POD TRAVEL IN THE PANDEMIC ERA:

SOCIAL MEDIA ANALYTICS ON

TRAVEL SENTIMENT AND SPATIAL DISTRIBUTION

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The undersigned, appointed by the dean of the Graduate School, have examined the dissertation entitled

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ABSTRACT

The outbreak of the COVID-19 pandemic brought an enormous downturn to the overall hospitality and tourism industry. Accordingly, a novel trend emerged, called 'pod travel,' reflecting travelers' needs and behavior shifts. This study aims to understand pod travel through two phases. In study 1, pod travel is conceptualized using the text mining approach of Twitter by comparing two time periods: Jan 2019 (before COVID-19) and Jan 2021 (during COVID-19) to figure out distinguishable differences that came out of the pandemic. Specifically, several theoretical concepts, including chaos theory, travel resilience, optimism bias, and xenophobia were adopted to understand the phenomenon, and through a topic modeling approach. In study 2, social media analytics on Twitter is implemented to identify public opinion about the pandemic and their sentiments and spatial distributions of the United States for travel. The findings are expected to deliver meaningful behavioral aspects distinguished from past traveler behavior. In addition to enlightening industry practitioners to overcome this hardship and behave strategically, this study proposes sustainable pod travel that is expected to be more prevalent and prosper.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

In 2020, the outbreak of the novel coronavirus (COVID-19) pandemic was a game-changer, triggering a devastating impact on the global economy across many sectors (UNWTO, 2020). In line with various governments' regulations to flatten the rising curve of COVID-19 cases, numerous procedures were implemented, including travel restrictions, social distancing, stay-at-home orders, and community lockdowns (CDC, 2020a).

The hospitality and tourism industry is among the hardest hit sectors, confronting unprecedented challenges in many areas (Krishnan et al., 2020). Due to the restrictions, travel demand has decreased significantly, and a massive number of employees have been furloughed overnight (Karmin & Fung, 2020). For example, restaurants have been asked to limit their operation hours, exclude dine-in services, and only serve menus using take-out or drive-thru options. Hotel occupancy rates and revenues also experienced sharp declines. According to STR (2021), US hotel profitability fell by 84.6% in 2020, including a 100.6% decline in December 2020 alone. Across all routes, the number of flights drastically decreased as the volume of travelers diminished. The industry was forecasted to sustain net losses of US$118 billion in 2020 (IATA, 2020). Considering the high operational costs of the hospitality and tourism industry, most businesses' survival is at risk.

Notwithstanding the easing of restrictions with protocols and guidelines, several market reports have predicted that recovery from the impacts of the COVID-19 pandemic will continue until 2023 and beyond (Krishnan et al., 2020; STR, 2020). Having been isolated for an extended period during the pandemic, people now realize the value of traveling and its essential role in our lives. Craving for travel during the pandemic has increased the demand for novel forms of travel that require further research attention.

"Pod travel," an emerging tourism trend, is mainly concerned with public safety. This neologism refers to traveling together with a group of people throughout a given itinerary following safety guidelines, such as quarantine and social distancing rules, thus minimizing the risks for travelers (Levine, 2020; Smith, 2020). The "pod" may include any configuration of groups composed of two or more households, such as nuclear families, multigenerational families, friends, couples, or other groups of unrelated adults (Levine, 2020). The range of where-to is widely opened unless a location is crowded. As safety and cleanliness are the top priorities, travelers' preferences lean toward private spaces (e.g., renting an entire house, camping at a national park, chartering a boat, etc.) distant from urban areas. Based on travelers' mutual trust, they want to be connected safely and enjoy themselves within a controlled setting (Airbnb, 2020).

Several travel agencies have also launched new travel products in light of changing preferences. For example, Intrepid Travel (https://intrepidtravel.com) started its family retreats, allowing adventurers to engage with surrounding communities away from crowds and within more controlled settings. A local leader who has received specific COVID-19 training is tasked with accompanying groups of travelers to ensure their health and safety. Similarly, G Adventures (https://gadventures.com) started to offer

private travel options, with a pod of 8–12 travelers taking one of 80 tour choices (i.e., *The Book Your Bubble Collection*) to ensure that they were only together with their friends and family members. More importantly, travelers can now enjoy personalized itineraries with tailored services. Such examples demonstrate how people travel during the pandemic era, wherein the desire for traveling has never disappeared but only transformed into alternative formats.

Given the background of the rising demand for pod travel, this study attempts to explain this novel travel trend from a holistic approach by integrating several theoretical frameworks, including travel resilience, optimism bias, and xenophobia. A broad range of investigations is essential in coping with the so-called "new normal" changes to travel patterns (Chebli & Said, 2020; Kock et al., 2020). The key takeaway is that the phenomenon should not be limited to understanding the risk/crisis management sector. Instead, a holistic approach to understanding how the new normal has reshaped travelers' behaviors is imperative to respond to market demand appropriately.

When the pandemic ends in the future, it will not be easy to imagine that travelers will go back to the foreground to a pre-COVID-19 scenario. The world is changing, which opens opportunities for scholars to mitigate and resolve crises in a meaningful way. For example, travelers are now more concerned about environment-friendly options, such as sustainable tourism (Chang, McAleer, &Ramos, 2020; Romagosa, 2020) and community and regional resilience (Kimhi et al., 2020). Furthermore, a comprehensive approach is essential in identifying the current travel market trends and forecasting traveler psychology and behavior, which are expected to play a substantial role in hospitality and tourism operations.

1.2 Problem Statement

Since the 1970s, many studies on travel behaviors have been published. However, unlike previous studies addressing traveler behaviors and psychological decision-making processes, the devastating impact of the pandemic has brought about the need to revisit previous findings to determine whether they are still applicable. The impact of COVID-19 is much worse than that of previous crises (e.g., MERS, Avian Flu, SARS), as the scope and severity are felt worldwide (Chebli & Salid, 2020), and the duration is prolonged.

Despite the pandemic's impact on the hospitality and tourism industry, ongoing research in the academe is still in its infancy. Thus far, studies related to COVID-19 have mainly focused on its impact on different sectors of the hospitality and tourism industry, such as hotels (Pappas & Glyptou, 2021), airlines (Dube, Nhamo, & Chikodzi, 2021), and restaurants (Song, Yeon, & Lee, 2021). Other studies have segmented coping strategies into several levels, including government (Gombos et al., 2021; Goolsbee & Syverson, 2021), corporate (Kaczmarek et al., 2021), and individual (Karl et al., 2021; Zheng, Luo, & Ritchie, 2021). Although it is evident that such studies have contributed to the literature, they failed to provide a comprehensive understanding of the overall market, as they measure the impacts using individual sectors (i.e., hotels, airlines, and restaurants) or respective viewpoints (i.e., government, corporate, and individual).

Along with the overall transformation of traveler behavior and the shifting market paradigm, it is imperative to take a holistic approach to identify the novel "pod travel" trend (Levine, 2020; Smith, 2020). The literature's understanding of this novel concept is

still limited in relation to transformational consumer demands. Therefore, the idea is still in the development stage, and its substantial role and implications require further research. It is expected that other significant attitudinal and behavioral dimensions may vary. As previously mentioned, travelers now care more about environment-friendly options (O'Connor & Assaker, 2021), are looking into sustainable tourism, and practice responsible rural tourism behaviors. Nevertheless, the concept of pod travel is still not well understood by all hospitality and tourism industry practitioners, and a knowledge gap exists regarding what pod travel entails and its measurements. Furthermore, the relationships between influential dimensions and behaviors remain underexplored.

1.3 Statement of Purpose

Based on previous research and acknowledging past findings, the current study seeks to address the research gaps by developing a framework that conceptualizes pod travel. Such an analysis would provide insights for hospitality and tourism stakeholders, drawing a roadmap for a comprehensive conceptualization and sustainable development of pod travel. This study also explores pod travel and how travelers make travel decisions while coping with the COVID-19 pandemic. Specifically, this study describes travelers' needs and behavioral shifts during the pandemic and how such changes can have long-term, sustainable effects on the hospitality and tourism industry. Therefore, this study provides a comprehensive and concrete understanding of pod travel through two phases of different studies, integrating several theoretical concepts, namely, optimism bias, and xenophobia, to demonstrate travelers' transformative behaviors.
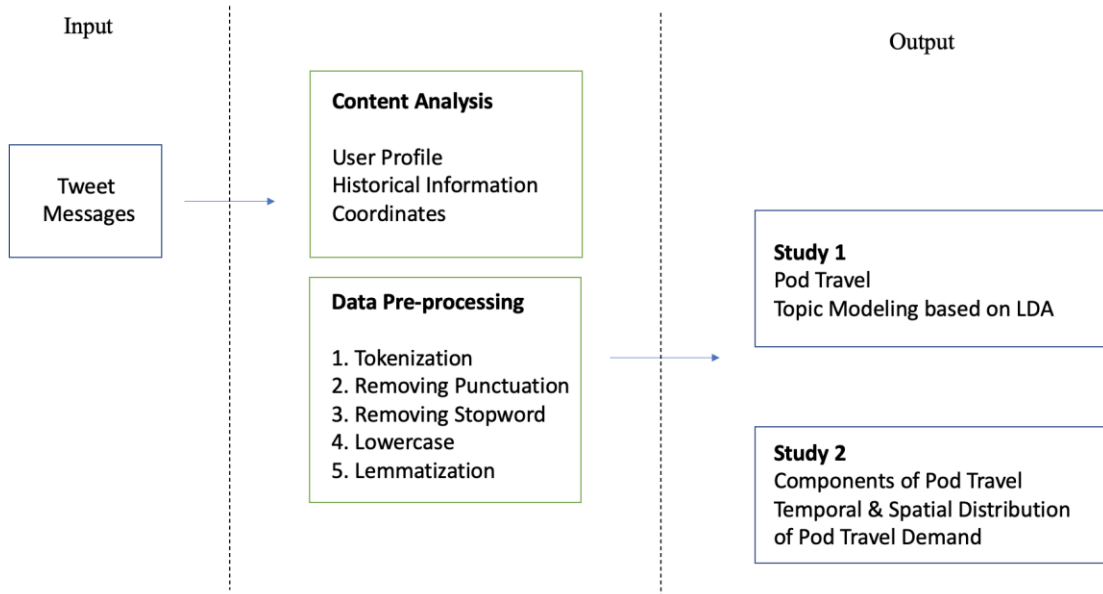
Figure 1. An Overview of the Research Framework.

Study 1:

This study attempts to establish an overarching conceptualization of pod travel. By providing meaningful topics and keywords to understand pod travel, tweets have been analyzed to compare how people talk and discuss travel before and during COVID-19. In addition, several theoretical concepts, such as travel resilience, optimism bias, and xenophobia, were applied to explain pod travel. In particular, this study articulates traveler's perception through the schema of cognitive and behavioral patterns based on tweet discourse. Several keywords that directly depict travel (OR tourism OR trip) was crawled in January 2019 (before COVID-19) and January 2021 (during COVID-19) to compare the differences. In order for that, one of the machine learning techniques, topic modeling is adopted; each result describes the similarities and differences in people's perceptions about travel and the pandemic.

Study 2:

To describe and characterize pod travel, this study uses social media analytics by analyzing tweets posted during the entire year 2020. Using Twitter Application Program Interface (API), several types of data (text, user, and geographic coordinates) have been collected to identify the public's perception and behavioral patterns of travel during COVID-19 as a longitudinal study. More importantly, to examine the public sentiment about how they are enduring this crisis, the Wheel of Emotions (Plutchik, 1980) is adopted that was not widely applied in hospitality and tourism literature. Several different analyses have been implemented to figure out meaningful implications for academic and industry stakeholders by looking at different patterns of public sentiments, public opinions, and geographical location.

1.4 Research Questions and Hypotheses

To deal with the purpose of this study, several research questions and hypotheses are suggested as follows:

Study 1:

RQ1. What are the significant theoretical concepts that explain pod travel during COVID-19?

RQ2. What are the significant topics and keywords that explain pod travel during COVID-19?

H1. Based on the chaos theory, travelers' needs have become more diversified compared to pre-COVID-19.

H₂. Travel resilience is a significant factor to explain pod travel.

H₃. Optimism bias is a significant factor to explain pod travel.

H₄. Xenophobia is a significant factor to explain pod travel.

Study 2:

RQ₁. What are the general features of travel during the COVID-19 pandemic period, in
terms of emotional and spatial characteristics?

RQ₂. Specifically, what are the emotion-related keywords expressed by the public
about travel when applying the Wheel of Emotions?

RQ₃. What are the keywords that can describe the characteristics of pod travel?

RQ₄. What are the temporal and spatial characteristics of the demand for pod travel?

1.5 Significance of the Research

The findings of this research are expected to benefit both academia and industry practitioners by providing them with more knowledge about transforming market trends and pointing out ways to overcome the pandemic with minimal impacts. Although studies related to COVID-19 have continuously progressed, the overall mission of researchers should involve finding ways to deal with the long-term effects to mitigate crises and disasters and find pathways for sustainable tourism that benefit communities and consumers alike. Based on the results, this study serves as a foundation to conceptualize pod travel. Therefore, this study mainly provides its definition, concepts, characteristics, components, and how it reshapes the hospitality and tourism industry in the long run.

In terms of theoretical contributions, the findings shall describe travelers'
behaviors and their psychological perceptions by integrating several concepts, including
travel resilience, optimism bias, and xenophobia. In doing so, the study provides an
overarching framework to explain pod travel. This study expects to better deal with the
pandemic to better understand the phenomenon being studied and insights. Specifically,
this study investigates other influencing factors by analyzing tweets on Twitter. This
study also attempts to articulate the meaningful psychological and behavioral constructs
explaining the emergence of pod travelers, who are expected to remain after the
pandemic via sustainable tourism. Thus, the scope of this study is not only limited to
travelers' behaviors during the COVID-19 pandemic but also their overall experiences
and expectations in the long run. The framework of the current study can be viewed as a
theoretical foundation for broadening the literature related to the pandemic, wherein
travel trends and market insights are presented.

From a practical perspective, the tourism and hospitality field can draw from this
study's findings and actively and dynamically benefit from social media. Doing so can
help stakeholders figure out public opinion and meet the diverse needs of their relevant
clientele, enabling them to better position information searches and communication
during the entire consumption process. In addition, the findings of this study are
advantageous for industry practitioners aiming to develop both long- and short-term
strategies to attract more consumers by emphasizing their strengths. This is because the
current study is expected to provide them with knowledge of the emerging market of pod
travelers based on their psychological, behavioral, and environmental pathways.

1.6 Assumptions of the Study

Although the threat of COVID-19 is still rampant worldwide, people are slowly

beginning to travel again in alternative forms that follow health and safety regulations

and guidelines. To understand pod travelers' behaviors, this study assumes that such

behaviors and travel patterns follow psychological resilience, which is the capacity to

recover from difficulties or toughness. Although human behaviors are complicated and

cannot be easily understood, the domain of the behavioral sciences can help find

sufficient explanations. This field explores the cognitive processes within organisms and

the behavioral interactions among organisms in the natural world and attempts to

accomplish legitimate, objective conclusions through rigorous formulations and

observations (Klemke, Hollinger, & Kline, 1980). Understanding human behavior is

essential within industries for marketing purposes and unpacking decision-making

processes and finding ways to deal with consumers in various domains of studies,

including hospitality and tourism (e.g., Lee & Kim, 2021; Lehto, Kim, & Morrison,

2006).

Related to the physical properties of the universe, Newton's three laws of motion

resulted in the advancement of the physical sciences, and the newfound enthusiasm

significantly leveraged the concept to industrial applications. These three laws are

explained as follows: (1) If a body is at rest or moving at a constant speed in a straight

line, it will remain at rest or keep moving in a straight line at a constant velocity unless a

force acts upon it. (2) The acceleration of an object, as produced by a net force, is directly

proportional to the magnitude of the net force in the same direction as the net force and is

inversely proportional to the object's mass ($F = ma$). (3) When one object exerts a force

on a second object, the second one exerts a force on the first that is equal in magnitude and opposite in direction.

Even though there are no equivalent concepts in the behavioral sciences to directly provide calculated answers for explaining human behaviors, the underlying themes are believed to share analogous tendencies. Hence, in the spirit of Newton's three laws of motion, the current study posits that human behaviors follow similar principles. Reflecting the rationale behind Newton's three laws of motion, this study thus argues that human behaviors can be explained as follows: (1) people tend to follow the status quo unless it is acted upon by an external force (fuel, friction); (2) behavior represents a combination of the person and his/her environment (surroundings, expectations of society, etc.), $F = f(P, E)$; and (3) every decision features trade-offs or opportunity costs (Holzwarth, 2019).

First, humans are resistant creatures who are likely to choose established practices over others. A certain degree of effort is needed to induce a change in one's behavior that is not part of a routine. In explaining this phenomenon, status quo bias is defined as a cognitive bias that people who prefer to stay in shape. In human behavior, the status quo is a powerful force similarly explained by Newton's first law of motion: force is required to induce a change in motion. Just as in physics, there are two primary types of forces in human behaviors: fuel (a force that pushes you forward) and friction (a force that slows you down). Fuel represents anything that prompts one's behavior and enhances engagement, whereas friction works as a barrier that inhibits further action. Without external forces, people would stick to the status quo. In behavioral science, both external forces of fuel and friction can induce changes in human behavior.

Second, behavior represents a combination of a person's attributes and contains elements of one's beliefs, cultures, personality, knowledge, and so on within their social environment (Germain & Bloom, 1999). In other words, behavior is an outcome of one's unique personality and environment and reflects their previous experience. Based on field theory (Lewin, 1939), the psychological climate has to be regarded functionally by claiming B=f(P, E) or *Behavior = Function of person and environment*. The equation implies that one's behavior is not separate from a function of the environment, as such elements interact with one another. To fully understand consumers and their behaviors, it is imperative to comprehend them as individuals situated within their surrounding social environments.

Third, every decision consists of a trade-off between costs and benefits. Regardless of our attention to the tradeoffs inherent in any decision, there are often losses suffered in one area when gains are made in another. An opportunity cost refers to something that must be given up when choosing a different option. Just as Newton's law of motion explains that every action in nature has an equal level of action and reaction, every human behavior is contingent upon his/her choices. When people make decisions, they may not be able to avail of other things at the same time due to limited time and resources. People do this as a trade-off about a specific behavior. For instance, if a family decides to visit South Korea during the Thanksgiving break, they cannot visit other countries simultaneously, as their time and resources would already be allocated for the South Korean trip.

Based on three rationales to explain human behavior, this study expects to describe better how travelers fulfill their needs and desires while coping with the

COVID-19 pandemic. Again, the yearning for travel and experience never disappeared but merely transformed into alternative forms that comply with health and safety regulations that were more emphasized throughout the studies.

1.7 Organization of the Dissertation

The overall organization and structure of this research are described below (see Figure 2). **Chapter 1** is an introductory chapter that provides the background and rationale of the study. The aim and significance of the study are also explained with several research questions and hypotheses.

Chapter 2 demonstrates the first study. It describes how COVID-19 has reshaped the tourism and hospitality industry, thereby conceptualizing the phenomenon of pod travel. From a theoretical perspective, several concepts to explain pod travel have been adopted, such as travel resilience, optimism bias, and xenophobia. By analyzing tweets, topic modeling identifies the individual's perception of travel by describing keywords' similarities and differences before and after the COVID-19 pandemic.

Chapter 3 demonstrates the second study. It explains the public discourse presented on social media as a form of a longitudinal study. Twitter analyzes how people share their opinions, feelings, thoughts, and experiences about travel during the pandemic. In this step, tweets are collected and analyzed using several techniques (i.e., sentiment, public opinion, geographic). The findings are developed to provide meaningful implications.

Chapter 4 summarizes the key findings of the study. The summaries of each study, limitations of the research, and suggestions for future research are presented in the final chapter.

- An introductory chapter that provides the background and rationale of the study.
- The aim and significance of the study are explained with research questions and hypotheses.

Chapter 1

- Study 1 describes how COVID-19 reshaped the tourism industry by conceptualizing pod travel.
- Tweets are analyzed before and after the COVID-19 outbreak.
- Topic modeling was used to identify individuals' perception differences.

Chapter 2

- Study 2 is a longitudinal study, which explains the public discourse presented on social media (e.g., Twitter).
- Several social media analytics are used to collect and analyze public opinions toward pod travel (i.e., textual, sentiment, spatial analysis).

Chapter 3

- The final chapter summarizes key findings of the overall study.
- Summery of the results and limitations of the research, and suggestions for future research are presented.

Chapter 4

Figure 2. Structure of the Dissertation.

CHAPTER 2

POD TRAVEL: AN EMERGING TOURISM TREND

DURING COVID-19 PANDEMIC

2.1 Introduction

The International Epidemiology Association's Dictionary of Epidemiology defines a pandemic as an epidemic occurring worldwide or over a vast area, crossing international boundaries and affecting many people (Porta, 2008). In 2020, a new pandemic disease called COVID-19 occurred, which hit the globe with an unprecedented impact on the tourism industry. Since its appearance, over 80 countries and territories have initiated travel restrictions, including border closure and flight suspensions (Kiernan & DeVita, 2020). Also, the increasing number of cases and deaths has led to public anxiety, fear, and avoidance of contacting strangers.

