MODUL UNIVERSITY
PRIVATE UNIVERSITY VIENNA

# Visualizing Instagram Data to Identify Common Tourist Hotspots within Austrian Destinations

---

Master Thesis submitted in fulfilment of the Degree

Master of Science

in International Tourism Management

Submitted to Dr. Christian Weismayer

Katharina Ladurner, BA

51816622

Vienna, 20th of June, 2022

# AFFIDAVIT

I hereby affirm that this Master Thesis represents my own written work and that I have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed.
The thesis was not submitted in the same or in a substantially similar version, not even partially, to another examination board and was not published elsewhere.

20th of June 2022

Date

Signature

# ABSTRACT

Though the development of ICT in the past years has made an abundance of objective information available leading to a vast advancement in data analysis opportunities, destination decision makers often still rely on mere gut feeling and subjective experiences to make decisions in their destination development. One area where this becomes abundantly clear is in the understanding, or lack thereof, of the tourist movement within the destination.

Thus, the objective of this study is twofold. First to visualise and analyse easily available Instagram geotagged data from two destination case studies. In the course of the thesis, the second goal is for this paper to provide a manual on how further destinations can apply such research.

The research through case studies found that there are seasonal differences in post frequency for the destination as a whole as well as differentiating seasonal patterns among tagged locations. Hotpots of posts as well as blank spaces with no posts could be observed and a general concentration of tourists in the villages and mountains was detected. Lastly it could be seen, that the paths vary significantly between tourists both within the destination and in a comparison between destinations. However, there is a tendency for the posts to gravitate towards the centre of the destination.

In regard to the manual a six-step process that can be applied to other destinations was defined. The five steps are: Investigating the destination background, choosing the most useful hashtag and collecting the affiliated data, processing the data, visualising the data, interpreting the visualised data and lastly the individual findings and recommendations.

# ACKNOWLEDGEMENTS

First and foremost, I would like to thank my supervisor Dr. Christian Weismayer for his continuous support during my year of writing this thesis, specifically the technical and even more importantly moral support he extended to me at any given time. For at times the ICT part of my study as well as trying to find the light at the end of the tunnel had brought me to my limits.

In line with this, I want to acknowledge the ESPON "TOURISM – Carrying capacity methodology for tourism" project and analysis for being the origin of my idea for this thesis and inspiration for the methodological approach used.

Acknowledgments should also go to MODUL University Vienna and the amazing faculty, whose research has been quoted numerous times in this thesis. I would especially like to express my gratitude to the MODUL University Vienna Merit committee for permitting my scholarship proposal and in turn the Merit foundation for funding this thesis with a research scholarship.

Lastly, I am grateful to my circle of friends and family for their patience and understanding during my work on the thesis. Thank you for motivating me to push through. Specifically, I would like to highlight three people for their contributions. First my sister Anna-Maria Lam MSc for generously sharing her expertise acquired as research assistant and research study coordinator of the University of Alberta with me. Additionally, she took on the task of proofreading this thesis and ensuring I always found the correct words to bring to paper what was already clear in my mind. Secondly, I want to thank my friend Julian Flür for helping me whenever I got stuck on a particularly stubborn error message on my code. Finally, I want to thank my partner Johannes Kogoj, BSc for his continuous support throughout each and every chapter of this thesis.

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# LIST OF ABBREVIATIONS

| | | |
|---|---|---|
| AOI | - | Area Of Interest |
| AFITH | - | Attraction, Facilities, Infrastructure, Transportation Hospitality |
| BMLRT | - | Bundesministerium für Landwirtschaft Regionen und Tourismus |
| CBT | - | Community-Based Tourism |
| Csv | - | comma separated values |
| DACH | - | D – Deutschland (Germany), A – Austria, CH – Confederation Helvetica (Switzerland) |
| DM | - | Destination Mix |
| DMO | - | Destination Management Organization |
| eWOM | - | electronic Word-Of-Mouth |
| FOMO | - | Fear Of Missing Out |
| GDP | - | Gross Domestic Product |
| GDPR | - | General Data Protection Regulation |
| GSA | - | Germany, Switzerland, Austria |
| ICT | - | Information- and Communication Technologies |
| KPI | - | Key Performance Indicators |
| Lat | - | Latitude |
| Lng | - | Longitude |
| R-TSA | - | Regional Tourism Satellite Account |
| SM | - | Social Media |
| SME | - | Small and medium-sized enterprise |
| SNS | - | Social Networking Site |
| TSA | - | Tourism Satellite Account |
| UGC | - | User Generated Content |
| UNWTO | - | World Tourism Organisation |
| USP | - | Unique Selling Proposition |

# 1 INTRODUCTION

## 1.1 Current Situation

Tourism is a research topic that has been vastly looked into in academia with a specific focus on recognizing tourism as a key contributor to the economic situation globally as well as in specific countries and regions. However, even before the era of digitalization, urbanization, globalization and mobilization, tourism has always been an industry shaped by societal development (Butler, 2015; Echtner, 1999; Towner & Wall, 1991).

