of each platform's users (Tufekci, 2014). From the collection of articles, 18 studies chose to use a variety of sources for their

analytics, which in turn likely decreased validity problems, data availability biases, and authenticity concerns (Chiu et al., 2015; García-Pablos et al., 2016; Höpken et al., 2015; Ma et al., 2018; Phillips et al., 2015).

4.4. Distribution of Articles by the Type of Analysis

Table 2 represents frequencies of use for different types of SM analysis. This helps to identify gaps in SMA use and tendencies toward specific methods. Influenced by the SM analytical framework proposed by Stieglitz and Dang-Xuan (2013), types of analytical methods are divided into text analysis, content analysis, sentiment analysis (opinion mining), social network analysis, and trend analysis. This definition was expanded by adding predictive analytics, spatial analysis, and comparative analysis as potential categories. Topic modeling and cluster analysis were the two common approaches for content analysis. It is no surprise that many articles fit more than one of the eight categories. This was especially true for the categories of text analysis, sentiment analysis, and topic modeling, which showed the interdependency of the aforementioned methods and techniques such as text mining and NLP. Of the 85 articles, text analysis (65 publications), sentiment analysis (38; 23-applied unsupervised, 18-supervised, and 4-combined both), and topic modeling/cluster analysis (35) were the methods most often used, followed by spatial analysis (27), predictive analytics (16), and comparative analysis (15).

These observations can be explained by the fact that user-generated content, and online reviews in particular, contain useful textual information for consumers and travelers which can both help them in their decision-making process, and offer valuable insights for DMOs and service providers to align their marketing objectives with the consumers' needs. Also, further investigation of the articles that conducted a sentiment analysis revealed that 62% of studies applied

unsupervised machine learning methods in order to determine the contextual polarity of textual entities, and 48% employed supervised approaches for detecting valence and emotions from text. Only 11% of collected articles employed both supervised and unsupervised techniques (Table 3). Therefore, incorporating supervised and mixed methods can produce more robust and reliable results and improve the performance of the sentiment classification of the hospitality and tourism SM data (Chaovalit & Zhou, 2005; Kirilenko et al., 2018).

4.5. Distribution of Articles by the Purpose of Research

The purpose of research was categorized into four main streams: opinion mining, travel patterns, accuracy and performance testing, and visitation prediction (Table 4). Two-thirds of the studies generated a list of attributes for hotels, destinations, or restaurants (quality, features, etc.) and aggregated opinions about them using SM analytic methods, most commonly text analysis, sentiment analysis, topic or cluster analysis, spatial analysis, and comparative analysis. Research identified as opinion mining fits this description in its emphasis on extracting and analyzing judgments on particular aspects of destinations, hotels, or restaurants, namely image of given items (e.g., destination image), satisfaction, review helpfulness, and competitiveness analysis.

Identifying travel patterns and tourist flow, popular tourist locations, and desired tourism activities are other common goals of the hospitality and tourism-focused research. One-third of collected studies investigated these travel patterns, with the most common analysis methods being spatial analysis, topic and cluster analysis, text analysis, and predictive analysis. Performance measurement and accuracy testing of SM analytical methods was another purpose of research followed by seven percent of collected studies in which the most common analysis methods measured and assessed were predictive analytics, spatial analysis, trend analysis, topic modeling,

and text analysis. Finally, the main purpose of research for six articles was to predict places, hotels, landmarks, and restaurants that tourists would visit, through the application of analysis methods such as text analysis, sentiment analysis, predictive analytics, and comparative analysis.

Table 2. *Distribution of articles by the type of analysis.*

Type of analysis	Articles	Percentage of articles (total=85)
Text analysis	Berezina et al. (2016); Boo and Busser (2018); Brandt et al. (2017); Calheiros et al. (2017); Capriello et al. (2013); Chang et al. (2019); Cheng and Edwards (2015); Chiu et al. (2015); Crotts et al. (2009); Del Vecchio et al. (2018); Dickinger and Lalicic (2016); Edwards et al. (2017); Fuchs et al. (2014); Gan et al. (2017); Gao et al. (2018); García-Pablos et al. (2016); Geetha et al. (2017); Ghose et al. (2012); Girardin et al. (2008); Guo et al. (2017); He et al. (2013); He et al., (2017); Höpken et al. (2015); Hu and Chen (2016); Hu, Chen, and Lee (2017); Hu, Chen, and Chou (2017); Hwang et al. (2014); Ji et al. (2011); Kirilenko et al. (2018); Költringer and Dickinger (2015); Krawczyk and Xiang (2016); Kwok and Yu (2013); Lee et al. (2018); Li, Law et al. (2015); Li, Lin et al. (2015); Li et al. (2013); Liu et al. (2013); Ma et al. (2018); Mak (2017); Mariani et al. (2016); Marine-Roig and Clavé (2015); Marine-Roig and Clavé (2016); Marrese-Taylor et al. (2014); Miah et al. (2017); O'Mahony and Smyth (2010); Park, Jang et al. (2016); Park, Ok et al. (2016); Pearce and Wu (2018); Pekar and Ou (2008); Philander and Zhong (2016); Rossetti et al. (2016); Thomaz et al. (2017); Vu et al. (2019); Wang et al. (2017); Xiang et al. (2015); Xiang et al. (2017); Xie et al. (2017); Xu and Li (2016); Xu et al. (2017); Ye et al. (2009); Zhang and Cole (2016); Zhang et al. (2017); Zhang et al. (2016); Zhang et al. (2011)	76%
Sentiment analysis	Calheiros et al. (2017); Capriello et al. (2013); Chang et al. (2019); Chiu et al. (2015); Crotts et al. (2009); Del Vacchio et al. (2017); Gan et al. (2017); Gao et al. (2018); García-Pablos et al. (2016); Geetha et al. (2017); Ghose et al. (2012); He et al. (2017); He et al. (2013); Hu and Chen (2016); Hu, Chen, and Lee (2017); Hu, Chen, and Chou (2017); Hwang et al. (2014); Kirilenko et al. (2017); Költringer and Dickinger (2015); Lee et al. (2018); Li, Lin et al. (2015); Liu et al. (2013); Marrese-Taylor et al. (2014); Nakayama and Wan (2018); O'Mahony and Smyth (2010); Park, Jang et al. (2016); Pekar and Ou (2008); Philander and Zhong (2016); Rossetti et al. (2016); Vu et al. (2019); Wang et al. (2017); Xiang et al. (2017); Xie et al. (2017); Xu et al. (2017); Ye et al. (2009); Zhang et al. (2017); Zhang et al. (2016); Zhang et al. (2011)	45%
Topic modeling/cluster analysis	Bassolas et al. (2016); Berezina et al. (2016); Boo and Busser (2018); Brandt et al. (2017); Calheiros et al. (2017); Chang et al. (2019); Dickinger and Lalicic (2016); Edwards et al. (2017); Gao et al. (2018); Geetha et al. (2017); Guo et al. (2017); He et al. (2017); Hwang et al. (2014); Li, Law et al. (2013); Kurashima et al. (2013); Kwok and Yu (2013); Mak (2017); Marine-Roig and Clavé (2015); Marine-Roig and Clavé (2016); Oender (2017); O'Mahony and Smyth (2010); Pearce and Wu (2018); Pekar and Ou (2008); Rossetti et al. (2016); Salas-Olmedo et al. (2018); Sun et al. (2015); Thomaz et al. (2017); Vu et al. (2015); Wang et al. (2017); Xiang et al. (2017); Xie et al. (2017); Xu and Li (2016); Xu et al. (2017); Zhang et al. (2016)	40%
Trend analysis	Chang et al. (2019); Del Vecchio et al. (2018); Li, Lin et al. (2015); Li, Law et al. (2015); Miah et al. (2017); Pantano et al. (2017)	7%
Predictive analytics	Geetha et al. (2017); Ghose et al. (2012); Hu et al. (2016); Hu, Chen, and Lee (2017); Kurashima et al. (2013); Lee et al. (2018); Li, Law et al. (2015); Ma et al. (2018); Majid et al. (2013); Marrese-Taylor et al. (2014); Miah et al. (2017); Pantano et al. (2017); Phillips et al. (2015); Rossetti et al. (2016); Sun et al. (2015); Zhang et al. (2017)	19%
Social network analysis	Edwards et al. (2017); Jin et al. (2018); Park, Ok et al. (2016)	4%
Spatial analysis	Bassolas et al. (2016); Brandt et al. (2017); Chang et al. (2019); Cheng and Edwards (2015); Chua et al. (2016); Del Vecchio et al. (2018); Fuchs et al. (2014); García-Pablos et al. (2016); Ghose et al. (2012); Girardin et al. (2008); Gutiérrez et al. (2017); Hawelka et al. (2014); Höpken et al. (2015); Huang et al. (2017); Önder et al. (2016); Jankowski et al. (2010); Ji et al. (2011); Jin et al. (2018); Kurashima et al. (2013); Majid et al. (2013); Mariani et al. (2016); Miah et al. (2017); Oender (2017); Salas-Olmedo et al. (2018); Sun et al. (2015); Vu et al. (2015); Zhou et al. (2015)	32%
Comparative analysis	Chang et al. (2019); Chiu et al. (2015); Dickinger and Lalicic (2016); Gao et al. (2018); Kirilenko et al. (2018); Ma et al. (2018); Majid et al. (2013); Mak (2017); Nakayama and Wan (2018); O'Mahony and Smyth (2010); Park, Jang et al. (2016); Wang et al. (2017); Xiang et al. (2017); Ye et al. (2009); Zhou et al. (2015)	18%

Table 3. *Distribution of articles by supervised vs. unsupervised learning method*

Type of sentiment analysis method	**Number of articles**	**Percentage of articles (total=37)**
Unsupervised learning	23	62%
Supervised learning	18	48%
Mixed method	4	11%

Table 4. *Distribution of articles by the purpose of study*

Purpose	Subcategories	Number of articles	Percentage of articles (total=85)	Most common analysis methods	Least common or missing analysis methods
Opinion mining (57)	Image	19	22%	TeA, TM/CuA, SA	SpA, TrA, PA, SNA, CA
	Satisfaction	26	30%	TeA, SA, TM/CuA, CA	TrA, PA, SNA, SpA
	Review helpfulness	7	8%	TeA, SA, PA, CA	TM/CuA, TrA, SNA, SpA
	Competitiveness analysis	6	7%	TeA, SA, TM/CuA, CA	TrA, PA, SNA, SpA
Travel patterns (19)	Landmarks	15	18%	SpA, TM/CuA, TeA, PA	CA, SA, SNA, TrA
	Tourist flow	11	13%	SpA, TM/CuA, TeA	CA, SA, SNA, TrA, PA
	Travel activity	3	3%	SpA, TM/CuA	TeA, SA, TrA, PA, SNA, CA
Performance measurement & accuracy testing		6	7%	PA, SpA, TrA, TM/CuA, TeA, CA	SA, SNA
Visitation prediction		6	7%	TeA, SA, PA, CA	TM/CuA, TrA, SNA, SpA

Note: Text analysis (TeA), sentiment analysis (SA), topic modeling/cluster analysis (TM/CuA), trend analysis (TrA), predictive analytics (PA), social network analysis (SNA), spatial analysis (SpA), comparative analysis (CA)

5. Discussion

In the last 18 years, the rapid increase in the amount of information that tourists create and share on SM platforms has provided tourism promoters and suppliers an invaluable, but also overwhelming amount of data, which requires rigorous, relevant and responsive approaches to effectively engage this data to support tourism success. This paper presents a systematic literature

review of hospitality and tourism-related SMA studies with a view to addressing this big data opportunity. Since different SM platforms contain unique types of information that may need specific analytical methods, a classification of SM type and analytical techniques was conducted. The paper provides researchers with an understanding of past application of SMA in hospitality and tourism research, and contributes to the field by identifying historical shortcomings, including excessive reliance on particular data types and analytical methods. The paper also highlights the potential of SM spatial data, which, along with relevant analytic methods, is underutilized. The availability of Volunteered Geographic Information (VGI) and geo-referencing features in SM platforms such as Twitter and Flickr have shaped common domain knowledge between disciplines which study tourists' footprints, including geography and environmental science, computer science and information technology, as well as hospitality and tourism. This study integrates previous definitions of and approaches to SMA into a more inclusive suite of analytics which not only includes typical analytical methods such as text analysis and sentiment analysis, but also elevates less adopted approaches such as comparative analysis and spatial analysis.

Among SMA methods, comparative analysis is increasing in popularity in the hospitality and tourism research. However, use of other methods such as social network analysis for identifying and visualizing hidden patterns and relationships in a large network of tourists (Jin et al., 2018; Park, Ok, et al., 2016), or trend analysis for providing tourism providers with insights into tourist trends and seasonal effects (Miah et al., 2017), can benefit hospitality and tourism industry and scholarship by providing enriched understanding of this multifaceted sector. Another important finding is the small but constant increase in the number of publications which have applied a combination of analytical methods, showing increased interest in achieving more comprehensive and more robust SMA. There is still room for improving and expanding use of

applications such as tourism demand prediction and destination recommendations based on trend analysis, which can in turn provide hospitality and tourism researchers with detailed understanding of collective tourism behavior and predictive insights (Miah et al., 2017; Rossetti et al., 2016). As an example, a potential future research avenue could be the application of SM predictive analytics using explanatory evaluation methods with high predictive power.

As for the levels of sentiment analysis, results of the present literature review show that almost all hospitality and tourism studies that applied this analysis focused on document and sentence levels inferred from the sentiment, while very few studies targeted sentiment detection at an aspect level (Marrese-Taylor et al., 2014), previously referred to as "aspect-based sentiment analysis." Exploring sentiments at a variety of levels beyond simply determining whether a review or a piece of text is negative, positive, or neutral is needed (Feldman, 2013). While an online reviewer can speak positively about specific features of a destination, such as restaurants or night life, they might have expressed a negative attitude toward another component, like transportation.

With respect to the supervised versus unsupervised methods for sentiment analysis, results reveal that 62% of articles used unsupervised learning, 48% supervised, and only 11% applied a combination of both methods for subjectivity detection of user-generated content (Table 3). Since a lexicon-based sentiment analysis is highly domain-dependent, and considering the limitations of using manually and automatically-created sentiment lexicons, it is surprising to see that only a few studies have either used or reported domain-specific sentiment lexicons that could be more suitable to the hospitality and tourism domain (Xiang et al., 2017). Future hospitality and tourism research on content and sentiment analysis of SM would benefit from domain-specific dictionaries for sentiment and topic detection, and this can only be achieved by collaborative research between

hospitality and tourism researchers and textual data and NLP scientists. Considering the relatively enhanced performance of supervised learning methods compared to unsupervised lexicon-based methods (Chaovalit & Zhou, 2005; Kirilenko et al., 2018), future work is needed to improve the performance of the sentiment classification of the hospitality and tourism SM data through the application of supervised techniques or combined methods.

The ability to perform appropriate and accurate reporting on analytic methods helps hospitality and tourism organizations make more informed and evidence-based decisions. Undetected inaccuracies and improper reporting in analytics methods such as text mining and sentiment analysis can produce bigger inaccuracies in subsequent analytic efforts, that can in turn cause a snowball effect in reporting (Hayes et al., 2005). As few as 36% of the studies of the current review conducted performance measurement metrics and reported accuracy testing results for measuring the sensitivity and relevance of the applied methods. That said, a further suggestion would be to evaluate and report on the accuracy testing results of the applied classifiers and performance analysis of supervised machine learning techniques for sentiment analysis of the hospitality and tourism SM data.

The studies were divided into four main study purpose categories: opinion mining, travel patterns, accuracy and performance testing, and visitation prediction. This research identified which analytical methods were overemphasized in each category, and tracked under-used or missing methods. Results show that SMA studies in hospitality and tourism placed an excessive emphasis on text analysis, sentiment analysis, and topic modeling or cluster analysis when researching different aspects of image, tourism satisfaction, review helpfulness, and/or competitiveness analysis of destinations, hotels, or restaurants. Potential analysis methods that

have received little or no attention within subcategories of this classification are spatial analysis, predictive analytics, trend analysis, and social network analysis. This is important because the applications of these methods appear to be highly effective in generating a better understanding of many facets of destination image and tourist experience (MacKay & Fesenmaier, 1997).

For the literature reporting travel patterns such as popular landmarks, tourist flow, and travel activity, it is no surprise that spatial analysis, topic modeling, and cluster analysis are more commonly used, as these are the most well-known methods for analyzing spatial data and tourists' movements (Fischer & Wang, 2011; Haining & Haining, 2003). One important missing method that holds promise is the application of text analysis techniques on SM data, used in comparison with geoinformation and spatial data for a better understanding of tourists' travel behaviors and activity patterns (Girardin et al., 2008, Ji et al., 2011). Predictive analytics and trend analysis are among the other methods that should be applied more frequently when researching tourist satisfaction, provider competitiveness, predicting visits to popular locations and travel pattern identification. Finally, when the purpose of research is predicting visits to destinations, hotels, and restaurants, the most under-utilized yet relevant analytical methods are identified as trend analysis, topic modeling, and cluster analysis.

Consumer review networks and SNS were the dominant SM platforms, and most SMA studies have focused on TripAdvisor, Twitter, and their Chinese equivalents over other channels. Underuse of multi-type data such as user-generated content and geo-tagged information, or multiple SM platforms like TripAdvisor and Flickr was also in evidence. The majority of existing articles focused on single types of information and media (see Table 1); however, using multiple sources of information and multi-type data is recommended to fully understand the multifaceted

characteristics of the hospitality and tourism system (Del Vecchio et al., 2018; Gutiérrez et al., 2017; Kirilenko et al., 2018; Salas-Olmedo et al., 2018). The complex nature of the tourism experience and the role of food, excursions, and transportation in creating such an experience suggests that consideration of cross-domain data in SMA research is essential. Yelp, a crowd-sourced review forum on food services and restaurants, is an example of an under-used source of SM data, as dining preference, satisfaction, and behaviors have significant influence on destination performance.

6. Conclusion and Future Research Directions

The growth in SM data and accompanying SMA related research highlights the need to construct an integrative framework for tracking the application of SMA to facilitate systematic and comprehensive analysis of this complex topic. This study appears to be the first work that systematically reviews SMA in the hospitality and tourism domain. In order to characterize this emerging research topic in hospitality and tourism, I looked at SMA research from seven different perspectives: the overall growth, publication source, research regions, disciplinary home, SM types, types of analysis, and research purpose.

Research using SMA in hospitality and tourism has increased rapidly since 2014, with an extreme bias toward choosing destinations, hotels, and restaurants in the USA and China for case studies and only 12 articles compared a combination of different locations. Greater study location diversity and more comparative studies should be prioritized in scholarly efforts (Guo et al., 2017; Nakayama & Wan, 2018).

The highest number of hospitality and tourism SMA studies examined hospitality services and hotels, followed by travel and tourism destinations, and finally food, restaurant, and beverage sectors. Adoption of a more holistic understanding of the tourist experience is recommended, by studying SM data sourced from all three of these domains, simultaneously is needed. An example of this kind of comprehensive examination can be seen in a study by Thomaz et al. (2017), in which different components of tourists' experiences such as food and beverage, hospitality, and transportation in a FIFA World Cup 2014 host city were investigated. Also facilitating holistic understanding would be the increased application of supervised methods of sentiment analysis and the use of domain-specific dictionaries for sentiment and topic detection when analyzing user-generated content.

As for the distribution of articles by type of SM, SNS and consumer review networks were the leading sources of data, with TripAdvisor and Twitter as the dominant SM platforms, followed by content communities and discussion forums. Few studies report data from multiple SM platforms. Rather than a reliance on single types of SM, analyzing several sources of information and multi-type data is imperative to fully understand the complexity of the hospitality and tourism system. Prioritizing the incorporation of geolocative data into data selection and analysis decisions in combination with textual analysis from several SM platforms is an example of this.

More research studies need to apply accuracy testing and performance measurement of analytic methods (Ye et al., 2009; Zhang et al., 2011) to evaluate the robustness of analysis. Additionally, a number of methods appear to be underused in tourism and hospitality SMA including predictive analytics using explanatory evaluation methods, social network analysis, trend analysis, comparative analysis and spatial analysis. Expansion of the use of these methods

may accelerated SMA research relating to travel patterns and visitation prediction, which were identified a less frequently investigated than tourist opinion mining.

In closing, this paper provides a comprehensive description of trends and the current state of the application of SMA in hospitality and tourism research. Future reviews of SMA in this field should include detailed explanations and recommendations regarding SMA best practice to guide hospitality and tourism researchers in their selection of SMA methods and their respective executions. These best practice approaches, in part, will need to be identified and adopted from other field of research such as information communication technology studies.

CHAPTER 3: Destination Loyalty in Nature-based Setting

Study 2: Exploring Destination Loyalty: Application of Social Media Analytics in a Nature-based Tourism Setting

Abstract

User-generated content across social media platforms is playing an increasingly important role in tourism. Understanding tourists' experiences and opinions about tourism destinations has led to numerous opportunities to provide tourism providers with greater insights. Identifying sentiments, detecting topics of interest, and exploring loyalty behaviors from user-generated content can provide valuable direction for managerial decisions. This paper presents a novel and inclusive approach that uses different analytical techniques such as sentiment analysis and topic modeling to extract sentiments and topics of interest from tourists' conversational data on TripAdvisor from 2002 to 2019. It also explores destination loyalty statements using a keyword clustering approach. Previous destination loyalty literature was used to develop a keyword list that was applied to search for expressions of loyalty in online reviews. The robustness of loyalty clusters and optimal number of clusters was also assessed prior to final analysis. Four leading loyalty-focused categories of destination offerings were observed: glaciers, waterfalls, lakes and islands, and hiking and trails. Prioritization of visitor experience enhancements relating to these loyalty-inducing destination components are discussed.

1. Introduction

Social media (SM) has experienced tremendous growth in recent years, especially with the emergence of diverse SM platforms such as social network sites, discussion forums, wikis, picture

and video sharing platforms, and ratings and reviews communities. In the tourism context, SM has also significantly revolutionized the way tourists seek information, plan their trips and, more importantly, share travel experiences with others. These different SM applications and platforms produce a remarkable amount of measurable data for destination marketers whose goal is to effectively render these data for decisions relating to promotion and offerings development (Buhalis & Law, 2008; Hays et al., 2013; Xiang & Gretzel, 2010). These different forms of user-generated content have not only enabled tourism actors to monitor and analyze tourists' behaviors and develop different marketing performance indicators but have also helped them communicate with consumers and plan long-term strategies (e.g., destination loyalty). Social media analytics (SMA) opens the door for destination marketing/management organizations (DMO) to develop new knowledge through reshaping their understanding of the field and making better business decisions with the use of decision support systems (Xiang et al., 2015).

Tracking the behavioral dynamics of tourists has become a major challenge for tourism destinations. DMOs and other tourism service providers in destinations such as tour operators are very interested in a number of factors. These include knowing the details of touristic locations that tourists visit, what factors attract the tourists to these locations, the tourists' subjective evaluations of the locations, their personal reflections and, most importantly, their loyalty behaviors such as future travel behavioral intentions and whether they will recommend the destination to others. Most current research advances are not capable of addressing these issues with a decision-centric, integrated and comprehensive approach. In fact, most of the existing approaches for studying SM data are focused on tackling nonexploratory questions that are already predefined and rarely assist in generating understanding of tourists' interests, emotions, experiences, and loyalty behaviors (Miah et al., 2017). This study seeks to develop and evaluate a new analytics method based on

textual content of tourists' online reviews about Jasper National Park (JNP) as a nature-based tourism destination. This study incorporates emerging computational methods to provide a management-driven framework in which the details of the proposed design artefact are specified as a nature-based tourism destination management strategic planning and operational decision support tool. In order to come up with a more effective solution, this study brings together four computational techniques (text processing, sentiment analysis, latent Dirichlet allocation topic modeling, and text clustering) to more comprehensively tackle the DMO's decision-support needs. Combined, these methods have the capacity to provide insight into tourists' loyalty behavior to support DMOs with tourism development, management and planning.

2. Literature review

2.1. Destination loyalty

Loyalty has become a critical part of tourism research in recent decades. Tourism providers realize the importance of loyal visitors, knowing that their competitors offer similar attractions, services and experiences. Destination managers try to maintain an acceptable level of service and maximize visitor satisfaction within given constraints. To convert visitors to loyal patrons, destinations first need to know what visitors' expectations are, so that they can meet and potentially exceed those expectations by providing appealing services before, during and after their visit. Understanding how visitors form their destination loyalty and what factors influence their loyalty formation is important for the success of tourism destinations.

There are three main approaches for defining and measuring tourist loyalty: measuring attitude, measuring behavior, or measuring a combination of two. The behavioral perspective focuses on a tourist's actual consumption behavior such as repeat visit duration, frequency and

intensity (Oppermann, 2000). In contrast to the behavioral approach that produces only a static outcome of a dynamic process, the attitudinal perspective goes beyond and considers loyalty in terms of tourists' strength of affection toward a destination or attraction (Pritchard & Howard, 1997). Finally, a composite conceptualization of loyalty integrates both behavioral and attitudinal dimensions, by not only looking at the tourist's consumption behavior such as repeated visits, but by considering future actions such as willingness to recommend to third parties (Oppermann, 2000), the strength of preference (Lee, Yoon, & Lee, 2007), and the feeling of attachment towards the place (Yuksel et al., 2010). Chen and Gursoy (2001) argued a composite measure of loyalty (combination of both attitudinal and behavioral measures) provides the most accurate representation of destination loyalty. Identifying determinants of loyalty has been an important research topic among tourism researchers. While some loyalty-related researchers have focused on factors such as activity (Backman & Crompton, 1991), service quality (Baker & Crompton, 2000), and tourism providers (Morais et al., 2004), other researchers have pointed out the importance of commitment to a specific place, or what is referred to as destination loyalty (Kyle et al., 2004; Oppermann, 2000).

2.2. Antecedents of tourist loyalty

2.2.1. Service quality and satisfaction

There is a general agreement about the positive relationship between service quality and satisfaction, and that quality service and satisfaction can lead to loyalty (Baker & Crompton, 2000; Mason & Nassivera, 2013). There is also evidence of a mediatory effect of tourist satisfaction in the relationship between service quality and behavioral intentions (Chen & Chen, 2010). Moreover, satisfaction directly affects destination choice (Tian-Cole & Cromption, 2003), revisit intentions (Um et al., 2006), and recommendations to others (Lee et al., 2007). Tourist satisfaction

is one of the most commonly used determinants of loyalty and plays an important role in the success of a tourism destination.

2.2.2. Destination image

Destination image can be generally defined as a person's collection of beliefs, impressions, benefits, and attributes of a destination based on information he or she has gradually processed from various sources (Zhang et al., 2014). Destination image plays an important role in the tourists' decision-making processes, from pre-visit planning to post-visit consequent behaviors (i.e., did they complain to friends or praise the place). Previous studies have found positive relationships between image and satisfaction and image and quality (Chen & Tsai, 2007; Chi & Qu, 2008). These relationships can indirectly influence loyalty. At the same time, a strong relationship has also been found between destination image and behavioral intentions of tourists, such as the intention to revisit the same destination in the future (Kim et al., 2012).