Previous studies highlight that the tourism industry is dramatically affected when pandemic outbreaks occur, with slow recovery (Novelli et al., 2018). Indeed, tourism has been severely damaged due to travel being regarded as a high-risk activity during COVID-19. Moreover, the fear of the epidemic itself and traveler perceptions have led to significant reductions in travel demand due to the uncertainty and misleading information (Rittichainuwat, Nelson, & Rahmafitria, 2008). Although numerous studies have been investigated regarding previous epidemics, such as SARS (e.g., Kuo et al., 2008), H1N1 (e.g., Lee et al., 2012), and Ebola (Novelli et al., 2018), COVID-19 is significantly larger in size and scope.

Although chaos theory originated in mathematics, its applications are varied among several disciplines (e.g., finance, engineering, marketing, education). As an interdisciplinary theory focusing on complex non-linear systems of social complexity, chaos theory assumes that nature includes some instances of social behavior and system that are highly complicated, and the only possible prediction that can be made is that it is unpredictable. Based on this fact, it tries to find the common patterns among different circumstances.

Several studies have revealed that travelers' public fear concerning COVID-19 (e.g., Zheng et al., 2021) and market demand were geared toward specific types of travel, such as outdoor activities, camping, and nature-based tourism (Sigala, 2020). As the importance of public safety increases, pod travel has become a new trend in tourism. This neologism refers to traveling with a group of people together throughout the itineraries by following safety guidelines, such as wearing a mask, quarantine, and social distancing, to minimize the risks (Levine, 2020; Smith, 2020). The "pod" entails any form of a group composed of two or more households – families, multigenerational families, friends, couples, or other groups of unrelated adults (Levine, 2020). As McKercher (1999) argued, tourism essentially functions as a chaotic and non-linear system due to its fragility toward externalities, such as crisis and disaster (Ritchie, 2004); the chaos theory can explain pod travel that occurred during the pandemic. In other words, optimism bias results in their behavior to travel safely, as they tend to believe their risk of infection is low if they follow the health and safety rules by avoiding crowds (e.g., xenophobia). Indeed, studies revealed that coping with fear increases individuals' resilience, which

helps moderate perceived losses and improves the adaptability to the disaster (Rodriguez-Llanes, Vos, & Guha-Sapir, 2013).

Nonetheless, to the best of our knowledge, the conceptualization of pod travel is still in its infancy, which lacks empirical research to manifest its substantial roles and implications as future agenda. Therefore, this study uses the chaos theory and other theoretical concepts (travel resilience, optimism bias, and xenophobia) to describe the emerging pod travel trend stemming from COVID-19. Specifically, social media analytical techniques were employed to explain pod travelers' behavioral patterns and/or diversified aspects. A total of 20,382 tweets were collected before and during COVID-19, and the users' thoughts and/or opinions were analyzed using topic modeling, respectively. The results and findings of this study are expected to help scholars and tourism practitioners establish effective communication and policies to enhance pod traveling behavior by providing meaningful insights and suggestions.

2.2 Literature Review

2.2.1 COVID-19 Pandemic and Tourism Industry

The definition of the pandemic refers to a widespread occurrence of an infectious disease that occurs anywhere, regardless of boundaries between countries and continents (French, Mykhalovskiy, & Lamothe, 2018). The pandemic is highly contagious that spreads rapidly among people with possible fatal outcomes, leading to intense fear and panic in public (Person et al., 2004). The impact of the pandemic becomes rampant, which facilitates governments to implement specific guidelines and regulations, such as

prohibiting public events, closing schools, restricting overseas travel, and placing quarantines and isolation to minimize the negative outcome and damage.

In 2020, the emergence of COVID-19 brought an enormous change to the hospitality and tourism industry. The travel industry is grappling with an unprecedented wave of cancellations and a significant drop in demand amid strict governmental instructions to implement social distancing and the restriction of unnecessary travel. Inevitably, many businesses were at risk of permanent closure, and a significant number of employees lost their jobs overnight. Globally, border closures rose, and the airline business ran short. Although losses are expected to reduce steadily in 2022 compared to the previous years, the recovery should be long and challenging to deal with many issues, including debt levels, operational efficiencies, recession, and confidence (IATA, 2020).

Regarding the previous studies covering epidemics, Wen, Huimin, and Kavanaugh (2005) revealed that Chinese tourists altered their traveling behaviors in a social distancing way, such as choosing natural tourism destinations, decreasing group tours, and avoiding contact with other people during traveling after the 2002-2004 SARS outbreak. According to Novelli et al. (2018), tourism in developing countries had devastating consequences, inducing a significant decrease in demand across the whole continent of Africa during Ebola in 2014. Also, travelers are reluctant to domestic travel due to confirmed cases as their perceived travel risk and susceptibility increase (Cahyanto et al., 2016). Based on the previous literature, it is evident that several public avoidant behaviors occur during or after severe disease outbreaks (e.g., Nabi & Prestin, 2016; Wong & Sam, 2011).

Similarly, there has been much literature dealing with COVID-19 after its outbreak. For example, Bae and Chang (2020) explored the effect of risk perception on behavioral intention in South Korea. Specifically, they highlighted 'untact' tourism that emphasizes a health-protective behavior based on an individual's perceptions of COVID-19 using two types of risk perceptions (i.e., cognitive, affective). Duro et al. (2021) demonstrated how the tourism industry was vulnerable during COVID-19 that impacted leisure activities worldwide, using the dimensions of the Tourism Vulnerability Index (TVI) composed of tourism intensity and density, rural accommodation, proximity demand, seasonality, and COVID incidence in Spain.

Several experts claimed that the COVID-19 outbreak is the moment to reset both industry and research for further advancement. In other words, it is necessary that scholars critically review past and emerging literature to help professionals and researchers to understand better, manage and valorize both the tourism impacts and transformational affordance of COVID-19 (Sigala, 2020).

2.2.2 Emerging Trend of Pod Travel

As facing new normal, several market reports indicated that consumer behavior would not remain the same before and after the pandemic outbreak. The transformational consumer trends that are expected to reshape the overall hospitality and tourism industry (Airbnb, 2020; Levine, 2020; Smith, 2020) as this study manifests three trends: (1) collapsed boundary between work and travel life, (2) staycation, and (3) travel bubbles. The first trend is *Collapsed boundary between work and travel life*. Along with the social distancing and quarantine, companies started to provide remote working environments;

employees have an option to work at home without commuting. People can work from anywhere besides their office, as long as they have no problem connecting to others (peer/colleague) online. According to the market report, 20% of respondents relocated their living environment after the pandemic (Airbnb, 2020). As they do not need to stick to their homes, this trend leverages a massive opportunity for the travel industry, enabling travel anytime, without specific seasons or holidays. This trend is rather outstanding to younger generations (e.g., Generation Z, Young Millennials), indicating this phenomenon to become more prominent even though the pandemic is over (Airbnb, 2020; Soria et al., 2020).

Residents have relocated to suburban and rural areas since the declaration of the pandemic. According to Egkolfopoulou (2020), metropolitan areas of New York and California have lost people because of travel restrictions, being locked down, and remote working. It accelerated residents to relocate from a highly dense to a sparse area, and a substantial decrease occurred since the pandemic. Indeed, 24% of their respondents have relocated to a suburban and 21% to a rural area (Airbnb, 2020; Meyer, 2021). In this context, peer-to-peer accommodation, such as Airbnb, receives the spotlight, as people can test-drive a new city and/or town before their relocation. Airbnb (2020) showed that guest reviews mentioned: that "relocation," "remote work," or "trying a new neighborhood" was increased by more than 128%, compared to the same time frame (July 2020) of the previous year.

Moreover, Airbnb provides geographical advantages by securing one's privacy. Although hotels tend to be located in densely populated areas to maximize profit and efficient operation, Airbnb does not require such premises since owners individually

maintain their property. The accessibility of Airbnb facilitates travelers to visit more

distant regions alongside various types of accommodations, including islands, mountains,

and rural areas (Airbnb, 2020).

The second trend, *Staycation,* entails traveling to destinations closer to one's

home, and staying at the accommodation for a relatively shorter time (Alexander, Lee, &

Kim, 2011). As uncertainty about traveling abroad persists, domestic travelers are

steadily increasing. A range of domestic locations in national parks, winter skiing, and

beach towns are reported as the popular destinations, whereas overseas traveling became

less popular like Paris, London, and Rome due to the travel restrictions. Accordingly, a

staycation is frequently observed in domestic travelers, whose mobility and localities

from their home to the destination are close (Alexander et al., 2011; Compton, 2021).

Indeed, Airbnb (2020) revealed that 62% of people are interested in taking a vacation

within a drivable distance. In addition to the locational accessibility, travelers still expect

to seek unique travel experiences and expand their horizons toward the world.

Importantly, travelers seek sustainable accommodation options that include a variety of

spaces known for using less energy and producing less waste (Airbnb, 2020). More

travelers are trying to staycation during the COVID-19 era by traveling with or visiting

friends and family.

The third trend includes *Travel bubbles* that emphasize safety and mutual trust. It

refers to geographical areas with low infection rates that allow residents to travel between

the regions without quarantine (Smith, 2020). With companions that one can trust (e.g.,

family, friends), a group of people travels together by minimizing the chance of external

exposure and unnecessary contact with others. By using their vehicles, travelers head to

destinations surrounded by nature. Such examples include rural, nature, and eco-tourism that emphasizes sustainability. An exclusive partnership between two or more countries is essential for air travel. This process demonstrates their success in dealing with COVID-19 to ensure both parties have the strong bilateral trust required for their commitment. Under the mutual agreement, these countries open their borders to travel without on-arrival quarantine. For example, Hawaii started a new policy addressing those inbound travelers who are free from quarantining as they bring a negative COVID-19 result along with them (https://www.gohawaii.com/travel-requirements). By implementing such a policy, travelers can easily choose their next travel destination as they can save time and resources required for quarantine. In other words, it emphasizes the importance of mutual trust to guarantee safety while traveling.

The term pod travel (or travel pod) is a way to travel with others while minimizing the risks associated with group travel. These pods include two or more unrelated couples or families, multigenerational groups, extended families, or other groups of unrelated adults (e.g., solo travelers) (Levine, 2020). The concept is based on a group of two or more households whose members have been following coronavirus quarantine and social distancing guidelines that make plans to vacation. Notably, pod travel can be distinguished into two types, whether acquaintances or strangers accompany them: (1) a group of family and/or friends trip together or (2) travelers join with a group of strangers on an organized trip to visit a new destination and create a travel pod with them. Although the companions differ across two categories, one overarching premise is that each traveler trusts other group members that they are healthy and safe. Since following the safe guideline is hardly possible among group members, it is essential to

build confidence before their journey so that the whole travel itinerary is smooth and comfortable without worrying about contagion or infection.

Pod travel reflects individuals' demands for traveling during the pandemic era. It emphasizes the importance of compelling and memorable experiences for people to create the desired impression, even though they are not encouraged during COVID-19. Virtuoso reported that 79% of respondents indicated they would participate in a travel pod due to the safe and comfortable environment (Levine, 2020). In addition, travelers who included 'family' in the Wishlist title have been increased three times on the website compared to pre-COVID-19 (Airbnb, 2020).

Pod travel is expected to last after the decrease of COVID-19 as a means of sustainable tourism. Along with the pandemic, travelers became more knowledgeable about how they could cleverly resolve the current crisis within the tolerated boundary. They are now more interested in sustainable tourism that does not harm the environment. Once travelers change, it is likely to change further based on their current pattern of behavior. It brings hospitality and tourism industry practitioners to learn current traveler behavior and keep up with their interests.

Nevertheless, the theoretical understanding of this concept is greatly limited as this concept of travel has recently appeared after COVID-19. Thus, it is imperative to delve into this concept, including its characteristics and the scope, through a comprehensive understanding of pod travel. By integrating the theoretical concepts that explain pod travel, the emerging trend can be identified through the influential dimensions for traveler engagement that seems suitable for understanding the current phenomenon. Based on the literature, this study poses the following research questions:

RQ₁. What are the significant theoretical concepts that explain pod travel during COVID-19?

2.2.3 Pod Travel and Revisiting Adventure Travel

Pod travel can be considered a more advanced form of adventure travel along with its situational and environmental change. The definition of travel has substantially changed over the decades due to ever-changing individuals, industries, and environments. Numerous studies have been implemented in order to define the adventure based on its behavioral characteristics. Detailed definitions are provided in Table 1.

Table 1. Literature Review about Definition of Adventure Travel.

Definition	Source
Any number of leisure pursuits which provide exposure to physical danger.	Meier (1978)
Activities that involve human participation as a response to the challenge are offered primarily by the physical, natural world such as hills, air currents, and waves.	Progen (1979)
All pursuits that provide an inherently meaningful human experience that is related directly to a particular outdoor environment - air, water, hills, mountains, etc.	Darst & Armstrong (1980)
Outdoor activity involving the natural environment where the outcome perceived by the participants is unknown.	Yerkes (1985)
A variety of self-initiated activities utilizing an interaction with the natural environment, that contain elements of real or apparent danger, in which the outcome, while uncertain, can be influenced by the participant and circumstance.	Ewert (1989)
A broad spectrum of outdoor touristic activities, often commercialized and involving an interaction with the natural environment away from the participant's home range and containing elements of risks in which the	Hall (1992)

outcome is influenced by the participant, setting, and management of the tourists' experience.	
Travel for the specific purpose of pursuing adventurous recreation.	Johnston (1992)
A trip or travel with the specific purpose of activity participation to explore a new experience, often involving perceived risk or controlled danger associated with personal challenges, in a natural environment or exotic outdoor setting.	Sung, Morrison, & O'Leary (1996)

Among the factors commonly emphasized in previous studies, several components were mainly presented: activity (Ewert, 1989; Hall, 1992), motivation (Iso-Ahola, 1980; Manning, 1986; Ewert, 1989), risk (Ewert, 1989; Hall, 1992; Priest, 1992), performance (Ewert, 1989; Martin & Priest, 1986), experience (Iso-Ahola, 1980; Ewert & Hollenhorst, 1989), and environment (Hall & Weiler, 1992). In addition, when understanding the motivations of travelers who engage in outdoor recreations were similar to those of adventure travelers (1) to achieve something, (2) to avoid something, and (3) risk taking. Although pod travel has similar characteristics to adventure travel in that it is based on outdoor recreation, the significant difference is that pod travel focuses on risk minimization rather than risk taking, which was emphasized characteristic in adventure travel. Indeed, the subject of risk is different. The risk taking suggested in the existing literature on adventure travel is not risk taking from the external environment but risk taking from the activity itself, as part of the thrill. On the other hand, risk minimization suggested in pod travel is based on the concept of xenophobia to minimize the risk of external health and sanitary threats, not activities themselves.

In a similar vein, another difference exists, as adventure travel emphasizes "activity″ whereas pod travel emphasizes travel "companion". As mentioned earlier, pod

travel is traveling with close friends and/or acquaintances to minimize exposure to strangers whom one can meet randomly throughout the itinerary. In order to define pod travel, therefore, three components of (1) activity, (2) experience, and (3) environment will be applied to reflect the current phenomenon during the pandemic amongst the existing previous elements.

2.2.4. Conceptual Framework

2.2.4.1 Chaos Theory

One of the enduring problems in tourism management is the lack of theoretical tools to describe and predict traveler behavior under peculiar circumstances (Levy, 1994). Substantially, it is almost impossible to forecast a new crisis and expect the size of the impact on the industry. The underlying problem is the dynamic evolution of the industry with diverse interactions among social, economic, political, and cultural environments (Bramwell & Lane, 2011). Nonetheless, existing theoretical models take relatively simple linear relationships to understand consumer behavior, assuming tourists are rational decision-makers seeking to maximize their utility. Also, these models have been manipulated through input-output models to investigate preferences and behavioral intention (Levy, 1994). However, as the tourism market matures, the extent to which the tourism market can explain and predict tourist behavior becomes uncertain (McCabe, Li, & Chen, 2016). These models are based on the iterative patterns perceived in the real world but usually have too many exceptions to the models that prohibit valuable predictions.

Chaos theory is the study of complex, non-linear, dynamical systems pioneered by Lorenz (1963). His study assumes that chaotic systems can become genuinely random at the limit while studying turbulent flow dynamics in fluids. Theoretically, throwing a coin or rolling dice is a deterministic system with unexpected results. Because not only it is impossible to throw a coin in the exact same way twice, but each time, the coin would be subjected to a slightly different airflow (Ford, 1983). One of the critical achievements of chaos theory is showing how a simple set of deterministic relationships can generate patterned but unpredictable consequences. According to the theory, the chaos system never repeats the same exact state, though the results are limited and create patterns that represent mathematical constants (Feigenbaum, 1983). The promise to find the underlying order and structure behind complex events explains the great interest that chaos theory has created in many domains.

Indeed, chaos theory is a practical conceptual framework that studies nonlinear dynamic systems, which reconciles the intrinsic unpredictability of industry through the emergence of unique patterns (Cartwright, 1991). Chaos theory was developed and applied in the physical sciences and other social, ecological, and economic systems since such fields also demonstrate non-linear relationships and complexities that dynamically transform over time. This recognition has led to increased interest in applying chaos theory to several disciplines, including engineering (Shrestha & Behzadan, 2018), medicine (Kumar, 2012), and economics (Faggini & Parziale, 2012).

The sign of chaos theory can be found everywhere in our daily lives, pointing out the ubiquity of complex and dynamic systems, having similarities between the patterns produced by simulated nonlinear systems (Levy, 1994). Despite the practical applicability

of chaos theory to describe non-linear dynamics between factors, there has been little work in the tourism and hospitality field to understand consumer behavior. In other words, the application of chaos theory to the social sciences is still in its infancy. Thus, this study introduces readers to chaos theory and discusses its relevance to the social sciences and aspects of the pandemic and tourism industry, particularly planning and forecasting and the impact of change on traveler behavior.

The application of chaos theory to a disruptive situation of COVID-19 and its relation to the tourism industry is illustrated using topic modeling. Specifically, it is difficult to imagine or forecast what kind of differences the pandemic would bring to the hospitality and tourism industry. This study assumes that travelers' behavioral patterns would be more complicated and diversified as they suffer from the COVID-19 pandemic, as they have to consider different aspects when they think of travel. By identifying the differences that account for the pandemic, the chaos theory is expected to help understand the transformed atmosphere among travelers. Thus, this study posits the following research question and hypothesis:

> *RQ$_2$. What are the significant topics and keywords that explain pod travel during COVID-19?*
>
> *H$_1$. Based on the chaos theory, travelers' needs will be more diversified compared to pre-COVID-19.*

2.2.4.2 Travel Resilience

Resilience was first introduced in ecosystems, which measures system persistence to absorb changes and disturbances and maintain the same status among variables

(Holling, 1973). In other words, the concept refers to the flexibility to be adapted to a particular situation, regardless of external threats. Several factors affect resilience's adaptability, such as technology, politic, and socio-economic changes (Berkes & Seixas, 2005). Likewise, resilience management implies the ability to maintain resilience and bypass critical thresholds (Berkes, 2007).

In tourism, resilience research is significant as it fills the research gap regarding vulnerability (Becken, 2013). Resilience thinking incorporates complex system theories rooted in biophysics, dealing more implicitly with social and governance aspects (Miller et al., 2010). For example, resilience studies aim to increase robustness (dynamic) rather than stability (Nelson, Adger, & Brown, 2007). Scholars in social science argue that, unlike ecosystems, human systems can learn, predict, plan, and apply moral beliefs as part of collective behavior (Davidson, 2010). In addition, human actions are both reactive and proactive, which explains their ability to be resilient in a social setting (Gallopin, 2006).

As the COVID-19 pandemic hit the globe, the international and/or domestic travel restrictions resulted in most international tourism affairs being suspended, impacting the tourism industry. Due to such regulations to prevent the widespread transmission and seriousness of COVID-19, people seek social contact and mobility (Qiao, Ruan, & Pabel, 2021). It is known that the tourism industry is susceptible to external risks that contain environmental, political, or socio-economic aspects. Nonetheless, people overcame such threats through resilience, embracing a new lifestyle by adopting pandemic prevention measures (Gössling, Scott, & Hall, 2020).

This study assumes resilience as the capacity of flexibility that adapts successfully to disorders that threaten its function, viability, or development (Masten, 2014). This concept has been widely applied to investigate how tourism destinations and organizations respond to unexpected crises or disasters (e.g., Cartier & Taylor, 2020; Fountain & Cradock-Henry, 2020). However, little is known about how tourists generate and use resilience to manage changes and travel adversities (Prayag, 2018; Prayag et al., 2020). Numerous studies found that resilience helps alleviate individuals' losses and increase versatility to get over stressful or traumatic events, such as natural disasters (Rodriguez-Llanes et al., 2013) and terrorism (Bonanno et al., 2006). Thus, resilience is an essential aspect of clinical treatment, which helps to minimize one's fear and/or traumatic stress.