The modern concept of tourism can be traced back to the European noble youth taking on the Grand Tour, a round trip through Europe. Over the centuries tourism and travelling developed from something only available to the most upper classes, to something that many would consider a basic human need. Since its first traces tourism has faced many challenges ranging from World War II, the global financial crisis to the COVID-19 pandemic. Tourism has also gone through major developments such as the industrial revolution, commercialization of leisure air transport and the introduction of the world wide web in the late 1990s (Gössling et al., 2021; Papatheodorou et al., 2010; Weiss, 2004).

With those changes, whether it be technical advancements or globalization, mass tourism emerged and became a widely discussed issue in the 21st century. Destinations affected by mass tourism and their inhabitants voiced their concern and frustration with the development and the seemingly ever-growing numbers of tourists. Researchers forecasted distressing scenarios, for instance regarding the pollution, diminishing of historical heritage, gentrification etc. if this rise in mass tourism continues (Bui et al., 2020; Lee & Syah, 2018).

In some destinations that were particularly affected by over tourism, the resentment towards tourism grew to such a degree that protests against tourism arose and a global "tourism-phobia" was observable. Not only inhabitants but also tourists themselves started to negatively perceive the effects of the mass tourism trend. Overcrowding, surroundings polluted by tourists and hostile atmosphere towards tourists from locals were among some of the key indicators of tourist dissatisfaction. It is important to acknowledge

that simultaneously these reasons led to the trend for sustainable travelling that greatly conflicts with overcrowded mass tourism. This development of overcrowding also sparked a new area of research in the field of destinations maximum carrying capacity (Chong, 2020; Garau-Vadell et al., 2018; Vegnuti, 2020; Zekan et al., 2022).

In March 2020 the COVID-19 pandemic had an enormous disruptive effect on the global tourism industry and put all the issues stated above to a temporary halt. Now that tourism is slowly starting to pick up again worldwide, the same issues arise again. Before mass tourism, stakeholders of high-volume destinations had their sole focus on increasing the volume of travel, now they have to pay close attention to suitable and efficient infrastructure, facilities and services. Several studies indicate that sustainable tourism practices can mitigate the severe impact of tourism on natural resources and land use (Cucari et al., 2019; Wondirad & Ewnetu, 2019).

Thus, one of the key challenges of the tourism industry today is to provide suitable solutions to balance the life of the locals with tourism. To find those solutions and establish drivers for change, it is essential to understand how tourists are travelling in today's day and age. The aim should be to find a sustainable balance between giving the tourists the best possible experience whilst leading their flows in a way that does not, or least not negatively affects the destination's environment and community (Line et al., 2018; Pan et al., 2018; Rasoolimanesh et al., 2020; Streimikiene et al., 2021).

The introduction of Web 2.0 and more specifically social media has drastically changed how tourists travel and how tourism is perceived. Through posts on social networks, travellers have taken on a key role in destination formation. In 2020 almost 80% of adults in the U.S. said that they use at least one social media site to share photo or video content. The most common social media platforms being YouTube (81%), followed by Facebook (69%) and Instagram (40%). As daily life for most people around the globe becomes increasingly digitalized the number of traces we leave of our online activities increases and in turn the intensity of our digital footprint. In many industries, these footprints are already utilized and researched to a great extent. Specifically, the tourism industry was among the early adapters of integrating social media focused activities into their marketing strategy and researching different aspects of social media. The research ranges from sentiment analysis of social media posts to finding tourist-driven innovation ideas on

social media (Dickinger & Lalicic, 2017; Dickinger & Leung, 2017; Hvass & Munar, 2012; Hysa et al., 2021; Weismayer et al., 2021; Wiederhold, 2019; Zeng & Gerritsen, 2014).

As aforementioned, tourism has been greatly researched, but there are still many research gaps. The main focus of the research of digital footprints that has been conducted with a focus on city destinations and offers no easy application for other destinations. This becomes especially evident when DMOs (Destination Management Organizations) in rural Austria have to make decisions that could influence tourist flows. Often times there is no objective and factual data to rely on and decisions have to be made from gut feeling and tourism work experience (Mou et al., 2020; Önder et al., 2016).