2.2.3. Travel motivations

Travel motivation is one of the first steps in the travel decision-making process of tourists and has been widely examined in the tourism context. Drawing from social psychological theories (Iso-Ahola, 1982) and expectancy theories (Witt & Wright, 1992), the push-pull theory (Gavcar & Gursoy, 2002) has been one of the frequently utilized approaches to study the reasons that people travel. This theory suggests the main motives for tourists to travel to a destination are push factors or what people expect from the travel experience (i.e., personal internal desires such as the opportunity to escape from the daily routine or the opportunity to have fun), and pull factors or what the destination offers to create the experience (i.e., destination-specific attributes and attractions such as entertainment opportunities and good quality restaurants) (Gursoy et al., 2014; Prebensen et al., 2013). Previous research suggests that push and pull significantly impact tourists'

motivations with regards to their level of satisfaction with a destination, which in turn indirectly influences their loyalty (Prebensen et al., 2013; Yoon & Uysal, 2005).

2.2.4. Previous experience and involvement

Previous experience is the number of previous visits to a tourism destination and the length of these experiences. This measure, along with place attachment or the level of involvement with a destination, can affect destination image formation, revisit intention, and positive recommendations to others (Beerli & Martin, 2004; Milman & Pizam, 1995; Sönmez & Graefe, 1998). Previous experiences inspire tourists to encourage cognitive, affective and conative ties with a destination compared to a traveler with fewer or no previous trips (Gursoy et al., 2014; Halpenny et al., 2016; Yuksel et al., 2010).

The level of involvement with a destination (also known as "tourist personal relevance") plays an important role as a direct antecedent of tourist loyalty. Tourists' level of involvement depends on the degree to which the destination characteristics match the tourists' expectations, goals, values, and their prior knowledge of the destination (Gursoy et al., 2014). Personal involvement has been also defined as the degree to which tourists devote themselves to an activity or experience (Zaichkowsky,1985). In tourism research, evidence for the relationship between personal involvement and tourist loyalty is mixed. This evidence comes from previous studies showing that different aspects of involvement can have different forms of influence on behavioral constructs such as satisfaction and loyalty (Prayag & Ryan, 2012; Sparks, 2007).

2.2.5. Place attachment

Place attachment refers to the nature and nuances of a tourist's emotional relationship with places and tourism destinations. It has two main components: place dependence and place identity

(Williams & Roggenbuck, 1989). Place dependence is referred to as the level of attachment to a place because of its functional reasons and the use of its resources. Place identity is defined as an individual's value judgment in relation to the place, influenced by emotional developments over time such as beliefs, preferences, feelings, values, goals, etc. (Williams & Roggenbuck, 1989).

Place attachment as an antecedent variable has been widely studied in hospitality and tourism, as a predictor of tourist satisfaction and tourist loyalty, spending preferences, pro-environmental behavior, and leisure participation patterns (Alexandris et al., 2006; George & George, 2004; Halpenny, 2006; Lee et al., 2007). Previous research shows that place attachment and destination loyalty are significantly and positively related (Lee et al., 2007; Yuksel et al., 2010).

2.2.6. Perceived value

Perceived value is rooted in equity theory. Under the equity concept, consumers compare their monetary payments or nonmonetary investments such as time and energy with the output they receive from providers, and evaluate what is fair, right, or deserved for the perceived value (Bolton & Lemon,1999). Perceived value and its effects on consumers' perception about quality of services, satisfaction and destination loyalty has been extensively studied in the hospitality and tourism context, suggesting that perceived value is a key determinant of satisfaction, perception of quality and loyalty behavior (Chen & Chen, 2010; Gallarza & Saura, 2006; Sun et al., 2013; Velázquez et al., 2011).

The related destination loyalty literature cited above was applied to develop a keyword list that can be used to detect destination loyalty expressions and statements that visitors posted on TripAdvisor about Jasper National Park. These keywords include but are not limited to: "revisit,"

"visit again," "come back," "recommend," and "worth." (See section 3.4 for the full list) Next, an introduction to social media analytics (SMA) is provided, followed by an overview of current methods for evaluating destination loyalty expressed through social media posting.

2.3. Social media analytics

SMA refers to a variety of interdisciplinary techniques and informatic tools such as Web crawling, computational linguistics, machine learning, and statistical methods to "collect, monitor, analyze, summarize, and visualize SM data, usually driven by specific requirements from a target application'' (Zeng et al., 2010, p. 14). The systematic literature review of the previous chapter (Chapter 2) on the applications of SMA in hospitality and tourism revealed that the majority of tourism studies have applied SMA to explore destination image (Fuchs et al., 2014; Költringer & Dickinger, 2015; Li et al., 2015), destination satisfaction (Capriello et al., 2013; Del Vecchio et al., 2018), and travel patterns/tourist flow (Chua et al., 2016; Vu et al., 2015; Zhou et al., 2015). Tourism studies have also used SMA to predict destination visits (Miah et al., 2017; Pantano et al., 2017) and measure the performance and test the accuracy of analytical methods (Kirilenko et al., 2018; Ye et al., 2009). The variety of SM analytical methods that have been used in tourism studies include but are not limited to text analytics, clustering and topic modeling, sentiment analysis, trend analysis, predictive analytics, and spatial analysis (Mirzaalian & Halpenny, 2019; Stieglitz & Dang-Xuan, 2013).

Positive and negative online reviews are full of insights that help tourism providers to understand brand value in the mind of consumers, and whether they have been able to deliver their brand promise. Sentiment analysis of negative reviews, for instance, highlights where a destination has failed to deliver services that were claimed in its mission, while on the other end of the

spectrum, analyzing the most enthusiastic reviewers from loyal visitors can give DMOs ideas as to how to reach more visitors while reinforcing revisit intentions among loyal tourists. Analyzing a visitor's sentiment expressed in online reviews is also important for DMOs to have an informed understanding of the experience and subjective opinions of visitors toward the destination, detailed insight that would not be gained by relying only on comments and the overall experience rating.

Topic identification (also known as feature extraction) is another useful method which focuses on extracting features of a specific product or service and distinguishes the topic of online reviews by assigning a predefined topic (supervised machine learning techniques) or identifying unknown topics (not predefined) mentioned within a review statement (unsupervised method). The latter turns out to be a promising approach in the tourism context, specifically for tourism destinations, to gain new insights into "not previously recognized" relevant quality dimensions of tourism services, as well as strengths and weaknesses of concrete tourism services along those quality dimensions (Menner et al., 2016).

SM platforms can be categorized into social networking sites (e.g., Facebook, Twitter), discussion forums (e.g., TripAdvisor Travel Forum), media and content communities (e.g., Flickr, YouTube), and consumer review sites (e.g., TripAdvisor, Yelp) (Mirzaalian & Halpenny, 2019). Social networking sites refers to web-based applications and services where public or semi-public users can connect with each other and share similar personal interests, lifestyles, or activities based on the nature of the site (Boyd & Ellison, 2007), while discussion forums are mainly organized around people with common interests where they can share their knowledge and experience in different areas. Media and content communities refer to web and mobile applications which enable their users to share content such as photos and videos. Finally, consumer review sites refer to platforms on which consumers can post content about products and services. The majority of SM

analytical research in the hospitality and tourism context has focused on consumer review sites (specifically on TripAdvisor and Daodao.com), social networking sites (explicitly Twitter and Sina Weibo), and media/content communities (Flickr in particular) (Mirzaalian & Halpenny, 2019). Consumer review sites (also referred to as "consumer-generated media") in the hospitality and tourism context can be categorized into community-based websites and transaction-based online travel agencies (Gligorijevic, 2016). In the former case, online platforms such as TripAdvisor combine a variety of user data, information tools, and travel forums to represent different aspects of destinations (or hotels and restaurants), while the focus in transaction-based platforms such as Expedia and Bookings is more on financial aspects of tourism (Xiang et al., 2017). Differences between these two data sources must be considered for the accuracy, representativeness, and quality of data in SM research in general, and tourism-related online reviews in particular. For instance, gathered data about a specific destination from social networking sites such as Facebook and Twitter are unstructured in nature, which makes the interpretation challenging, while exploring structured data collected from other online travel websites like TripAdvisor is more practicable.

TripAdvisor is one of the largest travel sites, the world's largest travel community, with an average of 455 million unique visitors every month. It generated approximately 730 million user reviews and opinions covering more than eight million listings for restaurants, hotels, vacation rentals and attractions (Statista.com, 2019). TripAdvisor has a unique feature of "Top Things to Do" for each specific tourism destination. This feature provides classified review-based information for the entire destination. Travelers can limit their search results based on different criteria and "Types of Attractions" such as "Nature and Parks," "Outdoor Activities," "Sights and Landmarks," etc. This destination-based feature has made TripAdvisor an appealing avenue for hospitality and tourism studies, especially for outdoor tourism destinations such as national parks

and natural attractions. For example, in a study of 5,000 TripAdvisor reviews of 843 hotels, relationships between sentiment, rating, volume and variation of reviews and hotel performance were examined; results revealed that overall and specific ratings, variation and volume of reviews, and the number of management responses were associated with hotel performance (Xie et al., 2017). Another study of 373 TripAdvisor reviews of Costa Rica ecolodges used exploratory content analysis and linear regression to find influential factors on ecotourists' satisfaction (Lu & Stepchenkova, 2012). Their quantitatively supported method classified satisfaction attributes into satisfiers, dissatisfiers, critical, and neutrals. Pearce and Wu (2018) also used an exploratory content analysis of 350 TripAdvisor reviews of entertainment performances at a China-based attraction. Their findings suggest international tourists were generally positive toward the entertainment while sharing their experiences in TripAdvisor and were mainly attracted to the attraction's culturally distinctive style (Pearce & Wu, 2018). Another study examined 20,000 TripAdvisor reviews of 106 attractions in New Orleans. Using review readability, reviewer characteristics, and review rating, the authors examined which factors led people to judge a review as helpful. The results showed review readability and reviewer characteristics are the most influential factors that affect the perceived value of reviews (Fang et al., 2016).

2.4. Evaluating destination loyalty construct on social media

Social media has fundamentally revolutionized the way tourists communicate, collaborate, consume, and generate information related to destinations. SM also characterizes one of the most transformative impacts of information technology on tourism, both within and outside destination boundaries. Previous tourism studies tried to demonstrate different antecedents of loyalty including satisfaction, service quality, perceived value, and communication through a variety of

survey research methods. While very useful for identifying relationships, one potential constraint of survey research is that variables are defined by the researcher. User-generated content and electronic word of mouth (eWOM) posted by frequent travelers on travel websites and Internet forums such as TripAdvisor.com provide a rich source of self-reported, publicly accessible, unconstrained data, enabling researchers to enter the minds of tourists without any set parameters and explore their true thoughts on loyalty (Berezan et al., 2015). Obtaining market research data and understanding social interaction from online communities, what is referred to as netnography, is considered an efficient and naturalistic method of data collection. It has been argued that this method can outperform traditional data collection methods in some situations (e.g., focus groups, interviews), as it is spontaneously generated by consumers and thus reflects perceptions that are not easily obtained through other means. A benefit of this unsolicited content is that people may be more open and honest online than in face-to-face situations (Kozinets, 2002; Reid, 1996).

Social media has also provided a new marketing opportunity for hospitality and tourism providers to create interactive relationships with consumers. This shift from offline activities to online is an influential factor in building customers' loyalty (Senders et al., 2013). The eWOM posted by tourists in their different stages of travel (i.e., before, during, and after trip) has an influential effect on the reputation of tourism destinations. Therefore, providing timely feedback on user-generated content is becoming more and more important for suppliers and DMOs to build tourist trust, attract potential tourists, and encourage return visitation (McKay et al., 2019; Zeng & Gerritsen, 2014). Destinations can see the impact of their retention and loyalty efforts and identify opportunities for improvement by analyzing online reviews and user-generated content. Exploring themes of online reviews can help suppliers and DMOs recognize visitors' expectations and understand if they are met.

However, some argue online reviews are inherently incomplete since they fail to reflect the opinions of users who have different propensities to post a review (Hargittai, 2020), or those with differing sentiments toward their experience (Chen et al., 2016). Overlooking these silent users can result in a reporting bias (Chen et al., 2016; Hargittai, 2020; Morstatter & Liu, 2017). Moreover, hospitality and tourism online reviews tend to be more positive in nature in comparison with other service industries such as banking and finance (Gilbert & Veloutsou, 2006), mainly because expressing negative feelings is not an important motive behind writing reviews for tourists (Yoo & Gretzel, 2008). For the above-mentioned reasons, SM data has to be treated with caution and researchers should be aware of such potential biases when applying study results beyond particular online groups. Combining SM data with data collected from other traditional methods (e.g., interviews, focus groups, surveys) may be useful if the researcher seeks to generalize to groups other than the populations studied (Kozinets, 2002). These considerations helped to guide the research design employed in this current study. Explanations of the four analytics methods used in this paper and research procedures are provided in the following methodology section.

3. Methodology

All travelers' online reviews about top natural attractions and park areas in JNP were extracted from the third-party review website TripAdvisor, ranging from as early as December 2002 to October 2019. The reviews were collected in October 2019 (a total of 19807 reviews). Non-English reviews made up less than 15% of the corpus, however, only English reviews (17224 reviews) were included for further analysis to avoid misinterpretation of comments written in other languages. Moreover, a loyalty keyword vocabulary was developed and employed in this study that contained English terms, therefore, only English reviews could be identified and separated

from the rest of the corpus. JNP is the largest national park in the Canadian Rockies and part of UNESCO's Canadian Rocky Mountain Parks World Heritage Site (Parks Canada, 2019). Top natural attractions and park areas listed by TripAdvisor are as follows: Annette Lake, Athabasca Falls, Athabasca Glaciers, Columbia Icefield, Maligne Canyon, Maligne Lake, Mt. Edith Cavell, Mt. Edith Cavell Trail, Pyramid and Patricia Lakes, Spirit Island, Sulphur Skyline Trail, and Sunwapta Falls and Canyon. What follows is an explanation for the four analytic steps used to explore the extracted online reviews: text processing, sentiment analysis, latent Dirichlet allocation topic modeling, and text clustering.

3.1. Text processing

For data extraction, I used the client-side software and data extraction tool, Octoparse, which extracts web data through the application of advanced machine learning algorithms (Octoparse, 2019). For this study I extracted online reviews from TripAdvisor. The extracted text-based online reviews were further pre-processed for each of the four analytic methods I employed. Some common pre-processing steps were splitting reviews into sentences through regular expressions based on punctuation (e.g., exclamation points, question marks), and splitting sentences into words (tokenization). Further pre-processing steps were stop-words removal (e.g., "the," "a," "and"), stemming (e.g., removal of suffixes e.g., "ing"), part-of-speech (POS) tagging (e.g., identification of words as nouns, verbs, adjectives, etc.), and lowercase transformation. Full reviews or single sentences were finally transformed into a term-document-matrix, which describes the frequency of terms that occur in each respective posting. This transformation is based on term occurrences, term frequency, and inverse document frequency values.

3.2. Sentiment analysis

Computer-assisted sentiment analysis has unique advantages such as outperforming manual content coding analyses in terms of efficiency and reliability of the results (Capriello et al., 2013), and also significantly lowers cost, time, and labor compared to traditional methods like surveys or focus groups (Chiu et al., 2015). Sentiment analysis is premised on the idea that the content of a review is based either on opinions, personal feelings, beliefs, and judgment about entities or events (i.e., subjective), or is based on facts, evidence, and measurable observations (i.e., objective) (Feldman, 2013). In the case of tourism, online reviews and SM posts often reflect tourists' (dis)satisfaction, happiness, frustration, or disappointment toward tourism products and destinations (Schuckert et al., 2015). Sentiment analysis can be performed through either supervised technique or unsupervised (lexicon-based approach). Although showing a relatively higher performance than other methods (Chaovalit & Zhou, 2005; Kirilenko et al., 2018), supervised machine learning techniques have not been widely applied in tourism research (Mirzaalian & Halpenny, 2019). Therefore, there is a need for tourism studies to apply accuracy testing and report performance measurements of methods (Ye et al., 2009) to evaluate the robustness of sentiment analysis (See Appendix 3 for more information about sentiment analysis and differences between approaches). This study employed a supervised machine learning approach, where online reviews were first categorized into positive, neutral, and negative using the Valence Aware Dictionary and sEntiment Reasoner (VADER) sentiment (Gilbert & Hutto, 2014), followed by classification of the corpus into training set and test set to predict sentiments and evaluate accuracy of the prediction model (See Figure 8 for supervised sentiment analysis procedure). 2-fold cross-validation[1] was conducted to examine 15972 positive and 920 negative reviews. The sentiment score was constructed by scoring the online reviews for positive and

[1] Cross-validation is a statistical method and resampling procedure used to evaluate machine learning models on a limited data sample, where the parameter K refers to the number of groups that a given data sample is to be split into.

negative terms, and was calculated by adding a point for each positive word to the total score and deducting a point for each negative word (no points were given for neutral words) (Miner et al., 2012; Philander & Zhong, 2016). The Pos/Neg ratio score is computed as the ratio of overall positive words in each location to overall negative words, with any neutral word discarded. The average number of words in any of 12 attractions have been also reported.

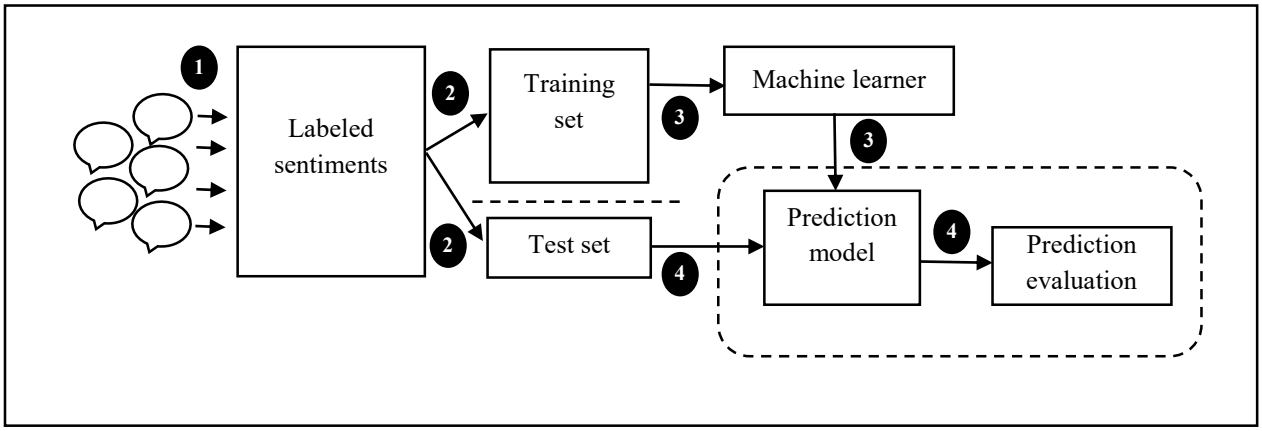

Figure 8. Supervised sentiment analysis procedure.

3.3. LDA topic modeling

The second analytic approach was latent dirichlet allocation (LDA) topic modeling (Blei et al., 2003), which was used to effectively extract dimensions of the visitor experience from the corpus of text data extracted from TripAdvisor. Topic modeling is a good method for finding hidden semantic structures of online reviews and discovering the main topics and meaningful dimensions of visitors' experience-sharing regarding JNP. LDA is the most common method for topic modeling and is a generalization of probabilistic latent semantic indexing (PLSI) (Hofmann, 1999) (See Appendix 1 for further information about LDA topic modeling). LDA model was adopted instead of other text classification methods mainly because LDA modeling not only surpasses other methods in efficiently analyzing large-scale data at a highly granular level, but because it also helps to clarify the practical frequency of occurrence of each extracted dimension

based on its intensity in the corpus (Guo et al., 2017). Revealed topics represent the important aspects related to tourists' experience and have a distribution across the online reviews depending on their frequency of occurrence. Over the last decade a number of improvements have been made to evaluate the semantic interpretability of topics and topic coherence within SM posts (Chang et al., 2009; Lau et al., 2014; Newman et al., 2010) (See Appendix 2 for further background). The output from these LDA processes result in topics ranked by "coherence level". In this study, the Elbow Method was applied during the LDA modeling to examine the coherence value (i.e., the degree of semantic similarity between high scoring words in the topic), and to determine the appropriate number of topics for LDA model (Ketchen & Shook, 1996) (Figure 10).

3.4. Text clustering

Text clustering is the application of cluster analysis to textual documents and is the process of finding groups of similar objects in the text, where the objects to be clustered can be documents, paragraphs, sentences or terms (Aggarwal & Zhai, 2012). Text clustering is a widely studied method used for data mining on textual contents, which through using different feature extraction techniques, sentences are converted into a term-document-matrix (Pang et al., 2002; Menner et al., 2016). One of the commonly used feature extraction techniques, based on term occurrences, is called Term Frequency (TF) or Term Frequency–Inverse Document Frequency (TF-IDF). A term document matrix with the TF-IDF weighted review words represents the basis of the k-means clustering algorithm, which was used with the cosine similarity (i.e., similarity between two non-zero vectors) as a distance measure as highly recommended by the text mining literature (Schuckert et al., 2015). Words with high TF-IDF values within a cluster then represent words often co-occurring in online reviews and represent latent topics (See Appendix 4 for further information

about text clustering). This paper mainly adapts a clustering approach used in the Menner et al. (2016) study, where the authors utilized a term-document-matrix to identify relevant topics in tourism online reviews by performing a keyword clustering based on TF-IDF values. Therefore, it was assumed that topics are typically represented by special parts of speech, and that important words of an online review represent the major topics of that review. Therefore, frequent nouns have been extracted as topics, while frequent verbs have also been treated as topic words (Wartena & Brussee, 2008).

That being explained, after a detailed review of the hospitality and tourism loyalty literature by the author (See Appendix 5 for a curated list of literature consulted), a vocabulary of destination loyalty keywords was developed. This keyword vocabulary[2] was subsequently used to identify and separate loyalty-expressed reviews from the rest of the corpus. A close reading check was further applied to ensure the relatedness of the extracted reviews to destination loyalty conversations. The elbow method was applied in order to select the optimal number of clusters (i.e., 4 clusters), where based on the nature and characteristics of each location, destination loyalty expressions were categorized into 4 main predefined labeled clusters and were prepared for a more sophisticated supervised learning clustering (e.g., Athabasca Falls into waterfalls, Athabasca Glaciers into glaciers, Annette Lake into lakes and Islands, and Sulphur Skyline Trails into hiking and trails). A term-document-matrix with the TF-IDF weighted review words was used for this clustering approach, where the matrix characterizes the basis of the k-means clustering algorithm with the cosine similarity as distance measure as recommended by the text-document-clustering literature (Huang, 2008; Menner et al., 2016). Words with high TF-IDF values within a cluster then represent

[2] Loyalty keyword vocabulary: “revisit,” “visit again,” “return,” “go back,” “come back,” “must,” “recommend,” “repeat,” “refer,” “worth,” “again,” “loyal.”

words often co-occurring in loyalty-expressed reviews and, thus, represent topics. A summary of what explained above and different steps toward the text clustering task is shown in Figure 9.

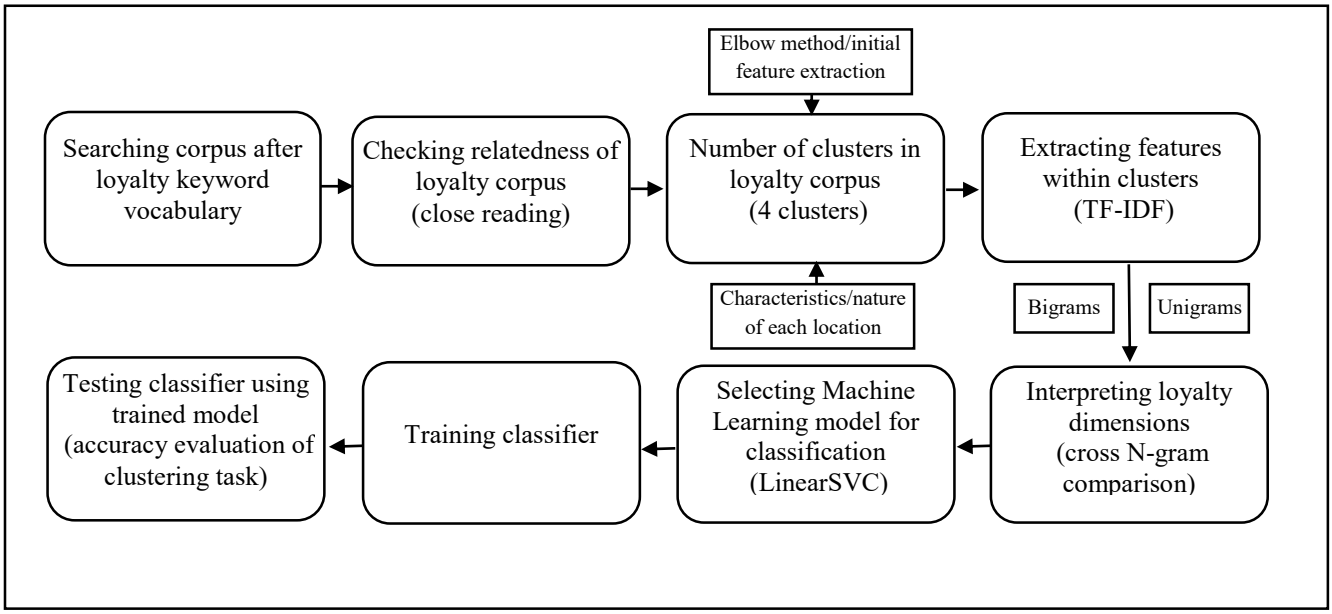

Figure 9. Summary of strategy and different steps followed in the text clustering task.

4. Results

In this section, I summarize the results of the extraction of the dimensions of tourism experience, sentiment analysis and subjective evaluation of tourists' opinions, and finally dimensions of tourists' destination loyalty. The validity of these dimensions was then examined through reporting the performance measures of applied methods.

4.1. Sentiment analysis

Sentiment scores of the 12 touristic locations of JNP are provided in Table 5; special attention should be directed to the "Average sentiment rank" and "TripAdvisor relative rank" columns. The Pos/Neg ratio ranking, for instance, is calculated by dividing the overall Pos ratio scores to Neg ratio scores of total reviews in each location. For example, Annette Lake has a Pos/Neg ratio score of 17.65 (i.e., 0.226 overall positive ratio score to 0.013 overall negative ratio score of 87 reviews, neutral ratio discarded), and is ranked first based on this particular measure amongst other sights. In general, positive online reviews significantly outweighed negative reviews. This outweigh aligns with the observations (Yoo & Gretzel, 2008) that hospitality and tourism online reviews tend to be more positive in nature because expressing negative feelings is not an important motive behind writing reviews, especially in comparison with other service industries (e.g., banking and finance) which have a lower rate of positive reviews (Gilbert & Veloutsou, 2006).