Indeed, a dynamic protective process of various coping skills reveals an individual's psychological adjustment, such as personal traits (adaptive/maladaptive coping) (Campbell-Sills, Cohan, & Stein, 2006; Stratta et al., 2015). Travelers' adaptive behaviors based on their resilience significantly impact themselves to protect from the threat (Hua, Chen, & Luo, 2018). For example, people who are cautious rather than avoid travel during the pandemic hold a high level of resilience. Overall, COVID-19 expedited the necessity of examining travelers' resilience to figure out how the pandemic has transformed travel behavior and reshaped their travel patterns.

H_2. *Travel resilience is a significant factor to explain pod travel.*

2.2.4.3 Optimism Bias

Optimism bias (or the optimistic bias) is a cognitive bias proposed by Weinstein (1980). The concept refers to the individual's belief that adverse events are less likely to occur, whereas positive events are more likely to happen (Weinstein, 1980). In his experiment, students were asked to assess their possibilities of experiencing several desirable and undesirable events (see Table 2). The results indicated that most respondents were more likely to experience desirable events, whereas unpleasant circumstances would be less likely to happen. He concluded that optimism bias is an individual's tendency to consider themselves less vulnerable to negative consequences, whereas more likely to receive positive results (Weinstein, 1984). In other words, there exists a mismatch between an individual's expectation and reality, where expectation surpasses reality (O'Sullivan, 2015).

Table 2. Sample Items of Optimism Bias.

Event Type	Examples	
Undesirable events	Get dental problems without regular floss. Get caught cheating a test. Fail a class without regular study. Develop lung cancer due to smoking.	Attempt suicide. Get divorced. Drop out of school. Have a heart attack.
Desirable events	Get a good grade for studying an exam. Get an interview when applying for a job.	Make a new friend if I make the first move.

(Source: Nandedkar, & Midha, 2012; Lapsley & Hill, 2010)

Studies have demonstrated that optimism bias is widely spread and common, which transcends gender (Lin & Raghurbir, 2005), age (Druică, Musso, & Ianole-Călin, 2020), occupations (Weinstein, 1984), nationality (Klein & Helweg-Larsen, 2002),

intellectual ability (Klaczynski & Fauth, 1996), as well as effective to non-humans (Matheson et al., 2008). The concept is widely considered one of the most reproducible, prevalent, and robust social perceptions and cognitive biases observed in psychology and behavior economics (O'Sullivan, 2015; Sharot, 2011).

In the previous literature, optimism bias is more likely to happen when there is a low probability of a negative outcome (Chapin & Coleman, 2009), lack of experience/knowledge (Costa-Font, Mossialos, & Rudisill, 2009), and closeness to risk source (Trumbo et al., 2011). Accordingly, various studies have applied this concept to their research, including psychology, management, health, and behavior (Coelho, 2010; Harris, Griffin, & Murray, 2008). For example, Ricci et al. (2013) found that residents near volcanic hazard areas underestimate the potential for a volcanic eruption. They believe the likelihood of severe consequences of the explosion is lower than the possibility of their town experiencing severe damages. In terms of health-related risk assessment, studies were implemented on various diseases, such as H1N1 Flu (Cho, Lee, & Lee, 2013), campus influenza outbreak (Kim & Niederdeppe, 2013), lung cancer (Dillard, McCaul, & Klein, 2006), and bird flu (Wei, Lo, & Lu, 2007). Also, smokers showed higher levels of optimism bias and believed that they were less likely to suffer health problems than other smokers (Windschitl, 2002). Thus, it is evident that people show optimism bias, as they rate their risks to be lower, especially if the event is undesirable. In other words, optimism bias contradicts the decision-making weights and payoff independence found in models under risks (e.g., expected utility, subjective expected utility, and prospect theory) (Bracha & Brown, 2012).

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In tourism, this concept relates to the idea that travelers have an ambiguous positive faith that they are safe and secure during traveling. Previous literature on optimism bias in tourism is relatively scarce. For example, Rittichainuwat et al. (2018) applied the perceived probability of risk and bias toward optimism to identify travelers' decisions toward natural disasters. Also, Jennings (2012) addressed the overrunning costs of the London 2012 Olympic Games by applying optimism bias toward risk and uncertainty in budgeting.

When applied to COVID-19 to traveler behavior, those travelers recognize their risk of infection as only slim (Pascual-Leone et al., 2021) and thereby continue to travel to satisfy themselves. As long as travelers are confident that they feel like have control of the surrounding environment, their optimism bias would stimulate travelers to hit the road continuously. Therefore, this study adopts optimism bias in this context as underestimating the probability of experiencing adverse events while traveling. Along with the same line, this study argues that people engaged in pod travel show a higher level of optimism bias because the infection of COVID-19 is an unpleasant event. In other words, they rate the risk of getting COVID-19 lower than others, which helps to form a positive attitude towards pod travel. Thus, the following hypothesis is posited:

H_3. Optimism bias is a significant factor to explain pod travel.

2.2.4.4 Xenophobia

Xenophobia refers to the psychological state of hostility or fear towards strangers (Reynolds, Falger, & Vine, 1987). It is a form of attitudinal, affective, and behavioral prejudice toward immigrants and those perceived as foreigners. Often, foreigners are

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constructed as unknowns or strangers, threatening the status quo and being considered

suspicious (Hjerm, 1998). When it comes to the notions of nationalism and

ethnocentrism, they usually pertain to the belief in the superiority of an individual's

nation-state over others (Licata & Klein, 2002). In tourism, Kock, Josiassen, and Assaf

(2019) defined tourist xenophobia as a tourist's perceptual discomfort and anxiety

associated with strangers encountered at foreign destinations. This phenomenon is rather

prevalent in the hospitality and tourism domain as those travelers come from diverse

countries, cultures, and races and, therefore, contain multidimensional and multicausal

phenomena (Kock et al., 2019).

Xenophobia affects tourists' skepticism toward foreigners or strangers,

influencing their behavior. According to Glover and Filep (2015), tourism is inextricably

linked to mingling with different peoples and encounters with strangers. The absence of

trust toward strangers has fueled xenophobia, a form of attitudinal, affective, and

behavioral prejudice against other foreigners (Yakushko, 2009), which is conceptualized

as a psychological state comprising the intention to accept vulnerability based upon

positive expectations of the intentions or behavior (Rousseau et al., 1998). It describes

our willingness to be vulnerable to the actions of others due to our belief that they have

good intentions and will behave well toward us. In the risk domain, trust is a nexus to

reduce complexity and enable people to maintain their capacity to act in complex

environments (Siegrist, 2021). Therefore, xenophobia tourists were described as having

doubt, comfortable, uneasiness, misunderstandings, suspicious, and worried feelings

(Kock et al., 2019).

Unlike the phenomenon used to describe the discriminatory behavior rooted in racism, COVID-19 made it applicable to every stranger. A significant number of cases were reported as asymptomatic (Nishiura et al., 2020), confusing people with no idea of who is infected or has a potential threat. Thus, travelers tend to pertain to negative attitudes toward strangers that they pass by in different places as they try to avoid the crowd. Notably, the world-famous tourist destinations and landmarks (e.g., Times Square in New York, the Eiffel Tower in Paris) have become a complete desert. In addition to the regulations and inhibitions of activities, it is evident that travelers try to minimize contact with the public masses. It serves as a relevant concept to treat xenophobia in the COVID-19 pandemic response. Thus, the current study focuses on tourists with xenophobia that lack social trust, an essential type of trust in risk management research when trying to understand hazards and risk perceptions. It is perceived to serve as a relevant concept for treating xenophobia in the COVID-19 pandemic response, where the following hypothesis is posited:

H_4. *Xenophobia is a significant factor to explain pod travel.*

Table 2. A Comprehensive Literature Review of the Theoretical Concepts.

Concept	Description	Considered Variables
Travel Resilience	The capacity of flexibility that adapts successfully to disorders that threaten its function, viability, or development	- Travel behavior (Corbisiero & Monaco, 2021; Kim, Bonn, & Hall, 2021; Srinivasan & Khumar, 2015) - Travel time (Faturechi & Miller-Hooks, 2014) - Self-protection and coping (Zheng et al., 2021) - Tourism industry (Sharma, Thomas, & Paul, 2021) - Psychological capital (Pathak & Joshi, 2021) - Tourism accommodations (Cellini & Cuccia, 2015; Watson & Deller, 2021) - Destination type (Cellini & Cuccia, 2015) - Regions (Cellini & Cuccia, 2015) - Adaptive capacity (Hartman, 2018) - Social capital (Chowdhury et al., 2019; Guo et al., 2018) - Life satisfaction (Pathak & Joshi, 2021)
Optimism Bias	The individual's belief that adverse events are less likely to occur, whereas positive events are more likely to happen	- Perceived susceptibility (Mao, Chien & Kelly, 2021) - Perceived probability of risk and bias (Rittichainuwat et al., 2018) - Risk perception (Caponecchia, 2012; Kuper-Smith et al., 2021; Mccoll et al., 2021; Wise et al., 2020) - Misconception (Hammad et al., 2021) - Sensation seeking (Bruno, 2001)
Xenophobia	The psychological state of hostility or fear towards strangers during the COVID-19 period	- Travel risk perception (Abadi et al., 2021; Matiza & Slabbert, 2021) - Travel cautions (Abadi et al., 2021; Zenker, Braun, & Gyimothy, 2021) - Preference for group travel / travel agency (Kock et al., 2019) - Perceived COVID-19 infectability (Kock et al., 2020; Abadi et al., 2021) - Travel bubble (Fusté-Forné & Michael, 2021) - Travel burnout (Yousaf, 2021)

	- Crowding perception (Kock et al., 2021)
	- Subjective safety of tourism activity (Matiza & Slabbert, 2021)

2.3 Methodology

Topic modeling is one of the most powerful techniques in text mining for data mining, latent data discovery, and finding relationships among data and text documents (Bolelli, Ertekin, & Giles, 2009; Jelodar et al., 2019). It analyzes words from the original text to find themes in the dataset, how they are connected, and how they change over time (Hong & Davison, 2010). Among various methods for topic modeling, Latent Dirichlet Allocation (LDA), first introduced by Blei, Ng, and Jordan (2003), is addressed as one of the most popular methods. It is an unsupervised generative probabilistic method for modeling a corpus, which assumes that each document can be represented as a probabilistic distribution over latent topics and that topic distribution in all documents share a common Dirichlet prior. In other words, the documents are represented as random mixtures over latent topics, where a distribution over words characterizes a topic. Given a corpus D consisting of M documents, with document d having N_d words ($d \in 1, ..., M$), LDA models D according follows the generative process (Blei et al., 2003):

(1) Choose a multinomial distribution φ_t for topic t ($t \in \{1, ..., T\}$) from a Dirichlet distribution with parameter β

(2) Choose a multinomial distribution θ_d for document d ($d \in \{1,..., M\}$) from a Dirichlet distribution with parameter α.

(3) For a word w_n ($n \in \{1, ... , N_d\}$) in document d,

Note: (a) Select a topic z_n from θ_d, (b) Select a word w_n from φ_{zn}.

In this generative process, words in documents are observed variables, while others are latent variables (i.e., φ, θ) and hyperparameters (i.e., α, β). The probability of observed data D is computed and obtained from a corpus as follows:

$$p(D|\alpha,\beta) = \prod_{d=1}^{M} \int p(\theta_d | \alpha) \left(\prod_{n=1}^{Nd} \sum_{Zdn} p(z_{dn}|\theta_d) p(w_{dn}|z_{dn}, \beta) \right) d\theta_d$$

Defined α parameters of topic Dirichlet prior and the distribution of words over topics, which, drawn from the Dirichlet distribution, given β. Defined, T is the number of topics, M is the number of documents; N is the size of the vocabulary. The Dirichlet-multinomial pair for the corpus-level topic distributions are considered as (α, φ). The Dirichlet-multinomial pair for topic-word distributions, given (β, φ). The variables θ_d are document-level variables, sampled when per document; z_{dn}, w_{dn} variables are word-level variables and are sampled when for each word in each text document. Overall, LDA is a prominent tool for latent topic distribution for a large corpus. It identifies sub-topics in the technical field that consists of many patents and represents each patent in a series of topic distributions. With LDA, the terms in the set of documents generate a vocabulary where it can be applied to discover hidden topics.

In particular, social media provides valuable resources to analyze user behaviors and capture user preferences (Jelodar et al., 2019). As the user-generated content (UGC) in social media is challenging to be explored, using topic modeling techniques, such as

LDA, can contribute to an essential role in the discovery of hidden structures related to user behavior in social media (Diao et al., 2012; Yin et al., 2014). Notably, Twitter is one of the most popular social networks, and its evaluation and analysis can be very effective for analyzing user behavior. It generally reflects various events in real-time with up-to-date information (Martinez-Rojas, del Carmen Pardo-Ferreira, & Rubio-Romero, 2018); it is one of the popular social media platforms used as a source of data for research. Therefore, researchers have proposed many LDA approaches for analyzing user tweets on Twitter (Brandt, Bendler, & Neumann, 2017; Brzustewicz & Singh, 2021; Lu & Zheng, 2021; Resnik et al., 2015). This study utilized TF-IDF scores and considered it a baseline, also used Latent Dirichlet Allocation (LDA) to calculate the topic distributions for Tweets. Specifically, using LDA, tweets were analyzed through three parts: (1) data loading, (2) pre-processing, and (3) model building.

2.3.1 Data Loading

Twitter API version 2.0 and Python program code were used to obtain the tweets. To compare public sentiment, experiences, perceptions, and behaviors about travel before and during COVID-19, all the tweets posted during January 2019 and 2021 with GPS-based latitude and longitude information were collected using search keywords of "travel OR trip OR tourism". Only English Tweets were collected to minimize the bias from different languages within the United States. As a result, 14,173 tweets were collected (206,024 words) during January 2019, whereas a total of 6,209 tweets were collected (92,315 words) during January 2021.

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2.3.2 Data Pre-processing

Given that texts are unstructured, the five steps of data pre-processing were implemented (see Table 4). First, tweets were separated into minimal units called tokens for the analysis purpose. Several pre-processing were implemented to remove unnecessary words that might impact the outcome. Such a process includes removing punctuation marks, numbers, and symbols. All the letters were transformed to lowercase, and typos were corrected manually. Also, stopwords (e.g., the, a) unrelated to meaningful texts were deleted. To ensure the exact words indicate the same meanings, all the words were transformed into the primary form (e.g., 'ate' to 'eat,' 'kids' to 'kid').

Table 4. Five Steps of Data Pre-processing.

Step	Process	Description
1	Tokenization	Exchanging sensitive data for nonsensitive data called "tokens" that can be used in a database or internal system without bringing it into scope
2	Removing punctuation	Checking the punctuations using a raw string which contain punctuations and remove all punctuations from a string
3	Removing stopword	Removing the words that occur commonly across all the documents in the corpus, such as articles and pronouns
4	Lowercase	Changing the letters that are in larger uppercase or capitals into smaller lowercase
5	Lemmatization	Grouping together the inflected forms of a word so they can be analyzed as a single item, identified by the word's lemma, or dictionary form

2.3.3 Model Building

A document term matrix (DTM) was created with the extracted words, containing the terms and documents as dimensions. When building the DTM, a maximum of two

words were allowed to choose within the algorithm to tokenize the tweets, only if which are the more essential phrases to concatenate together. Also, if the term appeared less than five times, we discard them, as it does not add any value to the algorithm and reduces computation time. In DTM, the LDA algorithm for topic modeling was implemented with a maximum number of topics (=k) as 20. After, the algorithm calculated a coherence score to allow us to choose the best topics from 1 to k. The higher the score for the specific number of k means that there will be more related words together for each topic. The topic will make more sense by maximizing the various topics and minimizing the missing words. Each topic has each word/phrase assigned a phi value (*pr*(word | topic)) — the probability of a word given a topic.

The result shows that $k = 4$ gave us the highest coherence score of 0.15 in 2019, whereas $k = 20$ had 0.03 in 2021 (see Figure 4 and Figure 5). In other words, the appropriate number of topics before the pandemic is four, which is five times smaller than that during the pandemic, as the number of topics after the pandemic outbreak is 20. Thus, the result implies that the public talks about much more diversified topics related to travel after the pandemic, which leads to intricated emotions when understanding this phenomenon. The model supports the chaos theory that their behavioral patterns and trends would significantly change as they encounter unexpected circumstances. The topics within a collection of Tweets were named based on the demonstrated keywords in Tweets that will be further discussed in the next chapter.
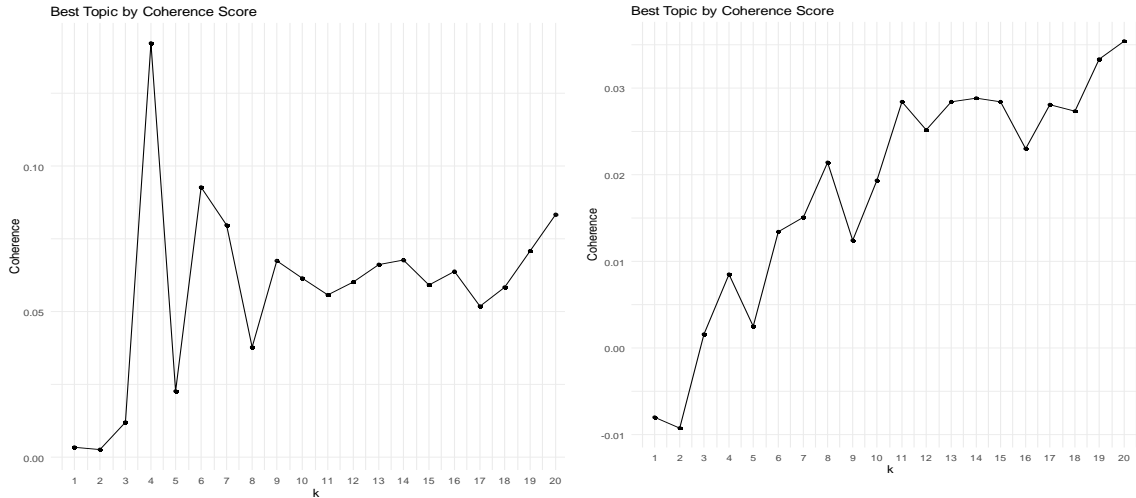
Figure 4. Best Number of Topics by Coherence Score.
Note: Left chart shows that of 2019, Right chart shows that of 2021.
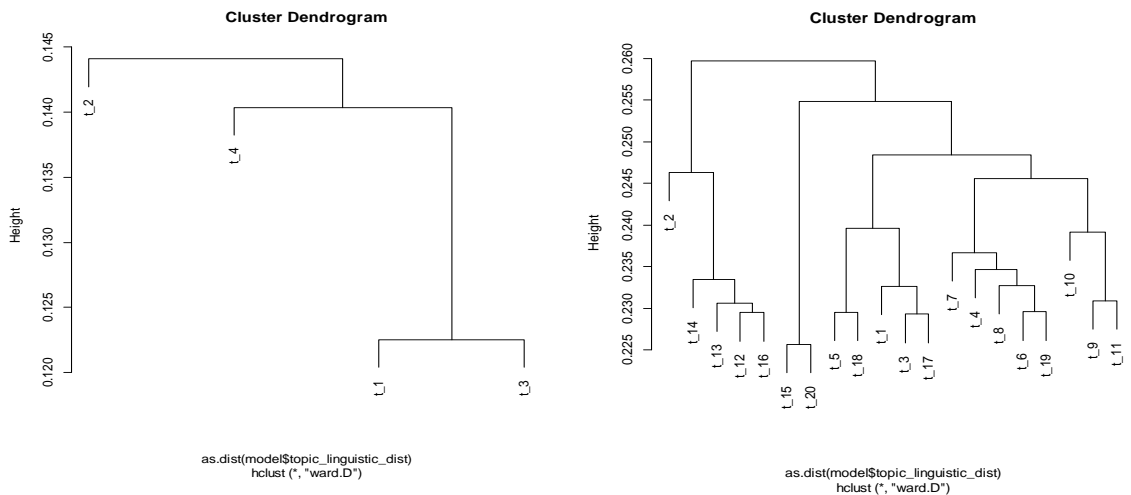
Figure 5. Best Number of Topics by Cluster Dendrogram.
Note: Left chart shows that of 2019, Right chart shows that of 2021.

2.4 Results

2.4.1 Identified Travel Topics before the COVID-19 Pandemic

The results compare before and during covid-19, which is the first phase of

conceptualizing pod travel. As the result of topic modeling about travel in 2019 (see

Table 5), the number of tweets reached 14,173, with four topics (i.e., Impression &

Behavior, Destinations, Trip for Youth, and Sport Events). This shows that before the

COVID-19 pandemic, people generally had a simple and ordinary perception and feeling

about travel. In other words, the topic and keywords are likely to come out intuitively

when individuals think of travel before COVID-19, regarding the contents that have

positive emotions. Most of the keywords were simple and straightforward, expressing

monotonous and positive sentiments.

Table 5. Identified Travel Topics before COVID-19.