Because of the current research situation, this thesis will explore the possibility of analysing geotagged data from social media networks, specifically Instagram to find out about current and upcoming hotspots and tourists' paths within the destination. To draw meaningful conclusions and make comparisons two destinations from within Austrian Alpine leisure tourism have been chosen (Montafon in Vorarlberg and Zillertal in Tyrol). For each destination 20,000 Instagram posts will be analysed and compared. The aim of the thesis is to create a straightforward and easy to apply, yet meaningful and objective data-analysis process for destinations to analyse and interpret their tourist flows according to Instagram, to make objective decisions in return.

## 1.2 Key Issue

Though ICT (Information- and Communication Technologies) have made immense advancements regarding data analysis in the past years and despite the availability of information about tourists behaviours in the destination, it can be concluded that currently, many destinations have little to no evidence-based data in regard to the movement patterns of locals and tourists alike. This results in a lack of objective input for making evidence-based decisions for future developments in several fields such as marketing, tourism flow management and destination organization. Various authors suggest that new and modernized approaches to destination management are necessary to improve destination performance and competitiveness. The DMOs themselves frequently face the challenge of understanding why, how and where the tourists activities within the destination take

place and as a result they lack understanding of how they can be controlled (Meriläinen & Lemmetyinen, 2011; Stienmetz & Fesenmaier, 2019; Zach & Gretzel, 2011).

## 1.3 Research Question

Given the research gap on tourist paths and hotspots, in rural Aline regions of Austrian destinations this thesis aims to answer the question:

"How can the identification of common tourist paths and hotspots through social media data in the past years help to improve decision making in regard to new implementations to destinations in the rural Alpine regions of Austria for destination management organizations and their stakeholders?"

## 1.4 Purpose and Objectives

The objectives of this study are twofold. The first goal of this research is to analyse the Instagram location data from two given destinations and find correlations that are applicable between destinations and to visualize them. In the course of the thesis, the second goal is to provide a manual on how further destinations can interpret their local Instagram data and highlight certain indicators that should be taken into consideration when making tourism-based decisions. Depending on the outcome of the analysis, destination management organizations as well as their stakeholders will be able to implement the analysis method in their decision-making process to investigate how well the given layout of their destination and the location of its most popular sights is working as well as how certain changes to this layout, the infrastructure, the marketing etc. could lead to a potential change in the common tourist paths. Moreover, the data will also help to recognize potential cases of overcrowding and other problematic trends at an early stage to avoid conflicts that could stem from tourist flows before the problem areas fully manifest.