On average, there were 1435 online reviews per location, with Athabasca Falls having the most reviews (4319), and Annette Lake the fewest (87). Some locations with lower review volumes, such as Sulphur Skyline Trail and Spirit Island, appeared in the top five average sentiment score rank, as along with other well-known locations with higher review volumes such

as Maligne Lake. The average number of words in 12 attractions shows that despite significant differences between some attractions in terms of overall volume of reviews, all 12 documents are to some extent consistent in terms of average number of words used in online reviews. Also, although the average sentiment score and the Pos/Neg ratio score ranks were aligned with one another for most of the locations, some attractions had meaningfully different ranks such as Sulphur Skyline and Mt. Edith Cavell Trails, Spirit Island, and Athabasca Falls. Another remarkable finding upon comparing TripAdvisor relative rank with sentiment and ratio scores is that lakes and islands are relatively ranked lower on TripAdvisor in contrast to higher sentiment and ratio ranks uncovered in the results. These attractions are Annetee Lake, Pyramid and Patricia Lakes, Maligne Lake, and Spirit Island.

Table 5. *Attractions' sentiment scores.*

	Review volume	≈Avg number of words	Avg sentiment score	Avg sentiment rank	Pos/Neg ratio score	Pos/Neg ratio rank	TripAdvisor relative rank
Sulphur Skyline Trail	134	118	0.82	1	6.29	9	2
Mt. Edith Cavell Trail	168	101	0.80	2	6.39	8	1
Annette Lake	87	56	0.79	3	17.65	1	7
Maligne Lake	1110	74	0.76	4	9.03	4	9
Spirit Island	240	70	0.75	5	12.02	2	6
Pyramid & Patricia Lakes	1425	50	0.74	6	11.25	3	10
Maligne Canyon	3740	55	0.71	7	8.47	5	3
Mt. Edith Cavell	472	87	0.71	8	6.49	7	5
Athabasca Falls	4319	41	0.70	9	6.84	6	4
Athabasca Glaciers	709	90	0.69	10	5.81	10	8
Sunwapta Falls & Canyon	595	52	0.65	11	4.39	12	12
Columbia Icefield	4225	71	0.64	12	5.51	11	11

4.1.1. Performance evaluation of sentiment analysis

Accuracy, Precision, Recall, and F1-score were used for evaluating the results of sentiment analysis. Accuracy measures how accurate the method is in its prediction task through dividing the number of correct predictions by the total number of predictions. Precision is defined as the ratio of the number of cases correctly classified as one of the Pos, Neg, or Neu classes relative to

the total number of cases predicted as that class. Respectively, the Recall of a class is defined as the relative number of cases correctly classified as one of the classes compared to the total number of instances. Finally, the F1-score is a weighted harmonic mean of both, the Precision and Recall. Results of the classification report for the sentiment rating shows an acceptable level of evaluation for the prediction model in each class, except for Neu most likely due to its smaller sample compared to other 2 classes (Pos and Neg), as well as satisfying weighted average for all 3 classes (93% for Accuracy, 87% for Precision, 93% for Recall, and 90% for F1-score).

4.2. Dimensions of tourism experience

LDA was applied to extract and label the dimensions of tourist experience across all collected online reviews from top touristic locations. LDA identified 14 topics and within each topic showed the top-20 words and their relative weight.

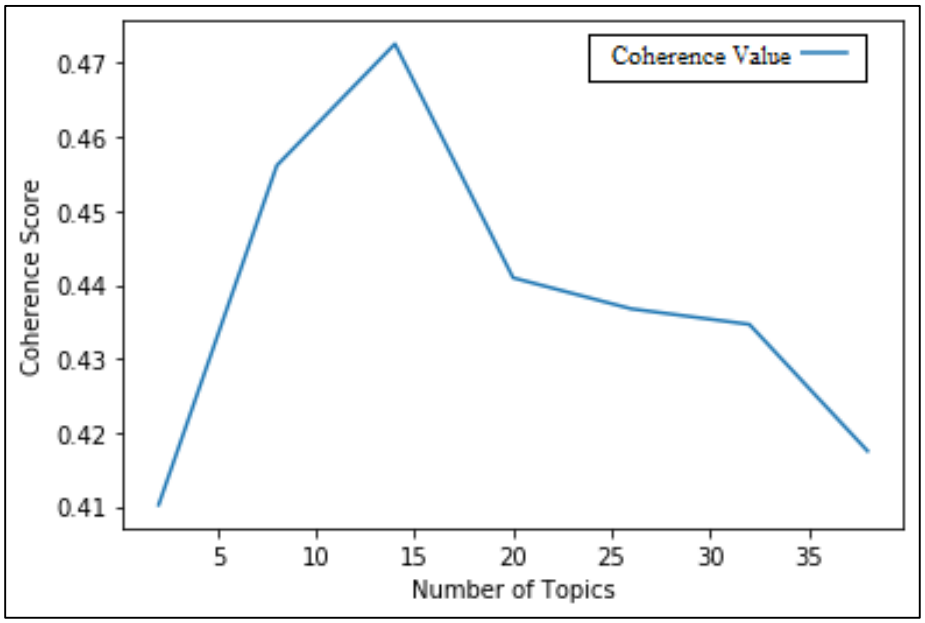

Figure 10. Coherence values based on number of topics.

The labeling of dimensions was first conducted by one researcher and then confirmed by a second researcher. Labeling was based on the identification of a logical connection between the most frequent words for a topic. For example, in Figure 11 and Figure 12, a sample of 4 topics with word cloud and relative weights of their top 10 words has been shown. As an example, the topic labeled as "Water/Cruise Tour" is based on the words 'experience,' weighted 61%, 'cruise' (40%), 'great' (35%), and 'trip' (26%), all of which appear at the top of the list (see Figure 11 and 12). Another example is the topic labeled as "Waterfalls Visit Experience" which is based on the top weighted words 'fall,' (99%), 'worth' (47%), 'stop' (39%), 'walk' (39%), 'view' (38%), 'visit' (35%), 'well' (27%), and 'beautiful' (27%) (see Figure 11 and 12).

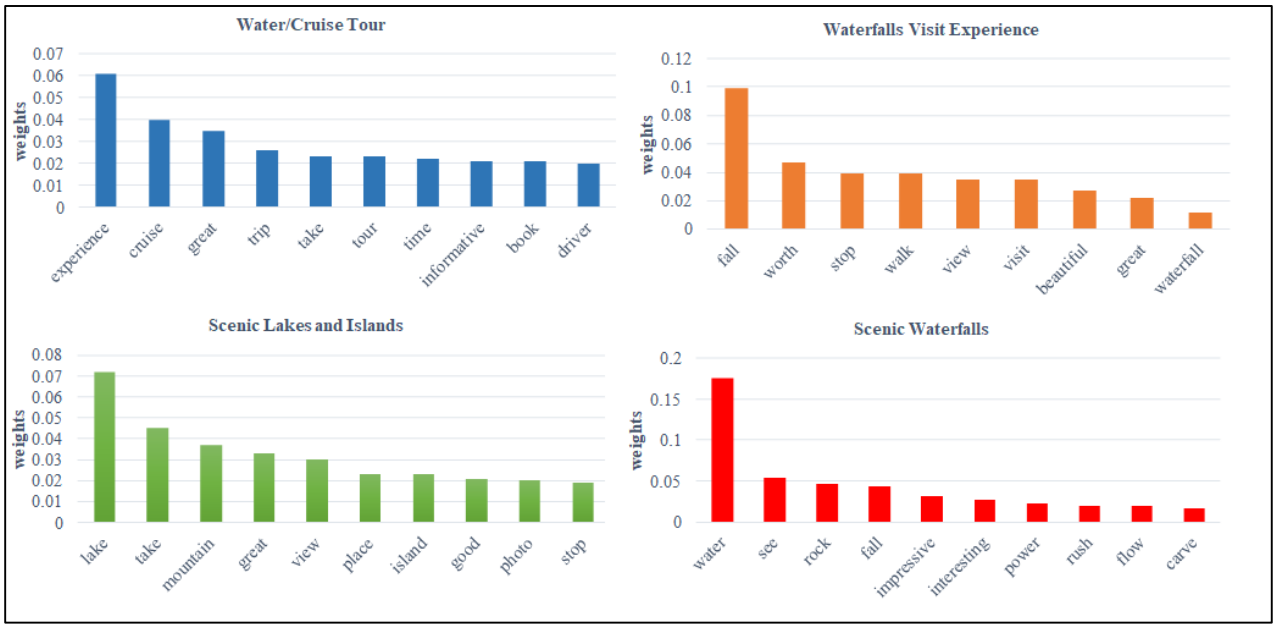

Figure 11. A sample of 4 topics with relative weights of their top 10 words.

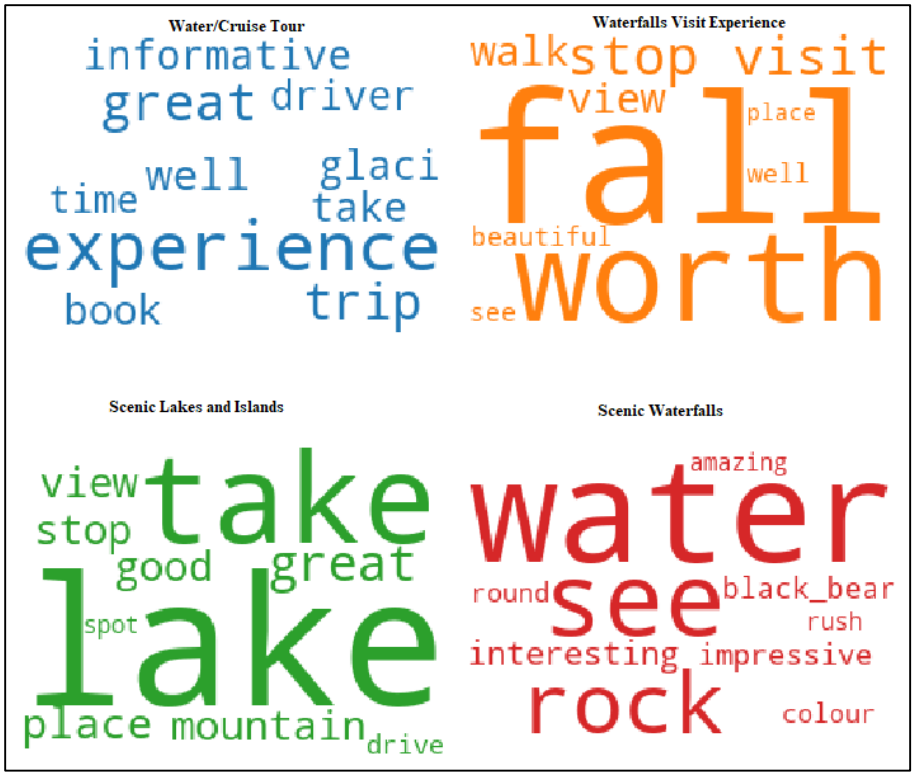

Figure 12. Word cloud of sample topics with their top 10 words.

The candidate topic label was further tested via rational link to other terms in the top-20 distribution list. If a logical connection was found, the topic name was kept, otherwise, the labeling process restarted using this information to update it. Figure 13 presents LDA extracted dimensions (topics) from 17,224 online reviews for top touristic locations across JNP. First five dominant topics were “Ice Walking,” “Glacier Exploring Tour,” “Scenic Waterfalls,” “Water-based Activities,” and “Waterfalls Visit Experience,” respectively. Three of the dimensions represent tourists' perceptions of glaciers: “Ice Walking,” “Glacier Exploring Tour,” and “Glacier Visit Experience,” while three dimensions correspond to tourists’ hiking activities: “Trails and Pathways,” “Hiking Activities,” and “Forest Challenge” (see Table 6). Other groups of dimensions represent lakes and islands (e.g., “Scenic Lakes and Islands,” “Water/Cruise Tours,” and Water-based Activities”) and waterfalls (e.g., “Scenic Waterfalls” and “Waterfalls Visit Experience”).

The remaining dimensions show four distinct aspects of tourists' general experience (e.g., "Suggestions," "Weather," "General Experience"). Figure 14 also demonstrates Termite two-dimensional visualization of topic models, a visual analysis tool for the term-topic distributions produced by topic models (Chuang et al., 2012). Termite uses a tabular layout to promote comparison of terms both within and across latent topics and aims to support the domain-specific task of building and refining topic models (Chuang et al., 2012). In Figure 14, the red bars in the Termite topic model are defined as estimated term frequency within the selected topic, which is equivalence with the relative weights of top words within each topic.

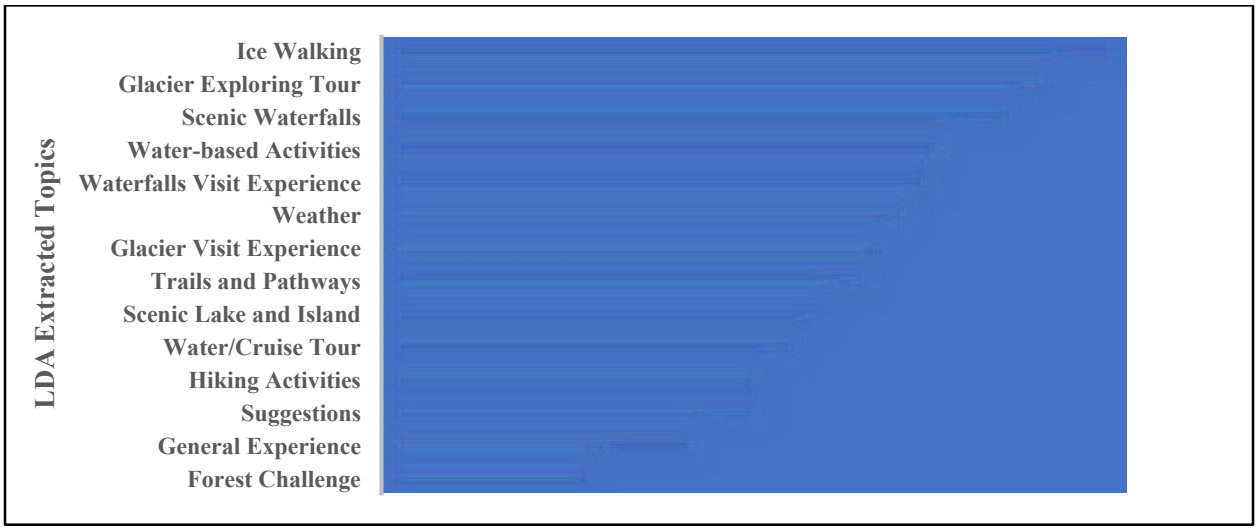

Figure 13. Extracted topics from LDA topic modeling ranked based on average weights of topic's top words.

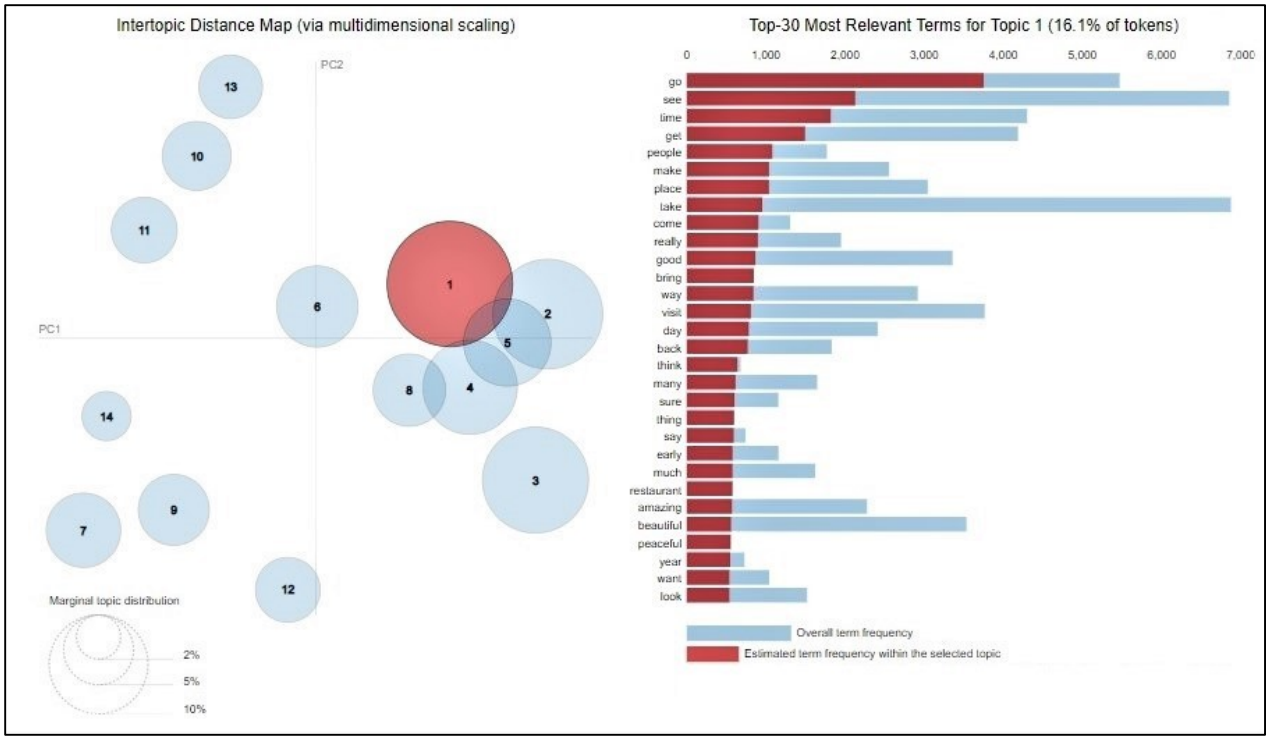

Figure 14. Two-dimensional visualization of top 30 most relevant terms for the topic "General Experience" (Termite topic model visualization (Chuang et al., 2012)).

Table 6. *Classifications of extracted topics into common groups.*

Glaciers	**Hiking and Trails**	**Lakes and Islands**	**Waterfalls**	**General Experiences**
Ice walking	Trails and pathways	Scenic lakes	Scenic waterfalls	Weather
Glacier tour	Hiking activities	Water tours	Waterfalls experience	General experience
Glacier experience	Forest challenge	Water-based activities		Suggestions

These dimensions were further organized into three fundamental categories based on the Crouch and Ritchie's (1999) model of Tourism Destination Competitiveness (TDC): core resources and attractors, destination management, and qualifying and amplifying determinants (see Table 7). The core resources and attractors refer to the main components of destination that inspire potential visitors to choose one destination over another, or in other words, visitors' key motivators for visiting a tourism destination such as scenic waterfalls and lakes, water-based activities, and

hiking activities. These factors are partially-controlled aspects of destination that can be somewhat improved through effective management approaches. Destination management category plays the main role in achieving a balance between all other components of TDC from maintaining and enhancing the core resources and attractors to strengthening of the supporting factors and adjusting with restricting constraints (Crouch, 2011). Destination management components are normally recognized as controlled factors and can be substantially improved by DMOs (e.g., glacier exploring and cruise tours). Finally, qualifying and amplifying determinants of the TDC model refers to the factors that can either positively or negatively drastically affect destination competitiveness (Crouch & Ritchie, 1999; Enright & Newton, 2004). These qualifiers and amplifiers can be alternatively called "situational conditioners" because they impact tourism demand and are mainly considered as uncontrolled factors such as weather and visitors' perceptions of their own experiences (Ritchie & Crouch, 2011). Tourism providers (e.g., operators of Athabasca Glacier tours, Maligne Canyon Ice Walk tour, boat tours and river cruises) and DMOs should place an emphasis on addressing controlled and some partially-controlled dimensions, such as enhancing tourism experience in glacier and cruise tours, improving infrastructure and informative aspects of hiking trails and pathways, and carefully listening and fulfilling tourists' suggestions and recommendation that are shared online.

Table 7. *A typology of extracted dimensions based on TDC model.*

Destination management (controlled)	**Core resources and attractors (partially controlled)**	**Qualifying and amplifying determinants (uncontrolled)**
Glacier Exploring Tour	Scenic Lake and Islands	Waterfalls Visit Experience
Water/Cruise Tour	Scenic Waterfalls	Glacier Visit Experience
Trails and Pathways	Water-based Activities	General Experience
Suggestions	Hiking Activities	Weather
	Ice Walking	
	Forest Challenge	

4.3. Exploring destination loyalty

After a detailed review of the hospitality and tourism loyalty literature by the author, a vocabulary of destination loyalty keywords was developed. This keyword vocabulary[3] was subsequently used to identify and separate loyalty-expressed reviews from the rest of the corpus. A close reading check was applied to ensure the relatedness of the extracted reviews to destination loyalty conversations. Figure 15 shows a word cloud of top 100 loyalty-expressed terms toward JNP on TripAdvisor.

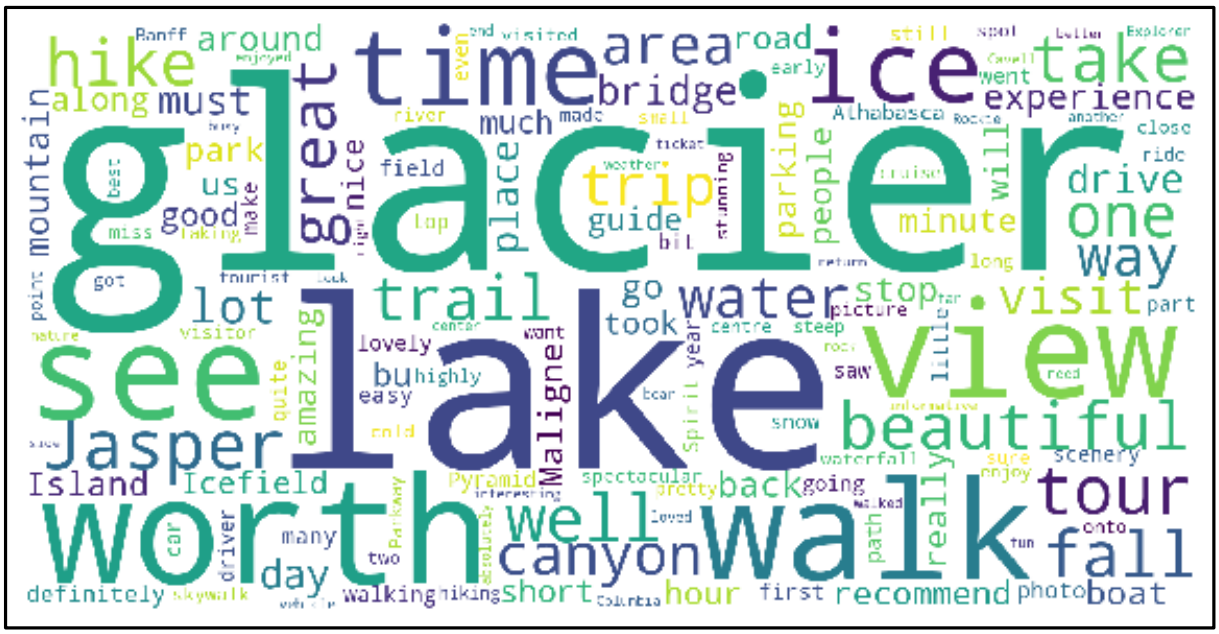

Figure 15. Word cloud of destination loyalty expressions.

[3] Loyalty keyword vocabulary: "revisit," "visit again," "return," "go back," "come back," "must," "recommend," "repeat," "refer," "worth," "again," "loyal."

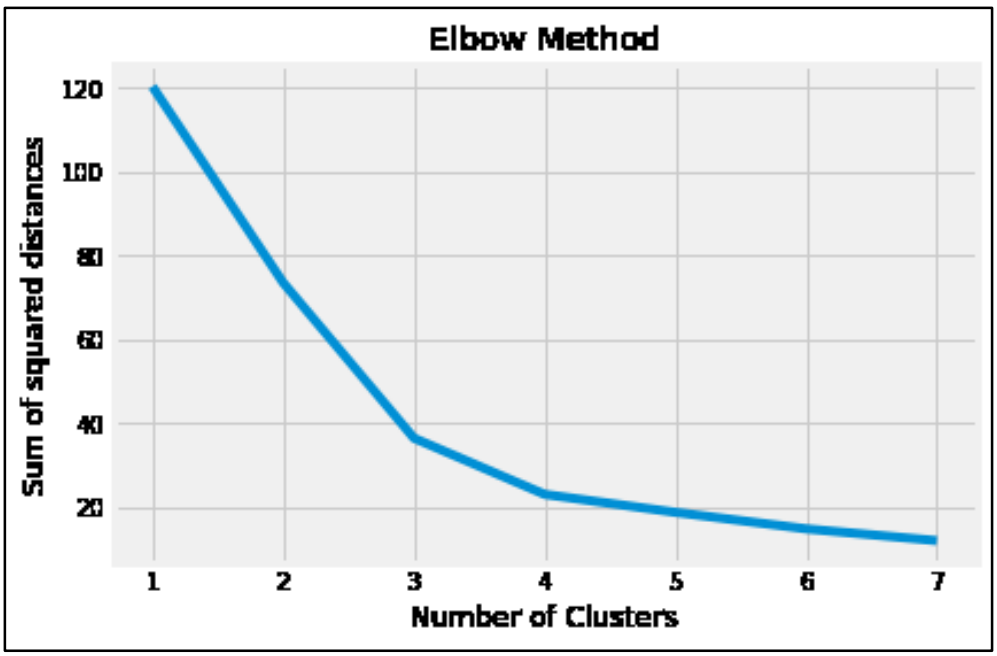

Figure 16. Elbow method for optimal number of clusters.

Keyword clustering approaches including TF-IDF term document matrix and k-means clustering algorithm have been applied on the corpus of destination loyalty online reviews. The elbow method was applied in order to select the optimal number of clusters (Figure 16). The elbow method runs k-means clustering on the dataset for a range of values for *k* (e.g., 1-10), and for each value of k computes an average score for all clusters. When the overall metrics for each model are plotted, and after checking at the percentage of variance explained as a function of the number of clusters, it is possible to visually determine the best value for k by looking at the "elbow" of the line chart (the point of inflection on the curve) for the best value of k (Ketchen & Shook, 1996). Here, 4 clusters were chosen, as another number of clusters would not have provided improved modeling of the data (Figure 17).