Topic #	Topic	Keywords	Description
1	Impression & Behavior	drive, safe, book, school, field, kid, friend, family, love, life, feel, happy	general impression, perception, and behaviors
3	Destinations	snow, Disney world, ski, love, fun, birthday, mountain, beach, winter, happy, enjoy, ready, hope, amazing, photo, picture	winter destinations
2	Trip for Youth	game, varsity team, win, boy, girl, basketball, play, cancel, gameday, JV (junior varsity), fan, luck	athletic sports games
4	Sport Events	Super bowl, championship, NFC Championship, national, rematch, Refs, Saints, amazing, fun	national football championship

2.4.2 Identified Travel Topics during the COVID-19 Pandemic

Among the 20 topics in 2021, overlapping or substantially non-travel-related

topics were deleted, and thus 18 topics were detected (see Table 6). After the pandemic

outbreak, identified topics that are related to travel have been diversified as

Friend/Family birthday, ski trip, VFR, Gameday, Trip for youth, Road trip, COVID &

Air travel, Trip planning, Stay home, Reminiscence, YouTube, Outdoor activities, Bucket

list, Weather-related, social media, Politics, Travel pension. During COVID-19, it is evident that users are showing mixed feelings about the trip. In particular, 6,209 tweets were uploaded, and the amount of data has been reduced to about one-third compared to 2019, which was before COVID-19. In addition, topics that were mentioned insignificantly in 2019 appeared in a variety of major categories in 2021.

Based on the findings, the first significant characteristic of pod travel is that the number of event-type travel has increased. In this case, events are not necessarily related to escapes or holiday trips but, more likely, to VFR (visiting friends and relatives) or a type of travel to celebrate a specific event. The exemplary topics are 'family birthday' or 'friend birthday', which emphasize engagement and involvement in close relationships. Also, the topics such as 'Gameday' show the form of travel to attend sporting events, which can also be viewed as a part of pod travel.

Second, it is a form of a road trip by traveling within a drivable distance. When people travel, they can easily imagine traveling using flights. However, it has become practically impossible due to COVID-19, which is also represented in the topic of 'COVID & Air Travel'. Thus, road trips, which appear as an alternative to travel, aspire consumers, are attractive as they can travel within driving distances. Indeed, the findings show that topics such as 'road trips' and 'outdoor activities' appeared after COVID-19. For instance, travel using natural resources such as a national park, mountain, and ski trip, a part of nature-based tourism, was considered pod travel. It was also confirmed that the topic of 'weather' closely related to outdoor activities was identified as the main topic.

In addition, it was confirmed that keywords related to social media (e.g., YouTube, social media) frequently appeared as a part of travel-related topics. This phenomenon can be explained in two ways. Firstly, users are looking for vicarious satisfaction by watching YouTube videos of travelers and/or travel destinations that they cannot physically visit due to the COVID-19 situation. As influencers describe their travel experiences and upload them to YouTube along with their feelings, users who watch these videos can quench their thirst by watching high-resolution videos. Secondly, social media is used to check travel information along with the COVID-19 situation quickly. Most travel destinations provide information on their websites, but they sometimes fail to deliver real-time information in sensitive cases like COVID-19. Therefore, it is to be used as a tool for travelers to check information faster and more accurately through communication with users who have already been to the place or trip.

Moreover, specific topics were related to revenge tourism, including the keywords related to 'bucket list,' 'reminiscence,' 'trip planning,' or 'stay home. These topics do not directly illustrate pod travel; however, it grasps the trend of consumers' perception of travel based on the topics and keywords. It also reveals the vicarious experience through social media engagement, such as YouTube. Some people are still restricted from traveling at this point because of their situations (e.g., physical, health, budget). However, as COVID-19 gradually eases, their demand would explode. In order to develop pod travel into a sustainable form, it is essential to be prepared to accommodate these travelers.

The previous form of nature travel was only popular among the maniacs, it has become a general form of pod travel undergoing the COVID-19 pandemic. Likewise, pod

travel will expand its size and scope to the market in the future. Suffering and experiencing too much from the pandemic, travelers started to seek voluntary isolation through engaging in pod travel. Pod travel establishes a more universal and casual form of travel, using their vehicle with their acquaintances, exploring nature and environmental-friendly destinations, and avoiding crowds and strangers. Concerning the chaos theory, it was evident that the number of topics and keywords have been dispersed after the pandemic hit the globe. In other words, this topic modeling result supports the chaos theory, indicating that the pandemic have created several different aspects that were not   considered before its outbreak.

Table 6. Identified Travel Topics during COVID-19.

Topic #	Topic	Keywords	Description
2	Friend Birthday	plan, book, birthday, ready, girl, friend, exciting, cabin, Miami, Las Vegas, Orlando, Colorado, Mexico, Los Angeles, California	planning friend birthday party
14	Family Birthday	fun, birthday, happy, parents, dad, wife, baby, brother, sister, share, exciting, child	planning family birthday party
13	Ski Trip	ski, snow, North, mountain, cool, day trip, Colorado, drive, enjoy, moment, resort, pretty, nice, annual (trip)	ski trip
12	VFR	family, friend, visit, home, meet, sweet, care, remember, plan, town, Christmas, Florida, Texas, Georgia, Ohio	visiting friends and relatives
15	Gameday	game, gameday, team, start, win, luck, matchup, season, favorite, district	college football gameday
20	Trip for Youth	girl, play, game, boy, win, basketball, team, lose, school, grade, coach, program	athletic sports games
5	Road Trip	road, car, head, drive, dog, bus, worth, covid test, international	road trip during COVID-19
18	COVID & Air travel	change, covid test, vaccine, negative, positive, fly, flight, international, airline	changed travel pattern during COVID-19
1	Trip Planning	spend, summer, wait, couple, season, visit, spring break, beach, Hawaii, Scotland, Arizona, Jersey, London	planning upcoming vacation
3	Stay Home	love (travel), stay safe, stay home, (travel) stop, bad	stay home campaign
17	Reminiscence	cross country, (trip down) memory lane, remember, short, quick, future, beautiful, hard, move, town	recall past travel memory
7	YouTube	road, YouTube, adventure, watch, listen, music, travel channel, episode, play, hear, beautiful, check	watching/listening YouTube channels
4	Outdoor Activities	road, love, mountain, hike, beautiful, favorite, camping, photo, lake, picture, nature, drive, fun, solo, fine	engaging outdoor experiences
8	Bucket List	live, Disney world, life, amazing, airport, bucket list, experience, golf (trip), ready, vacation, pack, enjoy	future travel listings

6	Weather-related	snow, winter weather, ice, road, condition, slow, advisory, cold, country, travel plaza	road trip and winter weather
19	Social Media	photo, video, Twitter, Instagram, follow, talk, local, travel center, wear mask, pandemic, vacation, nice	photos and/or videos on social media platforms
10	Politics	Trump, ban, Biden, country, restriction, COVID, China, president, stop, border, pandemic, virus	COVID-19 and political restrictions
11	Travel Pension	pay, money, secret service protection, pension, Trump, chance, impeach, (travel) allowance, government, budget	travel pension for former presidents

2.4.3 Definition and Constructs of Pod Travel

Based on the topic modeling results of tweets that appeared during the COVID-19 period, the revealed topics are categorized into the components of pod travel suggested from the previous literature: activity, experience, and environment (see Table 7). First, the activity implies the specific outdoor activities and/or events that attract the travelers as participants, and the related topics are identified as gameday, ski trip, road trip, and outdoor activities.

Next, the description of the experience indicates situational and/or behavioral competence based on traveler demand that encompasses both physical and virtual; the topics represented here are Trip for youth, YouTube, Social Media, Trip planning, Reminiscence, and Bucket List. In this result, the experience can be divided into two types. One is the experience that can be explored realistically in the current COVID-19 situation. In fact, in the case of youth trips, it was found that middle and high school students participated in events such as tournaments in other regions using weekends and different periods to participate in the events at school. The second case is about the virtual experience. This means that (potential) travelers satisfy through vicarious experiences such as vlogs of other influencers through social media or YouTube at this point, where travel is not as possible as it used to be. In addition, this virtual experience seems to be related to a specific behavior, including preparing for future travel or making a bucket list.

The description of the environment is the outdoor setting based on the physical environment, and the identified topics are Stay home, COVID & Air Travel, and Weather-related. This acts as a booster in reducing the pandemic threat as pod travel is based on outdoor activities but at the same time appears to act as a constraint. Specifically, in the case of stay home or air travel, it is a social constraint factor such as quarantine or social distancing. The weather is also an uncontrollable external factor in daily life.

Lastly, it is a construct not presented in previous studies but emerged in this study. It includes a travel companion with the unique characteristics of pod travel. Relevant topics are friend birthday, family birthday, and VFR (visiting friends and relatives). Those topics can generally be seen as the subject who enjoys traveling together to events. Although the importance or necessity of these contents was not emphasized much in previous studies, specific categories were identified as topics in this study. It can be understood that travel forms based on them are in full swing.

Table 7. Constructs and Identified Topics of Pod Travel.

Construct	Activity	Experience	Environment	Misc
Description	Specific outdoor activities and/or events that attract the travelers as participants	Situational and/or behavioral competence that is based on traveler demand that encompasses both physical and virtual	Outdoor setting that is based on the physical environment	External factors that are not directly related to tourism but influential to the industry
Identified Topics	- Gameday - Ski trip - Road trip - Outdoor activities	- Trip for youth - YouTube - Social Media - Trip planning - Reminiscence - Bucket List	- Stay home - COVID & Air travel - Weather-related	- Friend birthday - Family birthday - VFR - Politics - Travel pension

Based on the three theoretical concepts of travel resilience, optimism bias, and xenophobia that were addressed to explain pod travel, identified topics were categorized accordingly (see Figure 6). Out of 18 different topics that were identified, 16 topics were found to fit into the theoretical concepts (89%). Thus, these concepts are appropriate for explaining pod travel that came out after the COVID-19 outbreak. Regarding travel resilience, the idea represents an individual's willpower to travel in the alternative way as much as possible under government and state restrictions and regulations. It shows their behavioral expressions of how they are managing themselves amidst the pandemic. Representative topics were outdoor activities, trip planning, reminiscence, weather-related, bucket list, road trip, and ski trip.

About optimism bias, the concept is based on one's biased perception that the risk of experiencing adverse events is lower than others, which acts as a stimulus to prompt one's behavior, regardless of the possibility of infecting COVID-19. In other words, the topics in this concept reflect travel for occasions to meet others, as they consider themselves safe even though they travel to run into people. Identified topics are friend birthday, family birthday, VFR (visiting friends and relatives), gameday, and trip for youth. It encompasses meeting close people and strangers, depending on the types of events. For example, meeting friends and/or family are the people who are already close enough to learn how they are dealing with the pandemic, which eases one's mind. On the other hand, gameday and trip for youth are the events where one is likely to come across strangers throughout the event. Nonetheless, the travelers are optimism biased as they

believe that they are safe to travel for such occasions and not be infected with COVID-19 though encounter others.

In terms of xenophobia, there are worries and concerns due to COVID-19, which works as a barrier for people to engage in traveling. Although people yearn to travel and be resilient, positively thinking they will be okay while traveling but at the same time, they still fear and anxiety. Related topics are COVID & Air travel, stay home, YouTube, and social media. As manifested, these topics cover an individual's behavior of being isolated from others. They avoid air travel and stay home, watching YouTube or engaging in other social media platforms through their means to deal with the pandemic.
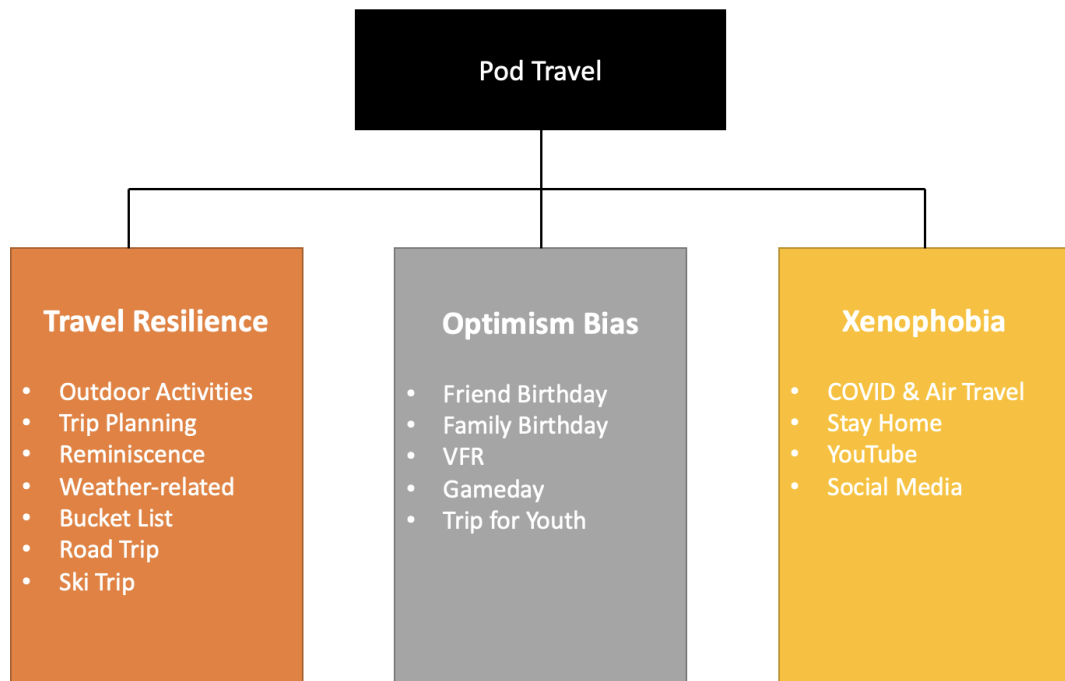
Figure 6. The Constructs of Pod Travel Induced by Data Analysis.

2.5 Conclusion and Discussions

2.5.1 Conclusion

As the COVID-19 pandemic lasts, the travelers have been transformed by looking for a novel type of travel. They would not go back to normal, even though COVID-19 is over, as now they have faced a "new normal". In other words, travelers now have more options than they can choose from and are not necessarily stuck to the travel types that we have been used to engaging. Understanding evolved traveler behavior is a vital issue to the current industry from a long-term perspective as well as sustainable pod travel development. This study explores pod travel to conceptualize its definition and critical characteristics that appeared after the pandemic outbreak. By comparing the topics identified before and during COVID-19, this study manifested that those topics discussed within social media differed as topics that were not frequently discussed before the pandemic became actively discussed after its outbreak as the number of topics varied.

In order to articulate this phenomenon, this study adopted three theoretical concepts in addition to the chaos theory, that is travel resilience, optimism bias, and xenophobia. Four hypotheses were suggested to understand how these concepts interact with pod travel, and all of them are supported as identified topics fit into these theoretical concepts. In other words, it is relevant to adopt these aspects to address pod travel that have become predominant along with the pandemic.

Above all, this study has significance in that it explains pod travel, which attracts travelers' attention, using the chaos theory, which has not been used widely in the tourism field. Indeed, no one could have predicted that the impact would have global and long-term effects on people's daily lives when the pandemic first occurred. When it comes to

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travel, such restrictions remain similar. Even in such an opaque and unpredictable situation, people have taken an alternative form of travel by complying with rules and regulations; and the current study identified this type of travel as pod travel based on several common characteristics and features that were not identified before the pandemic, having more dismantled and diversified topics that have been changed. Details are discussed further in the theoretical and practical implications.

2.5.2 Discussions

2.5.2.1 Theoretical Implications

First, this is the first study that contributed to conceptualizing pod travel. Obviously, after the outbreak of COVID-19, people started to show different travel behaviors than they used to before the pandemic. Nonetheless, there was a lack of consensus on the definition of a pod travel, and how the phenomenon has been changed was insignificant. More often, this emerging trend of traveler behavior was being highlighted online. Based on the judgment that this phenomenon would last in the long term, it is necessary to conduct research from a sustainable perspective. Therefore, this study defined and conceptualized pod travel as a phenomenon only discussed online. Thus, it is meaningful that the study provides implications based on the research results found on both theory-based and data-driven for justification.

In addition, this study adopted several academic concepts to explain pod travel, such as travel resilience, optimism bias, and xenophobia. For instance, existing studies often handle travel resilience, such as crisis management (Boin & McConnell, 2007; Prayag, 2018) or community resilience (Jang & Kim, 2022; Yang et al., 2021).

Meanwhile, existing studies' concepts such as optimism bias and xenophobia were not often dealt with and were relatively unfamiliar in hospitality and tourism literature. This study applied these concepts to the traveler behavior that emerged after the COVID-19 outbreak. The topic modeling analysis showed that the concepts of travel resilience, optimism bias, and xenophobia explain the pod travel phenomenon.

It is also significant that the existing travel has been transformed into a novel type as suggested in the chaos theory. In theory, the complicated and unpredictable situations settle in society with their own rules in the chaos (Lorenz, 1963). It claimed the ability to show how a simple set of deterministic relationships can generate patterned but unpredictable consequences. Similarly, pod travel is different from the general form of travel before COVID-19. Still, there are some overlaps with the current patterns of pod travel. For example, the keywords and topics that were spoken among the public like "Impressions & Behaviors," "Destinations," and "Trip for Youth" before COVID-19 are similar to "Outdoor recreation" or "Trip for Youth" appeared during COVID-19. The apparent difference, however, is that while pre-COVID-19 topics are monotonous and straightforward, travel-related topics during COVID-19 have become much more complicated and diversified.

In addition, the findings of topic modeling provide a new perspective compared to the implications of the existing literature results. The results derived based on this are meaningful in that they provide the definition and characteristics of pod travel and the behaviors consumers perceive about travel in general, and the direction that the tourism industry and practitioners should take in the future. Among 18 identified topics, it was noted that the topics related to travel not only refer to consumer behavior that is directly

related to travel per se but also to social media or politics. Thus, the findings reveal that people felt the topic of travel was somewhat heavier than before as some of the topics are sensitive to be addressed. Overall, the results help to understand the differences in travel before and during the COVID-19 pandemic.

2.5.2.2 Practical Implications

First, it is necessary to develop travel products considering the increased demand for outdoor activities. In fact, after the COVID-19 outbreak, the number of consumers using tourism products based on natural resources has increased significantly in the mid-west region of the United States. For example, the demand for agritourism, including a corn maze, has increased substantially. Regarding agritourism, which shares similarities with the nature of pod travel, it is well described in the previous literature. It has the advantage of enjoying private time with friends and family in a place isolated from others. For example, corn mazes are located at a drivable distance from one's location, and it doesn't require a lot of travel expenses or travel period, which makes it a perfect moment to refresh. Even though such type of travel existed previously, it became a more popular trend along with the COVID-19 pandemic. In other words, it might be an excellent opportunity to attract niche markets or travel products that had low demand that was not treated as a majority type of travel.

In a similar vein, to minimize the damage caused by COVID-19 in the travel industry, it is necessary to identify the changing needs of consumers by actively accepting and reflecting on them. The results showed that transforming consumers naturally gear towards their interest in environmentally-friendly and ethical consumption,

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which requires their responsibility while engaged in nature-based tourism. Similarly, as pod travel is established in a sustainable paradigm, environmental friendliness should be emphasized. Before the COVID-19 pandemic, consumers were more interested in leisure than simply enjoyment. Still, as they are becoming more educated with more responsibilities after COVID-19, tourism practitioners need to consider this aspect to attract consumers.

In addition, if the word 'pod' itself is emphasized while promoting the tourism products, the effect that can be received through marketing is expected to be significant. As illustrated in the message framing theory, the marketing effect obtained using such an approach seems appropriate even if the same phenomenon is promoted to consumers. Specifically, one effective promotion method is adding and using words, having frames, such as 'memories,' 'reminiscences,' or 'bucket list,' covered in topic modeling. Using this approach is expected to positively impact the industry practitioners to capture customers interested in pod travel.

CHAPTER 3

PUBLIC DISCOURSE: A SOCIAL MEDIA ANALYTICS

3.1 Introduction

As the COVID-19 pandemic disrupted the global, the number of total cases in the US reached 77.8 M and worldwide hit 412 M (as of Feb. 14, 2022). Tourism is inherently vulnerable to crisis and natural disasters as the industry highly relies on the functioning infrastructure, transportation, individuals of consumers, and nature, and thereby it is difficult to prepare and respond to such risks (Laws & Prideaux, 2006; Ritchie, 2004). Businesses still suffered hardly for more than two years after the first case was reported. The number of airlines has been reduced; fewer travelers make reservations with hotels and travel agencies. Several countries have not opened their borders yet, resulting in fewer travel destinations and attraction options. Ritchie, Tung, and Ritchie (2011) suggested that tourism professionals should understand the complex interaction between nature and travelers to minimize the negative impacts and maintain sustainability for businesses and resources.

Notably, alternative ways of pod travel are getting attention to travelers that travel with a group of people, following tourist guides who are educated by keeping social distancing and quarantine (Smith, 2020). Unlike visiting popular and crowded tourist destinations, such as Time Square or Madison Square Garden, pod travelers engage in outdoor activities and visit rural and nature-based places so that their interaction among strangers is limited, lessening to get COVID-19. Meanwhile, social media is a place where individuals directly express their thoughts, opinions, and actions regarding this

transformative form of traveling during COVID-19 (Obembe et al., 2021; Park et al., 2020). Accordingly, social media analytics have been widely applied in crisis management. For example, Park et al. (2020) investigated Facebook to identify individuals' perceptions of a crisis that were different before and during Irma. Similarly, Yu et al. (2020) analyzed TripAdvisor user data to determine their behavioral patterns during COVID-19.