## 1.5 Structure

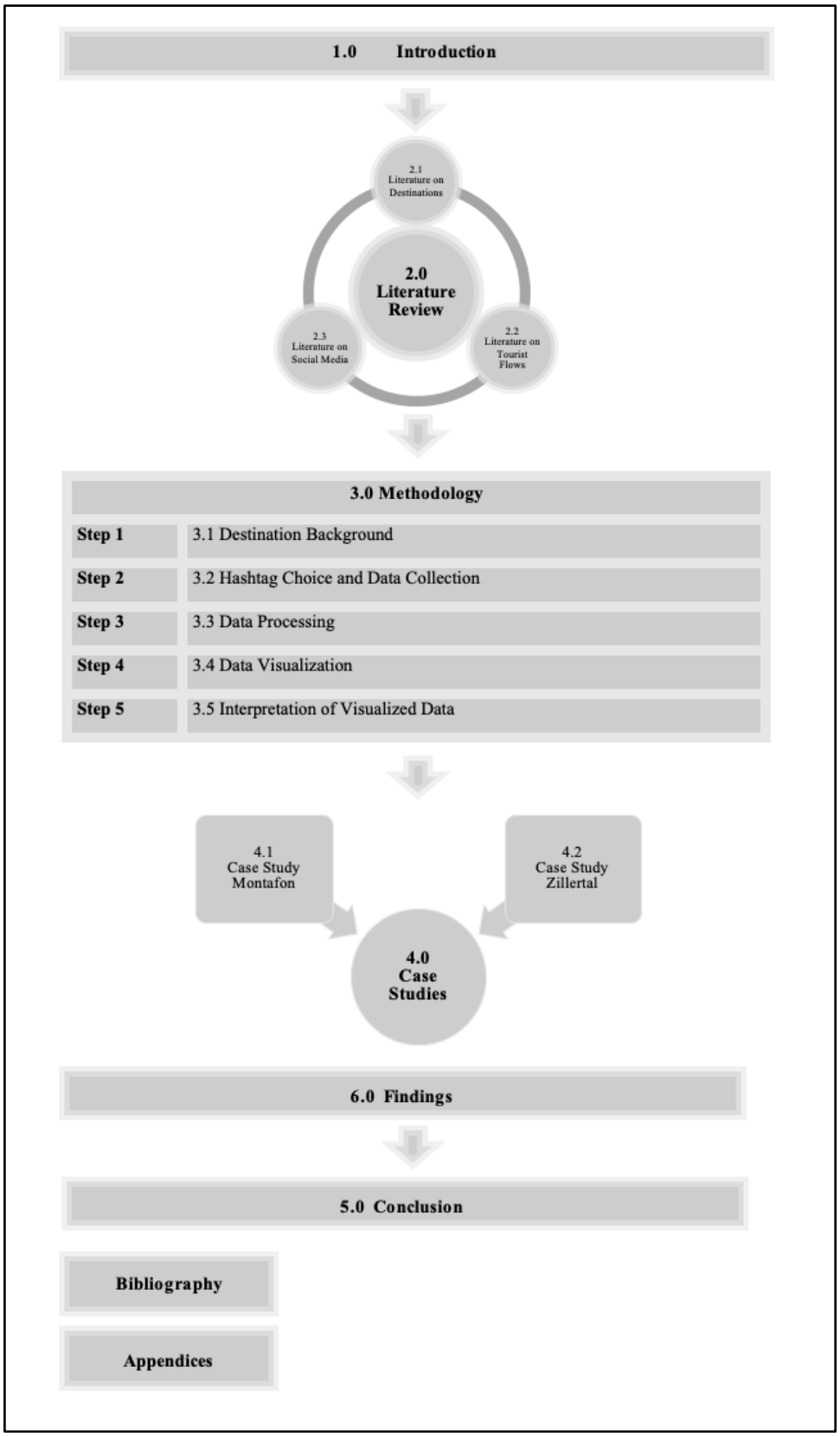


FIGURE 1 – THESIS STRUCTURE (OWN DESIGN)

This thesis is divided into 6 main chapters, starting with the introduction above as chapter one.

Chapter 1 – Introduction: The instruction gives an insight into the historical changes in tourism, the current state of tourism, underlines the importance of this research topic, as well as the research question to be answered and the main objectives of this thesis.

Chapter 2 – Theoretical Background: The next section, chapter two, is the theoretical foundation of this thesis and will discuss the main literature available from past research as well as relevant non-academic sources. The chapter is divided into three major parts: Destinations, tourist flows and social networking sites. Within those three overarching topics, the chapter aims to give insights and critically assess these topics most central terms, definitions and the current state of research. The chapter shows the strong connection between the three topics in tourism and highlights how past research confirms the relevance of the chosen topic as well as the validity of the chosen data basis.

Chapter 3 – Methodology: In the third chapter the used methodology is explained. This includes the process of data selection and acquisition, the data processing, the data visualization, the interpretation of the results and finally the formulation of recommendations based on the literature review. This chapter explains and gives an overview over the different steps taken in the following practical part of the thesis in the form of case studies.

Chapter 4 – Case Studies: This section of the thesis discusses the two chosen destinations individually. First an overview and some general insights about each destination are given, followed by an individual described and interpreted data analysis of each destination.

Chapter 5 – Findings & Discussion: In this chapter key findings and noteworthy correlation among the case studies are highlighted and discussed. This chapter also includes the suggested method for DMOs, and the research question is answered.

Chapter 6 – Conclusion: In the last chapter the content of the thesis is summarized, the limitations are shown, and methods are critically reflected. Theoretical implications as

well as managerial implications for both DMOs and other relevant stakeholders are laid out and some potential leads for future research and more research gaps are described.

Following the main content part of this thesis are the references and appendices. The references give a full overview of all the previous knowledge, academic and non-academic, that this thesis is based on. Lastly, the appendices give further information on the exact data used and codes compiled and can be used to promote further discussion. However, they are not inherently necessary to understand the findings of this research.