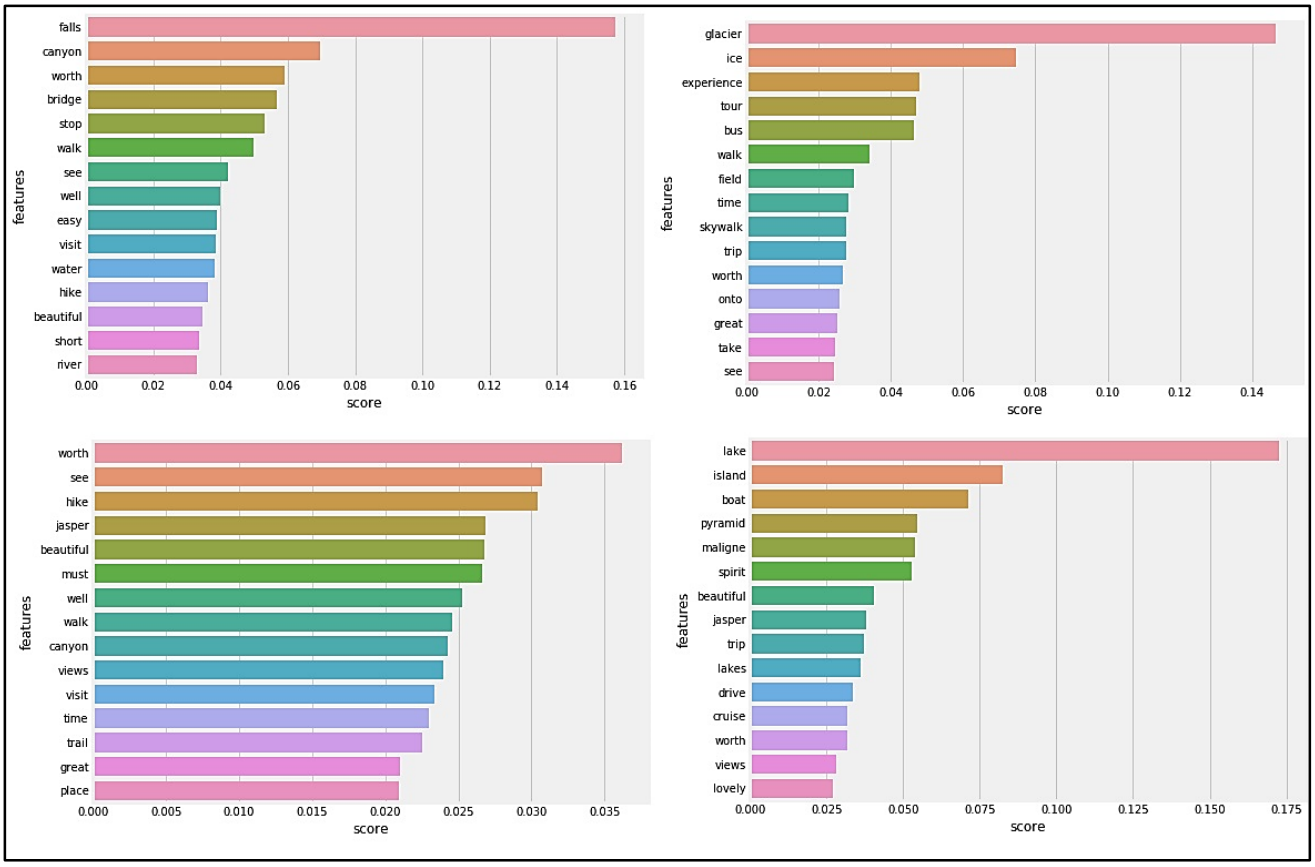

Figure 17. Features and scores within 4 clusters of destination loyalty expressions.

Results of the k-means clustering method suggest that destination loyalty expressions can be categorized into 4 main subjects, namely “waterfalls,” “glaciers,” “lakes and Islands,” and “hiking and trails.” This is also aligned with the detected topics of LDA model that were classified into common groups (Table 7). Thus, all of the 12 touristic locations were further categorized and labeled into these 4 clusters based on the nature of the place and types of activities that take place in each (e.g., Athabasca Falls into waterfalls, Athabasca Glaciers into glaciers, Annette Lake into lakes and Islands, and Sulphur Skyline Trails into hiking and trails). Destination loyalty expression

reviews with predefined labeled clusters were then prepared for a more sophisticated supervised learning clustering (Figure 18).

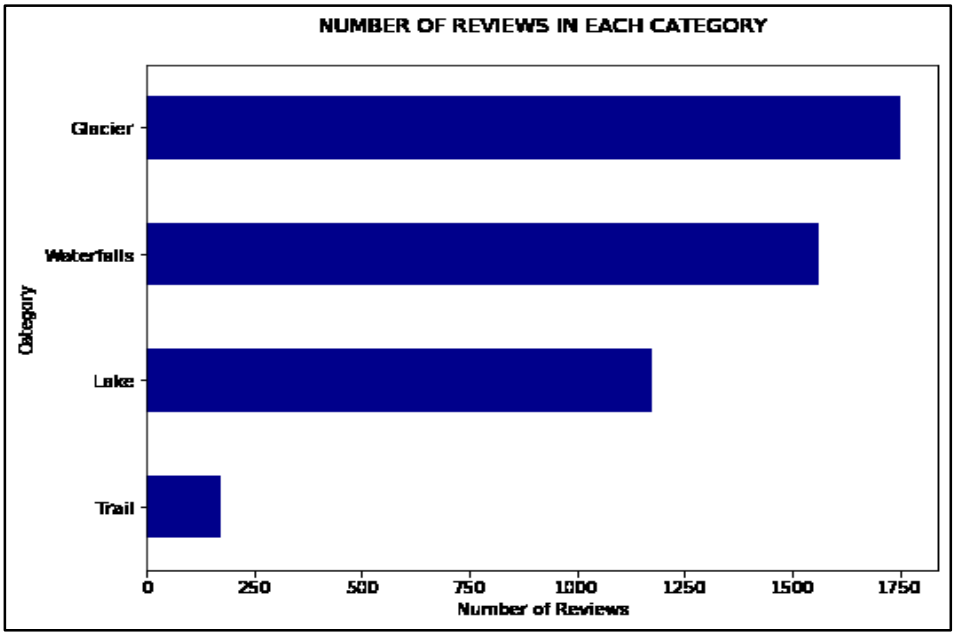

Figure 18. Distribution of loyalty expression reviews within 4 categories.

Top unigrams and bigrams[4] of each category were identified (Tables 8 & 9). Bigrams are expected to improve the model performance by taking into consideration words that tend to appear together in the reviews associated with the 12 different locations. A thorough investigation of unigrams and bigrams within each category revealed prevalent characteristics and factors important to tourists when expressing their loyalty on SM. In cluster 1, Glaciers, a cross N-gram comparison suggests that tourists' recommendations and revisit intensions were mainly motivated by their experience from Columbia Icefield Glacier Skywalk, entertaining and informative aspects of Ice Explorer Glacier and Icefield Sightseeing tours, and guided interpretive hikes on the Athabasca Glacier (Ice walk). The 230-kilometer mountain road to the Icefields Parkway was also

[4] In computational linguistics, N-gram is a contiguous sequence of N items from a given sample of text, therefore, a unigram is referred to a single token (e.g., glacier), and a bigram is a two-word sequence of words (e.g., glacier walk).

articulated as a worthwhile and beautiful driving experience with spectacular mountain views. In cluster 2, Waterfalls, natural wonders and beautiful sceneries, short walks, less challenging hikes, and winter walks were among the most frequently cited topics of interest for JNP visitors. Cross N-gram comparison within the Lakes and Islands cluster reveals that lake cruise tours, water-based leisure and sport activities (e.g., canoeing/kayaking and fishing), nature and landscape photography, and wildlife viewing are amongst top motivators for visitors to recommend to others and revisit attractions. Finally, the most important aspects in the Hiking and Trails cluster were challenging trails, sense of accomplishment, and beautiful skyline. These dimensions are summarized in Table 10.

Table 8. *Top N unigrams between 4 clusters.*

Glaciers	Waterfalls	Lakes and Islands	Hiking and Trails
Glacier	Canyon	Lakes	Trail
Skywalk	Waterfalls	Boat	Summit
Icefield	River	Island	Ascent
Experience	Bridges	Cruise	Skyline
Bus	Nature	Quiet	Tough
Tour	Walks	Elk	Hike
Doubt	Gorgeous	Wildlife	Challenging
Winding	Easy	Canoeing	Miette
Icebergs	Paths	Picnic	Rewarded
Cold	Cleats	Beach	Mountain
Entertaining	Routes	Picturesque	Windy
Funny	Amaze	Photography	Climb
Money	Stop	Kayaking	Peak
Informative	Miss	Fishing	Uphill
Drive	Slippery	Moose	Autumn
Considering	Power	Lakeside	Alpine

Table 9. *Top N bigrams between 4 clusters.*

Glaciers	Waterfalls	Lakes and Islands	Hiking and Trails
ice field	make stop	beautiful lake	hot springs
glacier walk	worth stopping	boat tour	glacial lake
beautiful drive	black bears	lake great	glacier lake
view mountain	easy walk	cruise worth	worth view
worth driving	drive lake	visit lake	amazing scenery
short easy	trip lake	capped mountains	tree line
spectacular view	worth time	pyramid mountain	start trail
fantastic place	beautiful walk	love visit	beautiful glacier
ice worth	ice cleats	love area	beautiful trail
parkway beautiful	hike canyon	tour lake	road little
trails walk	walk view	second visit	viewing point
narrow winding	canyon lake	snow capped	went twice
mountain lake	breathtaking worth	photo stop	miette hot
miss drive	visit way	enjoying view	amazing view
worth experience	visiting jasper	lake frozen	glacier snow
viewing area	easy worth	little island	relatively easy
views drive	early beat	jasper worth	longer hike
beautiful sights	falls beautiful	stop photos	experience time
staff really	beautiful hike	wonderful place	easy moderate
photos worth	special trip	unfortunately weather	saw bear

Table 10. *Suggested destination loyalty dimensions within 4 clusters through cross N-gram comparison.*

Glaciers	Waterfalls	Lakes & Islands	Hiking and Trails
-Icefield Skywalk	-Natural wonder	-Cruise tours	-Challenging trail
-Ice Explorer tour	-Beautiful scenery	-Water-based activity	-Sense of
-Icefield Sightseeing	-Short/Easy hike	-Nature photography	accomplishment
tour	-Winter walk	-Wildlife viewing	-Beautiful skyline
-Icefields Parkway			
mountain drive			

4.3.1. Performance measurement of clustering task

Linear Support Vector Classifier (also known as Linear SVC) was selected over other classification models (e.g., Random Forest, NB, and Logistic Regression Classifiers) because of a higher accuracy score (Look for Linear SVC in Figure 19). After classifying and fitting the model to training and test data, the performance of clustering task was evaluated on the test data (i.e., Precision, Recall, and F1-score). The confusion matrix and the classification report of the prediction model for each cluster are described in Figure 20, where most of the clusters (except for trail most likely due to a smaller sample) have acceptable values of 60% and above.

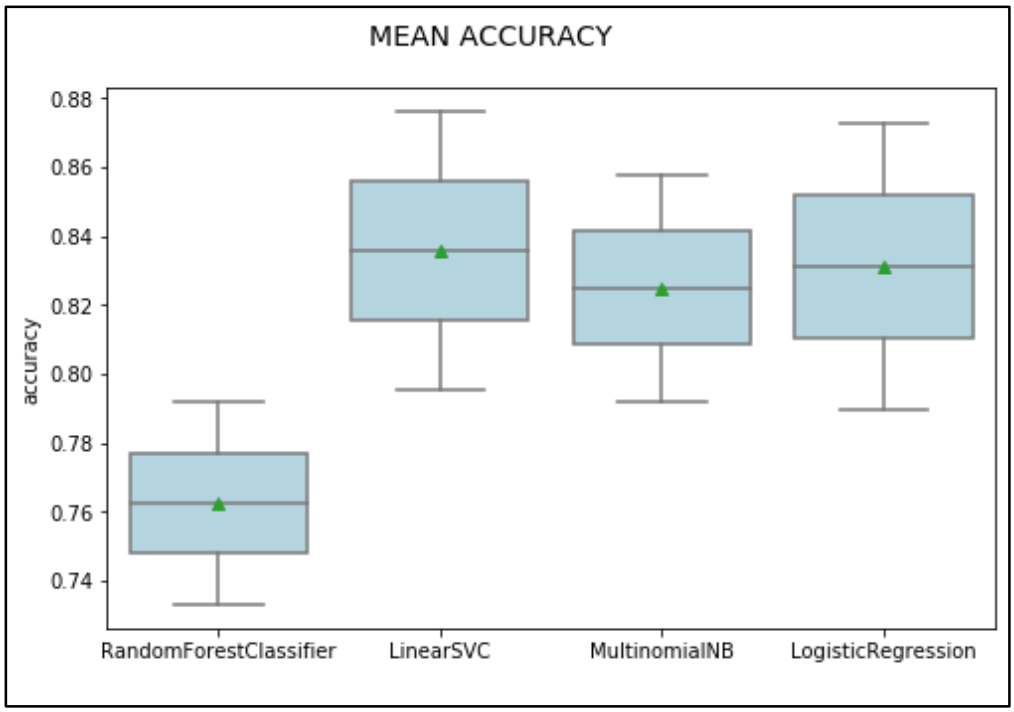

Figure 19. Accuracy comparison between classification models.

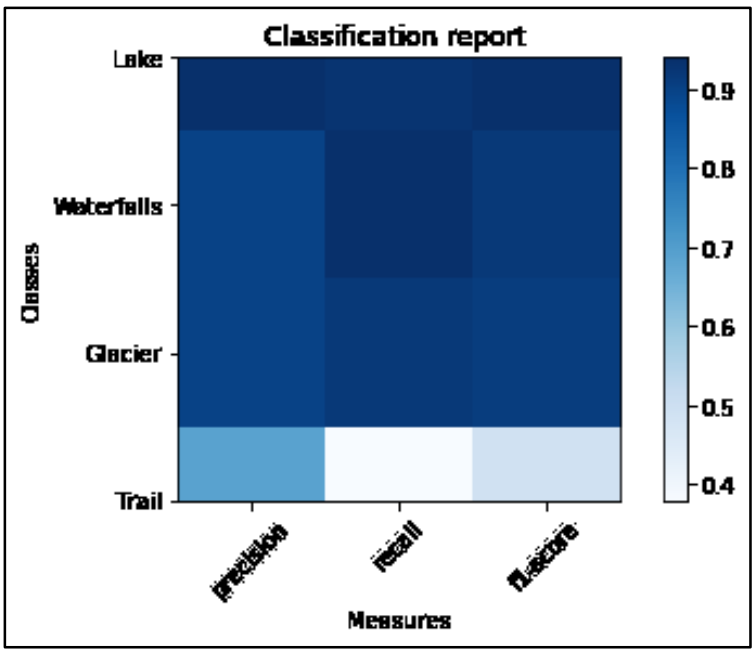

Figure 20. Accuracy confusion matrix of clustering task.

5. Discussion and conclusions

As SM has been widely adopted by tourists and it has become vital for destinations to leverage their SM platforms to stay competitive in the global economy. SMA is an invaluable method to monitor and listen to consumer-to-consumer conversations (i.e., eWOM) and systematically evaluate tourists' opinions about destinations. Sentiment analysis empowers tourism destinations to track tourists' opinions and viewpoints on a large scale and picture a trajectory of the public buzz around a destination by comparing changes in scores over time and against other places. Destination marketers can also use sentiment analysis to improve customer relationship management and recommendation systems through detecting positive and negative customer feedback. In particular, "flames" (overly heated or antagonistic languages) can be detected and excluded in social communication to enhance antispam systems (Cambria et al., 2013).

In this study, the sentiment analysis revealed that some touristic locations in JNP are outperforming others in terms of sentiment and ratio scores on SM, despite the fact that tourists less frequently reflect on their experiences at these places on SM, resulting in lower volumes of reviews (e.g., Sulphur Skyline Trail, Mt. Edith Cavell Trail, and Annette Lake). The presence of these less considered locations placed higher in the ranking suggests that average sentiment score can be a more informative measure than simple TripAdvisor rankings. While the average sentiment score and the Pos/Neg ratio score ranks were aligned with one another for most of the locations, a more detailed review of the scores reveals that some attractions had meaningfully different ranks such as Sulphur Skyline and Mt. Edith Cavell Trails, Spirit Island, and Athabasca Falls. Part of this difference in ranking can be explained by the fact that a higher number of neutral reviews with sentiment scores of zero reduce a location's average score but has no effect on the Pos/Neg ratio score. This difference suggests that locations with a considerably higher on-average scores compared with their ratio scores may have subgroups of visitors with extremely strong feelings toward these locations (e.g., Sulphur Skyline and Mt. Edith Cavell Trails).

Sunwapta Falls and Canyon Athabasca Glacier, and Columbia Icefield are located on the other end of sentiment spectrum with the lowest sentiment and ratio scores as well as TripAdvisor ranking. This, however, conflicts with the topic modeling results that suggests glacier activities and tourism (e.g., Ice Walking, Glacier Explore Tours) are amongst the most important dimensions of tourist experience in JNP. Part of this difference can be explained by the fact that conversations around climate change and glacier retreat contain mainly negative expressions and therefore score less in sentiment and ratio rankings. It is quite probable that TripAdvisor follows the same ranking method by relying on sentiment scores, however, this by no means implies that these glacier tourism attractions are less popular in the eyes of JNP tourists.

This study also proposes a novel approach to extract latent dimensions of tourist experience toward a nature-based tourism destination retrieved from online reviews. LDA analysis of online reviews uncovers key aspects that are not discovered through traditional methods. The relative significance of the obtained dimensions is identified based on the intensity of the conversations around each. “Ice Walking,” “Glacier Exploring Tour,” “Scenic Waterfalls,” and “Water-based Activities” are the most important dimensions in the analysis. This supports the findings of prior studies that have proposed natural environment, beauty of the scenery, and glacier tours as key factors influencing tourism experience and destination image (Beerli & Martin, 2004: Purdie, 2013). Results of the LDA model strongly suggest that JNP tourism providers leverage destination management dimensions (controlled factors) such as glacier and cruise tourism experiences. The quality of the interpretation provided by tour operators and improvement in both content and delivery techniques are crucial factors to optimize tourists’ tour experiences. Well planned interpretation more likely results in satisfying visit experiences for tourists, which in turn leads to positive word-of-mouth, recommendations, and repeat visitation (Hwang et al., 2005). DMOs and tour operators can play an important role in filling the knowledge gaps through trainings and workshops, mentoring and internships, as well as providing information materials directly to tourists pre, during and post visit. This goal cannot be achieved without a clear and effective communication and liaison channels between DMOs and tour operators.

Another controlled dimension was trails and pathways. Considering the exceptionally higher sentiment scores of trails and hiking locations, both from the results and on TripAdvisor rankings, improving infrastructure and informative aspects of hiking trails and pathways through strategic and operational plans for trail development is something that tourism providers should invest further in. DMOs should also understand the needs and characteristics of potential hikers,

identify diverse constraints that prevent their trail use, and recognize factors that inspire and facilitate their use. DMOs can also develop partnerships across different public and private sectors to promote specific trail activities, hiking experiences and packages for target groups, for example through showcasing unique cultural, natural, and historical features of the trail.

This study advances investigations of destination loyalty through cluster analysis of TripAdvisor online reviews. A destination loyalty keyword vocabulary was developed through reviewing loyalty literature in hospitality and tourism, and loyalty-expressed reviews were identified and separated from the rest of the JNP TripAdvisor corpus. After categorizing loyalty-expressed reviews into 4 clusters of glaciers, waterfalls, lakes and islands, and hiking and trails, top features within each cluster were presented and analyzed. Results revealed that different types of tours play an important role in recommendations and revisit intentions of JNP tourists (e.g., Columbia Icefield and Sightseeing tours, Glacier Skywalk, Maligne Lake Cruise tour). Water-based recreational activities such as kayaking and canoeing, boating, paddle boarding, and fishing were amongst highly recommended activities when visiting lakes and islands. Nature photography and wildlife viewing were other inspiring factors for destination loyalty expression in reviews. Aligned with the findings from sentiment analysis and topic modeling, hiking activities and trail attractions were notable motivators for tourists' loyalty expressions on SM. Results show that sense of accomplishment upon finishing longer hikes and more challenging trails together with beautiful skyline and alpine view are amongst reasons for sharing loyalty toward JNP online.

This study has several managerial implications. Tourism providers can not only verify underlying aspects of tourist experience from user-generated data but can also portray a perceptual mapping of touristic locations within their destination through a comprehensive analysis of online reviews. Moreover, there is a lack of understanding about the factors influencing destination

loyalty in nature-based setting. Thus, this study enables DMOs to specify destination's salient characteristics that influence tourists' recommendations and revisits intentions. Online review analysis of JNP visitors reveals key dimensions of destination loyalty toward JNP, including informative and recreational tours, water-based recreational activities, and challenging trails.

While the findings of this study contribute to the academia and tourism industry, it has some limitations. First and foremost, due to the inherently incomplete nature of online reviews (Chen et al., 2016; Hargittai, 2020; Morstatter & Liu, 2017), SM data has to be treated with caution when generalizing the results to beyond particular studied online groups. Combining SM data with other types of data such as interviews, focus groups, and surveys may be a useful strategy for tourism researchers to not only distinguish extreme views from more typical perspectives held by tourists but to generalize their results to groups other than the studied population. Second, this study only focused on analyzing the most frequently used terms and failed to consider and further explore least frequently employed, unique terms per document (i.e., each attraction) and in the entire corpus. A fruitful avenue for future research would be to consider those terms occurring the least frequently and compare them with the most frequently used terms – as they may signal a new trend or change of perspective held by tourists. Third, it is hard to generalize the findings to other tourism destinations because of the exploratory nature of this study. Thus, future research can replicate the current study in other destinations to test the applicability of data analysis and compare the findings from attractions and tourism destinations across the globe. Another limitation of the current study is the comprehensiveness of the collected data from different touristic locations within JNP, as well as focusing only on TripAdvisor. Future research can not only make use of a broader scope and include other touristic places but can also incorporate other SM sources such as Twitter to better understand tourists' sentiments and interests. Last but not least, the current study

treated the entire extracted reviews from 2002 to 2019 as one corpus, and failed to analyze the trend components of the time-series data. Future research is encouraged to divide and compare different time spans in the data and explore how tourists' behaviours change over time.

CHAPTER 4: Climate Change Conversations on Social Media

Study 3: Tourism-related Climate Change Perspectives: Social Media Conversations about Canada's Rocky Mountain National Parks

1. Introduction

While perceptions of climate change in the tourism context in traditional media, such as newspapers, have been relatively well-studied (Becken, 2007; Capstick et al., 2015; Gössling et al., 2012), there are only a few studies that focus on how climate change is perceived in social media. One of the main reasons for this lack of attention is the methodological challenges of handling and analyzing the large amounts of unstructured textual data that often characterize social media. Social media is not only a significant source of the (re)production of informal conversations in society, it is an exceptional source for studying everyday discourses outside the scope of mass media. One of the main objectives of this study is to investigate the public understanding and discursive construction of climate change in social media. Employing linguistic analysis and discursive analysis of laypeople's conversations about climate change in online reviews, this study seeks to extend knowledge about how climate change is perceived in the sense-making practices of visitors to Jasper National Park. I argue that discursive explorations can provide important insights into the public debate on climate change, which can potentially inform tourism providers about how to improve their communication and tailor their discourse to address the needs and interests of the public. This paper explores the discourse produced on TripAdvisor regarding climate change and how opinions are expressed, discussed, and created through online reviews of

Jasper National Park. The following questions guide this research: what views do visitors of Jasper National Park express on TripAdvisor relating to climate change, and what can discussions about climate change in online reviews tell us about how the subject is perceived by visitors and communicated to others? This research also tries to understand tourists' reactions to climate change and their interests in engaging in pro-environmental behaviors that will mitigate and minimize tourism activity related impacts.

2. Literature review

2.1. Climate change and tourism research

Climate change and its significant impacts on tourism are now a pressing issue for tourism destinations worldwide. There has been an extensive and ongoing academic debate on tourism and climate change throughout the last decade, with scholars actively engaged in research critiques (Scott & Becken, 2010) attempting to move tourism-climate change scholarship into a new phase of maturity and criticality (Becken, 2013). Long-term analyses of the effects of climate change on tourism systems have been a popular area of research in the past two decades (Elsasser & Bürki, 2002; Scott et al., 2016; Steiger et al., 2019). However, the ability to understand tourists' behaviors and responses toward this environmental issue is vital as well. This understanding will require the development of new approaches to not only illustrate a clearer picture of tourists' thoughts and beliefs, but to improve their understanding and ability to address climate change, and reduce their level of uncertainty regarding the changing climate.

Nature-based tourism is a major component of Canadian tourism; it is strongly influenced by climate, with significant impacts on physical settings, associated outdoor recreation activities,

and seasonality (Scott et al., 2007). National park visitation in Canada is highly seasonal with nearly 70% of annual visits occurring between May 1 and September 30 (Parks Canada, 2020a). Global climate change has affected the length and quality of tourism seasons. This has posed opportunities and risks for tourism providers by providing more revenue and economic opportunities for communities and businesses on one hand, but negatively affecting the ability to maintain ecological integrity on the other (Jones & Scott, 2006; Scott et al., 2004).

While some tourism destinations include climate change in their strategic planning and tourism development, there are still many destinations that do not acknowledge climate change and prefer to quietly adapt to or deny its negative consequences, simply because they see it as a risk to their competitiveness (Scott & Becken, 2010). According to Wang and Pizam (2011), as global ecological and social climate change-related concerns intensify, DMOs must do their best to be "seen as green" (i.e., to appear to be taking the issues seriously and acting upon them) both short-term in the "hype" phase and long-term through sustainable development and by focusing on "green conversation." In general, destination competitiveness will improve in places such as Canada, Northern Europe, and Russia because of changes in push-pull visitor motivating climatic factors. For example, warmer temperatures in the higher latitudes will pull or attract more visitors to those regions and adverse physical conditions such as climate change-related floods and wildfire will repel or push visitors away from destinations increasingly prone to these hazards. Declines in visitation have been observed in many subtropical and tropical areas (Scott et al., 2012). A better understanding of tourists' perceptions of climate change can help DMOs to not only substantiate tourism climate indicators but provide a precise assessment of their destination's competitiveness and how to redistribute resources to address climate change and its impacts in the future.

Tourist perceptions of climate change are of great importance to tourism destinations, particularly those that are highly sensitive to climate change (Gössling et al., 2012; Hall & Lew, 2009; Scott, 2006; Scott et al., 2008). Mountain tourism is a good example of sensitive locations, where the perceived quality of the alpine environment is a major source of attraction for visitors. Studies of how tourists comprehend and respond to changes in North American nature-based tourism destinations indicate that more people are visiting the Canadian Rocky Mountains, where warming is moderate; while fewer people are visiting Rocky Mountain National Park in Colorado, where extreme heat conditions are more common (Richardson & Loomis, 2005; Scott et al., 2007). Tourists also cite receding glaciers as another reason that they are less likely to visit mountain parks in the future (Yuan et al., 2006), although future generations may not share the opinion of current visitors (Scott et al., 2007). Environmental change in mountain destinations is such that with the exception of mountaineers as a specific market segment, the number of visitors to mountain destinations might not necessarily decrease, despite the adverse impacts of climate change on such destinations (Gössling et al., 2012).

2.2. National parks and climate change discourse on social media

National parks and protected areas throughout the world are already beginning to see impacts of climate change, such as changes to species distribution (González et al., 2010), glacial retreat (Hall & Fagr, 2003), and altered river and marine ecosystems (Suffling & Scott, 2002). Modern transport technologies for mass tourism such as high speed rails and road links have significantly changed accessibility to mountain areas and reduced tourists' sense of remoteness (Prideaux et al., 2010). Tourist activity has also introduced new pressures on both human and biological communities in mountain destinations, including on fragile environments, mountain

heritage values and local cultures and, more importantly, climate change itself (Beniston, 2003). Climate in general is perceived to be both a resource for the tourism experience as well as a risk (Becken & Hay, 2007). Of all the previously mentioned concerns of mass tourism, climate change is one of the most serious issues faced by nature-based tourism destinations, and is likely to have the greatest long-term impact. Some of the expected impacts on mountain areas for instance, include but are not limited to receding glaciers (Hall & Fagre, 2003), shifts in the range of some species (Johnson et al., 2011; Parmesan & Yohe, 2003), longer and more severe droughts and/or flooding, more intense fire events causing large-scale and irreversible changes to plant and animal communities (Scott et al., 2003), and decreases in the occurrence of cold extremes concurrent with more intense weather events (Allen et al., 2019).