Furthermore, emotions in tourism behavior have increased interest amongst researchers and managers alike. Tourism is all about recreating and feeling better, both mentally and physically (Gnoth & Zins, 2009). Studies adopting social media analytics have also examined users' emotions through text mining (e.g., Park et al., 2020; Ramanathan & Meyyappan, 2019). Nonetheless, emotional responses to supply and experience elements in tourism have yet to be appropriately addressed in crisis research. Although Obembe et al. (2021) adopted Twitter to figure out travelers' emotions through sentiment analysis, their emotions are classified as either positive or negative, which is bipolar and limits the scope for various types of emotions. Understanding emotions are crucial as it can be helpful to understand how the actual interaction between tourists and the environment is experienced.

More importantly, these studies have not considered geographical differences while manifesting the impact of COVID-19 and travelers' behavior. Indeed, the severity of COVID-19 varies across different states in the US, where this aspect should be incorporated into research. In other words, individuals are exposed to different situations and circumstances around his/her environment, and inevitably, their perceptions and behavioral patterns differ that need attention to provide practical implications to

academic and industry practitioners. In other words, previous studies are fragmented and rather abstract to provide practical importance to the industry practitioners as it fails to integrate geographic elements along with elaborated emotions that are applied in social media analytics of text mining. As the hospitality and tourism industry is severely suffering from the COVID-19 pandemic that is uncontrollable for them to handle and attract consumers, it is required for scholars to show evolving behavioral patterns and perceptions of travelers based on real-time data to understand travelers' behavior through detailed and elaborated information.

The goal is to understand public opinions and thoughts represented in online user-generated content (UGC). Specifically, this study adopted Tweets during the entire year of 2020 by using three keywords (travel, tourism, and trip) within the United States. Twitter is a popular social media where users can post and interact with each other through tweets. This tool has been examined in literature as it offers real-time communication and provides a valuable indicator for understanding public opinion. By analyzing the online data, this study aims to capture the meaningful aspects of actual/potential travelers who talk about travel during the pandemic. Therefore, this study aims to identify public opinion about traveling during the COVID-19 pandemic by proposing four research questions: (1) What are the general features of travel during the COVID-19 pandemic period, in terms of emotional and spatial characteristics? (2) Specifically, what are the emotion-related keywords expressed by the public about travel when applying the Wheel of Emotions? (3) What are the keywords that can describe the characteristics of pod travel? (4) What are the temporal and spatial characteristics of the demand for pod travel?

Several social media analytics are applied to deal with research questions, such as descriptive, sentiment analysis, and spatial analysis. Furthermore, this qualitative approach relies on diverse, in-depth interpretations from humans, allowing for inductive, exploratory research and theoretical approaches. Based on the findings, this study expects to benefit industry practitioners to better deal with travelers concerning COVID-19 by understanding their cognitive and behavioral characteristics that vary along with geographical locations.

3.2 Literature Review

3.2.1 COVID-19 and Geographic Exploration

Tourism is inherently vulnerable to natural disasters due to its reliance on the functioning infrastructure and transportation, the discretionary nature of consumption, and the opened and fragmented nature of tourism, which make it difficult to prepare for properly and quickly respond to such unexpected external risks (Laws & Prideaux, 2006; Ritchie, 2004). Accordingly, Ritchie et al. (2011) suggested that tourism professionals should understand the complex nature of different disasters, examine management strategies to minimize the unexpected negative impacts, and maintain the sustainability of tourism businesses and resources.

In particular, geographic differences in numbers of COVID-19 cases and deaths, cumulative incidence, and changes in incidence tend to reflect a combination of jurisdiction-specific epidemiologic and population-level. For instance, such factors include (1) the timing of COVID-19 introductions, (2) population density, (3) age distribution and prevalence of underlying medical conditions among COVID-19 patients,

(4) the timing and extent of community mitigation measures, (5) diagnostic testing

capacity, and (6) public health reporting practices (CDC, 2020c).

Indeed, cumulative COVID-19 incidence varies significantly by jurisdiction (e.g.,

Minnesota: 20.6 cases per 100K, NYC: 915.3 cases per 100K) (as of April 2020) (CDC,

2020). According to the CDC (2020) statistics, 395,926 COVID-19 cases were reported

in the US on April 7, 2020. All 50 states reported cases, and two-thirds of all COVID-19

cases (66.7%) were reported by eight jurisdictions: NYC (76,876), New York (61,897),

New Jersey (44,416), Michigan (18,970), Louisiana (16,284), California (15,865),

Massachusetts (15,202), and Pennsylvania (14,559) (see Table 8).

Table 8. Reported COVID-19 Cases, Deaths, and Estimated Cumulative Incidence.

No	Jurisdiction	# of cases	# of deaths	% of deaths	Cumulative incidence
1	New York City	76,876	4,111	5.3	915.3
2	New York	61,897	1,378	2.2	555.5
3	New Jersey	44,416	1,232	2.8	498.6
4	Louisiana	16,284	582	3.6	349.4
5	Massachusetts	15,202	356	2.3	220.3
6	Connecticut	7,781	277	3.6	217.8
7	Michigan	18,970	845	4.5	189.8
8	District of Columbia	1,211	24	2.0	172.4
9	Rhode Island	1,414	33	2.1	133.7
10	Washington	8,682	394	4.5	115.2
11	Pennsylvania	14,559	240	1.6	113.7
12	Illinois	13,549	380	2.8	106.3
13	Delaware	928	16	1.7	95.9
14	Colorado	5,429	179	3.3	95.3
15	Georgia	9,713	351	3.6	92.3
16	Vermont	575	23	4.0	91.8
17	Maryland	5,529	124	2.2	91.5
18	Indiana	5,507	173	3.1	82.3
19	Idaho	1,210	15	1.2	69.0
20	Nevada	2,087	71	3.4	68.8
21	Florida	14,302	296	2.1	67.1
22	Mississippi	2,003	67	3.3	67.1
23	Tennessee	4,139	72	1.7	61.1
24	Utah	1,804	13	0.7	57.1

25	New Hampshire	747	13	1.7	55.1
26	Missouri	3,037	53	1.7	49.6
27	South Carolina	2,417	51	2.1	47.5
28	Alabama	2,197	39	1.8	44.9
29	Wisconsin	2,578	92	3.6	44.3
30	Virginia	3,645	75	2.1	42.8
31	Ohio	4,782	167	3.5	40.9
32	California	15,865	374	2.4	40.1
33	Maine	519	12	2.3	38.8
34	Wyoming	221	0	-	38.3
35	New Mexico	794	13	1.6	37.9
36	Oklahoma	1,472	67	4.6	37.3
37	South Dakota	320	6	1.9	36.3
38	Arizona	2,575	73	2.8	35.9
39	Iowa	1,048	26	2.5	33.2
40	Arkansas	993	18	1.8	32.9
41	Montana	332	6	1.8	31.3
42	North Dakota	237	4	1.7	31.2
43	North Carolina	3,221	46	1.4	31.0
44	Kansas	900	27	3.0	30.9
45	Alaska	213	6	2.8	28.9
46	Texas	8,262	154	1.9	28.8
47	Oregon	1,181	33	2.8	28.2
48	Kentucky	1,149	65	5.7	25.7
49	Hawaii	362	5	1.4	25.5
50	Nebraska	478	10	2.1	24.8
51	West Virginia	412	4	1.0	22.8
52	Minnesota	1,154	39	3.4	20.6

Note: U.S. jurisdictions including states, District of Columbia, and New York City (as of April. 7, 2020) / cumulative incidence in descending order

The different implementation and timing of community-based mitigation strategies across jurisdictions have contributed to the observed variation in incidence and changing incidence in geographical locations. As shown in Figure 7 and Figure 8, the Pandemic Vulnerability Index (PVI) is provided by CDC (https://covid.cdc.gov/covid-data-tracker/#pandemic-vulnerability-index). The PVI is sliced into 12 levels from 1 (red), 4 (green), 6 (blue), to 12 (pink). Specifically, 1: 'Infection Rate Transmission Cases,' 2: 'Infection Rate Disease Spread,' 3: 'Pop Concentration Pop Mobility,' 4: 'Pop

concentration Residential Density,' 5: 'Intervention Social Distancing,' 6: 'Intervention Testing,' 7: 'Health & Environment Pop Demographics,' 8: 'Health & Environment Air Pollution,' 9: 'Health & Environment Age Distribution,' 10: 'Health & Environment Co-morbidities,' 11: 'Health & Environment Health Disparities,' and 12: 'Health & Environment Hospital Beds.'

Moreover, the PVI became more severe along with the time series. East Coast of the United States has been chiefly devastated due to a significant number of cases and deaths. Looking at the differences between two different timestamps, almost all the states have turned to red around Thanksgiving (Figure 7), emphasizing the severity impact of COVID-19 when compared to the six months ahead (Figure 8).
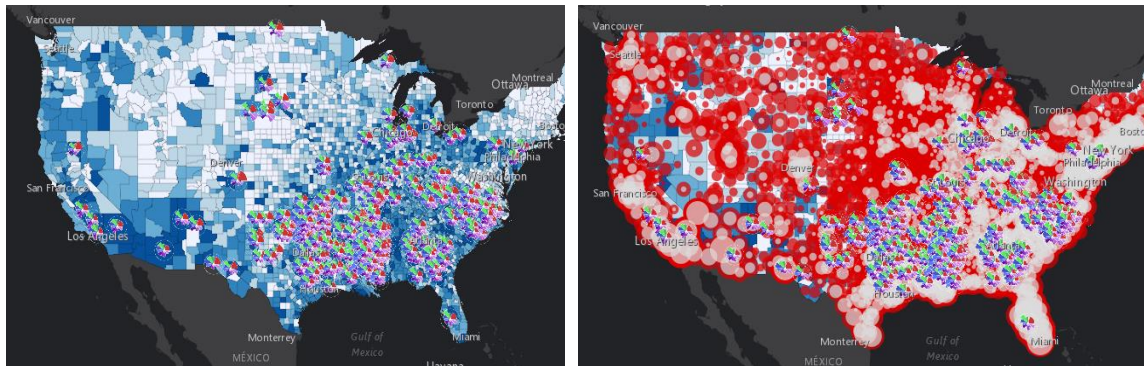
PVI Model

COVID-19 Layers
(Red: Cases / Gray: Deaths)

Figure 7. United States COVID-19 PVI by County. (as of 11/23/2020)

PVI Model

COVID-19 Layers
(Red: Cases / Gray: Deaths)
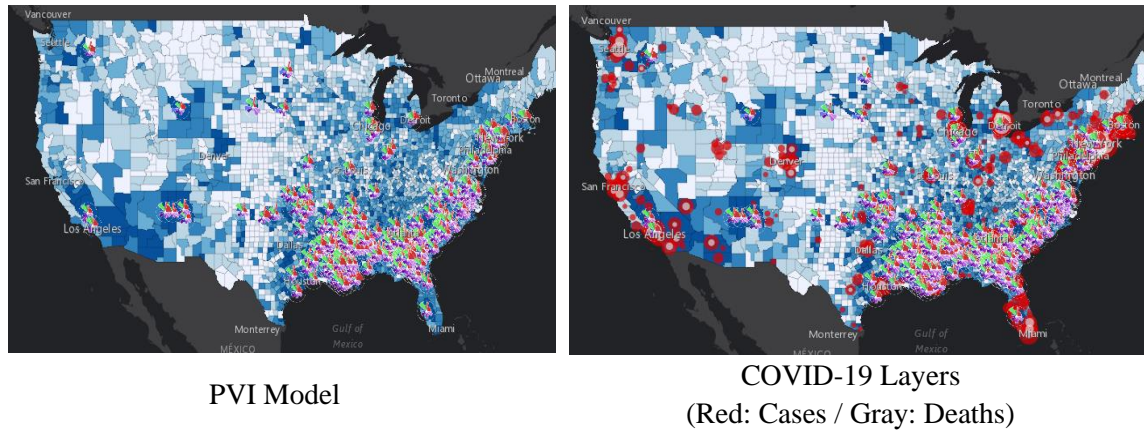
Figure 8. United States COVID-19 PVI by County. (as of 04/06/2020)

In order to investigate the geographic characteristics and recognize differences among different states, a geographic information system or GIS has been widely adopted by researchers. A GIS is a computerized system that collects, manages, and analyzes geographical data, supporting spatial-related decision-making processes (Lee, Pennington-Gray, & Kim, 2019). In the tourism literature, GIS has been often used to examine several decisions makings in tourism planning (McKercher et al., 2012; Yang & Wong, 2013), policy (Kang, Kim, & Nicholls, 2014), marketing (Yang & Fik, 2014), and management (Kim, Thapa & Jang, 2019; Xu, Pennington-Gray & Kim, 2019). As stated by Miller (1999), GIS is a powerful tool that provides valuable information to make decisions in tourism businesses and promote local communities and community visitors.

In the tourism literature, GIS is commonly combined with social media analytics (e.g., Twitter) by investigating geographical patterns of flows (Bordogna et al., 2016; Chua et al., 2016) or visitor emotions in a tourist destination (Park et al., 2020). By combining GIS and Tweets, studies enhance understanding of spatial-temporal patterns of tourist flows, activities, and emotion visualization (Park et al., 2020; Salas-Olmedo et al., 2018)

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3.2.2 Travelers' Emotional Experience amid COVID-19

Emotion is considered one factor that shapes customers' meaningful experiences that affect forms of memory (Kim & Ritchie, 2014). Since travelers visit a place to seek unique moments at the destinations and attractions, experience is the ultimate offering (Agapito, Valle, & Mendes, 2014; Park et al., 2020). Lashley, Morrison, and Randall (2005) demonstrated that emotion influences satisfaction through consumption experience in which positive emotions reflect the presence of satisfaction. Therefore, providing memorable experiences to travelers has been a competitive advantage that differentiates a destination from its competitors (Pine & Gilmore, 1998). In other words, emotion is an essential indicator in traveler experience management (Kim & Fesenmaier, 2015).

Pod travel, one of the most popular outdoor activities and destinations in the tourism industry, is where visitors mainly form positive experiences. Such experiences are primarily driven by travelers' emotional appeals (Smith, 2020). In the literature, Bigne, Andreu, and Gnoth (2005) argued that positive emotions like delight, joy, and excitement effectively increase customer satisfaction and positive future behaviors like customers expressing their positive emotional states. Philander and Zhong (2016) analyze tweets to extract the sentiment regarding resorts in Las Vegas with a dictionary-based method. The authors compare the sentiment score of various resorts in the data set over eight weeks. Overall, they conclude that the sentiment score of resorts is more effective at understanding real-time information than TripAdvisor's ranking. Accordingly, measuring

the emotional states of visitors on-site is essential to evaluating their experiences and enhancing marketing performance (Park et al., 2020).

Meanwhile, researchers have claimed that human feelings are complex and ambiguous (Plutchik, 1980; Russell, 1980). Previous studies utilizing sentiment analysis regarding UGC still focus on a level of one dimension of being positive or being negative in text data; in other words, it is still lacking in terms of the investigation of fine-grained emotions, especially on Twitter, which has become one of the most popular social media platforms. To overcome the limitations mentioned above, one of the famous theoretical approaches models to identify the spectrum of human emotions concretely. Plutchik's Wheel of Emotions (1980) focuses on emotional groups based on similarities. In other words, there are eight pairwise emotions suggested joy ↔ sadness, trust ↔ disgust, fear ↔ anger, surprise ↔ anticipation.

Additionally, his model shows connectivity between the ideas of an emotion circle with a wheel. Primary emotions can also be expressed at different degrees of intensity; there are three degrees for each emotion. For example, serenity is less joy, and ecstasy is a more intense degree of joy. Plutchik's emotions can be mixed to form a new emotion. For example, joy and trust are combined to form emotion, love. Likewise, joy, trust, and anger are combined with jealousy (see Figure 9).
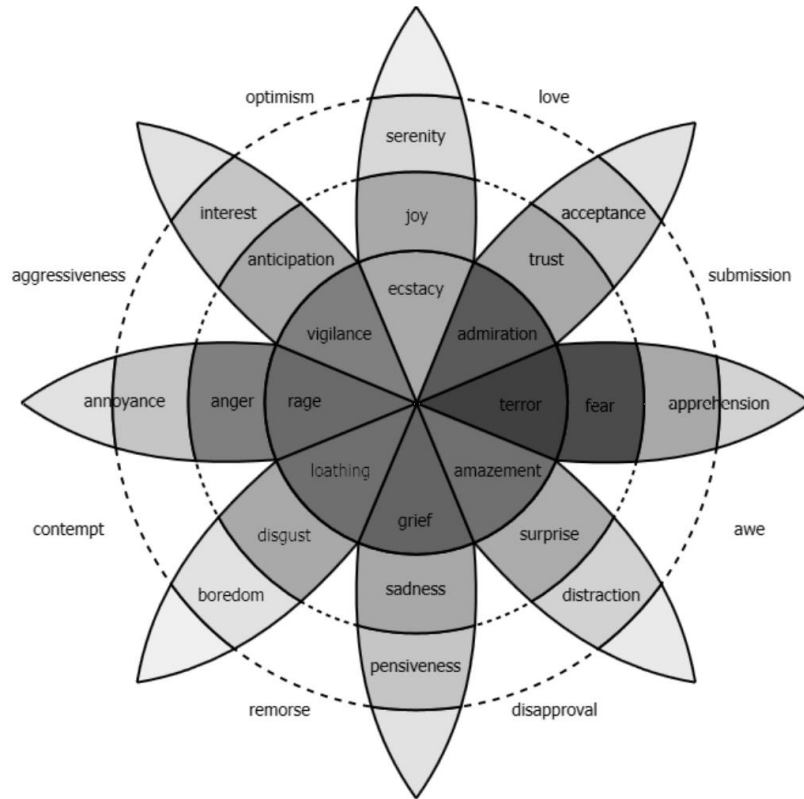
Figure 9. Plutchik's Wheel of Emotions Model.

Accordingly, this study employs sentiment analysis to identify public opinion on Twitter based on the model of the wheel of emotions (Plutchik, 1980). These eight emotions are assumed to be complete because any expressed emotion is related or subsumed by one of the eight as they are culturally independent (Tromp & Pechenizkiy, 2014). Given this assumption, this study expects to discover meaningful words to describe users' emotions regarding travel during the pandemic and their travel behavior. Therefore, the following research questions are posited as follows:

> *RQ1. What are the general features of travel during the COVID-19 pandemic period, in terms of emotional and spatial characteristics?*
>
> *RQ2. Specifically, what are the emotion-related keywords expressed by the public about travel when applying the Wheel of Emotions?*

3.2.3 COVID-19 Communication and Social Media Analytics

Tourism researchers have been utilizing social media that helps gather a large volume of data to understand individuals' behavior through its analytical tools (Kirilenko & Stepchenkova, 2017; Park, Ok, & Chae, 2016). Online travel agencies (e.g., TripAdvisor, Yelp) and social networking sites (e.g., Facebook, Twitter) are well-known examples often investigated and examined in numerous studies. Twitter is one of the most popular platforms on social media, with millions of users creating, sharing, and receiving tweets every day. It provides text data, but it also enables to collect the user information (e.g., number of followers), language type, posting time, and geographic coordinates of posting location. To crawl such information, the Twitter Application Programming Interface (API) is a valuable tool to collect data that benefits academia and industry by interpreting users' opinions and discussions about a specific topic (Kirilenko & Stepchenkova, 2017).

In tourism research with Twitter data, text mining, sentiment analysis, and cluster analysis have been widely applied to interpret the public's opinion and perception. Notably, text mining is practical for mining opinions and recognizing travel patterns (Park et al., 2020), in addition to the descriptive analysis (e.g., frequency), which is a valuable method to investigate ongoing issues or relevant words in its content (e.g., Park et al., 2016). More importantly, obtaining the most appropriate and representative dataset referring to a research topic from Twitter by using search words or location search operators to interpret data accurately is essential. Studies using sentiment analysis have measured users' emotions and feelings toward specific topics in their tweets. This approach is beneficial when examining attitude or satisfaction with a brand or

destination, and it can help predict tourism businesses' performance (e.g., Kim & Chae, 2018). By detecting keywords related to emotions (positive vs. negative) and/or emotional strength, researchers could have a better idea to understand general impressions and develop future research agendas (e.g., Philander & Zhong, 2016).

In the previous studies, Park et al. (2020) investigated Facebook to identify individuals' perceptions of a different crises before and during Irma. Similarly, Yu et al. (2020) analyzed TripAdvisor user data to determine their behavioral patterns during COVID-19. As tourism is all about mentally and physically recreating better (Gnoth & Zins, 2009), studies adopting social media analytics are crucial (e.g., Park et al., 2020; Ramanathan & Meyyappan, 2019). Nonetheless, emotional responses to supply and experience elements in tourism have yet to be appropriately addressed in crisis research. Although Obembe et al. (2021) adopted Twitter to figure out travelers' emotions through sentiment analysis, their emotions are classified as either positive or negative, which is bipolar and limits the scope for various emotions. In addition, despite the remarkable growth of the methodological integration of social media analytics and GIS in tourism research, many social media studies have been limited to descriptively reporting social media users' opinions (e.g., important topics) or sentiment states from social media data, and there is a lack of developing more pragmatic research outcomes as prescriptive analytics with location-based social media data.