# 2 THEORETICAL BACKGROUND

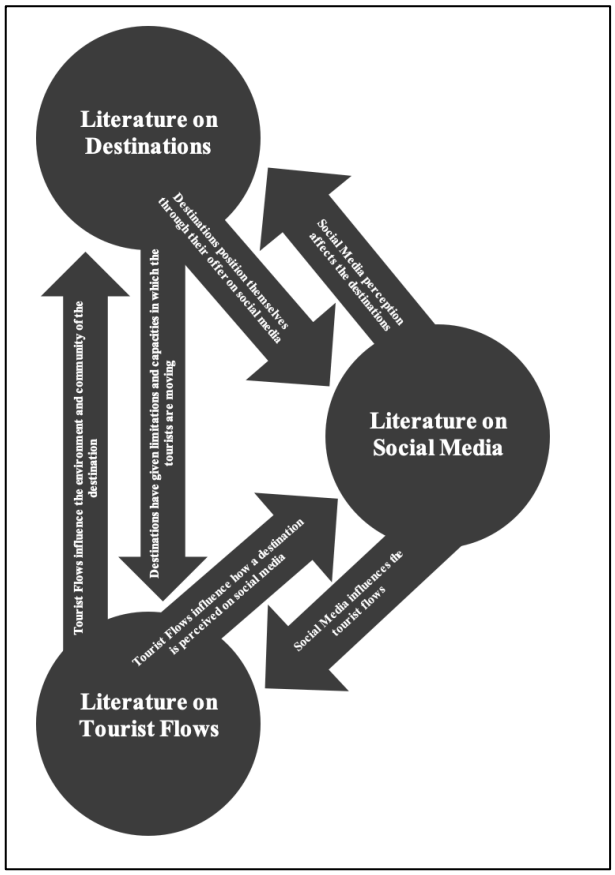


FIGURE 2 – THE REVIEWED LITERATURE STREAMS AND THEIR INTERRELATIONS (OWN DESIGN)

In this chapter the past research in the fields relevant to the thesis is covered. In the first section research regarding the subjects of this thesis, destinations, and the case of Alpine Austrian rural leisure tourism destinations will be explained in more detail. In the course of the chapter the importance of the destination management organization in tourism is laid out, as is their organizational structure in Austria.

In the second chapter the research on tourist flows, their importance, the monitoring methods and the management strategies thereof is laid out.

In the third and last chapter of the literature review the existing research on the influence of social networking sites on the tourist behaviour is explained, the key drives of social media use are laid and relevant social media channels in tourism are listed.

## 2.1 Austrian Alpine Leisure Tourism Destinations

Considerable tourism research has established a broad understanding of what destinations are and nowadays, they are a well discussed topic within academic literature in tourism. Destinations are viewed as productive-systems with a market-oriented view that consist of characteristics from the demand and supply side. The supply side is made up of a network of stakeholders as well as resources needed to create the supply of the destination. On the demand side there are the tourists as well as their flows (Gajdošík et al., 2017).

Due to the importance of the tourism industry to the Austrian economy, many aspects of the country's tourism have been researched the demand as well as the supply side in the past. It has been found, that specifically the most western federate states of Austria have been significantly shaped by the influence of alpine leisure tourism (Bätzing, 2016; Gajdošík et al., 2017; Mayer et al., 2013).

This chapter will focus on the supply side of tourism destinations and how they operate, whilst chapter 2.2 Tourist Flows will focus on the demand side and what influences their decisions.

### 2.1.1 Tourism Destinations

Due to the variety of types of tourism, as well as vacations being a bundle of specific and customizable services, there have been various attempts to define what a destination is from a supply perspective. The most basic definition of a destination that researchers commonly agree on is, that a tourist destination can be described as a geographical area (village, town, city, region etc.) that the tourist perceives as the place of their holiday. Therefore the tourist destination in incoming tourism is the competitive unit that acts as one strategic business entity (Bieger, 1996; Bieger & Beritelli, 2013; Flagestad & Hope, 2001; Melián-González & García-Falcón, 2003).

More broadly a tourism destination can be described as several distinct services on the supply side that make up a system. Amongst each other the actors are interrelated through various activities and potentially shared resources (Frechtling, 2010; Stienmetz & Fesenmaier, 2019; Zach & Gretzel, 2011). One widely accepted definition was formulated by the World Tourism Organization (UNWTO, 2007):

*"A local tourism destination is a physical space in which a tourist spends at least one overnight. It includes tourism products such as support services and attractions and tourist resources within one day's return travel time. It has physical and administrative boundaries defining its management, and images and perceptions defining its market competitiveness. Local destinations incorporate various stakeholders often including a host community and can nest and network to form larger destinations. Destinations could be on any scale, from a whole country (e.g. Australia), a region (such as the Spanish 'Costas') or island (e.g. Bali), to a village, town or city, or a self-contained centre (e.g. Center Parc or Disneyland)."*

The UNWTO (2007) has also proposed that the destination is the fundamental unit to be analysed in tourism research.

It should be mentioned that more advanced definition will include factors besides geographical ones such as, social factors, cultural factors and organizational elements attached to certain attractions (Freyer, 2009; Stickdorn & Zehrer, 2009). This thesis focuses on the destination as a geographical unit and the tourist behaviour within this geographical area, thus the prior definition will be applied.