The impacts of climate change on nature-based tourism can be viewed on two levels: a global scale, and a destination scale. On the global scale, human-generated climate change poses a range of problems primarily related to global warming and increasing temperatures, which in turn changes weather patterns and will have a substantial influence on different ecosystems (Allen et al., 2019). The impacts of climate change at a destination level are likely to cause considerable changes to local ecosystems and fit into four categories: changes to local ecosystems; changes to local weather patterns (i.e., daily/annual patterns of precipitation, wind, humidly); changes in human use, activity and consumption; and economic impacts (i.e., impacts to the regional economy and ecosystem services) (Palomo, 2017; Prideaux et al., 2010; Stern et al., 2006). Changes to local weather patterns can disrupt recreational activities such as winter snow sports, while changes in local ecosystems can impact scenic values and the perceived attractiveness of specific mountain regions. The annual increased temperatures in the Canadian Rocky Mountain Parks was predicted to attract a larger number of visitors with estimated increases of 7-12% for the 2020s (Richardson

& Loomis, 2005). Visitor data as recent as 2020 appears to confirm this trend in growth (Parks Canada, 2020a).

It is important for visitors to acknowledge that climate change causes problems for human wellbeing as well as to accept their central role in this problem. Researchers and climate action activists speculate that an increasing portion of visitors will wish to become part of the solution, although this requires significant changes in visitors' lifestyles and patterns of travel consumption (McKercher et al., 2010). Within academia, tourism scholars have explored the degree of public understanding of climate change in relation to tourism (Becken, 2007; Gössling et al., 2007; Miller et al., 2010); and tourists' perceptions of carbon offsetting schemes and their response to such reality (Becken, 2004; Mair, 2011). Previous studies suggest that although an agreement exists in the scientific community about anthropogenic climate change, such a consensus cannot be easily found in the public domain (Freudenburg & Muselli, 2013). Public skepticism on the subject of climate change remains present in many cultural domains across the world, and is more pervasive in western nations (Capstick et al., 2015; Leiserowitz et al., 2013). For example, in a study on public perceptions of climate change in Britain, Poortinga et al. (2011) found that the public's skeptical views regarding climate change have grown from 4% in 2005 to 15% in 2010. Funk and Kennedy (2020) also studied how Americans see climate change and the environment and reported that at least 43% of Republicans believe climate policies not only make no difference on the environment, but about two-in-ten (22%) say such policies also do more harm than good for the environment.

Such disparity between scientific domain and public understanding has become the focus of research in the last two decades, such as studying how conservatives in the United States are

climate change skeptics (McCright & Dunlap, 2000); how democrats with high science knowledge believe that human activity contributes a great deal to climate change (Funk & Kennedy, 2020); the extent to which climate change skeptics have a deep-rooted sense of skepticism about everything, not just climate change (Hobson & Niemeyer, 2013); and public perceptions of climate change and growing public skepticism since the mid-2000s (Capstick et al., 2015). Bringing such debates into the tourism context, contemporary academic discussion focuses mainly on the extent to which anthropogenic climate change exists and the role of the tourism industry in this matter (Hall et al., 2015; Hanna et al., 2016). However, less attention has been paid to public understandings of climate change, and in particular visitors' perspectives.

2.3. Communicating climate change to the public

In the last two decades, efforts to research climate change communication and its comprehension by and impact on the general public have grown considerably. Climate change communication is a difficult for two reasons. First, this is due to the complexity of climate change itself. Since climate change occurs over a long time period and often is only visible in highly remote locations (e.g., permafrost melt and coral bleaching), and because changes in weather patterns may or may not be linked to longer-term trends (Ungar, 1992), it is difficult for people to comprehend and personally substantiate. Another issue is the complexity of the communication involved with climate change (Nerlich et al., 2010). Climate change communication has many features in common with a number of other communication disciplines including risk (McCarthy et al., 2008), health (Schiavo, 2013), and science (Nisbet & Kotcher, 2009). Social science communication, which has entered quite late to the debate, involves examining the efforts of social

scientists to engage with the issue and evaluating the role of the social sciences in addressing climate change challenges (Lever-Tracy, 2008).

Previous climate change communication literature covered a range of issues such as Climategate, which is a deep-rooted argument between supporters and deniers of climate change (Leiserowitz et al., 2013; Koteyko et al., 2013); efforts to shift attention from saving the planet to prioritizing saving money as a result of the global recession (Scruggs & Benegal, 2012); and the realization that decreased public interest in climate change meant that efforts to improve communication failed to lead to better global and local policies (Feldman & Hart, 2018). Studies of climate change communication reveal diverse perceptions of climate change, but also increasing concern with the rise of climate change skepticism. However, an upward trend in scholarly interest in climate change communication has been observed in the last decade (Capstick et al., 2015; Pearce et al., 2015).

A good number of publications involved finding optimal and ideal climate change messages that the public would easily understand or be captivated by (Moser, 2010). In fact, the increasing number of new media such as discussion forums has enabled users to interact with each other, while providing researchers with opportunities for innovative methods to make sense of how climate change is communally formulated and, possibly, acted upon (Segerberg & Bennett, 2011). The emergence of social media opened a public space for climate change deliberation and brought with it opportunities for democratic debates in an apolitical way (Rapley et al., 2014). Against such a background, an increasing number of social science studies attempted to comprehend deep-rooted tensions that characterize climate change debates, understand public opinion about climate change, and seek new communication strategies such as consensus messaging (Pearce et al., 2015;

Wibeck, 2014). For these purposes, scholars have researched social media platforms such as blogs and Twitter to investigate the dialogue and evaluate how different stakeholders including professional communities, political activists, and the "lay" public participate in online debates (Hawkins et al., 2014; Koteyko et al., 2015).

In one of the first attempts to study climate change communication on social media by applying linguistic analysis, Koteyko (2010) argues that blog discussions are rich sources of data for scholars studying the conceptualizations of climate change conversations. Online communities such as blog discussions and review platforms allow public audiences the opportunity to spontaneously interact with each other with many possibilities for content creation, enabling the manifestation of a large number of opinions that can be analyzed in real time (Koteyko, 2010). Linguistics has empowered climate change communication scholars to systematically retrieve social media big data and investigate the patterns of language use by different discourse communities (Koteyko et al., 2010). Nevertheless, quantitative social media "big data" analysis has to be treated with caution, as it can become abstracted and detached from key contexts which give meanings to social media postings. Therefore, to comprehend its full potential, quantitative social media analysis must be employed in conjunction with qualitative analysis of postings (Boyd & Crawford, 2012).

With all of these debates, visitors to nature-based tourism destinations are exposed to climate change-related messages on social media and contribute to these conversations through their postings on various social media platforms. As Koteyko et al. (2013) also call for research to focus on "lay discourses" of climate change, in particular "Internet-based discourses," the current study seeks to extend this concern to tourism research, arguing that tourism research would

ultimately benefit from "the discursive building blocks underpinning taken-for-granted ways of talking about climate change" (Hanson-Easey et al., 2015, p. 217). Studying public perceptions of climate change on social media can provide evidence of what tourists know and believe about climate-related concerns, and how they communicate about such issues, with the ultimate goal of easing an enhanced communication between tourism providers and tourists regarding the potential risks and benefits of climate change. An analysis of tourist perceptions of climate change should also consider the tourists' understanding of their own role in this process. Hence, a second goal of this paper is to evaluate what tourists know about their own contribution to tourism-related environmental problems, particularly climate change.

Early studies that applied content analysis for the purpose of researching climate change discourse on social media (Lederbogen & Trebbe, 2003) heavily relied on a set of concepts defined by the analyst and based upon existing theoretical frameworks rather than online users themselves, leading to categorizing discourse for what the users are rather than what they do (Lamerichs & Molder, 2003). To overcome this limitation, the approach to online reviews adopted in this study is informed by a linguistic perspective and is closest to what Herring (2004) refers to as "computer-mediated discourse analysis."

3. Design and method

While some scholars in the field suggest more effort needs to be put into studying lay discourses of climate change on social media, interested scholars are limited by several methodological challenges such as the tremendous amount of unstructured textual content characterizing social media (Bail, 2014; Karpf, 2012; Törnberg & Törnberg, 2016). This challenge is not limited to big data, as delineating online postings or tweets has its own challenges for

relatively small datasets as well. These textual data are often short, lack discursive context, and vary in complexity, making them difficult to comprehend and study using traditional methodological approaches and analytical methods (Törnberg & Törnberg, 2016). As a result, the few existing tourism studies using such data to study lay discourse on climate change have been limited to either qualitative analysis of small samples, or relatively simple and basic quantitative methods such as word frequency lists. To address these issues, this study combines a corpus-linguistic approach with thematic analysis to investigate online lay discourse of climatic change issues in nature-based tourism destinations. This mixed methodological approach enables us to not only study this vast amount of unstructured data but to address some methodological concerns often raised about solely using corpus linguistic or thematic analysis, including but not limited to researcher's subjective preconceptions affecting the outcome of the analysis (Orpin, 2005), and the imminent risk of "cherry picking," leading to potential representativeness and generalizability problems (Baker et al., 2008). Therefore, this study is placed within the relatively recently developed field of Corpus-Assisted Discourse Studies (CADS).

3.1. Corpus linguistic analysis

Several techniques are used in corpus linguistic analysis to identify patterns and co-occurrences of elements and features, through the analysis of words and their textual context, using word lists, keywords, collocations and concordances (Cheng, 2013). From a range of conventional tools and techniques, this study applies a qualitative corpus linguistic tool in the form of concordances. Concordance analysis (see Figure 21, for example) allows examination of the lexical environment of a search term (e.g., climate). Corpus-assisted study involves analyzing numerous concordance lines to identify themes and patterns that may not be easily evident via

keyword analysis (Baker et al., 2008). Since the interpretation of patterns is fundamentally a qualitative process and the data often needs to be "subtly massaged" in order to produce desired results, the approach adopted here can be best described as a form of qualitatively informed corpus-based analysis (Törnberg & Törnberg, 2016).

Left	Term ↓	Right
the gone Ghost we thought about the impact of the	climate	change. The moraines are incredible and shows the force of
bit of the glacier fall, not a good sign re	climate	change." "We were at the last August long-week end
a unique way to understand what is happening to earth's	climate	in our own lifetimes." "We hiked from Jasper early in
at an ever increasing pace and a visit underlines the	climate	change taking place on our planet provoking sobering thought. "I'll
of glacier melt in the past 100 years due to	climate	change here is mind blowing! The Ice Field is surrounded
but some people were wearing sandals -- it is like another	climate	zone up there, wear proper shoes and have some warm
remarkable experience but if it encourages people to think about	climate	change & human impact then it is worth it's weight in
special experience for the children specially coming from a warm	climate	country. The guides are very good. A little expensive and
of a stupid idea. We're always talking about how the	climate	change destroys the glacier and then they take stupid busses
if it helps more of us to be aware of	climate	change, and the need to do what we can, than
the end of the glacier. A real example of how	climate	change changes the environment." "I was in two minds as
been told the Icefield essentially has its own little micro-	climate	that ususally involves low hanging clouds. Clear days are to
attraction. We questioned whether this is abusing the environment given	climate	change and the melting of the glaciers? Saw it, won't
world governments will not accept that climate change is real.	climate	change is real and can be seen here. One gets
and all because the world governments will not accept that	climate	change is real. Climate change is real and can be
slipping" The ice fields continues to shrink every day. As	climate	changes so does the earth. I am pretty sure having
will melt and it gives us more reasons to take	climate	change seriously.Must visit when you are in Banff or Jasper
more temperate regions. Disappointing is the fact that changes in	climate	are resulting in the size of the glacier reducing gradually
to make everyone apologize and commit hara-kiri over the	climate	change theories that they have bought into. This makes a
and glaciology. Everybody insists on talking about nothing other than	climate	change. Columbia Ice Field has not changed appreciably in more
way. We stopped at Bow Lake, which was gorgeous." "With	climate	change in full force, this ice field will only be
reviews. Maybe it's interesting if you don't live in a	climate	where it snows? Being from Minnesota, it just felt like
to visit and experience walking on a glacier. Due to	climate	change and the warming of the atmosphere driving the loss
worldly, and we could really understand better the effects of	climate	change! Thank you, Peter!" "Stunning opportunity to be walking on
incredible natural wonder . At the same time you see how	climate	change has an impact on our environment ....scary and beautiful

Figure 21. Concordance of 'climate'

3.2.Thematic analysis

When it comes to qualitative analysis, I applied thematic discourse analysis and followed Braun and Clarke's (2006) suggested steps for thematic analysis. Thematic analysis is a method for identifying, analyzing, and reporting recurrent patterns of meaning across a dataset and involves repetitive coding and re-coding of text and the accumulation of codes into broader themes (Braun & Clarke, 2006). Themes are reviewed to make sure they are coherent and distinct from other themes and to make sure that they reflect an overview of the data. Extracted themes are then

analyzed at a deeper level, considering what, if anything, they indicate about broader social discourses in relation to climate change, in part through applying discourse analysis. Discourse analysis is a method that examines how individuals construct their internal understanding of phenomena through discourse (Burman & Parker, 2016). According to Braun and Clarke (2006), an ideal thematic analysis involves a progression from description (i.e., patterns and semantic content), to interpretation and identifications of underlying ideas (i.e., significance of the discovered patterns and their broader meanings in relation to previous literature). Analysis within the latter approach tends to be located under a constructionist paradigm and, therefore, thematic analysis overlaps with some forms of discourse analysis. This methodological tradition is specifically referred to as thematic discourse analysis, where broader assumptions, structures and meanings are further conceptualized and theorized to interpret what is actually articulated in the data (Singer & Hunter, 1999).

3.3. Case study

Jasper National Park was established as Jasper Forest Park in 1907 and became Canada's sixth national park in 1911 (Parks Canada, 2020b). JNP occupies 1,122,800 ha of glacial carved landscape in the northernmost reaches of the Canadian Rocky Mountain Parks World Heritage Site (largest national park in the Canadian Rockies), and includes representations of montane, alpine and subalpine ecosystems (Parks Canada, 2020b). It is important to acknowledge that although the park is well-known for its ecological, aesthetic and cultural value, its establishment led to the eviction and displacement of four Metis homesteading families, and disrupted a longer historical use of the area by Indigenous peoples (Youdelis, 2016). JNP is among Canada's most heavily visited national parks for both inbound and outbound visitors (33% inbound travelers, 16% visitors

from USA, and 51% visitors from around the world) with over 2.5 million visits in 2019 (Parks Canada, 2020a). Visitors have access to a range of experiences, including but not limited to hospitality and entertainment services in the Town of Jasper, backcountry camping, boat tours, downhill skiing in the winter, trail access and hiking, and downhill skiing in the winter (Parks Canada, 2020b).

3.4. Glacier tourism in Jasper National Park

The Athabasca Glacier is a significant tourism draw for JNP due to its relative accessibility within the Columbia Icefield, with over a million yearly visits to view the glacier from the road and hiking trails, and an estimated 250,000 yearly visits to the toe of the glacier through all-terrain Ice Explorer vehicles and hiking (Luckman, 2017). The Athabasca Glacier, Similar to other glacier and last chance tourism destinations, is undergoing significant transformation due to development and climate induced environmental change (Groulx et al., 2019). The glaciers retreated about 1.15 km between 1919 and 2009, and the Columbia Icefield is estimated to have lost between 18% and 28% of its area over this period (Tennant & Menounos, 2013).

3.5. Data and procedure

All English travelers' reviews about top natural attractions and park areas in JNP were extracted from the third-party review website TripAdvisor, ranging from as early as December 2002 to October 2019. The reviews were collected in October 2019 (a total of 17224 English reviews). Top natural attractions and park areas listed by TripAdvisor are as follows: Annette Lake, Athabasca Falls, Athabasca Glaciers, Columbia Icefield, Maligne Canyon, Maligne Lake, Mt. Edith Cavell, Mt. Edith Cavell Trail, Pyramid and Patricia Lakes, Spirit Island, Sulphur

Skyline Trail, and Sunwapta Falls and Canyon. After a detailed review of the hospitality and tourism climate change literature (See Appendix 6 for the list of reviewed literature), a vocabulary of climate change keywords was developed (e.g., climate change, global warming, and glacier retreat). This keyword vocabulary was subsequently used to identify and separate climate change-expressed reviews from the rest of the corpus (Table 11).

Table 11. *Climate change vocabulary keywords and number of retrieved reviews for each.*

Climate change keyword	**# of retrieved reviews**	**Climate change keyword**	**# of retrieved reviews**
Recede(ing) glacier(s)	311	Shrink(ing) glacier(s)	104
Wildfire(fire)	145	Climate change	88
Retreat(ing) glacier(s)	130	Visibility	27
Global warming	121	Carbon dioxide	3
Disappear(ing) glacier(s)	108	Fossil fuels	2

After a close reading check to ensure the relatedness of the extracted reviews to climate change conversations, a total of 982 reviews remained for further analysis. Figure 21 shows a word cloud of the most frequent climate change-expressed terms toward JNP on TripAdvisor. A frequency list of top stemmed words with their weighted percentages and similar terms is also presented in Table 12. A thematic analysis on the remaining corpus was performed by using computer assisted qualitative data analysis software (CAQDAS), NVivo version 12, for the initial coding. NVivo is a widely used software application for qualitative data analysis that can aid the researcher in the search for an accurate and transparent picture of the data whilst also provide an audit of the data analysis as a whole. To perform the data analysis in a structured method, the six steps proposed by Braun and Clarke (2006) was used: 1) Familiarizing with the data; 2) Generating initial codes; 3) Searching for themes; 4) Reviewing themes; 5) Defining and naming themes; and

6) Producing the report. A mind-map depiction of the themes and sub-themes is presented as Figure 23, where the super-theme of wildfire and its themes and sub-themes are located on the left side of the Figure 23 and glacier super-theme on the left (e.g., destination environmental competitiveness is a theme located under the super-theme of glacier, with comparative advantages, destination loyalty, and perceived trip value as its sub-themes). In the next stage of the analysis and as the exploration progressed, a thorough reading of the data unearthed further subthemes within the existing major themes. After going thorough literature, these newly discovered subthemes were further coded and sorted into the appropriate sub-thematic categories (e.g., climate change hopelessness and solastalgia were coded and located as the sub-themes under the previously discovered theme of climate depression). Therefore, to sum up, the methods involved deductive extraction of relevant TripAdvisor postings and inductive analysis of each posting's content using Braun and Clarke's (2006) methods.

4. Findings and discussion

In this section, I start by presenting the emergent themes as well as their sub-themes and sub-categories separately, which are exemplified with short quotes from online postings within each category, and comparisons with relevant theoretical and empirical research. Next, each of these themes and sub-themes are discussed in details.

What emerged from thematic analysis is tourists' discourse about climate change on social media upon visiting JNP and can be seen in the hierarchical treemap of Figure 24. The hierarchical treemap (also known as mosaic charts) summarizes the hierarchical structures as well as similarities and anomalies in each theme and among all themes for a quick impression. The first levels of the hierarchy (themes) are shown in rectangles, where the size of each rectangle is

determined by the number of nodes given to each theme. Each rectangle is further sub-divided into smaller rectangles for the next level of the hierarchy (sub-themes), where the size is again determined by the same measure. The most significant themes under the super-theme of Glacier and Wildfire were [i] climate grief, [ii] pro-environmental behavior, [iii] interpretation and education, [iv] disappearing attraction, [v] destination environmental competitiveness, [vi] corporate environmental responsibility, [vii] negative impacts of wildfires, and [viii] eco-anxiety, respectively.

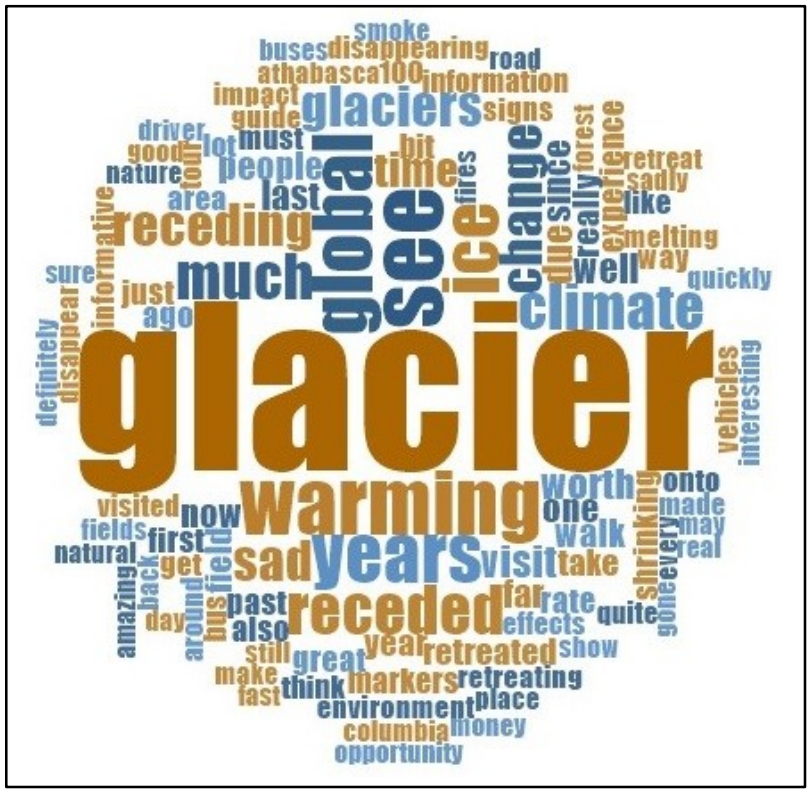

Figure 22. Word cloud of the most frequent climate change-related terms.

Table 12. *Frequency list of top 20 stemmed words with their weighted percentages and similar terms.*

Word	Count	Weighted Percentage (%)	Similar Words
glaciers	2366	4.63	glacier, glaciers
ice	868	1.70	ice, 'ice, iced
walks	667	1.30	walk, walked, walking, walks
years	433	0.85	year, yearly, years
tours	424	0.83	tour, 'tour, toured, tours
receding	404	0.79	recede, receded, recedes, receding
visits	372	0.73	visit, visited, visiting, visits
park	362	0.71	park, parked, parking, parks
experiences	297	0.58	experience, experiences
warming	273	0.53	warm, warmed, warming, warming', warmly
views	221	0.43	view, viewed, viewing, views
guide	207	0.40	guide, guided, guides, guiding
driving	199	0.39	drive, drives, driving
global	192	0.38	global, 'global
hiking	190	0.37	hike, hiked, hikes, hiking
worth	189	0.37	worth, 'worth
retreating	185	0.36	retreat, retreated, retreating, retreats
amazing	178	0.35	amaze, amazed, amazement, amazing
beauty	166	0.32	beauties, beautiful, beautifully, beauty
changing	160	0.31	change, changed, changes, changing

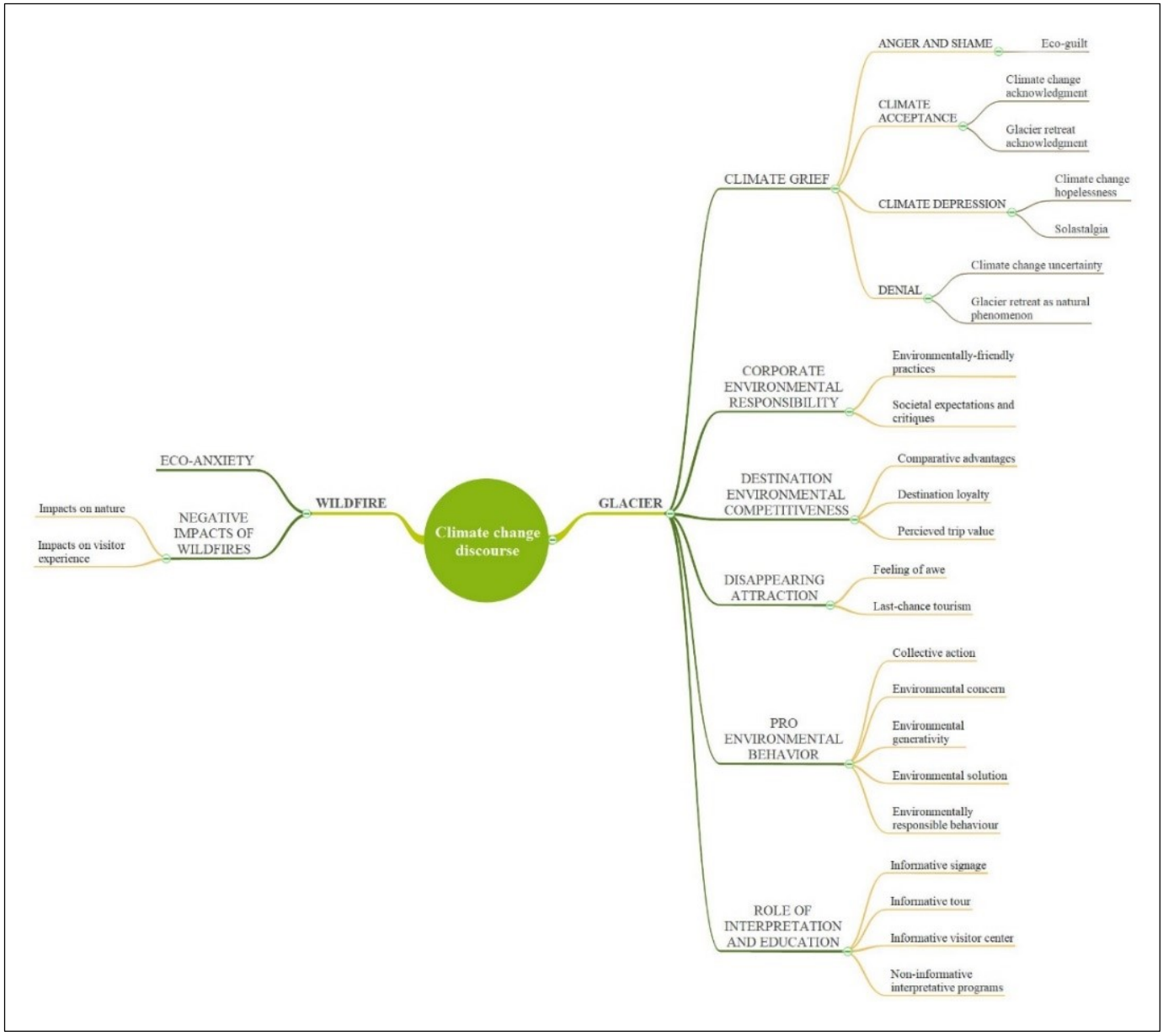

Figure 23. Thematic mind-map of the discovered themes and sub-themes.