Understanding emotions are crucial as it can be helpful to understand how the actual interaction between tourists and the environment is experienced—especially during the COVID-19 pandemic. Thus, this study examines the public's communication aspects about COVID-19 about travel through text mining. Specifically, several social

media analytics are adopted to tackle the following research questions and several methodological analyses:

> *RQ₃. What are the keywords that can describe the characteristics of pod travel?*
>
> *RQ₄. What are the temporal and spatial characteristics of the demand for pod travel?*

3.3 Methodology

3.3.1 Research Design

In this study, a qualitative grounded theory approach was adopted. The grounded theory supports the establishment of the theory following repetitive analysis so that researchers can visualize emerging patterns from raw data based on conceptual proximity and theoretical foundation (Braun & Clarke, 2006; Strauss & Corbin, 1998). By using this approach, it is effective to discover or find the theory, based on the available data which helps researchers to create connections between them (Matteucci & Gnoth, 2017). Indeed, the phenomenon of pod travel can be better understood through the grounded theory framework.

In particular, Twitter is employed for social media analytics. Twitter has drawn the attention of hospitality and tourism researchers (e.g., Park et al., 2020; Park et al., 2016) since it is the largest microblogging with 330M monthly active users (Oberlo, 2020), providing vigorous public opinions and thoughts, from basic information, user information to geographical location. Those features enable big data analytics, where breadth and depth of studies can be performed to better understand consumer behavior

via text mining (Bigné, Oltra, & Andreu, 2019; Park et al., 2020). Indeed, observing what people post on their tweets helps understand the status quo of unfiltered public opinion.

In order for the study, three keywords (travel, tourism, trip) that are perceived to be representative to identify the public opinion and sentiments regarding travel were examined by investigating Twitter. To deal with the research questions, large-scale text analytics were implemented to understand the emerging trend of pod travel using the new normal and how it impacts the hospitality and tourism industry through acknowledging tweets. Tweets were collected from January 2020 to December 2020, the entire year of 2020, after the pandemic outbreak, to comprehensively grasp the public opinions by encompassing the whole season. Based on the dataset, a text mining approach was carried out to identify the various dimensions and perspectives to explain the public opinions and sentiments about the general idea of travel during the pandemic and pod travel.

3.3.2 Data Collection

The Twitter dataset is collected using Twitter API version 2.0. User responses are collected to properly analyze the dataset, including tweets and user information with geographical location. In this process, data are gathered, filtered, and cleaned, as social media has unstructured data and is a prerequisite to performing data analysis. To track public opinions related to COVID-19 and travel during the pandemic, this study used Twitter's open application programming interface (API) to collect Tweets posted in 2020. In order to minimize the bias that comes from different cultures and languages, this study was specifically examined to learn the tweets written in English within the United States. In particular, a coded text mining tool contains Tweets of (1) the date and time of the

posting, (2) each message-level tweet (full text), and (3) coordinates of the user location. The data collection method compiles Twitter's Terms of Service and Developer's Agreement and Policy.

Before the analyses, several steps were taken to ensure the data quality through data pre-processing. Based on the suggestions of Kwon, Lee, and Back (2020), five steps were thoroughly implemented to minimize the data loss, such as tokenization, removing punctuation and stopword (e.g., a, the), lowercase, and lemmatization (see Table 9). In addition, the hashtag symbol and its content (e.g., #Travel, #COVID-19), @users, and URLs from the messages, which do not contain any meanings, were excluded. After the data pre-processing steps, 105,142 tweets were used for the analysis.

Table 9. Five Steps of Data Pre-processing.

Step	Process	Description
1	Tokenization	Exchanging sensitive data for nonsensitive data called "tokens" that can be used in a database or internal system without bringing it into scope
2	Removing punctuation	Checking the punctuations using a raw string which contain punctuations and remove all punctuations from a string
3	Removing stopword	Removing the words that occur commonly across all the documents in the corpus, such as articles and pronouns
4	Lowercase	Changing the letters that are in larger uppercase or capitals into smaller lowercase
5	Lemmatization	Grouping together the inflected forms of a word so they can be analyzed as a single item, identified by the word's lemma, or dictionary form

3.3.3 Data Analysis

In this phase, several underlying critical characteristics in the text are identified, such as textual, emotional, and geographical aspects. Notably, WordNet, WordNet-Affect ontology, ad-hoc software, and the Wheel of Emotions (Plutchik, 1980) are used for the analysis. The WordNet-Affect ontology is used to classify the emotions that appeared in texts, developed from WordNet (Miller, 1995) through selecting and labeling synsets that represent practical concepts. WordNet is a lexical database that relates hyponyms/hypernyms to synonyms called synsets, interpreted as specialization relationships between conceptual categories. The analysis process is expected to efficiently classify large data sets based on the patterns and characteristics of pod travel during the COVID-19 pandemic.

3.4 Results

3.4.1 General Characteristics of Travel

Table 10 shows the state-level statistics based on the frequency of tweets that talk about travel. A total of 106,099 tweets were found among 51 states about tweets containing travel-related keywords. As people talk about travel during the COVID-19 period, it is an indicator to be learned that there are such demands for traveling among individuals. Based on the findings, Florida ranked the highest need for traveling during the pandemic, accounting for more than 10% of the total, followed by Georgia, Texas, and California. On the other hand, the District of Columbia took first place with almost 0% and Rhode Island and North Dakota in terms of the lower rankings of travel demand.

Table 10. State-Level Statistics of the Travel Demand during the COVID-19.

No.	States	Freq.	%	No.	States	Freq.	%
1	Florida	10,965	10.3	27	Louisiana	1,331	1.3
2	Georgia	9,472	8.9	28	Maryland	1,242	1.2
3	Texas	7,544	7.1	29	Utah	1,226	1.2
4	California	6,472	6.1	30	Arkansas	1,185	1.1
5	Pennsylvania	4,780	4.5	31	Oklahoma	1,146	1.1
6	Virginia	4,410	4.2	32	Delaware	1,020	1.0
7	North Carolina	4,310	4.1	33	Massachusetts	996	0.9
8	New York	3,484	3.3	34	Iowa	927	0.9
9	South Carolina	3,097	2.9	35	Maine	862	0.8
10	Colorado	2,893	2.7	36	New Jersey	843	0.8
11	Ohio	2,627	2.5	37	West Virginia	824	0.8
12	Arizona	2,433	2.3	38	New Mexico	741	0.7
13	Kansas	2,337	2.2	39	Nebraska	641	0.6
14	Kentucky	2,325	2.2	40	Montana	638	0.6
15	Tennessee	2,226	2.1	41	Connecticut	586	0.6
16	Michigan	1,956	1.8	42	New Hampshire	574	0.5
17	Illinois	1,843	1.7	43	South Dakota	568	0.5
18	Wisconsin	1,841	1.7	44	Hawaii	564	0.5
19	Missouri	1,839	1.7	45	Wyoming	557	0.5
20	Alabama	1,814	1.7	46	Idaho	528	0.5
21	Indiana	1,667	1.6	47	Alaska	465	0.4
22	Washington	1,596	1.5	48	Vermont	443	0.4
23	Minnesota	1,543	1.5	49	North Dakota	214	0.2
24	Nevada	1,533	1.4	50	Rhode Island	122	0.1
25	Mississippi	1,445	1.4	51	District of Columbia	21	0.0
26	Oregon	1,383	1.3				

Next, the general characteristics of travel in Tweets were analyzed by applying to The Wheel of Emotions. It investigates how people express their sentiments about travel after the pandemic outbreak. The model is categorized into eight different feelings under four pairs of emotions that are located opposite each other (joy <-> sadness, anticipation <-> surprise, trust <-> disgust, fear <-> anger). By adopting this model, individuals' sentiments in relation to travel can be comprehended in detail, beyond the emotions that

simply describe either positives or negatives. Table 11 shows the frequency of each sentiment word based on eight different emotions. Out of 106,099 tweets composed of travel-related keywords during the COVID-19 pandemic, 14.6% of tweets contained emotions that could fall into one of The Wheel of Emotions (15,314 tweets). Looking at the frequency of each sentiment, a total of 16,477 words contained the sentiments, ranking followed by joy (40.3%, 6,644 words, 21 sentiments), sadness (16.3%, 2,693 words, 12 sentiments), surprise (13.3%, 2,191 words, 13 sentiments), trust (11.5%, 1,896 words, 6 sentiments), fear (8.7%, 1,431 words, 21 sentiments), disgust (5.0%, 818 words, 12 sentiments), anticipation (2.8%, 454 words, 6 sentiments), and anger (2.1%, 350 words, 11 sentiments).

Also, Figure 10 illustrates the examples of sentiments by reflecting on The Wheel of Emotions. In each sentiment, representative keywords that belong to the appropriate category were located. For example, two keywords of 'miss' and 'sadness' represent the sentiment of sadness, more than 86%. The keywords 'hatred' and 'disappointment' take over 79% for disgust. For trust, both 'hope' and 'belief' accounted more than 91%. In terms of surprise, two keywords, 'amaze' and 'surprise,' hold about 75%. About anger, 'anger,' 'mad,' and 'upset' took over 100% (and the sum of sentiment appearance percentage can be over 100% as several keywords appear multiple times in one tweet). In joy, multiple keywords have emerged, such as 'fun,' 'happy,' 'enjoyment,' and 'excitement,' covering over 84%. In fear, 'worry,' 'scare,' and 'avoid' took almost 40%. Unlike other sentiments, keywords related to fear were almost evenly distributed among multiple keywords. Lastly, about anticipation, both 'expectation' and 'promise' took nearly 92%.

Table 11. Frequency of Sentiment Words about Travel.

sentiment	word	Freq.	%	total	sentiment	word	Freq.	%	Total
sadness	miss	1,852	68.8	2,693	disgust	hatred	507	62.0	818
	sadness	502	18.6			disappointment	145	17.7	
	cry	224	8.3			awful	56	6.8	
	tear	57	2.1			bother	40	4.9	
	joyless	53	2.0			disgust	32	3.9	
	heartbreak	27	1.0			disturb	17	2.1	
	misery	27	1.0			insult	12	1.5	
	grief	21	0.8			dislike	6	0.7	
	gloom	7	0.3			disbelief	2	0.2	
	distress	6	0.2			disdain	2	0.2	
	hardship	4	0.1			loathe	2	0.2	
	woe	4	0.1			distaste	1	0.1	
trust	hope	1,215	64.1	1,896	anger	anger	172	49.1	350
	belief	514	27.1			mad	141	40.3	
	trust	96	5.1			upset	70	20.0	
	faith	54	2.8			violence	30	8.6	
	confidence	28	1.5			fury	16	4.6	
	reassurance	3	0.2			irritation	15	4.3	
surprise	amaze	1,082	49.4	2,191		pissed	11	3.1	
	surprise	559	25.5			unhappiness	3	0.9	
	incredible	207	9.4			unpleasant	2	0.6	
	stun	97	4.4			unsatisfaction	2	0.6	
	scream	71	3.2			ungrateful	1	0.3	
	shock	59	2.7		joy	fun	2,259	34.0	6,644
	unexpected	54	2.5			happy	1,291	19.4	
	curiosity	53	2.4			enjoyment	1,190	17.9	

Category	Keyword	Count	%	Total
	miracle	15	0.7	
	astound	4	0.2	
	dazzle	4	0.2	
	bedazzled	1	0.0	
	confound	1	0.0	
	worry	238	16.6	
	scare	166	11.6	
	avoid	147	10.3	
	concern	129	9.0	
	fear	122	8.5	
	horror	100	7.0	
	anxiety	98	6.8	
	xenophobia	93	6.5	
	panic	69	4.8	
	doubt	65	4.5	
fear	nervous	62	4.3	1,431
	depress	56	3.9	
	terror	39	2.7	
	dread	18	1.3	
	outrage	16	1.1	
	uncertainty	13	0.9	
	suspicion	9	0.6	
	jeopardy	8	0.6	
	hostility	5	0.3	
	uneasy	3	0.2	
	despair	2	0.1	

Category	Keyword	Count	%	Total
	excitement	862	13.0	
	glad	498	7.5	
	joy	215	3.2	
	comfort	148	2.2	
	cheer	136	2.0	
	pleasure	108	1.6	
	smile	94	1.4	
	entertainment	70	1.1	
	thrill	51	0.8	
	charm	36	0.5	
	delight	22	0.3	
	amusement	18	0.3	
	satisfaction	18	0.3	
	cherish	14	0.2	
	humor	12	0.2	
	bedelighted	1	0.0	
	overhype	1	0.0	
	overjoy	1	0.0	
	expectation	269	59.3	
	promise	146	32.2	
anticipation	anticipation	21	4.6	454
	outlook	8	1.8	
	prospect	8	1.8	
	apprehend	2	0.4	
Total number of tweets with sentiment			14.6	15,314
Total number of tweets			100	105,142

Note: A sum of each sentiment keyword can be over 100% as it can appear several times in one tweet.
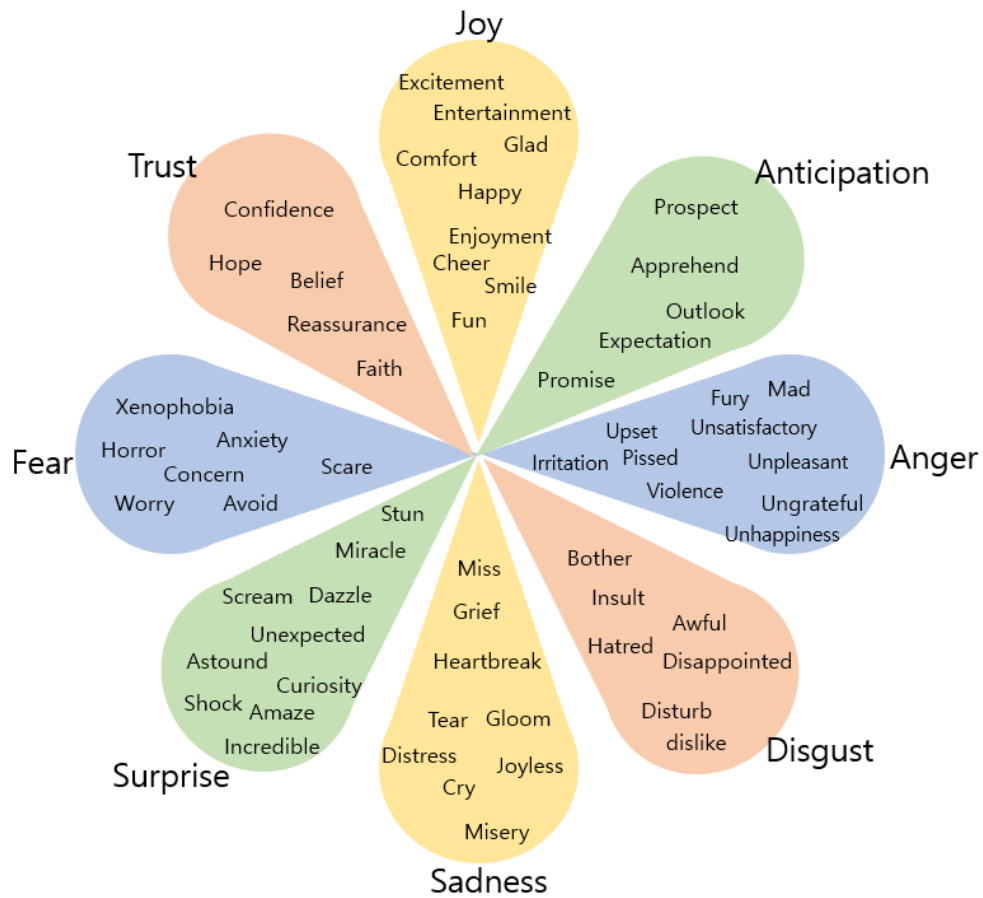
Figure 10. The Wheel of Emotions of Tweets about Travel.

3.4.2 Descriptive Statistics of Pod Travel

As this study aims to understand pod travel, various keywords were selected to capture the patterns and/or characteristics of pod travel. In this step, keywords related to pod travel were manually sorted since there is no literature describing the definition and characteristics of pod travel. Specifically, based on the criteria handled in Study 1 were adopted in this study to figure out the keywords related to pod travel. The keywords were categorized into three aspects that represent explaining pod travel: travel party, travel

behavior, and travel destination. In this step, 24,798 tweets were identified that were perceived to contain the context of pod travel (23.6%).

First, a travel companion is whom you travel with. Based on Study 1, it was found that when engaging in pod travel, individuals tend to travel with someone they are familiar with rather than with someone they do not know well. Traveling with friends and family are notable examples. It occurs since people started to distrust others as they do not know strangers well enough to consider as safe and healthy due to COVID-19. Descriptive statistical result shows as follows: friend (2,418, 28.5%), family (1,925, 23.3%), kid (1,091, 12.8%)), parents (598, 7.0%), couple (589, 6.9%), wife (423, 5.0%), brother (341, 4.0%), sister (332, 3.9%), husband (298, 3.5%), child (266, 3.1%), and cousin (162, 1.9%).

The second type to explain pod travel relates to travel behavior. Before COVID-19, travelers were free to travel domestically and abroad without worrying about quarantine. It also includes using transportation. However, with the outbreak of COVID-19, people cannot travel as they used to, and thereby domestic travel has come into the spotlight. In addition, a closed space or indoors with many strangers has become a threat that can increase exposure to COVID-19. Therefore, the keywords that frequently appeared for explaining travel behavior include a road trip, camping, hiking, fishing, and ski trip. Also, there were several occasional patterns based on the type of event, such as birthday or wedding. In other words, it relates to the travel party of the pod travel that was mentioned in the first characteristic, as friends and family participate in the events or anniversaries. In addition, the word 'xenophobia' was also found among the words appearing in travel behavior, which describes discomfort in the environment where

travelers encounter strangers while traveling. Descriptive statistical result shows as follows: road trip (7,498, 59.1%), birthday (1,483, 11.7%), camping (914, 7.2%), hiking (819, 6.5%), fishing (453, 3.6%), event (432, 3.4%), ski trip (254, 2.0%), horse riding (176, 1.4%), biking (162, 1.3%), wedding (160, 1.3%), outdoor (144, 1.1%), swimming (109, 0.9%), and xenophobia (93, 0.7%).

The third type is about the travel destination. It also relates to travel behavior, as outdoor-oriented tourist destinations based on nature have been mentioned among many users. As shown in Figure 11, keywords of beach, park, lake, mountain, river, national park, etc., are all formed along with nature, not a modern tourist destination crowded with people. These words represent the outdoor activities that pod travel aims for and provide an environment where travelers can relax comfortably with nature. Descriptive statistical result shows as follows: beach (1,379, 17.8%), park (1,286, 16.6%), lake (1,016, 13.1%), mountain (796, 10.3%), river (750, 9.7%), national park (577, 7.4%), island (523, 6.7%), cabin (435, 5.6%), valley (285, 3.7%), boat (246, 3.2%), forest (212, 2.7%), wildlife (105, 1.4%), Airbnb (89, 1.1%), rural (62, 0.8%), and orchard (38, 0.5%).

| Travel Companion | Travel Behavior | Travel Destination |

Figure 11. Pod Travel-related Keywords in Tweets.

3.4.3 Temporal Distribution of Pod Travel Demand

Next, the sentiment of the public talking about pod travel daily was analyzed using the wheels of emotions (see Figure 12). The model is composed of eight emotions, which are subdivided into four positive emotions (i.e., anticipation, joy, surprise, and trust) and four negative emotions (i.e., anger, disgust, fear, and sadness). As a result, the emotion with the highest level throughout the week about pod travel was found to be joy. Specifically, one's pleasant emotions tend to increase during the weekend. On the other hand, pleasant feelings were relatively decreased when a new week starts, such as Mondays and Tuesdays. For other positive emotions, anticipation was recorded as very low on average. Emotions about surprise were generally high, and it can be understood that people are looking forward to the weekend as it also shows an increase as the weekend approaches.
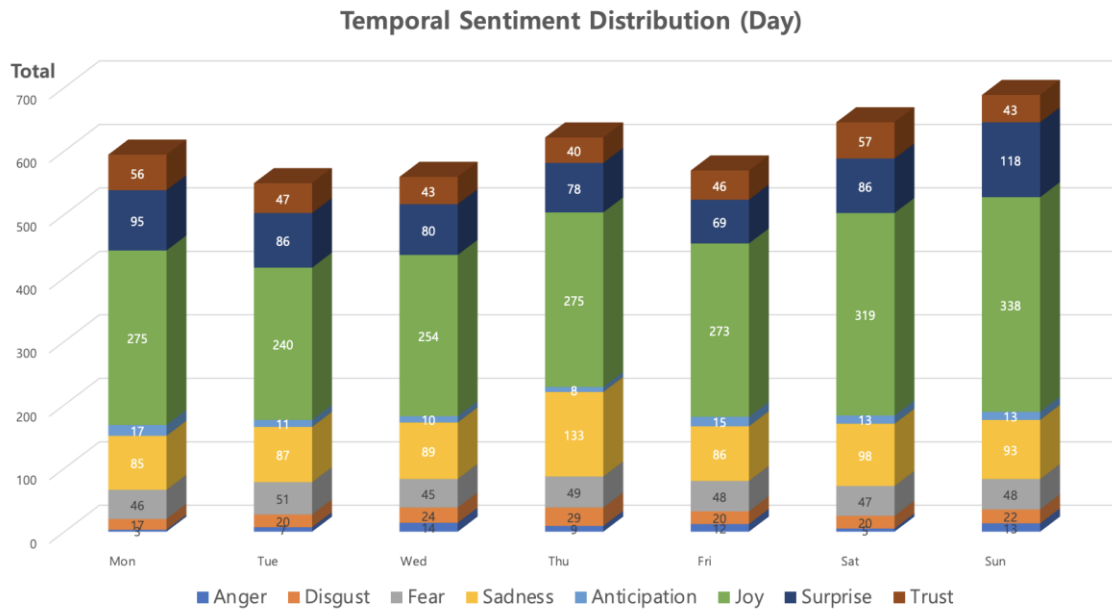

Figure 12. Temporal Distribution about Pod Travel (Day).