Generally, it is agreed upon that a tourist destination includes all necessary elements for the bundle of services that make up the holiday of the tourist. The destination must contain a combination of different elements to satisfy the tourists needs (Frechtling, 2010; Stienmetz & Fesenmaier, 2019; UNWTO, 2007; Zach & Gretzel, 2011). However, not unlike the definition for the destination itself, the definition of the common basic elements included differentiates amongst researchers. Similarly, the definition brought forward by the World Tourism Organisation (UNWTO, 2007) is commonly accepted. It defines the elements of a tourist destination as accessibility, attractions, human resources, image and character, price and public and private amenities. Another commonly used definition was brought forward by Morisson et al. (2012 & 2009) and defines the elements of the destination as the Destination Mix (DM) or AFITH, which stands for attractions, facilities, infrastructure, transportation and hospitality. A third definition comes from Cooper et al. (1993) and describes the "4-A's" of a tourist destination: access, amenities, ancillary and attraction. In the table below the mentioned elements have been compiled.

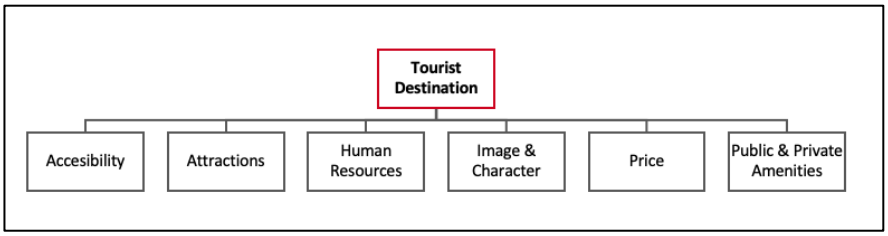


FIGURE 3 – THE BASIC ELEMENTS OF THE TOURISM DESTINATION (SOURCE: WORLD TOURISM ORGANIZATION (2007), P.1)

*Accessibility*

This element includes the afore mentioned elements Access and Transportation. Accessibility is defined as how easy or difficult it is to reach the destination, in other words the transportation needed and available. Accessibility is the linkage between the destination and the source of tourists and can thus be seen as a bridging component. Generally, three main modes of travelling to a destination are differentiated. The first one being air transportation, mainly used for long distance travelling. Secondly surface transportation which includes railways and roadways. Lastly water transportation, being the oldest mode of travelling. In most cases, accessibility is a means to an end but there are exceptions, where the transportation is concurrently the attraction. For instance, famous trains such as the Orient Express or the Trans-Siberian Express or award-winning first-class flights such as Emirates or Qatar. Besides the mode of travelling the accessibility also includes bureaucracy involved to get to the destination such as visa requirements, entry conditions or ports of entry (Cooper et al., 2005; Morrison et al., 2018; UNWTO, 2007; Vanhove, 2018).

*Attractions*

The attractions are often considered the main focus of a tourist destination in leisure tourism, as they are a key incentive to visit a certain area and for some travellers a precondition to travel. Generally, attractions are divided into natural and man-made attractions. Natural attractions include beaches, mountains, wildlife, climate, fauna and flora, waterfalls, lakes etc. – all attractions that exist in nature itself without initial human influence. In comparison man-made attractions are developed by humans. They can further be divided into primary man-made attractions that were not specifically built for tourism purposes and purpose-built attractions, specifically constructed for tourism purposes. The primary man-made attractions can include built attractions (architecture, religious

monuments such as cathedrals and mosques, archaeological sites, shopping malls, natural parks, sport stadiums etc.), cultural attractions (theatres, museums, festivals, carnivals etc.) and social attractions (native language, regional, dialect, ethnic groups, way of life within the destination, ancient traditions etc.). In comparison the purpose-built attractions can include sights such as theme parks, ski tracks, festivals, events, marinas etc. Events such as exhibitions, congresses, trade fairs, sports events and festivals are also considered attractions and fall under the category man-made. For instance, this means that an event can fall into the category primary man-made or purpose-built. This depends solely on the primary focus and whether it is on tourism or not (Cooper et al., 2005; Morrison et al., 2018; UNWTO, 2007; Vanhove, 2018).

*Human Resources*

The tourism product largely relies on labour intensive services and interactions. Thus, a well-qualified workforce is key to deliver high quality service to satisfy the customers. Besides, the people employed within the industry, the factor human resources also include the locals of the destination. The locals should have an agreeable view of tourism and be equipped with awareness of the responsibilities and benefits of tourism in their destination (Murphy et al., 2000; UNWTO, 2007).