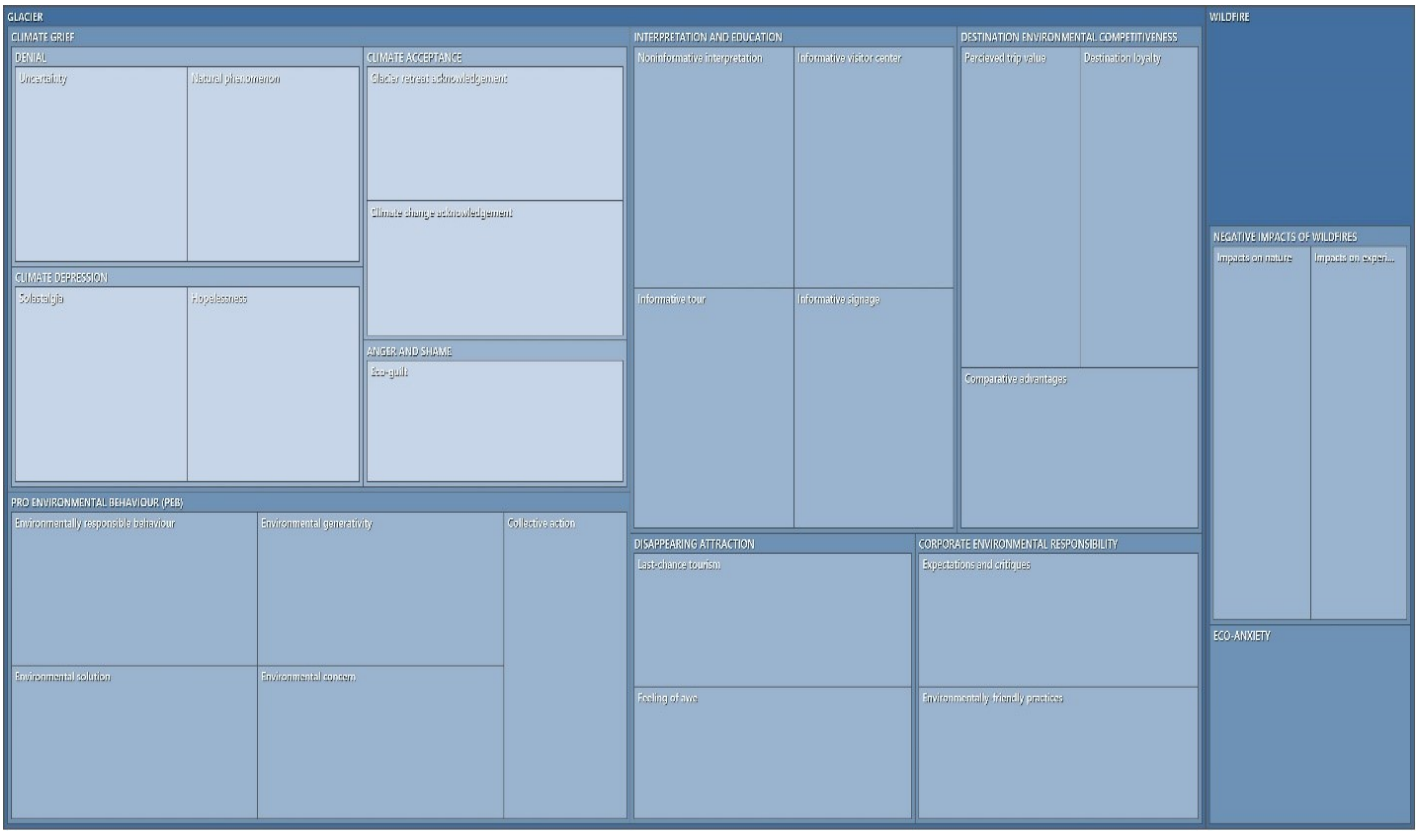

Figure 24. Hierarchical treemap of the extracted themes with their sub-themes.

4.1. Climate grief

> *"You'll probably never be on a glacier again, and this is where the sadness comes in. This glacier like many others is disappearing at a fast rate. If you were to go every year, you'd see less every year." (Male, solo traveler, 2018 posting)*

We are living in a time of astonishing environmental loss. Not only are our actions threatening the environments that sustain life, we are increasingly pushing the Earth into a completely new environmental era, often described as the Anthropocene Epoch (i.e., a timescale used to describe the most recent era in Earth's history when human activity started to have a significant impact on the planet's climate and ecosystems) (Ehlers & Krafft, 2006). Previous research indicates that people increasingly undergo the effects of environmental changes and their

associated ecological losses in their everyday lives, and that these changes have been directly and indirectly linked to mental health and well-being experiences including but not limited to: strong emotional responses (e.g., sadness, distress, despair, anger, fear, helplessness, hopelessness); mood disorders (e.g., depression, anxiety, and post-traumatic stress); and threats and disruptions to sense of place and place attachment (Albrecht et al., 2007; Clayton et al., 2017; Cunsolo & Ellis, 2018). An important concept emerging from such emotional experiences of climate change related to mental health is what is known as climate grief. Climate grief (also known as ecological grief) is a natural response to ecological losses caused by environmental destruction of climate change, and has the potential to be experienced more strongly and by a growing number of people as we move deeper into the Anthropocene (Cunsolo & Ellis, 2018). Climate grief is an emergent area of climate change communication research, which has the potential to shed light on collective responses to environmental loss, while also helping us to better understand the emotional dimensions of climate change impacts.

One of the best-known models of climate grief is derived from Elizabeth Kübler-Ross's work on death and dying (Kübler-Ross, 1970), in which she proposed a five-stage model that people with terminal diagnosis typically go through in adjusting to the reality and proximity of death. The first three phases are shock and denial, anger, followed by bargaining and, finally acceptance. Running (2007) incorporates this model very effectively to clarify some of the typical responses to climate change and associated environmental and ecological losses such as hurricane intensity, large wildfires, melting glaciers, and rising sea levels (Running, 2007). The "5 Stages of Climate Grief" are formulated as denial, anger, bargaining, depression, and acceptance.

4.1.1. Denial: Climate change uncertainty and glacier retreat as natural phenomenon

The first stage, denial, generally refers to people who refuse to accept the scientific evidence of climate change and global warming out of fear of the implications, or those who believe the science but ignore the potential consequences and need for action. Most people start at this stage and remain there until presented with convincing evidence. Among them are tourists with uncertainties associated with projecting climate change, its effects, and the degree to which human actions influence on those effects. A small number of visitors conceptualized glacier retreat as part of a natural climate cycle that has been recurring for millions of years, and not necessarily a permanent change in the climate. Such uncertainty in climate change presents a key challenge for adaptation planning of nature-based destinations. Characterizing and quantifying tourists' uncertainty in climate change is of great importance not only for detection and attribution of the problem, but for adaptation and mitigation strategic planning.

4.1.2. Anger and shame: Eco-guilt

Running (2007) believes that many people jump directly from denial to Stage 4 (depression), but for others, the second stage is anger. Anger, and related feelings, like frustration and rage, are sometimes referred to as "secondary emotions" because they tend to obscure other emotions such as sadness, hopelessness, and confusion (Novaco, 1976). An example is when tourists think about their environmentally harmful behavior and when they have not met personal or societal standards for environmental behavior, also called eco-guilt. Research shows that eco-guilt (sometimes referred to eco-shame) is not merely part of a general feeling of distress, but it appears to be a distinct emotion related to environmental behavior and is positively related to intentions to repair and protect the environment via personal and collective eco-friendly behaviors (Mallett, 2012). Stage 3 is bargaining. When people reach this stage, they try to downplay the

potential impacts of climate change (e.g., public deniers of global warming), or even focus on potential positive outcomes, such as “better weather.” In other cases, individuals admit that climate change is a major, human-induced problem, but claim that the answer is to "adapt" to it instead of mitigating climate change by responsibly changing our behavior. The key component of this reaction is the attempt to feel better and to avoid facing the loss, by wishful thinking and token efforts (Bryant, 2019). At a personal level, an example of this is when an individual buys an electronic car and hopes in technological fixes -- not facing the realization that climate change will require us to drastically change our consumption patterns. No quotation could be found in climate change-related conversations reflecting stage 3, bargaining, denoting that visitors of the glaciers in JNP are either working through the painful emotions of grief (uncertainty, despair, guilt, shame, sadness), or are accepting the reality of the ecological loss and are adjusting to the new environment as “climate-concerned citizens” (Randell, 2009).

4.1.3. Climate depression: Climate change hopelessness and solastalgia

Stage 4, depression, is when people accept the reality of climate change and global warming (and associated consequences), but feel helpless or hopeless about any chance of dealing with it. The emerging climatic and environmental concept of solastalgia fits perfectly into this category; solastalgia can be described as emotional or existential distress caused by negatively perceived environmental change (Albrecht et al., 2007). Solastalgia is the pain experienced when there is recognition that the place where tourist visits and loves is under physical and environmental distress. Tourists feel they are deprived of something when their tourism activities go through the changes brought about by tourism and are nostalgic for the past that preceded the massive arrival of tourists (Lalicic, 2019). Below is a sample post that illustrates this sentiment:

"I first visited the ice field in 1993. Going back to see how far it has disappeared made me sad. Where I stood on the ice 25 years ago is now vastly bare rocky land. The ice field has shrunk so far back." (Female, American resident, 2015 posting)

4.1.4. Climate acceptance: Climate change and glacier retreat acknowledgements

The final stage, acceptance, involves calmly accepting and acknowledging scientific facts, and mainly pertains to people who are now exploring solutions as a form of healthy response to feelings about climate loss. It also involves understanding that while the future is unknown, it will inevitably include suffering, and the loss of what we care about. While highly associated with each other, climate change and glacier retreat acknowledgements were mentioned most often in grief-related online postings, with 198 and 191 online reviews respectively. Two examples are provided below:

"When considering atmospheric warming and the shrinking of ice fields and glaciers in the Northern Hemisphere this is a graphic example with suitable signposting and notices on what's left of the glacier (still quite a lot but nothing like there was 100 years ago)." (Female, UK resident, 2014 posting)

"We first visited the Athabasca Glacier in 2007 (see my review). At that time, we took the Glacier Mobile out onto the glacier. It was disappearing at that time, but it was nothing compared to now, 8 years later when it has drastically receded." (UK resident, 2015 posting)

4.2. Pro-environmental attitudes and Behaviors

"we will [forgo transport by ice buggy] and walk with a guide on our next visit and brave the crevasses rather than risk damaging the glacier any further. This sounds mean; a little too much like it was alright for me to do it, but you shouldn't because you will damage it, however it is true to say that I will walk lighter next time and hopefully leave the glacier to last longer for others to enjoy." (Male, UK resident, 2016 posting)

The tourism industry faces the challenge of minimizing its negative impacts on the environment, taking into account that the majority of such impacts on travel destinations are often associated with tourists' delinquent behaviors (Pearce, 2005). One beneficial practice is the promotion of sustainable consumption (Dolnicar & Leisch, 2008; Li & Wu, 2020; Su & Swanson, 2017). Tourists' pro-environmental behavior in travel destinations refers to the actions by a tourist or group of travelers that promote or result in the sustainable use of tourism products and services (Kiatkawsin & Han, 2017; Li & Wu, 2020; Ramkissoon & Mavondo, 2014).

4.2.1. Environmentally Responsible Behavior (ERB)

Any sort of action that individuals or groups direct toward remediation of environmental issues is characterized and described as environmentally responsible behavior (ERB) (Borden & Schettino, 1979). ERB is characterized by a combination of self interest and concern for others, and includes both general actions (e.g., talking with social peers about environmental issues and encouraging them to behave in an environmentally responsible manner) and specific actions (e.g., recycling, energy conservation, using alternative means of transportation for reducing fossil fuel) (Bamberg & Möser, 2007; Thøgersen, 1999; Steg & Vlek, 2009). Some of the main elements that can influence ERB are psychological factors include place attachment (Lee, 2011; Vaske & Kobrin, 2001) and recreation experience (Lee & Jan, 2015), personal factors such as self-efficacy

(Tabernero & Hernández, 2011), and external factors such as the availability of tourism infrastructure (Su et al., 2018) and cultural values (Milfont et al., 2006). Nature-based tourism destinations provide an educational setting that not only encourages tourists to enhance their environmental knowledge (Powell et al., 2009) but enables them to develop emotional attitudes toward nature and to practice ERB (Collado et al., 2013; Lee & Jan, 2015).

4.2.2. Collective climate action

Tourists who adopt pro-environmental attitudes consciously manage their behavior, although this management is not necessarily related to their personal beliefs. This behavioral management is manifested in social attributes of altruism and collective climate action, both of which tourists will practice to minimize negative impacts (Ramkissoon et al., 2018; Steg & Vlek, 2009). Environmental conservation of a travel destination requires the cooperative participation of multiple stakeholders including visitors, residents, and destination-marketing organizations. Regardless of varied individualistic motivations to engage in such behavior such as social embeddedness (Stúrmer & Simon, 2004), sense of community (Talò et al., 2014), and emotional reactions (Rees et al., 2015), following the logic of collective climate action, environmental protection is a public matter, which needs to be addressed in the form of collective participation (Li & Wu, 2020; Steg & Vlek, 2009). An example is provided below:

> *"They don't seem like good value for money and when you read about the Glacier receding, I think it may be better to get off it altogether !!! and not drive huge vehicles onto it." (A travel couple, UK resident, 2017 posting)*

4.2.3. Environmental concern

"I chose not to do it [Glacier bus tour] and instead walked from the alpine centre [Discovery Visitor Centre] to the glacier edge. This means walking past several markers that show where the edge used to be up to around 100 years ago. Walking the distance, it has retreated is quite alarming and underscores the impact climate change is having in these areas" (Male, Australian resident, 2018 posting)

A large body of environmental psychology research has explored the origins of direct and indirect environmental behavior such as the relationship between concern for the environment and pro-environmental behavior. Environmental concern can be generally defined as, "the degree to which people are aware of environmental problems and support efforts to solve them and/or indicate a willingness to contribute personally to their solution" (Dunlap & Jones, 2002, p. 484). Based on this definition of environmental concern as a general attitude toward preserving the environment, and using the theory of planned behavior (TPB) (Ajzen, 1991), which states that intentional strength is a proximal cause of behavior, environmental concern can result in a more positive attitude towards pro-environmental behaviors (Fransson & Gärling, 1999). Despite the broad scope of pro-environmental attitudes and behaviors, research shows how climate change and environmental-related concern and coping can lead to active engagement in pro-environmental behavior as a form of individual mitigation (Helm et al., 2018; Howell et al., 2016; Steg & Vlek, 2009).

4.2.4. Environmental generativity – Concerns for future generations

"We all hear or talk about global warming but seeing the facts at Athabasca Glacier made us think that we are lucky to see this place with our kids, not sure our kids will be able to

see it with their kids or not? A food for thought!!!" (Female, Canadian resident, 2019 posting)

The foundation of pro-environmental behavior for most people is a mixture of self-interest and concern for others (e.g., future generations, other species, ecosystems, etc.) (Bamberg & Möser, 2007). The norm-activation model (Schwartz, 1977) is the theoretical framework for pro-socially motivated concerns, and rational choice models such as the theory of planned behavior (Ajzen, 1991) are the framework for concerns motivated by self-interest. Schultz (2001), for example, examined the importance and attitudinal value of environmental concern and its association with pro-environmental attitudes and behaviors. Findings show that environmental concern can best be described as the effect associated with beliefs about environmental issues that are expressed through three environmental motives: biospheric (plants, marine life, birds, and animals), egoistic (me, my lifestyle, my health, and my future), and altruistic (people in my country, all people, children, and future generations).

"It is a bit sad to think that my great grandchildren would probably not be able to see this and all because the world governments will not accept that climate change is real." (Male, Australian resident, 2016 posting)

Those environmental concerns that have an enduring effect over a longer period are of primary interest because they are passed from generation to generation and thus have a lasting impact and raise the issue of intergenerational justice. Such concern and care for the next generation in regards to environmental problems is referred to as environmental generativity (Urien & Kilbourne, 2011). Research has also shown the significant relationship between environmental generativity and pro-environmental behavior, indicating that generativity is well

suitable within the pro-environmental behavior framework and can be used to explore experiences of environmental stewardship activities (Urien & Kilbourne, 2011; Warburton & Gooch, 2007).

4.2.5. Environmental solutions – Tourists climate mitigation recommendations

> *"Come on Columbia Icefield, there's no excuse for this - you should be using electric buses for these journeys not adding to the problem. I suggested Brewster contacting Elon Musk." (UK resident, 2018 posting)*

Tourists climate adaptation and/or mitigation recommendations are highly associated with their environmental concerns and the degree to which they are aware of environmental problems and indicate willingness to contribute to the solutions (Dunlap & Jones, 2002). An environmentally concerned person perceives that they can influence the resolution of environmental issues by acting alone and/or as a group member to a greater extent (Braun, 2012). Environmental knowledge plays an important role on tourists' potential environmental solutions. Research indicates that tourists with high levels of knowledge about environmental issues tend to actively engage with environmental solutions and show higher degrees of empathy toward the natural environment (Cheng & Wu, 2015). Lack of knowledge about specific environmental issues may prevent tourists from engaging in pro-environmental behavior at a destination, regardless of their level of awareness about environmental problems and favorable attitudes toward the nature (Ünal et al., 2018). Tourists can gain such environmental knowledge by participating in a destination's eco-tours and interpretative programs that outline specific environmental issues and their simple solutions, and learn how to behave to reduce their negative influence on a destination and its natural resources (Lee et al., 2015).

4.3. Role of interpretation and education

> *"Park staff should be aware the [interpretive] signs are missing and should be eager to replace them to show the devastating effect global warming has had on this particular area. A teaching moment missed by the thousands who visit." (Female, Canadian resident, 2015 posting)*

Studies have shown that a well-organized nature-based tour can contribute to the environmental conservation and sustainable development of natural areas (Boley & Green, 2016; KC et al., 2015; Pegas & Castley, 2014), as it is argued that an encounter in a natural environment coupled with informative interpretative programs can offer an invaluable learning experience for tourists to be better educated about the environment (Powell & Ham, 2008). Such interpretative programs incorporated with nature-based activities can provide tourists with insight into the interrelationships in the natural environment, while allowing providers to use interpretations as a tool to improve visitors' knowledge and manage their behavior at environmentally sensitive locations (Littlefair & Buckley, 2008). Researchers have tried to understand the association between interpretative programs and visitor education efforts in protected areas and visitors' knowledge of such places (Marion & Reid, 2007; Powell & Ham, 2008), environmentally responsible behavior (Knapp & Poff, 2001; Lee & Moscardo, 2005), visitor satisfaction and experience (Stern & Powell, 2013), and pro-environmental attitudes and intended behaviors and actions (Cheng et al., 2018; Mayes et al., 2004).

For the specific case of impact-sensitive and imperiled tourism destinations, where visitors want to see vanishing landscapes and disappearing natural sites (known as last chance tourism), environmental education-based interpretation can potentially change behavior through increasing

visitors' knowledge. However, this can happen only if providers deliver learning opportunities that incorporate information in a thoughtful and effective way, i.e., by encouraging visitors to adopt more appropriate behavior that will sustain tourism development (Hungerford & Volk, 1990; Kuo, 2002). Such interpretive programs and activities are sometimes delivered by combining multiple sources of interpretation such as tours, brochures, signage, and a visitor/discovery centre. Below is a sample posting that exemplifies such combined interpretation offering:

> *"There are information boards placed near the glacier so that visitors may learn more about how the glacier is formed and how it is being negatively affected by human activity. There are also markers around the site which clearly show how rapidly the glacier is shrinking. All of these information boards and markers advocate the preservation of the glacier," (Male, family traveler, 2016 posting)*

Studies have showed that adding different layers of interpretive experience to repeat the message, what is referred to as "interpretive layering" (Coghlan & Kim, 2012), can substantially increase the effectiveness of interpretation. Interpretive layering allows visitors to participate in different activities and provides different levels of interpretation (Coghlan et al., 2011; Weiler & Smith, 2009). Interpretive layering is most effective at locations where visitors are unfamiliar with the attraction. An example is the subject of this research, nature-based destinations and glaciers. Tourists can co-create the experience by choosing from multiple activities, which is particularly beneficial because it is difficult at these sites to implement focused interpretive activities due to the nature of the environment (Coghlan & Kim, 2012; Lemieux et al., 2018).

4.4. Corporate Environmental Responsibility (CER)

"Brewster travel company makes money by taking people on bus tours on the glacier. Obviously, this will have an impact on this area that should be protected. They are exploiting nature for a profit. Even if these tours teach people about the importance of protecting the glacier, surely the message is lost being preached from a heavily polluting vehicle thundering on a vast expanse of nature that must be protected." (Male, UK resident, 2016 posting)

There is a significant body of literature about the relationship between the tourism industry and the natural environment and public concerns of climate change and ways in which the natural environment should be protected. Subject headings include sustainable tourism, ecotourism, and corporate social responsibility. The rubrics for tourism consumers are different from those of tourism providers. While tourism consumers have been urged to take appropriate action and practice responsible behavior in their surrounding environment, on the supply-side of things, corporate social responsibility (CSR) is introduced as an approach to business administration in which tourism providers are required to take closer voluntary consideration of ethical, social and environmental issues in their operations (Coles et al., 2013). As such, CSR is associated with a range of organizational activities including but not limited to employee welfare, stakeholder engagement, community action, charitable giving, responsible supply chain management, ethical leadership and, more closely related to the theme of the current study, environmental stewardship. Encompassed within the broader definition of CSR, corporate environmental responsibility can be described as the organizational acknowledgement of the legitimacy and importance of environmental issues and integrating them into the organization's strategic planning process (Banerjee, 2002).

Studies have examined CSR and corporate environmental responsibility from the perspective of stakeholders such as service providers (Kasim, 2006; Shah, 2011; Tamajón & Font, 2013), consumers (MacIntosh et al., 2013; Puhakka, 2011; Stanaland et al., 2011), and local communities (Gutiérrez & Jones, 2004; Mathew & Sreejesh, 2017). For environmentally sensitive tourism attractions such as nature-based tourism destinations and glaciers, the heavy reliance on the natural environment and environmental degradation caused by facility construction and interpretation tours have led to public concern for environmental protection. Tourism providers try to take such concerns and potential reputational damage into consideration. To satisfy consumers, activists, and regulatory bodies, they engage in actions such as environmentally friendly transportation, pollution prevention, and environmentally oriented design (Lyon & Maxwell, 2008; MacIntosh et al., 2013). Research on Canadian mass tour operators shows that despite a relatively high level of awareness about climate change, a non-regulatory CSR approach to climate change action exists and implementation of mitigation strategies was piecemeal in Canada's tourism industry (Dodds & Graci, 2009; Dodds & Kuehnel, 2010).

From consumers' point of views, tourists now more than ever want to see that providers are concerned with the greater good rather than self-interest such as increased profits and reputation management (Stanaland et al., 2011). By following CSR and corporate environmental responsibility initiatives and practices, tourism providers can upsurge tourists' revisit and referral intentions, and reinforce tourists' positive impressions (Chi et al., 2019; Jun et al., 2014). Findings of the current research reveal that only a few of online postings (5 cases) acknowledged Brewster's environmentally-friendly practices, as a matter of fact, the majority of visitors (64 cases) expressed their concerns, critiques, and expectations for tourism providers' CER approaches (see a sample posting below that illustrates such concerns and expectations for CER). Research into what tourism

service providers expect of CSR show top priorities for CER and ecological preservation such as nature protection, saving energy and resources, and climate protection among travelers of tourism destinations (Adlwarth, 2010). Such expectations for the environmental responsibility of different actors in the tourism market are reported to be particularly from tour operators, transport services, and touristic regions. Adlwarth (2010) notes that the growing number of CSR-attuned travelers creates a potentially attractive segment for tour operators, as these travelers are willing to pay 8% more for tours that meet their CSR and CER expectations.

> *"Come on Columbia Icefield, there's no excuse for this - you should be using electric buses for these journeys not adding to the problem. This is why I'm not rating you as excellent, you should be doing more to help the environment." (Male, UK resident, 2019 posting)*

4.5. Disappearing attraction

> *"I heard that it is only time before the glacier disappears so make sure you get to experience it. Catch it now before it disappears with global warming." (Male, Australian resident, 2014 posting)*

4.5.1. Last-chance tourism (LCT)

The last chance to consume is not a new phenomenon in the leisure and tourism industry. In fact, many of the earliest tourism destinations were considered places one "must see" before they were gone. Different from such last chance experiences, which were often limited to a particular geographic location, last chance tourism provides the opportunity to see the demise of ecosystems and observe ecocide first-hand (e.g., extinction of a particular species or disappearance of Arctic glaciers) (Lemelin et al., 2013). Climate change is gradually restructuring some tourism

destinations, and concerns over such vanishing attractions have prompted some tourism providers and tour agencies to recommend these destinations to consumers before they disappear. This trend in travel has been reported differently in the literature, where it has been referred to as disappearing tourism, doom tourism (Lemelin et al., 2010), and (when climate is a decisive factor) climate tourism (Becken & Hay, 2007). One main difference between last chance and climate tourism is that in addition to an emphasis on climate change, last chance tourism is also about destinations that may soon disappear due to a variety of environmental factors.

Visitors travel to last chance destinations (e.g., glaciers) mainly because they anticipate that climate change will cause these places to vanish soon, and there will be no future opportunities to experience them in their authentic form. Upon visiting last chance destinations, visitors can develop place-based connections, raise awareness and visibility for climatic and environmental concerns and, in some cases, promote conservation efforts (Groulx et al., 2019; Groulx et al., 2016; Lemieux et al., 2018). In fact, one of the main positive impacts of last chance tourism is that, if well performed, it can heighten tourists' awareness of a wide range of environmental issues and positively affect their ecological attitudes and behaviors, turning them into ambassadors for the protection of the specific region and long-term supporters of conservation activities (Burns & Bibbings, 2009; Lemelin et al., 2010; Miller et al., 2020).

4.5.2. Feeling of awe

In nature-based last chance tourism tours such as tours of the Columbia Icefield in Jasper National Park, the environmental interpretation provided by the tour guide in conjunction with a kind of immersive nature experience allows tourists to have a deeper understanding of and connection with nature. Studies investigated the potential experiential outcomes of last chance

tourism that tourists develop such as through an interaction between the tour and site characteristics (perceptions of quality and satisfaction) and motivations for visitation (Chan et al., 2015) and feeling of awe (Powell et al., 2012). A feeling of awe can be best described as "an emotional response to perceptually vast stimuli that overwhelm current mental structures, yet facilitate attempts at accommodation" (Shiota et al., 2007, p. 944). Feelings of awe in last chance tourism experience are often expressed through transformative or life-changing events, such as those that can be recalled years after the experience takes place, or those that permanently change a tourist's life and perspective (Powell et al., 2012). Emotions of awe can show themselves in different forms such as renewal of self, individual transformation, acknowledgment of global warming/climate change, or a substantial change in the perception of global and local environments (Brownlee & Hallo, 2012; Powell et al., 2012; Wilson, 2019). Below is a quotation from a post that reflects visitors' feelings of awe:

> *"This trip was eye opening as well in terms of how human activities are causing global warming and how glaciers have shrunk over past centuries. We all hear or talk about global warming but seeing the facts at Athabasca Glacier made us think that we are lucky to see this place with our kids before it's gone forever, not sure our kids will be able to see it with their kids or not? A food for thought!!!" (Female, Canadian resident, 2019 posting)*

Publicizing the vulnerability of certain impact-sensitive destinations as last chance tourism has an ethical paradox (Dawson et al., 2011). Despite acknowledging climate change and facilitating a connection to a place, last chance tourism can also accelerate negative impacts on sensitive destinations by attracting more tourists who enthusiastically seek to experience the place before it is gone forever. Studies report a disconnect between valuing last chance destinations and

contributing to the climate impacts that threaten the place. In that sense, last chance tourists seem to be unaware of or unbothered by the damage caused by their own environmental footprints and tend to find ways to justify their tourism behavior (Dawson et al., 2010; Eijgelaar et al., 2010; Groulx et al., 2019).