In terms of negative emotions, anger and disgust rarely appeared. Sadness was relatively high compared to other negative emotions and recorded a significant number on Thursday. Lastly, in the case of trust and fear, it can be understood that, although not generally high, it is constant regardless of the change of the day of the week. It was confirmed that people are not very sensitive to hygiene and/or health-related aspects when traveling during the pandemic, but that doesn′t necessarily mean that they do not consider them.

Next, temporal analysis based on the emotional change of the public was implemented. Figure 13 describes the emotional patterns of users talking about pod travel every month. Notably, this study categorized the temporal change into four seasons: Spring (March, April, May), Summer (June, July, August), Fall (September, October, November), and Winter (December, January, February). Among four positive emotions of anticipation, joy, surprise, and trust, joy recorded the highest place across all seasons, which is outstanding. In particular, this pleasant emotion was more than twice as high in the summer than in the winter season in December. In other words, individuals show more favorable sentiments when the overall weather is nice. Surprise showed a similar pattern to joy, showing an increase in summer and a decrease in winter. In terms of the trust, it had slight ups and downs and recorded relatively high numbers from March to September. Overall, there were few differences in anticipation among different seasons, which was very low.
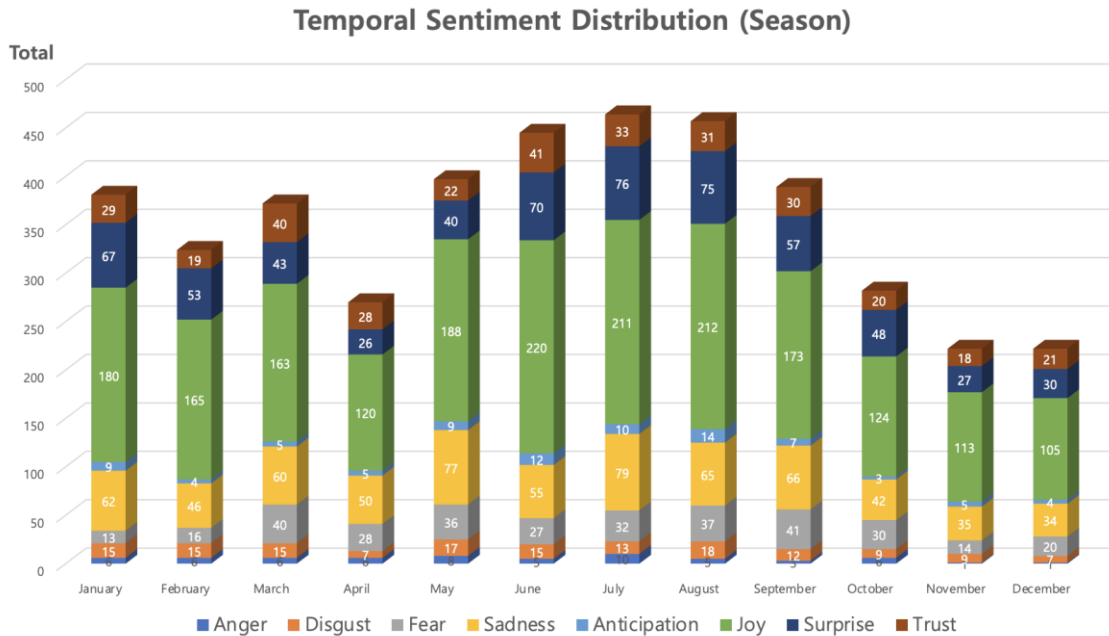
Figure 13. Temporal Sentiment Distribution about Pod Travel (Season).

When it comes to negative emotions of anger, disgust, fear, and sadness, people's anger was much lower than joy but showed a similar pattern. It was found that it decreased temporarily in spring, increased back in summer, and decreased again in winter. Disgust was found to be very low but remained consistent across different seasons. In terms of its frequency, it recorded a higher level than anticipation overall. The pattern for fear and sadness appeared relatively low in winter when the weather is cold, and traveling is not widespread due to the weather condition. In general, it can be seen that people's emotions about pod travel are much more diverse until summer and early fall, when the weather is nice, and travel is active. On the other hand, the demand for pod travel is lower in winter when the weather is cold. It makes perfect sense since most pod travel activities are closely related to outdoor settings, and thereby weather condition plays a vital role for individuals to engage in pod traveling.

3.4.4 Spatial Distribution of Pod Travel Demand

In order to understand the traveler's demand for pod travel based on their geographical locations, Table 10 is composed as follows. Notably, based on the number of keywords explaining travel in every state, the ratio of keywords that included pod travel was checked and calculated (see Table 12). Through this process, it was recognized to identify the state in which the demand for pod travel is prominent compared to other states. As a result, the state with the highest demand for pod travel was Utah (40.9%). After, Wyoming, Oregon, Idaho, Montana, New Mexico, South Dakota, Oklahoma, and Rhode Island showed a demand ratio for pod travel of over 30%. In terms of geographical location, there seems to be a high demand for pod travel in the states near the west coast of the United States.

Meanwhile, Florida, which was ranked first when talking about general travel in Tweets, was ranked 49th out of 51 states with a pod travel demand ratio of about 19%. However, this number only explains its ratio, and the absolute number that talks about pod travel shows the highest frequency that ranks first with 2,069 tweets. Overall, when looking at the percentage of demand for pod travel to travel, the significance of pod travel in many states appears to be significant.

Table 12. State-Level Statistics of Pod Travel Demand.

No.	States	Pod Travel Keywords Freq.	Travel Keywords Freq.	%	No.	States	Pod Travel Keywords Freq.	Travel Keywords Freq.	%
1	Utah	501	1,226	40.9	27	New Hampshire	135	574	23.5
2	Wyoming	196	557	35.2	28	South Carolina	726	3,097	23.4
3	Oregon	447	1,383	32.3	29	Kansas	547	2,337	23.4
4	Idaho	169	528	32.0	30	Arkansas	277	1,185	23.4
5	Montana	203	638	31.8	31	Hawaii	129	564	22.9
6	New Mexico	233	741	31.4	32	Iowa	212	927	22.9
7	South Dakota	173	568	30.5	33	New York	792	3,484	22.7
8	Oklahoma	349	1,146	30.5	34	Illinois	416	1,843	22.6
9	Rhode Island	37	122	30.3	35	Nevada	345	1,533	22.5
10	Arizona	726	2,433	29.8	36	Kentucky	507	2,325	21.8
11	California	1,916	6,472	29.6	37	New Jersey	182	843	21.6
12	West Virginia	240	824	29.1	38	Maryland	268	1,242	21.6
13	Vermont	121	443	27.3	39	Wisconsin	396	1,841	21.5
14	North Dakota	58	214	27.1	40	Maine	183	862	21.2
15	Alaska	126	465	27.1	41	Indiana	351	1,667	21.1
16	Michigan	525	1,956	26.8	42	Missouri	387	1,839	21.0
17	Minnesota	409	1,543	26.5	43	Ohio	550	2,627	20.9
18	Washington	421	1,596	26.4	44	Mississippi	301	1,445	20.8
19	Colorado	738	2,893	25.5	45	Pennsylvania	988	4,780	20.7
20	Alabama	459	1,814	25.3	46	Delaware	201	1,020	19.7
21	Louisiana	336	1,331	25.2	47	Georgia	1,830	9,472	19.3
22	Texas	1,902	7,544	25.2	48	District of Columbia	4	21	19.0
23	North Carolina	1,053	4,310	24.4	49	Florida	2,069	10,965	18.9
24	Nebraska	156	641	24.3	50	Massachusetts	178	996	17.9
25	Tennessee	535	2,226	24.0	51	Connecticut	88	586	15.0
26	Virginia	1,048	4,410	23.8					

Spatial characteristics of tweet data were analyzed to determine how individual emotions differ in relation to pod travel demand across different states. Accordingly, four positive emotions (anticipation, joy, surprise, trust) and negative emotions (anger, disgust, fear, sadness) were used for analysis, respectively, based on the wheel of emotions. The result is shown in Figure 14 below. As a result, as the data encompasses the entire states of the United States, micro differences are not confirmed in detail. In this map, boundaries for a total of 3,143 counties in the United States are marked. Specifically, when users post about pod travel in their tweets, the coordinates information was gathered as to where it was uploaded; it is marked with a green circle on the map, described as a Tweet Point. However, since the county was the basic unit, it was difficult to grasp the pod travel demand density since multiple tweets posted at the same coordinates were not distinguished on the map.

First, it was confirmed that the distribution of emotions was more lively in the Eastern States than in the Western States in terms of general emotions identified based on the Wheel of Emotions. The intensity of pod travel demand shares similarities to the PVI model (CDC, 2020b) presented in the literature review. In fact, in the PVI model, the number of cases and deaths due to COVID-19 was significantly high in the eastern States, and similarly, Figure 14 shows more increased demand for pod travel in the East States than in the West States. Since it can be assumed that state regulations and restrictions would be more robust in regions where the COVID-19 impact was more severe, there would have been more limitations for traveling. These limitations can be understood as reflecting the fact that people yearn for pod travel which is likely to be connected to appearing with various emotions. Specifically, looking at the states where

the distribution of emotions is strong, it can be seen that there are a lot of tweets related to emotional expressions in New York, New Jersey, Maryland, Massachusetts, Delaware, and so on. Although the differences in the eight emotions in these states are not visible, the overall figure is high, implying that the demand for pod travel is remarkably high.

It seems that a lot of emotions related to pod travel appear in the mid-west as well. For example, Missouri, Illinois, Tennessee, and Kentucky are representative states with a high distribution of overall sentiments. Based on the correlations with the severity of the COVID-19 pandemic in the PVI Model, these states were less severe than the Eastern states but still caused lots of casualties. In other words, these states also had many restrictions in 2020, amid the pandemic, and it can be understood that these restrictions have led to a further increase in individuals' demand for pod travel. Moreover, it was verified that the distribution of emotions related to pod travel was relatively low in the Western states. There are several reasons for the explanation, but based on the PVI model presented above, it is believed that the number of casualties due to COVID-19 is lower than in other states. Overall, it could be comprehended that the demand for pod travel correlates with the severity of COVID-19 in different states.

Positive emotions   Negative emotions
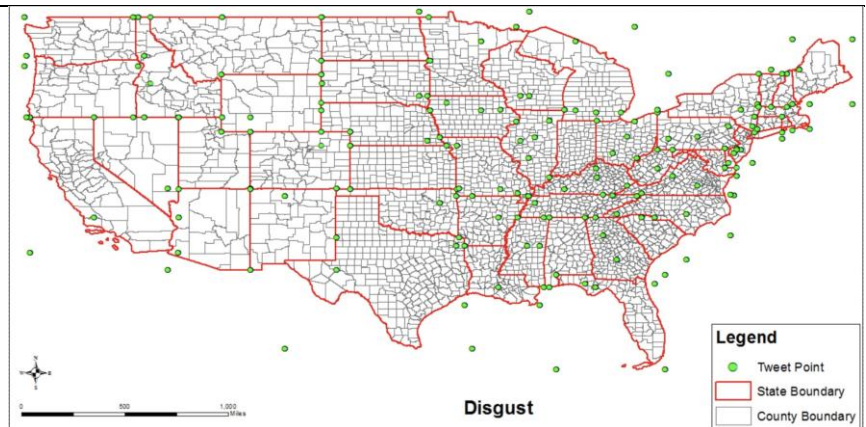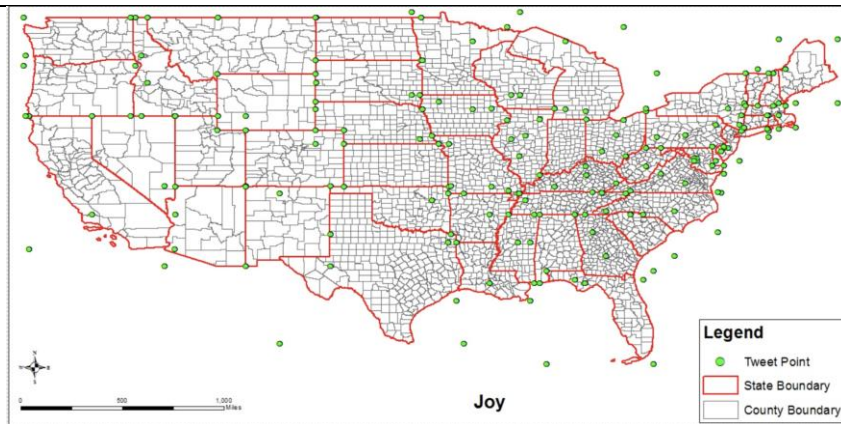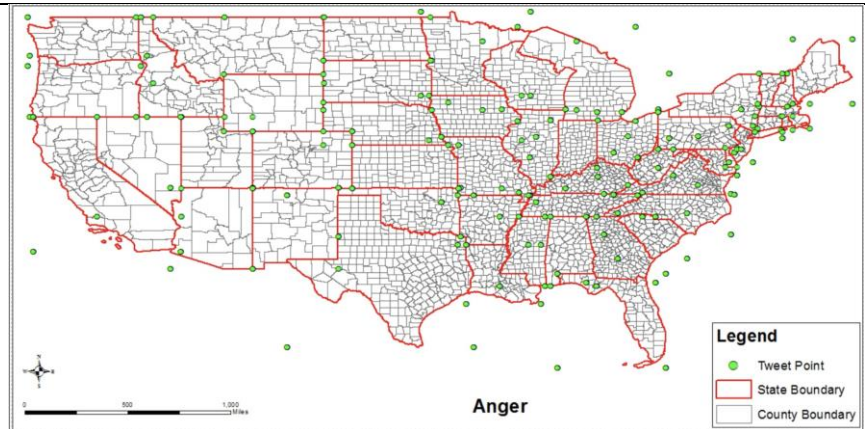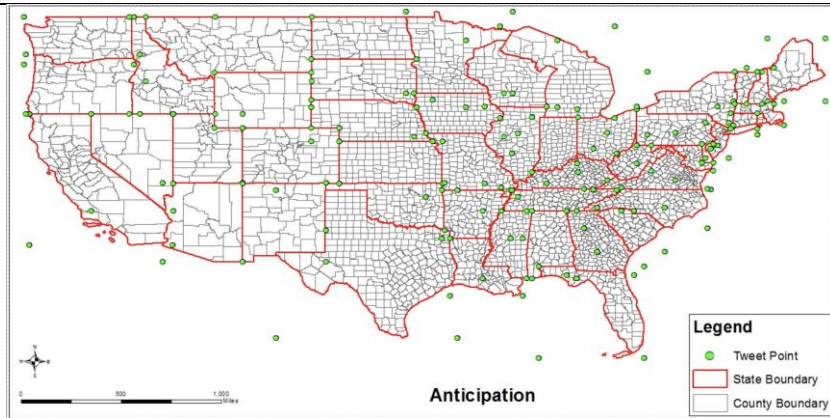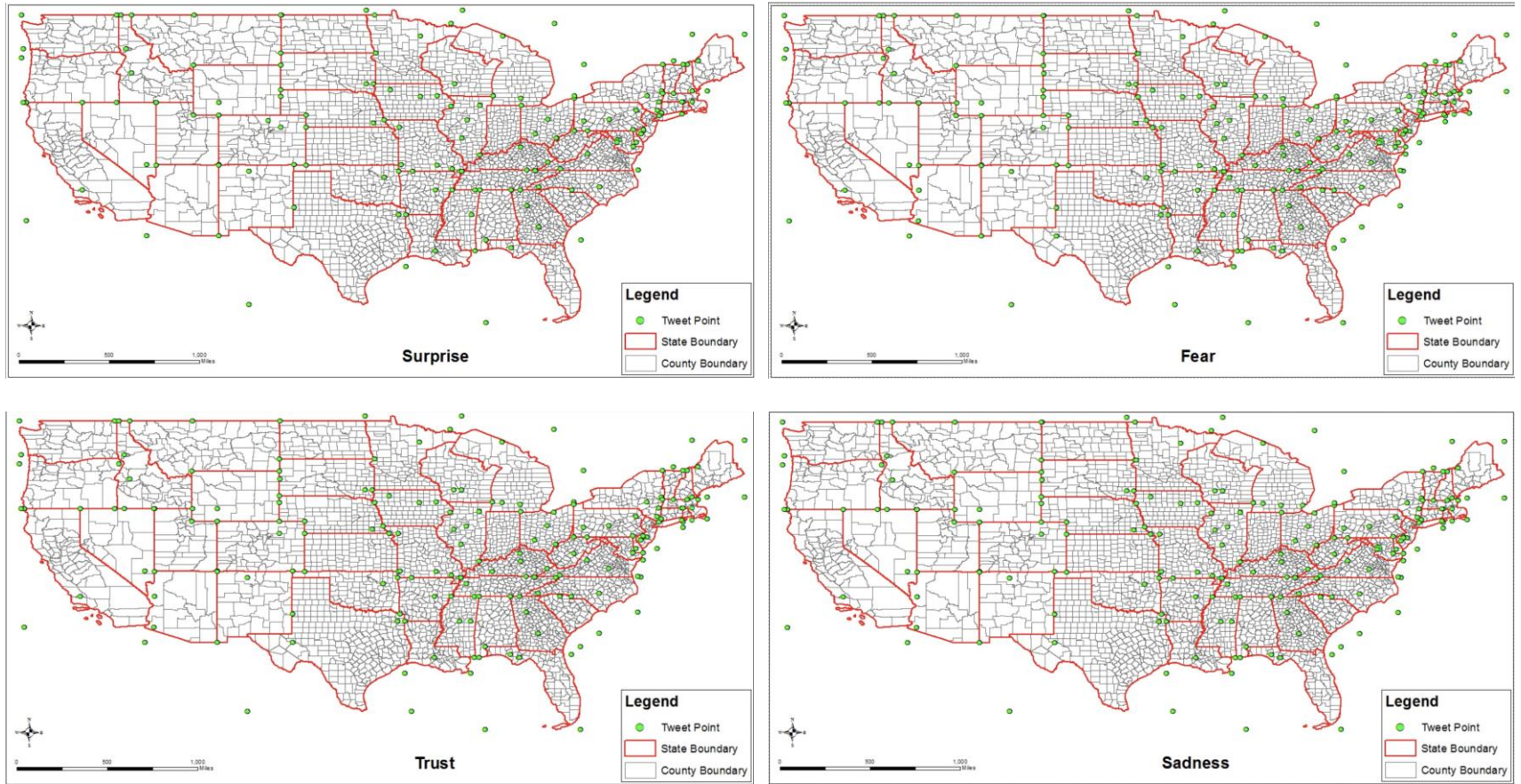
Figure 14. Spatial Distribution of Pod Travel Demand.

3.4.5 Difference of Pod Travel Sentiments in relation to Spatial Distribution

Furthermore, to understand how specifically the geographical differences appeared in the travelers' sentiment, this study segmented different states in the United States (e.g., Northeast, National Capital, Southeast, Midwest, Intermountain, and Pacific) that serve the U.S. National Park Service (https://www.nps.gov/index.htm). Figure 15 illustrates the distribution of each state that composes different national park service regions: Northeast (i.e., Connecticut, Delaware, Maryland, Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont), National Capital (i.e., District of Columbia), Southeast (i.e., Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virgin Islands), Midwest (i.e., Arkansas, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin), Intermountain (i.e., Arizona, Colorado, Montana, New Mexico, Oklahoma, Texas, Utah, and Wyoming), Pacific (i.e., California, Hawaii, Idaho, Nevada, Oregon, and Washington).

Figure 15. A Map of National Park Service Regions in the United States.
(Source: https://en.wikipedia.org/wiki/List_of_regions_of_the_United_States)

As pod travel is based on the concept of engaging in outdoor activities that deal with the nature, the national park service regions were recognized to be appropriate to categorize states into different sectors, and the findings of differences across the regions are expected to identify different groups that are based on geographical locations and their needs for pod travel by looking into the psychological perceptions and behavioral patterns.