*Image & Character*

Image and Character of a destination are a key to attract visitors to travel to the destination. This differs from the attractions and facilities as it is not sufficient to simply have them without visitors being aware of their existence. The image can include factors such as, the uniqueness of the destination, quality of the environment, safety, service levels etc. To raise awareness of the attractions and facilities, different means of marketing and media can be used. Such means include social media marketing via multiple channels through the DMO page or the pages of the suppliers themselves, influencer marketing, marketing campaigns in print media, PR work such as tourism trade fairs etc. (Murphy et al., 2000; Ritchie & Crouch, 2003; UNWTO, 2007).

*Price*

Pricing is specifically important in regard to competing with other destinations. The price is made up though cost of transport, accommodation, food and services, attractions, as

well as currency exchange rate and other economic features. Price can be seen as a supply component ( Ritchie & Crouch, 2003; UNWTO, 2007; Vanhove, 2018)

*Public & Private Amenities*

This element includes the before mentioned elements such as infrastructure, accommodation, hospitality and ancillary services. The amenities are defined as services and facilities such as, basic infrastructure, accommodation, food and beverage services, visitor information, guides, recreation facilities – all facilities that support the stay of the visitor (Cooper et al., 2005; Morrison et al., 2018; UNWTO, 2007).

The three elements image and character, human resources and price differ from more classical approaches, however, their importance to the destination product has been confirmed by various studies. For instance, merely having a wide range of amenities and attractions is not sufficient, if potential visitors are not aware, if there is no workforce to operate them or if the price is not competitive (Vanhove, 2018).

The table below explains one phenomenon of destination definition. The farther away the destination is from the home country of a traveller, the broader the definition is of what makes a destination. Incoming travellers from Germany to Austria may define the destination as the region, valley, village or city they spend their holidays in, whilst travellers from overseas more frequently see the country of Austria or the continent of Europe as their potential or chosen holiday destination. Besides the distance, the definition of the destination is also dependent on the travel motivation. The more specific the motivation, the more narrow the definition of what the destination is, for instance in congress tourism or wellness tourism often the resort / hotel that the stay takes place in is defined as the destination, rather than a village, region, country or continent (Dettmer et al., 2005; Luft, 2007).

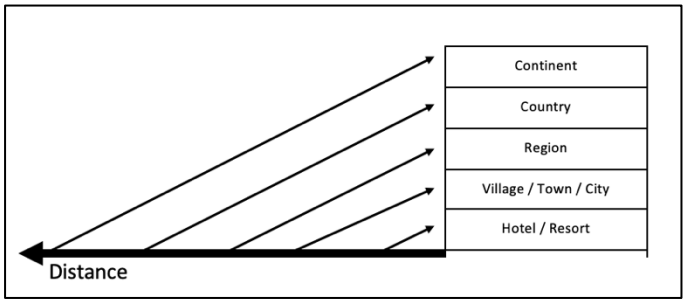


FIGURE 4 - DESTINATION DEFINITION OF INCOMING TOURISTS BY TRAVEL DISTANCE (OWN DESIGN BASED ON DETTMER ET AL. (2005) & LUFT (2007))

In regard to the organization of the destinations, there are two commonly differentiated destination models in leisure tourism: community-based and corporate-based. Both are two extreme theoretical models of organizational structure and are applied in a descriptive and qualitative way by various researchers in their studies. The discussions often focus on the extreme cases of both examples, to evaluate the importance of executive structures and administrative power in a destination. However, research has not found much evidence on how to measure the extremes as well as their dynamics. It has been found, that the success of each of the models strongly depends on the context and the given conditions (Beritelli et al., 2007; Bieger & Beritelli, 2013; Jamal & Getz, 1995; Pechlaner & Osti, 2002; Sheehan & Ritchie, 2005).

In its pure form, corporate-based destinations are characteristically operated and managed by one single company. The companies run all necessary tourism operations with their subdivisions including hotels, hospitality, uphill transportation, skiing schools, skiing areas and animation program. These centrally managed and integrated destinations are challenging the more traditional, continuously grown community-based model. Destination management in a corporate model consists of hierarchical relationship and emphasizing the dyadic perspective. The corporate model is especially prominent in the North American leisure tourism market, though few examples of the pure form exist. Examples of destinations that are operated by one or very few businesses include Aspen, Vail and Boyne in the United States (Beritelli et al., 2007; Flagestad & Hope, 2001).
Destinations that are managed centrally have several advantages:

- Developing more distinct, differentiated and focused strategies
- Decisions can be made quicker
- Measures are implemented quicker

(Alter & Hage, 2016; Bodega et al., 2004; Miles & Snow, 1986; Powell, 1991).