4.6. Destination environmental competitiveness

> *"Yes, there are many other glaciers that are whiter, higher, older, more pristine and bigger than this one - especially in the Columbia Icefield - but you can't usually see them as up close as this unless you take a helicopter. Well worth it and an absolute must do!"(Female, Canadian resident, 2012 posting)*

An increase in tourists' environmental consciousness has prompted tourism destinations to recognize the fundamental importance of environmental quality and incorporate environmental measures into their management strategies. Environmental quality can be generally defined as the quality of the natural features of the destination (e.g., beautiful scenery, natural structures) that can be deteriorated by human activities and therefore lose their appeal (Mihalič, 2000). The environmental quality of tourism destinations plays an important role in tourists' travel-related decisions and, down the road, destination competitiveness. It is unrealistic to expect that destinations with lower environmental quality can remain competitive, because a growing number of visitors are not willing to sacrifice lower environmental quality for a lower price (or even pay a premium to experience a pollution-free environment); studies have shown they will avoid what they consider to be polluted destinations (Cucculelli & Goffi, 2016; Mihalič, 2000). As a result, maintaining a high level of overall environmental quality is important for most destinations to remain competitive.

4.6.1. Comparative advantages- Comparison with other glaciers

"Alaska and New Zealand have prettier more spectacular glaciers - a little harder to get to though!" (Family traveler, Australian resident, 2014 posting)

First introduced by Crouch and Ritchie (1999), the model of Tourism Destination Competitiveness (TDC) was developed from qualitative interviews with the CEOs of mostly North America, who were asked about factors that determine the competitiveness and success of tourism destinations. The TDC model suggests that social, cultural, political, technological, ecological, and environmental strengths are all important when studying the competitiveness of tourism destinations. The model advocates the simultaneous consideration of specific comparative (endowed resources) and competitive (deployment of resources) advantages. The comparative advantages of a destination refer to the distinct features of a destination that can attract tourists when compared with other competitors in the tourism market (e.g., environmental resources, accessibility, knowledge resources, infrastructure and superstructure elements) (Ritchie & Crouch, 2011). DMOs and tourism providers who deploy these effectively and efficiently create a competitive advantage that can lead to the growth and success of a destination.

4.6.2. Perceived trip value

"Given the cost of the adventure, saying you did this when a lot of the glaciers have disappeared due to climate change will be the real value." (Family traveler, Canadian resident, 2012 posting)

In their TDC model, Ritchie and Crouch (2003) proposed that the quality of natural attractions (destination appeal) is an important factor of tourism destination competitiveness,

where destination attractiveness refers to elements such as natural features, climate, perceived appeal, unique geography, tourism infrastructure and superstructure, access and transportation facilities, and so on (Ritchie & Crouch, 2003). The proposed model also emphasizes that a well-performed environmental program of destination management enhances the perceived trip value and perceived quality of a destination and has the potential to strengthen its competitive position. Although the concept and definition of value are somewhat vague in the tourism literature due to the various uses of the term, in general, value can be defined as a combination of a destination's perceived quality and associated price which a visitor will quantify as the value received (Sanchez et al., 2006). Perceived trip value is a cognitive evaluation where the tourist compares the time or money invested in a trip with the experience gained from that visit. In that sense, the availability of appropriate environmental quality can be seen as an important factor in perceived trip value, which itself can be viewed as a diagnostic tool of a destination's competitiveness (Murphy et al., 2000).

4.6.3. Destination loyalty – Visit recommendations

> *"I would strongly recommend it to anyone visiting the Jasper area to visit the Columbia Ice Field. A definite must see." (Couple traveler, Canadian resident, 2016 posting)*

Now more than ever, tourism destinations understand the importance of loyal visitors, as their competitors offer similar attractions, services, and experiences. Destination loyalty is referred to as a tourist's intention to revisit the destination or his or her willingness to recommend the destination to other potential tourists such as friends, relatives, and social peers (Oppermann, 2000). Chen and Gursoy's (2001) definition of destination loyalty is the degree to which tourists perceive a place as recommendable. They emphasize that relying solely on repeated visits as an

indicator of destination loyalty is misleading. Previous studies have emphasized that satisfaction and loyalty are critical to the success of tourism destinations and to maintaining a destination's competitive advantage because they lead to economic stability (a regular and reliable flow of income) and employment for local communities (Eusébio & Vieira, 2013; McKercher & Guillet, 2011). From another perspective, pursuing repeated visits and visit recommendations (destination loyalty) is a significantly more efficient and effective use of resources than targeting new customers, to the extent that the loss of loyal customers can threaten the survival of destinations (Campón-Cerro et al., 2017; Pike et al., 2011). In environmentally sensitive destinations such as nature-based settings and glaciers, an appreciation of how visitors form their destination loyalty and factors that influence their loyalty are of great importance for success and competitiveness (Mirzaalian & Halpenny, 2020). The quest for discovering the authenticity of the place accompanied by the quality of environment in nature-based tourism destinations (where natural resources are the core product) can increase tourists' willingness to pay more for their visit. This willingness to pay extra enhances destinations' profitability and is a pre-condition of building tourist loyalty (Ramkissoon & Uysal, 2011). Therefore, a successful destination marketing strategy with a focus on developing competitive advantages should not only attract new visitors but develop the loyalty of those who have already visited the place.

4.7. Wildfires

> *"A combination of warming, pollution and wildfire smoke left this place a bit underwhelming. We were there a fortnight after the forest fire so there was [were] also the burnt forest remnants which was quite sad to see." (Family traveler, Canadian resident, 2016 posting)*

In the tourism context, natural disasters are referred to as natural events that disrupt or destroy tourism infrastructure and have adversely affect the tourism environment (Cioccio & Michael, 2007). Various studies have considered different consequences of natural disasters on tourism such as floods and earthquakes (Beirman, 2020), avalanches (Peters & Pikkemaat, 2006) and wildfires (Sanders et al., 2008). Wildfires are a natural part of nature-based ecosystems, but are becoming more destructive and less predictable, especially since the system is changing due to warming temperatures and shifting precipitation patterns. Wildfire risk can be influenced by a number of factors such as temperature, soil moisture, forest patterns, and the presence of trees, shrubs, and other potential fuel. However, a majority of these factors have a relatively strong direct or indirect relationship with climate variability and anthropogenic activities (Gralewicz et al., 2012). Research shows that changes in climate patterns and global warming have caused warmer, drier conditions, increased drought, and a longer fire season, all of which increase the risk of wildfires and result in an increasing trend in the number of high-severity fires in high-risk places such as the western United States (Dai, 2013; Singleton et al., 2019).

The impacts of various types of natural disasters such as wildfires on tourism and their serious threats to the tourism industry have been examined mostly with an emphasis on economic losses, crisis management, and recovery strategies (Mair et al., 2016; Ritchie, 2004). Limited studies have looked at this phenomenon from a demand perspective. Consequently, there is little empirical research with respect to understanding tourists' perceptions and behavioral reactions toward wildfires, and how wildfire experiences influence tourists' perceptions on climate change (E.g., Thapa et al., 2013; Walters & Clulow, 2010).

4.7.1. Eco-anxiety

Climate change has a range of direct and indirect effects, from physical impacts such as wildfires, changing temperatures, and heat stress, to human systems and infrastructure impacts such as energy infrastructure and human livelihood, to more indirect effects such as mental, physical, and community health impacts (Clayton et al., 2014). Unlike direct impacts of climate change, indirect impacts such as mental health issues are difficult to identify since they may happen gradually. Moreover, people who experiencing mental health issues may not immediately realize that they are having such issues and are often unconscious of their problem. A significant mental health-related impact of climate change is eco-anxiety, which is generally referred to as different emotions and mental states in relation to environmental conditions and ecological problems (Doherty & Clayton, 2011), or what the American Psychological Association (APA) defined as "chronic fear of environmental doom." Eco-anxiety has continuous effects on emotional wellbeing and is often centered around and highly related to particular emotions such as guilt or grief (Pihkala, 2018; Willox, 2012). Fredericks (2014) studied the behavior of online environmentalists by analyzing their online exchanges in blogs, discussion forums, and the comments sections of major news articles. The study reported that online environmentalists used a range of interchangeable terms including "eco-guilt," "green guilt," "feeling bad," "eco-sins," "confession," "anxiety," and "despair" when describing struggles and failures to follow their environmental ideals and in response to such failures (Fredericks, 2014). Finding shows that only a few of visitors (8 cases) expressed eco-anxiety in their postings, below is a sample post that illustrates eco-anxiety:

> *"A combination of warming, pollution and wildfire smoke left this a bit underwhelming."*
> *(Female, Australian resident, 2017 posting)*

4.7.2. Negative impacts of wildfire on tourism experience and nature

Natural disasters such as wildfires can cause a decline in tourism demand due to a number of factors. One of the first and foremost concerns for visitors both during and after a wildfire is the perceived level of risk to their safety and security (Thapa et al., 2013). During the destination choice process and when evaluating high-risk destinations, risk-averse visitors are likely to choose destinations perceived as safe, whereas risk seekers show risk-seeking behaviors and are less concerned about safety factors (Sönmez & Graefe, 1998). Health and aesthetic concerns of air pollution as a result of smoke from wildfires is another major factor that might impact visitation and often extends beyond the fire-affected areas (Fowler, 2003). Other studies have shown that wildfires can negatively impact tourism experience because of air pollution, which can exacerbate respiratory conditions such as asthma or bronchitis (Butry et al., 2001), and also because fire and smoke can get in the way of actually being able to see the aesthetic aspects and natural beauty of a landscape (e.g., scenery of parks and protected areas) (Lichtman, 1998). Loss of attractions and reduced recreational opportunities are influential factors in tourism. Forest fires in national parks and protected areas can destroy tourist attractions and damage infrastructure such as visitor centres and associated businesses (Hystad & Keller, 2008). Recreational appeal and opportunities may also be affected because wildfires and smoke can lead to access issues due to road closures, evacuations, campfire bans, restricted activities, and decreased photo opportunities (Kneeshaw et al., 2004; Lichtman, 1998; Sanders et al., 2008; Scott et al., 2007). And finally, the social value and importance that visitors place on protected areas and their perceptions of a healthy environment, especially in mountain regions, may be negatively affected by wildfires (Scott, 2003). Below is an instance that a visitor expressed their concerns about negative impacts of wildfires:

"I'm only giving this lake [Maligne Lake] two stars as record-setting wildfires in British Columbia flew into this area and obscured all the mountain views. Because the smoke was so bad, we didn't even attempt the boat trip." (Couple traveler, American resident,2017 posting)

4.8. Findings re-cap

The present study sought to develop an understanding of the tourists' perceptions and communications of climate change in relation to nature-based tourism destinations, as well as demonstrate how a qualitatively-informed corpus-based analysis can be employed for an inductive, bottom–up approach to uncover the visitors' discourses on climate change. Findings from the discourse thematic analysis offer an intriguing picture of the representations of climate change in the social medium TripAdvisor. Results from the thematic analysis of online postings revealed a sophisticated discourse among visitors of nature-based destinations that comprises multiple issues and viewpoints. The two major thematic clusters that emerged from the corpus are related to glaciers and wildfires. Of particular interest is the cluster about glacier tourism and visitors' different viewpoints about the effects of climate change on the Athabasca Glaciers. The glacier thematic cluster contained within itself sub-clusters of climate grief, the role of interpretation and education, destination competitiveness, pro-environmental behavior, corporate environmental responsibility, and disappearing attraction.

The emphasis on climate grief-related online reviews revealed by the thematic analysis supports the idea that tourists increasingly feel the effects of planetary changes and associated ecological losses and expose well-formed affective responses arising from their visits to glaciers at JNP. Running's (2007) stages of grief were observed in the online reviews, namely denial

(containing climate change uncertainty and glacier retreat as natural phenomenon), climate depression (including solastalgia and climate change hopelessness), climate acceptance (including climate change and glacier retreat acknowledgments), and anger and shame (containing eco-guilt). From an action perspective, such grief-related responses to ecological loss can act as a double-edged sword. While climate grief is expected to become a common reaction to climate impacts (Barnett et al., 2016), it may negatively influence productive engagement with climatic concerns and is disadvantageous to tourists' self-efficacy (i.e., the belief in one's ability to affect change) and their sense of responsibility (O'Neill et al., 2013). However, DMOs and conservation agencies that seek to engage tourists in climate mitigation and adaptation can overcome efficacy barriers of such grief-associated emotive responses by portraying an evocative imagery of the Athabasca Glacier as resilience, in the face of these challenges, to inspire hope. This can possibly be achieved by encouraging tourists to engage in small changes with an emphasis on positive affirmation and promotion of incremental environmental accomplishments (Epton & Harris, 2008), as well as fostering a sense of pride in pro-environmental behaviors and protections (Harth et al., 2013). Maintaining hope coupled with clear and accessible directions toward achievable climatic goals are not only critical to overcoming psychological barriers of climate change mitigation (what is also referred to as "dragons of inaction"), but can also motivate tourists to sustain their engagement in collective conservation, restoration, mitigation and adaptation efforts (Gifford, 2011; Hobbs, 2013).

The role of education and interpretation is another extensive sub-theme under the glacier super-theme, which included conversations around informative tour, signage, and visitor center (Discovery Centre) in one end of the spectrum, and reporting on the lack of delivery of appropriate information by the aforementioned entities on the other end. Previous research on the effectiveness

of environmental interpretation programs in national parks reported that environmental interpretation plays an undeniable role in allowing participants to gain relevant environmental knowledge (Beaumont, 2001; Tubb, 2003), however, findings are fairly inconsistent in terms of whether participating in such programs would actually lead to changes in tourists' environmental attitudes and behaviors. In other words, educational and interpretation programs are more effective in reducing behaviors that originate from thoughtless, misguided, unskilled, or uneducated actions, while having minor impact on routine or habitual behaviors in respect to the environment (Poudel & Nyaupane, 2013). One solution for tourism stakeholders (e.g., tour operators and resource managers) to alter such behaviors is to supplement educational programs with direct control practices, such as patrolling enforcement in the form of rewards, punishment, incentive, and disincentives. Mediating variables in the attitude-behavior relationship is another important factor, that can explain a situation where a tourist has strong intentions to participate in environmentally responsible behavior, but several personal, social, and environmental factors (e.g., harsh weather, cold temperature, occasional snowfalls) may pose barriers to pursue such behavior (Fishbein & Ajzen, 2010). Therefore, different personal, social, situational, and environmental factors in the Athabasca Glacier tourism should be considered and well examined to better adapt interpretation programs to the local setting.

Pro-environmental behavior made up another significant proportion of climate change-related online reviews under the super-theme. The most commonly identified sub-themes under pro-environmental attitudes and behaviors were environmentally responsible behavior, environmental concern, collective action, environmental generativity, and environmental solution, respectively. By considering a multi-dimensional conceptualization of tourists' pro-environmental attitudes and behaviors, this study introduces the most effective strategies to increase tourists' pro-

environmental intentions through combining factors such as environmental concerns for future generations, collective actions on environmental problems, and discussion about alternative solutions to such problems. Speaking of altruism and collective actions, the current study also offers evidence of the need to use social interactional elements to contribute to environmental sustainability of nature-based tourism destinations. That is to say, in addition to the educational and interpretation programs currently running in the Athabasca Glaciers, which are mainly individually-targeted interventions, a series of social-interaction-based strategies should be incorporated to foster individual's pro-environmental intentions. One example could be environmental-education programs targeting well-structured groups (e.g., social peers, families, friends) to encourage tourists' pro-environmental intentions through the intervention of group-shared norms and opinions. Another remarkable finding in climate change-related online postings was intergenerational aspects of the environmental issues, which is intimately bound up with pro-environmental intentions and environmentally friendly behaviors. As was discussed earlier, environmental generativity refers to beliefs within the tourist that the future is important and that there is an obligation on the current generation to take care of our environment for future generations. The long-term consequences of tourists' environmental behavior have been given little attention by either tourists or tourism providers. From a practical standpoint, through increasing generative values and instilling a sense of future in tourists with a focus on the future of society and the appeal to collective well-being, tourism stakeholders and policymakers should seek to bridge the attitude-behavior gap in long-term and not solely altering current behaviors. Such generative values stimulate environmental sustainability as a model of thought and have the potentials to compel tourists to think of the future and shift toward ERBs.

The destination environmental competitiveness thematic category comprises sub-themes relating to perceived trip value, destination loyalty, and the Athabasca glaciers' comparative advantages (comparisons with other glaciers). The significant role that environmental quality can play in the competitiveness of tourism destinations was discussed in details in the previous sections. Although marketing the environmental appeal and ecological balance of a nature-based tourism destination is not an easy job for DMOs, but one beneficial strategy would be to using different environmental awards and labels (e.g., "Blue Flag" eco-label awarded by the Foundation for Environmental Education (FEE) for environmental quality standards and management), followed by promoting information on such environmental awards as well as on destination's environmental codes of conduct (e.g., through press releases, award events, environmental guides, diplomas, brochures, stickers, etc.). Taking into considerations the conversations around comparative advantages of the Athabasca glaciers compared to other close competitors in the glacier tourism context (e.g., Mendenhall Glacier), one crucial step for JNP tourism is to well-position their destination brand through highlighting comparative advantages and core competencies of their destination (e.g., accessibility, cost/value, roadway viewing, etc.), while also differentiating the image of destination attributes from other close competitors in a superior manner. Given the impacts of loyalty and recommendation behaviors on creating competitive advantage for tourism destinations, it is also critical for destination managers and tourism service providers of JNP to seek strategies to deliver first hand experiences for improving visitors' perceived image, trip values, environmental quality, and more importantly their satisfaction, which all are important factors in forming loyalty toward nature-based destinations (Lee et al., 2007).

Disappearing attraction was another theme of discussion in online reviews, which was discourse about the Athabasca Glaciers as a last chance tourism destination as well as showing a

feeling of awe upon visiting the glaciers. I choose to discuss these categories together here, due to their similarity. From a managerial perspective, highlighting the "uneasy benefits" of the Athabasca Glacier as a last chance tourism destination would not be without trade-offs for its potential negative impacts. Having a higher number of visitors can not only cause a distraction in visitor experience and thereby a negative publicity for the site, it can also lead to more rapid degradation of the environmental resources and could weaken visitors' desire to preserve the natural identity of the site (Groulx et al., 2016). Alternatively, promoting greater visitation to a national park through LCT could not only provide additional revenues to be spent for better maintenance and development of infrastructure but can also contribute to social awareness about climate change by endorsing climate change ambassadorship and a range of education, interpretive, and outreach activities (Lemieux et al., 2018). The Athabasca Glacier is much more accessible destination compared to high latitude polar alternatives, and has relatively higher numbers of visitors with LCT motivations as their main reason for visiting the site (Lemieux et al., 2018). Such LCT motivations present an opportunity for JNP park agencies and tourism providers to develop education and communication programs with special attention on climate change awareness, since having effective interpretation and engaging experiences can consequently nurture place-protective behaviors in tourists (Barrett & Mowen, 2014; Halpenny, 2010; Lemieux et al., 2018).

The sixth and last category under the Glacier super-theme focuses on corporate environmental responsibility, with majority of discourse about expectations and critiques for CER in one end of the spectrum and acknowledgment of tour operators' (in this case Banff Jasper Collection by Pursuit) environmentally-friendly practices in the other end. This finding first and foremost reveals the importance of CER for visitors and that they not only have high expectations

from tour operators and park agencies to operate responsibly in relation to the environment, but visitors also reward tourism providers for their environmental consciousness through defending and praising their operational practices on online postings. Indeed, such environmental commitment of tourism providers positively affects destination image and acts as a valuable and rare resource for creating competitive advantages for tourism destinations (Golja & Krstinic Nizic, 2010). In practice, it can be concluded that tourism operators in the Athabasca Glacier need to continue to invest in and promote the Best Practicable Environmental Option (BPEO) (O'Riordan, 1989), while also incorporate a long-term, comprehensive, and integrated environmental planning which involves park agencies, tour operators and host communities.

Finally, the last super-theme relates to wildfire and includes online reviews reporting on eco-anxiety as well as negative impacts of wildfires on both nature and visitor experience. Other issues are also represented here, such as four reviews declaring wildfires as power of nature. However, whether visitors' experiences of wildfire events influence their perceptions of climate change, or if they think climate change is associated with wildfires, are still questions to be answered. The link it not made clear in their postings. This link may be explained by literature on the nature of climate change perceptions that reports, while there is a range of perceptions within and across varied social and cultural groups, uncertainty can be observed in the association between extreme weather events and natural disasters and public understandings of climate change (Brulle et al., 2012). There is also some evidence that natural disasters such as flood experiences can increase disaster awareness and adaptive behaviors, regardless of perceptions of climate change (Spence et al., 2011). Although such positive correlations between wildfire experience, risk perceptions and mitigation efforts might not necessarily exist in nature-based settings (Thapa et al., 2013), being able to prepare and respond to such natural disasters is more crucial for

adaptation than believing in climate change. Therefore, while considering negative impacts of wildfires on tourism experiences and visitors' mental health, managerial approaches must address supporting tourists to prepare, respond and mentally recover from wildfires, regardless of their views on climate change. This includes provision of preparation and recovery efforts such as emergency infrastructure and protocols, training workshops, and recovery marketing campaigns for tourism stakeholders (e.g., local businesses, tourism operators, visitors, etc.).

5. Conclusion

In this study I set out to demonstrate how a qualitatively informed corpus-based approach can be employed for an inductive, bottom–up study to capture the landscape of climate change by focusing on nature-based tourists' discourses on social media. This study unearthed divergent themes regarding tourists' perceptions of climate change upon visiting JNP, with the most significant discourses on climate grief, education and interpretation, pro-environmental behavior, and last-chance tourism. I also observed that despite scientific links between increasingly intense and extended wildfire seasons and climate change, visitors failed to connect wildfire's negative impacts on visitors' experiences in Canada's Rocky Mountain national parks with climate change. I have seen that while these themes are indeed relatively broad, and consist of discussions about various environmental issues, most topics are nonetheless highly interrelated with each other. Some practical implications and suggestions for DMOs and tourism providers in JNP are but not limited to: encouraging visitors to engage in small changes with an emphasis on incremental pro-environmental accomplishments; a better adaptation of interpretation programs with local setting while supplementing educational programs with some degrees of direct control practices (e.g., rewards, punishment, incentives, and disincentives) for both operators and tourists; emphasizing

comparative advantages and core competencies of JNP in their destination branding (e.g., accessibility, cost/value, roadway viewing); and expansion of crisis management planning and programs to support tourists and operators to prepare, respond and recover from wildfires (e.g., infrastructure and training investment, recovery marketing campaigns).

While the findings of this study contribute to the existing literature of the public understanding of climate change and tourism (e.g., Lemieux et al. (2018); Prideaux et al. (2010)), it has limitations. First, generalizing the findings to other nature-based tourism destinations is challenging due to the fact that not all destinations have an environmentally sensitive and last chance tourism attraction as the Athabasca Glacier in JNP. Therefore, future research can replicate the current study in other nature-based destinations to compare the findings from attractions and tourism destinations across the globe. The current study has considered only one social media platform (TripAdvisor) thus, future research can incorporate other social media sources such as Instagram and Twitter to better uncover tourists' public understandings and perceptions about climate change. Using multiple sources of information and different types of data in a complementary manner has also been recommended in the previous literature in order to fully understand the multifaceted characteristics of tourism system (Del Vecchio et al., 2018; Kirilenko et al., 2018; Mirzaalian & Halpenny, 2019). Finally, and most importantly, a necessary step is to develop new methodological solutions to approach the massive and growing everyday discourses on social media (Bail, 2014; Karpf, 2012; Ruggiero & Vos, 2014). The qualitatively informed corpus-based approach exemplified in this study demonstrates one such promising avenue. In one of the first attempts to apply qualitatively informed corpus-based analysis in tourism research, this study employed quantitative social media big data analysis in conjunction with qualitative analysis of postings to better comprehend online lay discourse of climatic change issues in nature-based

tourism destinations. Such mixed methodological approach enables researchers to not only study unstructured social media big data but to address some methodological concerns often raised about solely using corpus linguistic or thematic analyzes.

Chapter 5: Conclusion

The overall purpose of my dissertation was to investigate the environmental competitiveness of Jasper National Park (JNP) as a nature-based tourism destination by exploring destination loyalty and visitors' perceptions of climate change using SMA. Study 1 in this dissertation represented a pioneering effort to systematically review social media analytics (SMA) in the hospitality and tourism domain. In order to characterize this emerging research topic in hospitality and tourism, Study 1 looked at SMA research from seven different perspectives: the overall growth, publication source, research regions, disciplinary home, SM types, types of analysis, and research purpose. In Study 2, this dissertation advanced investigations of destination loyalty through sentiment analysis, topic modeling, and cluster analysis of TripAdvisor online reviews. Study 3 unearthed divergent themes regarding tourists' perceptions of climate change upon visiting JNP, with the most significant discourses on climate grief, education and interpretation, pro-environmental behavior, and last-chance tourism.