To examine how individuals' sentiments of a pod travel across different sectors of regions, public sentiments were dichotomized into two aspects of positive (i.e., joy, trust, surprise, anticipation) and negative (i.e., anger, disgust, fear, sadness). Specifically, the

number of frequencies within one text message was scaled from 0 to 4. For example, if there is joy and trust were contained in the message, its positive sentiment is counted as 2; and if no positive sentiment was found in the message, its positive level is 0. Table 13 shows the descriptive data for national park service regions (i.e., Northeast, Southeast, Midwest, Pacific, and Pacific) in terms of sentiments (i.e., positive, negative). In terms of sample size, Southeast shows the highest ($N = 1,242$), followed by Intermountain ($N = 724$), Midwest ($N = 684$), Pacific ($N = 549$), and Northeast ($N = 492$). When looking at the sentiments across different regions, the pacific regions showed the highest mean value of positive sentiment ($M = .84$), whereas Midwest showed the lowest ($M = .72$).

Table 13. Descriptive Data for National Park Service Regions and Sentiments.

Regions	Sample Size	Positive Sentiment		Negative Sentiment	
		Mean	SD	Mean	SD
Northeast	492	.77	.506	.42	.619
Southeast	1242	.75	.510	.30	.465
Midwest	684	.72	.526	.36	.488
Intermountain	724	.81	.501	.27	.453
Pacific	549	.84	.493	.25	.446
Total	3691	.77	.510	.31	.491

Table 14 illustrates the one-way ANOVA test results for sentiment among five national park groups. The results of both positive sentiment and negative sentiment were significant between groups level ($p < .001$).

Table 14. One-way ANOVA as for Sentiment in National Park Service Groups.

Source	SS	df	MS	F	p
POSITIVE SENTIMENT					
Between Groups	6.197	4	1.549	5.995[***]	.000
Within Groups	952.452	3686	.258		
Total	958.649	3690			
NEGATIVE SENTIMENT					
Between Groups	11.202	4	2.801	11.772[***]	.000
Within Groups	876.871	3686	.238		
Total	888.073	3690			

Note: [***]$p<.001$

In the next step, a post hoc analysis was implemented, and Tukey was chosen to determine where the significant differences occurred. Table 15 illustrates the comparisons among the different groups. In terms of positive sentiment, the ANOVA tests revealed significant differences in Pacific regions and both Southeast ($\eta^2 =.088$) and Midwest ($\eta^2 =.125$). In other words, pod travel-related sentiments within the Pacific regions (e.g., California, Hawaii, Washington) are more positive than those positive sentiments that were identified in the Southeast (e.g., Alabama, Florida, Georgia) and Midwest regions (e.g., Missouri, Michigan, Nebraska).

On the other hand, the negative sentiments and how it is affected by different regional groups were examined. the ANOVA tests revealed significant differences in Northeast regions and Southeast ($\eta^2 =.127$), Intermountain ($\eta^2 =.153$), and Pacific ($\eta^2 =.173$). It indicates that the Northeast region (e.g., Delaware, Maryland, New Hampshire, New York) shows more positive sentiment than the Southeast (e.g., Alabama, Florida, Georgia) and Intermountain regions (e.g., Arizona, Colorado, Texas).

Also, the differences in negative emotions in Midwest regions are significant in the Intermountain ($\eta^2 =.087$) and pacific regions ($\eta^2 =.107$). It implies that pod travel-

related sentiments are somewhat more pessimistic in the Midwest regions (e.g., Missouri, Michigan, Nebraska) when compared to the regions in Intermountain (e.g., Arizona, Colorado, Texas) and Pacific (e.g., California, Hawaii, Washington).

Table 15. Comparison Table of Sentiments among Different Regional Groups.

Dependent Variable			Mean Difference	Std. Error	Sig.
Positive	(1)	(2)	.021	.027	.940
		(3)	.058	.030	.301
		(4)	-.035	.030	.764
		(5)	-.067	.032	.209
	(2)	(3)	.037	.024	.537
		(4)	-.056	.024	.131
		(5)	**-.088***	**.026**	**.007**
	(3)	(4)	-.093*	.027	.005
		(5)	**-.125***	**.029**	**.000**
	(4)	(5)	-.032	.029	.798
Negative	(1)	**(2)**	**.127***	**.026**	**.000**
		(3)	.066	.029	.148
		(4)	**.153***	**.028**	**.000**
		(5)	**.173***	**.030**	**.000**
	(2)	(3)	-.061	.023	.064
		(4)	.026	.023	.781
		(5)	.046	.025	.352
	(3)	**(4)**	**.087***	**.026**	**.007**
		(5)	**.107***	**.028**	**.001**
	(4)	(5)	.020	.028	.953

Note: Numbers in the parentheses indicate as follows: (1) Northeast, (2) Southeast, (3) Midwest, (4) Intermountain, (5) Pacific

$^{*}p<.05$

3.5 Conclusion and Discussions

3.5.1 Conclusion

When people think about travel, various kinds of words for positive emotions and emotions are very high, despite the pandemic situation. It can be seen that demand for travel temporarily declined due to COVID-19, and it became to be considered entering

the form of an endemic to some extent. In other words, the demand for travel will increase steadily and continuously, and many experts predict that revenge tourism will become prevalent.

Travelers seek new experiences and make better decisions for them when they have multiple options based on their knowledge. In other words, tourism has become available in different forms after the outbreak of COVID-19, where new options were created by experiencing the attractive elements of a novel type of travel through new experiences, such as pod travel. Travelers who have experienced and are satisfied with pod travel will continue their engagement with it, in which that the demand for pod travel is expected to increase.

Interestingly, the individual's emotions about pod travel also differed across different geographical regions when segmented based on national park service areas. It was evident to see both severities of the pandemic and its natural resources are closely related to the public's sentiment, as there were disparities appeared among different groups. This finding provides the necessity to segment individuals' into different levels of perception and behavioral aspects, and not treated them in the same manner. As sentiments are closely related to one's experience that would be the foundation to determine sustainable behavior, it is essential to understand what is going on at this point to deal with the ever-changing market and consumer needs.

When examining the negative emotions related to pod travel, the emotions for fear were lower than joy but still showed a high frequency. In this regard, there is a need for means to reduce the health and sanitary-related anxiety of travelers when pod traveling. In fact, it was found that words such as worry, scare, and avoid were ranked at

the top which occurs frequently. Although it is said that the world is moving toward

endemic, it is also difficult to see that COVID-19 is completely over, and people are

accepting it as a situation to become the mode of 'With COVID-19'. Therefore, it is

necessary to reassure (potential) travelers that it is safe to travel. In a similar vein, the fact

that the word 'miss' accounts for almost 70% of emotions of 'sadness' is also a

representative example that can explain this phenomenon. Accordingly, if DMOs

promote what kind of preventive measures a specific tourist destination is taking for the

health of sanitary and visitors, it will also be effective to increase their travel experience

based on their trust.

3.5.2 Discussions

3.5.2.1 Theoretical Implications

This is the first exploratory research to understand the travel pattern throughout

the 2020 period when COVID-19 is rampant using social media analytics. In fact, many

studies were conducted during the COVID-19 period, but these studies were fragmented

as understanding from a certain perspective like tourism or hospitality industries that

focus on sales and revenue decrease (e.g., Dube, Nhamo, & Chikodzi, 2021; Pappas &

Glyptou, 2021; Song, Yeon, & Lee, 2021); from individual's point of view, their

psychological or decision-making process was investigated through a survey, focusing on

its motivational aspect (e.g., Karl et al., 2021; Zheng, Luo, & Ritchie, 2021). In other

words, these studies partially seek to acknowledge the effects of COVID-19, but there

exist limitations in identifying the overall pattern of the trend from a more comprehensive

point of view. This study contributed to the existing literature in that it implemented

longitudinal research by crawling all Tweet data about pod travel within the United States throughout a year, and provided insights based on the findings.

By summarizing the characteristics of pod travel based on the keywords, this emerging trend can be explained as "Visiting tourism destinations such as beach, park, lake, or mountain as a road trip with friends and family". When it comes to pod travel, there is no need to invest decent money and/or time in grand destinations, as we can normally imagine travel. In other words, pod travel has already come into our daily lives to some extent, where it is just that these actions have occurred more frequently and universally in conjunction with the time of COVID-19, and only that the term itself was unfamiliar before. Since this phenomenon was scientifically investigated through social media analytics of exploratory research, future studies are expected to develop further using the current study as a foundational concept.

In addition, it is meaningful in that the emotions for pod travel demand were identified by substituting them into the model of the wheel of emotions, as previous studies on existing sentiments have generally focused on whether it is either positive or negative (e.g., Alaei, Becken, & Stantic, 2019; Schmunk et al., 2013; Shimada et al., 2011; Zheng & Ye, 2009). However, there exists a limitation to simply subdividing into halves and understanding the emotions of travel and its experience, as the described keywords are very diverse. Accordingly, in this study, the wheel of emotions, which had not been applied widely in previous studies, was adopted for pod travel that has been occurred during the COVID-19 period, and the emotions about them were divided into four positive emotions (anticipation, joy, surprise, trust) and four negative emotions (anger, disgust, fear, sadness) for deeper understanding of the public's emotions related

to pod travel. In addition, this study is significant in that individuals' emotional expression of the words that can describe the eight emotions via the wheel of emotions, by showing what words have appeared in order for individuals to describe their emotions on Twitter.

3.5.2.2 Practical Implications

The pandemic, although it is evident to have severely impacted the hospitality and tourism industries, is a new opportunity for destinations and attractions that did not receive much attention before. With the advent of pod travel, the boundary that people think about travel destinations is not limited to existing famous tourist destinations but has expanded to places near our everyday lives. Taking this opportunity to promote the destinations during the pandemic period, it will be considered to benefit through a more effective marketing strategy.

In addition, Utah, Wyoming, and Oregon were found to have high pod travel demand based on the study findings. These states are popular with natural tourism resources and outstanding natural scenery. The nature of mountains and rivers is attractive for tourists to engage in outdoor activities, such as camping, hiking, and biking. Even in the cold winter season, it is an ideal destination for pod travel to do winter sports, such as skiing. Based on these characteristics, DMOs or CVBs are expected to consider it as a new opportunity to meet the needs of travelers for pod travel through a proactive marketing promotion.

Meanwhile, when looking at the absolute number of word frequencies related to pod travel, the states of Florida, California, Texas, Georgia, and Virginia appeared in the

Top 5. A typical characteristic of these states is that they are already loved by countless tourists as famous tourist destinations in the United States, and thereby they are not particularly ranked in the top ranking, in terms of pod travel. In fact, states like Florida and California are both famous tourist destinations and vacation destinations already, because of their gorgeous natural resources. However, because it is already famous, many tourists flock to it, which makes it difficult to keep social distance depending on the situation when actually traveling, as well as the probability of encountering strangers is high. Thus, when approaching the pod travel itself, the demand appears to be relatively small. Nevertheless, if DMOs or CVBs continue for strategic marketing, the demand is expected to explode as a post-COVID-19 revenge tourism destination along with their consistent popularity. A timely event is recommended in preparation for this moment, in addition to more effective marketing promotion.

Next is based on the pod travel demand in regard to temporal characteristics. In terms of the days of the week, the finding revealed that people still talked a lot about more positive and happy emotions on the weekends. Through this, although we are living in the pandemic era, it seems that there are a lot more positive sentiments about pod travel on weekends when people have more free time as they are busy during the week due to their daily routines. Based on these characteristics, it would be effective to hold a hashtag event for tourist destinations or activities on Twitter or other SNS, especially on Thursday or Friday before the weekend starts. For example, if you promote it with an example image or a short video on TikTok along with phrases such as "We take care of your special weekend', it will be an effective marketing strategy to attract nearby residents.

It would be useful to stimulate users' intrinsic motivation if a certain amount of price discount is offered to SNS users who make postings voluntarily. This will be highly effective marketing by using a referral promotion if it is related to real visiting via word-of-mouth. In addition, one can also get a glimpse of their storytelling-based ideas that communicate with other users in different ways. Overall, it will be fun to expect that they will be melted in different interpretations even toward the same destination or engage in the same activities.

Lastly, when looking at seasonal characteristics, outdoor activities in which visitors participate are very closely related to the weather, and thereby the season and demand for pod travel are also considered to be highly correlated. Therefore, if detailed descriptions of the activities available for each weather/season are accompanied by the promotions, it is expected that the synergistic effect will appear on tourism demand by conveying the attractiveness of the four seasons of nature to tourists. For example, outdoor activities without shade during the hot summer season can reduce the interest of travelers. At this time, places such as forests and wildlife are cool because there are shades with cool temperatures, which will act as an attraction for tourists. Indeed, Zheng et al. (2018) suggested a tourism destination recommendation system through users' sentiment and temporal dynamics. Outdoor activities have their own limitations, in contrast, indoor activities are controllable, as it doesn't really have much to do with the weather. Therefore, if you explain to travelers whether they are best suited for particular weather or season, it will be attractive enough to fascinate travelers. It is expected that the pleasant experience will create memories and thereby relates to continuous visits.

CHAPTER 4

SUMMARY AND CONCLUSION

4.1 Introduction

The goal of this study is to provide a comprehensive understanding of how travel is taking place with respect to pod travel, which has been in the spotlight after the COVID-19 pandemic, and how to understand travelers' demand for tourism. In the next section, this study discusses how pod travel can be more developed and maintained in a sustainable way by summarizing two conducted studies in this dissertation. In addition, it includes several suggestions for future research and tourism service providers along with limitations that have not been addressed in current studies.

4.2 Summary of Results

4.2.1 Study 1: Conceptualization of Pod Travel

As the COVID-19 pandemic lasts, the travelers have been transformed by looking for a novel type of travel. They would not go back to normal, even though COVID-19 is over as now they have faced a "new normal". In other words, travelers now have more options than they can choose from, and are not necessarily stuck to the travel types that we have been used to engaged. Understanding evolved traveler behavior is a vital issue to the current industry from a long-term perspective as well as sustainable pod travel development. This study explores pod travel to conceptualize its definition and key characteristics that appeared after the pandemic outbreak. By comparing the topics that have been identified before and during COVID-19, this study manifested those topics that

have been discussed within social media differed as topics that were not frequently

discussed before the pandemic became actively discussed after its outbreak, as well as the

number of topics varied. Above all, this study has significance in that it explains pod

travel, which is attracting travelers' attention, by using the chaos theory, which has not

been used widely in the tourism field. Indeed, no one could have predicted that the

impact would have such a global and long-term impact on people's daily lives when the

pandemic first occurred. When it comes to travel, such restrictions remain similar. Even

in such an opaque and unpredictable situation, people have taken an alternative form of

travel by complying with rules and regulations; and the current study identified this type

of travel as pod travel based on several common characteristics and its features. Details

are discussed further in the theoretical and practical implications.

4.2.2 Study 2: Public Discourse of Pod travel

When people think about travel, various kinds of words for positive emotions and

emotions are very high, despite the pandemic situation. It can be seen that demand for

travel temporarily declined due to COVID-19, and it became to be considered entering

the form of an endemic to some extent. In other words, the demand for travel will

increase steadily and continuously, and many experts predict that revenge tourism will

become prevalent.

Travelers seek new experiences and make better decisions for them when they

have multiple options based on their knowledge. In other words, tourism has become

available in different forms after the outbreak of COVID-19, where new options were

created by experiencing the attractive elements of a novel type of travel through new

experiences, such as pod travel. Travelers who have experienced and are satisfied with pod travel will continue their engagement with it, in which that the demand for pod travel is expected to increase.

Interestingly, the individual's emotions about pod travel also differed across different geographical regions when segmented based on national park service areas. It was evident to see both severities of the pandemic and its natural resources are closely related to the public's sentiment, as there were disparities appeared among different groups. This finding provides the necessity to segment individuals' into different levels of perception and behavioral aspects, and not treated them in the same manner. As sentiments are closely related to one's experience that would be the foundation to determine sustainable behavior, it is essential to understand what is going on at this point to deal with the ever-changing market and consumer needs.

When examining the negative emotions related to pod travel, the emotions for fear were lower than joy but still showed a high frequency. In this regard, there is a need for means to reduce the health and sanitary-related anxiety of travelers when pod traveling. In fact, it was found that words such as worry, scare, and avoid were ranked at the top which occurs frequently. Although it is said that the world is moving toward endemic, it is also difficult to see that COVID-19 is completely over, and people are accepting it as a situation to become the mode of 'With COVID-19'. Therefore, it is necessary to reassure (potential) travelers that it is safe to travel. In a similar vein, the fact that the word 'miss' accounts for almost 70% of emotions of 'sadness' is also a representative example that can explain this phenomenon. Accordingly, if DMOs promote what kind of preventive measures a specific tourist destination is taking for the

health of sanitary and visitors, it will also be effective to increase their travel experience

based on their trust.

Table 16. A Comparison between Different Travel Types.

Type	Travel	Adventure Travel	Pod Travel
Definition	Traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure and not less than 24 hours.	A trip or travel with the specific purpose of activity participation to explore a new experience, often involving perceived risk or controlled danger associated with personal challenges, in a natural environment or exotic outdoor setting.	Group tour with family or friends, visiting nature-based destinations within a drivable distance, engaging in outdoor activities while cutting off interaction with strangers as much as possible.
Purpose	Business, leisure	Leisure	Leisure
Keywords	Natural, Cultural and Man-made Resources, Attractions, Facilities, Services and Activities	Activity, Experience, Environment, Risk	Travel companion: family, friends Travel behavior: road trip Travel destination: beach, park, lake

4.3 Limitations and Future Research

4.3.1 Study 1: Conceptualization of Pod Travel

As no study can be perfect, this study has several limitations. First, due to the nature of topic modeling using big data, the number of topics can be affected by the number of samples. In this study, users' data were obtained using Twitter, a social media. With the usage, the volume of data is much larger than the amount that can be received through a general survey. However, the amount of data used for the final analysis had inevitably reduced through the data pre-processing while giving conditions of location and language, in order to reduce the bias. Therefore, this study may seem to have a relatively small sample size, compared to other studies using big data. Future studies will be able to have more generalized results when the study is repeated by crawling the data for a longer period.

Second, since the study is based on the users opinions who use Twitter, the opinions of those who do not post or use social media still remain unexplored. In other words, no matter how data is big, in terms of both quantitative and qualitative, this may be the result of people who use social media to the end. For example, one media covered pod travel in a similar sense to luxury travel, using a private jet and resting on a private island during the holiday season (Luxury Travel Magazine, 2021). Notably, this form of pod travel did not appear visually in the results obtained through big data analysis in this study. In other words, it can be understood that the luxury type of pod travel is only a small part to explain a general form of pod travel. Therefore, future research can focus on the niche market in various types of travel explaining pod travel, and further emphasizing the relationship between pod travel and luxury travel.

Third, this study analyzed the contents of Twitter that have been posted in English, in terms of language, and in the United States, in terms of geographical location. Although the study results explain pod travel in the United States, it should be kept in mind that there is a possibility of perception and behavior differences in other countries and cultures. Therefore, in future research, similar studies can be applied and repeated to other countries or cultures, which is expected to bring significant results that can be derived by comparing the results obtained through this with the current research.

4.3.2 Study 2: Public Discourse of Pod travel

When looking at the travel destination, the word 'Airbnb' appeared frequently. In other words, it is impressive that Airbnb itself is seen as a place for travelers to experience and relax, even if the destination doesn't have to be a huge tourist attraction. Therefore, future research can be developed in connection with pod travel and Airbnb attractiveness in a specific region. Previous studies of Airbnb and their geographic locations (Heo, Blal, & Choi 2019; Jang & Kim, 2022) were mostly conducted based on cases located in popular tourist destinations. Considering the COVID-19 outbreak, Airbnb located in wildlife or rural areas is also recognized to be an excellent travel destination in itself. With the results derived through a systematic research process, it is expected that Airbnb in areas that have not received much attention before will be able to take off along with the pandemic, as new opportunities.

This study was conducted across the United States based on Twitter in order to find out the demand for pod travel. Accordingly, it was possible to understand how a new type of pod travel emerged for travelers during the COVID-19 period. However, as

presented in the findings, the results of pod travel demand are universal, and therefore, it

is expected that further meaningful results would be derived if the analysis is more

subdivisions by states. For example, if the data unit is concentrated in Florida, where the

state with the highest absolute demand, rather than the whole of the United States, the

results will be beneficial in that how it can benefit local tourists and governments.

Similarly, in the case of Utah, where the relative demand for pod travel is high, if the

spatial characteristics of natural resources (e.g., mountains, valleys) located in the area

are considered at the same time, it would provide a customized itinerary to tourists.

Lastly, the current study is longitudinal research implemented in 2020, and

thereby Twitter data was collected when the COVID-19 was in full swing. Depending on

the severity of the COVID-19 situation, fluctuations in the overall hospitality and tourism

industry will be different. Currently, the activity of COVID-19 is being caught to some

extent, and in practice, regulations on quarantine and social distancing are lowering a lot

around the world. Therefore, it will be meaningful to reimplement a similar study in the

future to figure out similarities and differences in results with the current study.

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