Scholarly Implications and Future Research Opportunities

Novel application of social media analytical methods, tools, and techniques is the core unique contribution of this dissertation. The latest analytical methods and tools were employed to better highlight how SMA can be used to answer tourism-related questions. Innovative SM analytical approaches employed in this dissertation were: natural language preprocessing, text mining, sentiment analysis, topic modeling, text clustering, and discourse thematic analysis to analyze social big data on TripAdvisor through a case study of JNP. In study 1, hospitality and

tourism studies that have employed SMA from 2000 to 2018 were identified and collected from international electronic bibliographic databases. Study 1 was the first systematic literature review of SMA use in hospitality and tourism research. It employed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method and adapted Stieglitz and Dang-Xuan's (2013) SMA framework. The study integrated previous definitions of and approaches to SMA into a more inclusive suite of analytics which not only includes typical analytical methods such as text analysis and sentiment analysis, but also elevates less adopted approaches such as comparative analysis and spatial analysis. One of the major scholarly implications of this study was to provide researchers with an understanding of past application of SMA in hospitality and tourism research, while also to contribute to the field by identifying historical shortcomings, including excessive reliance on particular data types and analytical methods. The paper also highlighted the potential of SM spatial data, which, along with relevant analytic methods, is underutilized. The availability of Volunteered Geographic Information (VGI) and geo-referencing features in SM platforms such as Twitter and Flickr have shaped common domain knowledge among disciplines which study tourists' footprints, including geography and environmental science, computer science and information technology, as well as hospitality and tourism. By introducing improved approaches through the documentation of past and current analytic practices, Study 1 also highlighted advancements in SMA during the last 2 decades and recommended that common analytical methods such as text analysis and sentiment analysis should be supplemented by infrequently used approaches such as comparative analysis and spatial analysis. Findings from this systematic literature review suggest that rather than a reliance on single types of SM, analyzing several sources of information and multi-type data is imperative to fully understand the complexity of the hospitality and tourism system. Findings also recommended that more research studies need

to apply accuracy testing and performance measurement of analytic methods to evaluate the robustness of analysis. Additionally, a number of methods appeared to be underused in tourism and hospitality SMA including predictive analytics using explanatory evaluation methods, social network analysis, trend analysis, comparative analysis and spatial analysis. Therefore, future studies should focus on expanding the use of these methods to accelerate the SMA research relating to travel patterns and visitation prediction. Tourism demand prediction and destination recommendations based on trend analysis are other potential avenues for future research. Future reviews of SMA in this field should also include detailed explanations and recommendations regarding SMA best practice to guide hospitality and tourism researchers in their selection of SMA methods and their respective executions.

Study 2 presented a novel and comprehensive approach that uses different analytic techniques such as sentiment analysis, topic modeling, and text clustering to extract sentiments and topics of interest from tourists' conversational data on TripAdvisor, and also explore destination loyalty statements using a keyword clustering approach. By comparing changes in sentiment scores and rankings of different attractions within JNP (both TripAdvisor and sentiment analysis scores), I was able to reveal that some touristic locations in JNP are outperforming others in terms of sentiment and ratio scores on SM, despite the fact that tourists less frequently reflect on their experiences at those places, resulting in lower volumes of reviews. The higher rankings of these less discussed locations is of great importance because it shows that average sentiment score can be a more informative measure than simple TripAdvisor rankings. Another comparison was made between the average sentiment and the Pos/Neg ratio scores of attractions, and showed that some attractions had meaningfully different ranks. Part of this difference in ranking can be explained by the fact that a higher number of neutral reviews with sentiment scores of zero reduce

a location's average score but has no effect on the Pos/Neg ratio score. This also suggests that locations with a considerably higher on-average scores compared with their ratio scores may have subgroups of visitors with extremely strong feelings toward these locations. Rather than solely relying on results from the sentiment analysis, this study was amongst the first in the field to take a step forward and compare the findings from sentiment analysis with the results from topic modeling. Examples were Athabasca Glaciers and Columbia Icefield, where although located on the far end of sentiment spectrum with the lowest sentiment and ratio scores as well as lowest TripAdvisor ranking, but were identified as the most important dimensions of tourist experience in the topic modeling results. Part of this difference could be explained by the fact that conversations around climate change and glacier retreat contain mainly negative expressions and therefore score lower in sentiment and ratio rankings. All of these imply that TripAdvisor follows a ranking method that only relies on sentiment scores, which can be misleading and one should be aware of these potential biases. While sentiment score can be a more informative measure than simple TripAdvisor rankings, using variety in analytics and connecting findings from different methods is highly recommended for future research. This study also proposed a novel approach for extracting latent dimensions of tourist experience in a nature-based tourism destination, retrieved from online reviews. LDA analysis of online reviews uncovered key aspects of nature-based tourism experience that have not been discovered through traditional methods, with the relative significance of each obtained dimension identified based on the intensity of the conversations. Another important implication for study 2 was the identification of loyalty-expressed reviews through the development of a destination loyalty keyword dictionary by reviewing loyalty literature in hospitality and tourism, and investigation of destination loyalty through cluster analysis of TripAdvisor online reviews. Since a lexicon-based sentiment analysis

is highly domain-dependent, and considering the limitations of using manually and automatically-created sentiment lexicons, future tourism research on content and sentiment analysis of SM would benefit from domain-specific dictionaries for sentiment and topic detection. This important can only be achieved by collaborative research between tourism researchers and analysists specializing in textual data and NLP. Considering the relatively enhanced performance of supervised learning methods compared to unsupervised lexicon-based methods, future tourism studies are highly encouraged to improve the performance of the sentiment classification of tourism SM data through the application of supervised techniques or combined methods. Performing appropriate and accurate reporting on each analytic method was another contribution of this study. Undetected inaccuracies and improper reporting in analytics methods such as text mining and sentiment analysis can produce bigger inaccuracies in subsequent analytic efforts, that can in turn cause a snowball effect in reporting. Therefore, another suggestion for future researchers would be to evaluate and report on the accuracy testing results of the applied classifiers and performance analysis of supervised machine learning techniques for sentiment analysis of the hospitality and tourism SM data.

The main goal of study 3 was to explore the discourse produced on TripAdvisor regarding climate change and to develop an understanding of the tourists' perceptions and communications of climate change in relation to JNP as a nature-based tourism destination. This research also tried to understand tourists' reactions to climate change and their interests in engaging in pro-environmental behaviors. I set out to demonstrate how a qualitatively informed corpus-based approach can be employed for an inductive, bottom–up study to capture the landscape of climate change by focusing on nature-based tourists' discourses on social media.

This study unearthed divergent themes regarding tourists' perceptions of climate change upon visiting JNP, with the most significant discourses on climate grief, education and interpretation, pro-environmental behavior, and last-chance tourism. Findings of this study contributed to the existing literature of the public understanding of climate change and tourism. Aligned with the five-stages model of climate grief (Running, 2007), findings emerged from the data showed that visitors go through all stages of ecological grief (except for bargaining stage) upon visiting glaciers in JNP. Such grief-related emotive responses can be seen in different forms, from climate change uncertainty in the first stages of climate grief, to solastalgia and glacier retreat acknowledgement when tourists accept the reality of climate change. The role of interpretation and education, and pro-environmental attitudes and behaviors made other significant proportion of climate change-related online conversation.

While these findings are consistent with previous research on the effectiveness of environmental interpretation programs (Beaumont, 2001; Tubb, 2003), the current study offers evidence of the need to use social interactional elements to contribute to environmental sustainability of nature-based tourism destinations, in addition to the current educational and interpretation programs which are mainly individually-targeted interventions. Destination environmental competitiveness theme that emerged from the data proves the fundamental role that environmental quality of tourism destinations plays in tourists' travel-related decisions and, down the road, destination competitiveness (Cucculelli & Goffi, 2016; Mihalič, 2000). Since the current study considered only one social media platform (TripAdvisor), future research can incorporate other social media sources such as Instagram and Twitter to better uncover tourists' public understandings and perceptions about climate change. Using multiple sources of information and multiple types of data in a complementary manner is a highly suggested practice in order to fully

understand the multifaceted characteristics of tourism system. Finally, a necessary step for future researchers is to develop new methodological solutions (such as the qualitatively informed corpus-based approach exemplified in this study) to approach the massive and growing everyday discourses on social media. Adoption of such a holistic understanding of tourists' discourse on social media about climate change can advance current tourism scholarship in addressing climate change issues in a more decision-centric and integrated approach. It also develops environmental management scholarship through reshaping their understanding of the field and provides them with a comprehensive patterns and structures of ties between tourists.

Methodological Insights

Study 2 proposed a novel approach to extract latent dimensions of tourist experience toward a nature-based tourism destination retrieved from online reviews. A destination loyalty keyword dictionary was developed for the first time by reviewing loyalty literature in hospitality and tourism, and loyalty-expressed reviews were identified and separated from the rest of the JNP TripAdvisor corpus. Study 2 was also one of the first tourism studies that employed SMA and attempted to evaluate the robustness of analytical methods used such as sentiment analysis, topic modeling, and text clustering. Through splitting data into training and testing sets, I tried to evaluate the robustness and performance of learning algorithms and the perplexity of topic modeling results. Perplexity is a measurement in information theory that evaluates how well a probability model predicts a sample (AlSumait et al., 2008). Perplexity in natural language processing is a way of evaluating language models to measure the likelihood of a test data to be created under the trained model. A perplexity model provides a measure to evaluate the goodness of a given topic model, where the lower the perplexity is, the lower misrepresentation of the words

of the test data by the trained topics are (better generalization performance) (AlSumait et al., 2008). In other words, LDA model was trained on the training set first, then the model was assessed to see how "perplexed" it is on the testing set, or how well the word counts of the test data are represented by the word distributions represented by the topics. This study also measured the coherence of topic modeling results to evaluate the intrinsic quality of the extracted topic models based on latent Dirichlet allocation technique.

In Study 3, a qualitatively informed corpus-based approach was employed for an inductive, bottom–up analysis to capture perspectives on climate change by focusing on nature-based tourists' discourses on social media. The qualitatively informed corpus-based approach exemplified in study 3 was one of the first attempts to employ quantitative social media big data analysis in conjunction with qualitative analysis of postings to better comprehend online lay discourse of climatic change issues in nature-based tourism destinations. This mixed methodological approach enables researchers to not only study unstructured social media big data but to address some methodological concerns often raised about solely using corpus linguistic or thematic analyzes.

Summary of Practical Implications

Although generating managerial insights was not the primary goal of this dissertation, it does offer plenty of implications for tourism stakeholders. My dissertation contributes to the emerging area of SMA research in the tourism context by not only presenting feasible analytic approaches but by providing new rich findings and actionable insights with implications for tourism providers and DMOs to follow. Findings from Study 2, for instance, can help tourism providers and DMOs in JNP to verify underlying aspects of tourist experience from user-generated

data, portray perceptual mapping of touristic locations within their destination, and specify the destination's salient characteristics that influence tourists' recommendations and revisits intentions. Results from the sentiment analysis empowers Tourism Jasper to track tourists' opinions and viewpoints on a large scale and picture a trajectory of the public 'buzz' around JNP as a nature-based tourism destination by comparing changes in scores in different locations. Most importantly, Tourism Jasper can use sentiment analysis to improve customer relationship management and recommendation systems by detecting positive and negative customer feedback (see, for example, Schmunk et al., 2013).

Regarding the content analysis and topic modeling, results of LDA model in the second study suggest JNP tourism providers leverage destination management dimensions (controlled factors) such as glacier, trails and pathways, and cruise tourism experiences. Some practical recommendations in short-term could be the quality of the interpretation provided by tour operators and improvement in both content and delivery techniques as crucial factors for optimizing tourists' experiences. Knowing the importance of glacier tourism in visitors' opinions, investment in sustainability and corporate social responsibility practices that will mitigate climate change impacts would be another crucial action that JNP tourism providers should follow in long-term (Coles et al., 2013; Golja & Krstinic Nizic, 2010). Additionally, the industry leaders are suggesting that with the increased awareness of Millennials and Gen Z about the environmental issues they are inheriting, and increased overall populations' awareness of climate change impacts may enable destinations to gain a competitive advantage by focusing on sustainability (Skift, 2020). Aligned with findings from sentiment analysis and topic modeling, hiking activities and trail attractions were notable motivators for tourists' loyalty expressions on SM. Therefore, it is strongly recommended to JNP tourism providers to upgrade, realign, and reconstruct trails to not only

improve the sustainability of these trails and reduce maintenance, but to improve visitor experience by creating boardwalks and stairs, lowering steep grades with more gradual climbs, and improving trail treads and drainage for safer hiking.

Study 3 unearthed divergent themes regarding tourists' perceptions of climate change upon visiting JNP, with the most significant discourses on climate grief, education and interpretation, pro-environmental behavior, and last-chance tourism. Responding to visitors' grief-related discourse, DMOs and conservation agencies that seek to engage tourists in climate mitigation and adaptation can overcome efficacy barriers of such grief-associated emotive responses by portraying an evocative imagery of the Athabasca Glacier as resilience, in the face of these challenges, to inspire hope. This can possibly be achieved through encouraging tourists to engage in small changes with an emphasis on positive affirmation and promotion of incremental environmental accomplishments, as well as fostering a sense of pride in pro-environmental behaviors and protections. Maintaining hope coupled with clear and accessible directions toward achievable climatic goals can help DMOs in overcoming tourists' psychological barriers of engaging in climate change mitigation and motivate them to commence or sustain their engagement in collective conservation, restoration, mitigation and adaptation efforts. Regarding the essential role of education and interpretation programs in visitors' point of view, a practical implication for tourism stakeholders (e.g., tour operators and resource managers) would be to alter thoughtless and uneducated behaviors with direct control practices that complement educational programs, thought explicit, overt actions in the form of rewards, punishment, incentives, and disincentives. By considering a multi-dimensional conceptualization of tourists' pro-environmental behaviors, this study also introduced the most effective strategies to increase tourists' environmentally-responsible behavioral intentions and actions through combining factors

such as environmental concerns for future generations, collective actions on environmental problems, and discussion of alternative solutions to such problems. A multi-dimensional conceptualization of tourists' environmentally-friendly behaviors also introduces the most effective strategies to increase tourists' pro-environmental intentions and behaviors by combining factors such as environmental concerns for future generations, collective actions on environmental problems, and discussion about alternative solutions to such problems. That is to say, in addition to the educational and interpretation programs currently running at the Athabasca Glaciers, which are mainly individually-targeted interventions, a series of social-interaction-based strategies should be incorporated to foster individuals' pro-environmental behaviours.

Another important finding in climate change-related online postings was intergenerational aspects of the environmental issues. From a practical standpoint, through increasing generative values and instilling in tourists a focus on the future of society and the appeal to collective well-being, tourism stakeholders and policymakers should seek to bridge the attitude-behavior gap to address long-term goals and not solely altering current behaviors. Such generative values stimulate environmental sustainability as a model of thought and has the potential to compel tourists to think of the future and shift toward environmentally-responsible behaviors.

Regarding destination environmental competitiveness and its sub-themes (perceived trip value, destination loyalty, and comparative advantages), one beneficial strategy for JNP tourism providers would be to using different environmental awards and certifications such as "Blue Flag" eco-label for sustainable boat tours and Global Sustainable Tourism Council (GSTC) Criteria for tourism policy-makers and destination managers, as well as promote information on such environmental certifications. JNP tourism providers can also enhance the positioning of their

destination brand by highlighting comparative advantages and core competencies of JNP (e.g., accessibility, cost/value, roadway viewing), while also differentiating, in a superior manner, the destination's attributes from other close competitors. Knowing that the majority of corporate environmental responsibility conversations were about expectations and critiques for CER, as well as some acknowledgments of tour operators' environmentally-friendly practices, it can be concluded that tourism operators in the Athabasca Glacier need to continue to invest in and promote the Best Practicable Environmental Option (BPEO) (O'Riordan, 1989), while also incorporating long-term, comprehensive, and integrated environmental planning which involves stakeholders including park agencies, tour operators, visitors and host communities.

Finally, considering the reported negative impacts of wildfires on visitors' experiences and mental health, managerial approaches must address supporting tourists to prepare, respond and mentally recover from wildfires, regardless of visitors' views on climate change. This includes provision of response and recovery planning for providers such as seminars, workshops, and recovery marketing campaigns for involved tourism stakeholders.

Limitations

While the findings of study 2 and 3 contributed to the academia and tourism industry, they had some limitations. First, it is hard to generalize the findings to other tourism destinations because of exploratory nature of these studies. Also, the collected data in this dissertation might be destination specific and thus the results must be interpreted with caution. That being said, future research can replicate the current studies in other destinations to test the applicability of data analysis and compare the findings from attractions and tourism destinations across the globe. Another limitation of study 2 and 3 was the comprehensiveness of the collected data from different

touristic locations within JNP, as well as focusing only on TripAdvisor. Mainly due to time constraints, I failed to incorporate other social media sources such as Twitter in order to better uncover tourists' public understandings and perceptions about destination loyalty and climate change. One limitation to study 3 was the challenge to generalizing the findings to other nature-based tourism destinations due to the fact that not all destinations have an environmentally sensitive and last chance tourism attraction as the Athabasca Glacier in JNP.

Sampling is another major consideration in research involving social media data and user-generated content. Previous research tried to establish, test, and validate different sampling methods for content analysis of general media (Lacy et al., 1995), however, further research with respect to social media data sampling is critically needed. To achieve this, and if we consider the sampling procedure as three steps of selecting sources of communication, sampling documents, and sampling within documents, a purposive sampling (Krippendorff, 2018) seems to be an appropriate method for selecting sources of social media data, as well as randomization algorithms for the latter two steps. Although such issues of sample representativeness and generalizability of results may seem less relevant when the researcher takes the whole data and utilizes a big data approach to collect all available data for a certain period of time and/or a certain location (Lu & Stepchenkova, 2015).

Another limitation for this dissertation was the fact that personal information of reviewers (e.g., demographic information and level of expertise) could not be accessed due to TripAdvisor's policies and anonymity rights to their members, although in study 3, some basic information about reviewers has been exemplified with short quotes from online postings. This issue, to a great extent, relates to the ethical considerations of web data scraping, as peoples' privacy might be

directly violated in the process of obtaining personal information. Looking at the possible misuse of web content and structure data, it seems like there is little that can be done to limit the ethical issues other than to rely on legal measures that offer a baseline level for handling the problem. One useful solution for this ethical dilemma would be to check websites' privacy enhancing technologies (PETs) and comply with the 'allow/disallow-mining standards', as web mining of personal data is not often prevented by legal measures. Search engines use web agents, also known as robots, to create the indexes for their databases searches. The 'robots exclusion protocol' or simply 'robots.txt' is a standard used by websites to interact with web crawlers and other web robots to specify which areas of the website should not processed, and that how the site is to be catalogued. In other words, it is a text file that outlines what documents and/or directories are forbidden to be scrapped. For this purpose, "www.NAME.DOMAIN/robots.txt" will be navigated to scrape websites according with their scraping policy (e.g., "www.TripAdvisor/robots.txt" for checking TripAdvisor's robots.txt). After checking TripAdvisor's allow/disallow standards and directories, it was obvious that reviewers' information (e.g., name, gender, age, origin, number of reviews) are disallowed for crawling, while reviews alone (textual contents) are allowed and completely accessible. TripAdvisor Content API is only available for consumer-facing travel websites and applications. TripAdvisor grants only a limited number of API keys and does not allow access to the Content API for purposes of data analysis, academic research, and any use other than a consumer-facing (B2C) travel website or application (TripAdvisor, 2019).

Final Reflections

While reflecting on the experience of writing my dissertation, I came to the realization that I truly enjoyed this process, at least most of it. I am the type of person who loves to learn and seeks

to obtain more knowledge in and out of the classroom. I am especially passionate about creating multidisciplinary research opportunities, and through the guidance and supports provided by my supervisor and others around me, I discovered this topic for my research and was able to complete my Dissertation. I am very excited to write about my experience because I wish someone had given me insights into the journey I was about to embark on. Although the course work for my doctoral degree served as a strong foundation for the voyage, the dissertation phase was still a leap of faith. I often felt as though I was "shooting in the dark" and would be lucky to hit the target. In the following paragraphs, I would like to share the personal experiences and "aha moments" that I endured and enjoyed during the dissertation process. I hope that these thoughts will provide others with some insights and words of encouragement to persevere in completing what is undoubtedly one of the most rewarding challenges in a doctoral student's education. A good place to start is to tell the story of how I became interested in the topic that would eventually become my research project.

I originally had no idea as to what big data and big data analytics were. However, after spending a semester attending the very prestigious and well-prepared big data course taught by Prof. G. Rockwell, where we were asked to write a research proposal about utilizing big data and big data analysis in our fields of study, I began to see a path forward. I need to take a moment here and emphasize on the importance of performing pilot research, as it not only gives you a chance to determine whether your project is feasible but also an opportunity to better define the research question, test the proposed study design and process, educate yourself on different techniques related to your study, and many more. I presented my pilot studies at different conferences which helped me assess my approach and practice the necessary techniques required for my Dissertation. After that, my supervisor motivated me to systematically review social media data and SMA in

the hospitality and tourism domain. Upon gaining access to several useful articles, I dedicated enough time to examining and reading each and every journal to get good grasp of SMA in hospitality and tourism. Having gained a broad understanding of the research problems and issues, I started to think about how I want to utilize this emerging research topic in the tourism context and what I would research.

SMA is an interdisciplinary field. In fact, social media data is being analyzed by researchers with different backgrounds, with each discipline having its own traditions and merits, but also its own prejudices. I can say with confidence that a gap exists between social and computer science, what is also referred to as "unhelpful gulf" by Tinati et al. (2014). This gap became evident throughout my research process. Social scientists do not have the methods at their disposal to discover, collect and prepare relevant big social media data. On the other hand, many of the researchers who are currently applying computational approaches could benefit from a more solid grounding of their approaches in existing social theory. Bridging the gulf between the social and the computational sciences by choosing the most appropriate methodologies was one of the most challenging aspects in the completion of my research. I drew from lessons learnt from my discussions with my committee members and a deep reading on how SMA can be utilized in tourism research, and identified joint mixture of quantitative SMA in conjunction with other qualitative methods. This kinds of mixed-methods approach to social big data was applied in my third and last study, which in my opinion, is a manifestation of bridging the gap between "soft" and "hard" sciences. Although it was difficult at times to motivate myself to do the work, on the whole I enjoyed the research and writing and found that the work was much more manageable than I thought it would be. The dissertation phase is a lonely venture, but at the same time it is also the most rewarding part of the doctoral process.

I would like to offer some final words of advice. First, the research will be consuming. Therefore, it is critical that you select a topic that you are passionate about and can keep you motivated. You will be your best cheerleader. Second, when you hit a roadblock, do not get disappointed. Instead, try to understand why you are faced with this hurdle. By understanding the limitations inherent in the problem, you may learn how to get around it. Your persistence may lead you to make a future contribution to the larger body of research. Third, the role of background research is critical to any study. You need to understand the "bigger" picture before you can attack your area of interest. Look into all the related areas for insights. A strong literature review offers insights that may enable you to work more efficiently. Last, use all the members of your dissertation committee. Each professor brings her or his own unique expertise to the table. Keep them informed along the way and utilize their knowledge. You will be the expert on the topic, but they will help you elevate it to a higher scholarly level.

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APPENDICES

Appendix 1

Latent dirichlet allocation (LDA) topic modeling (Blei et al., 2003) is a generative statistical model used to find hidden semantic structures of textual content and is helpful for discovering the main topics and meaningful dimensions of online reviews. LDA model assumes that a set of topics and themes exists in the text and tries to uncover these hidden structures by looking at the co-occurrence of content terms in the text. In other words, LDA model repeatedly samples the words of the corpus based on a multinomial distribution to identify words that tend to associate with each other. The outputs of LDA model are the list of topics, surfaced based on the likelihood of word co-occurrence, and weight values presenting the probability that a word belongs to a specific topic. Topic models based on LDA technique are frequently used as a text-mining method to discover the hidden semantic structures in a text; however, evaluating the intrinsic quality of the topic model and topics remains controversial.

Appendix 2

One of the very first methodologies for evaluating the semantic interpretability of topics was introduced by Chang et al. (2009) as a "word intrusion" indirect approach, where "intruder words" are randomly inserted into LDA output topics and human annotators try to identify the intruded words. Newman et al. (2010) introduced the notion of "topic coherence" and tried to estimate the human-interpretability of topics using a more direct approach. In this method, human annotators were asked to rate topics on a three-point scale based on the coherence level of the topic words. They then assessed topic coherence based on pairwise pointwise mutual information (PMI)

between the topic words. One of the biggest limitations of these methods is that they underperform in large-scale evaluations since they require human annotations (Lau et al., 2014). Lau et al. (2014) introduced an improved formulation of Newman et al.'s (2010) approach based on normalized PMI (NPMI), a fully automated word intrusion method (WI-Auto-NPMI) and observed coherence (OC-Auto-NPMI) tasks. Their results show that NPMI achieves a noticeably higher correlation than OC-Human, especially at the model level.

Appendix 3

With the assumption that a given online review is subjective, sentiment analysis represents a polarity classification and valence identification of reviews and determines whether the polarity of textual content is positive, negative, or neutral. In the tourism context, this polarity classification of "positive" and "negative" can be inferred as "satisfied" and "dissatisfied," respectively (Alaei et al., 2019). The lexicon-based approach of sentiment analysis compares tokens of a given online review to pre-defined positive and negative sentiment lexicons to determine whether the review has a more positive or negative tone. In a supervised method of classification, a training dataset is first developed to distinguish a document's characteristics, and is further applied to test data (Feldman, 2013).

Appendix 4

One important step toward an effective text clustering process is that word frequencies need to be normalized in terms of their relative frequency of occurrence in the document and over the entire corpus. This task can be performed by vector-space based Term Frequency–Inverse Document Frequency (TF-IDF) representation, where the TF for each word is normalized by the

Inverse Document Frequency (IDF). The IDF normalization reduces the weight of more frequent terms in the corpus (e.g., stop-words), ensuring that the matching of documents is more influenced by unique words with relatively low frequencies. A sub-linear transformation function is also normally applied to the term frequencies in order to avoid the adverse effects of having a single term that might be very frequent in a document (Aggarwal & Zhai, 2012).

Appendix 5

A selective review of destination loyalty literature in the hospitality and tourism context was performed to develop the loyalty keyword vocabulary for study 2, including but not limited to: Akhoondnejad (2016); Alegre and Juaneda (2006); Alexandris et al. (2006); Backman and Crompton (1991); Berezan et al. (2015); Campón-Cerro et al. (2017); Chen and Gursoy (2001); Chi and Qu (2008); Gallarza and Saura (2006); Gursoy et al. (2014); Halpenny et al. (2016); Kastenholz et al. (2006); Kyle et al. (2004); Lee et al. (2007); Moore et al. (2015); Morais et al. (2004); Oppermann (2000); Prayag and Ryan (2012); Pritchard and Howard (1997); Senders et al. (2013); Sun et al. (2013); Velázquez et al. (2011); Yim and Kannan (1999); Yoon and Uysal (2005); Yuksel et al. (2010); and Zhang et al. (2014).

Appendix 6

A selective review of climate change general literature as well as climate change literature in the tourism setting was performed to develop a climate change keyword vocabulary for study 3, including but not limited to: Barnett et al. (2016); Barret and Mowen (2014); Becken (2004); Becken (2007); Becken (2013); Becken and Hay (2007); Braun (2012); Brownlee and Hallo (2006); Brulle et al. (2012); Burns and Bibbings (2009); Capstick et al. (2015); Cunsolo and Ellis

(2018); Dodds and Graci (2009); Elsasser and Bürki (2002); Gifford (2011); Gössling et al. (2006); Hall et al. (2015); Hanson-Easey et al. (2015); Jones and Scott (2006); Koteyko et al. (2013); Koteyko et al. (2015); Koteyko et al. (2010); Lemieux et al. (2018); Moser (2010); Nerlich et al. (2010); Palomo (2017); Parmesan and Yohe (2003); Pearce et al. (2015); Prideaux et al. (2010); Richardson and Loomis (2005); Scott (2011); Scott and Becken (2010); Scott et al. (2012); Scott et al. (2004); Spence et al. (2011); Steiger et al. (2019); Suffling and Scott (2002); and Wibeck (2014).