The second destination model, community-based destinations is characterized through SMEs making up a majority of the tourism businesses within the destination. These businesses act as mostly self-standing business entities, none of which have a dominant management authority. Ideally, the businesses collaborate within each other for synergy effects. However, due to the scattered ownership patterns, hierarchical environment and variety of independent actors, a direct top-down management with maximum

administrative control is challenging to implement. In the community-based context, destination management consists of the transactions and personal relationships within the destination network. This carries over to the development process, which includes information connections, trust and knowledge. Community-based tourism (CBT) is widely viewed as a more social approach to improve local economies. However, there is often little organizational structure, little substance and no strong drive for management and improvement if not politically motivated. There is some evidence that suggests that in destinations with not well-developed infrastructure, CBT has increased the quality of life of inhabitants by increasing the number of roads, facilities and recreational attractions as well as job creation within the community. However, in these studies there was no comparison drawn to corporate destinations in similar situations. Generally, the strategic leadership in CBT destinations is strongly influenced by the stakeholders and shows a higher concern for issues such as destination planning with the local inhabitants in mind, environmental issues, sustainability etc. The model with several independent stakeholders is especially prevalent in traditional European tourism. Examples of this style include the Austrian destination cases discussed in this thesis (Bieger & Beritelli, 2013; d'Angella & Go, 2009; Flagestad & Hope, 2001; Gajdošík et al., 2017; Lee & Jan, 2019; Volgger & Pechlaner, 2014; Williamson, 1991).

Both differentiated models have certain advantages and disadvantages and differentiating characteristics. The characteristics can be divided into asymmetries in power, experience and knowledge, informal and personal relationships, interdependence, transaction costs and trust and control. The differences in these common characteristics are highlighted in the table on the next page.

| Common Characteristics | Corporate Based Model | Community Based Model |
|---|---|---|
| Asymmetries in Power | High focus on the dominant company / companies Strong influence from governmental / public institutions | Highly dependent on the formation of coalitions and interest groups, as well as ownership structures |
| Experience & Knowledge | Highly detailed and specified, focused on factors with relevance in regard to business strategies for the destination | Very varied and diffused, more general and historical knowledge and experience. High amounts of knowledge on the individual relationships and institutions |
| Informal & Personal Relationships | Very limited and only among few actors | Highly networked environment with numerous varied relationships |
| Interdependence | High interdependence among the dominant companies and between them and the governmental / public institutions | Very diverse, however dependent on the destination's degree of integration of services and the diversity of their market portfolio |
| Transaction Costs | Lower as they are limited to the dominant companies and their businesses partners | Generally higher, however highly dependent on how many actors and institutions are involved |
| Trust & Control | More control than trust, enforced by formal contracts and mechanisms among the dominant companies, as well as between the dominant companies and the governmental / public institutions | Many relationships built on mutual trust with no formal contracts or control mechanisms. Trust is needed to make decisions and come to actions. Focus on social control rather than institutional control. |

TABLE 1 - CHARACTERIZATION OF COMMUNITY AND CORPORATE MODEL (OWN REPRESENTATION BASED ON BERITELLI ET AL. (2007); BIEGER & BERITELLI (2013); PECHLANER ET AL. (2013) & YIN (1981))

Research has shown that destinations funded on the community-based model perform better. Corporate-based models lack internal competition within the destination and therefore have lower motivation and drivers for innovation and customer orientation. Researchers have noted that destinations that lean more towards the community-based end of the spectrum, are only more likely to have a high performance, if an overarching coordinating body is present. This is why specifically in this model, the DMO usually builds the core of the destination, is the main driver for strategic business actions and change and aims to satisfy the needs of the stakeholders (Bieger & Beritelli, 2013; Flagestad & Hope, 2001; Gajdošík et al., 2017; Nordin & Svensson, 2005; Pechlaner et al., 2013; Yin, 1981).

The focus of this thesis are Austrian destinations that fall into the category of leisure tourism with the main source markets being the surrounding countries. In this context and in these cases the region / valley makes up the community-based destination and is managed as such by the destination management organization. The exact organization of each destination will be explained in the research part of this thesis, chapter 4.0 Case Studies.

### 2.1.2 Destination Management Organization (DMO)

DMOs refer to organizations of the regional tourism management that have taken on tasks overarching between the numerous actors within the destination, as mentioned in the previous chapter. This is why specifically in this model, the DMO usually builds the core of community-based destinations, which is the predominant organization model in Austria.


FIGURE 5: THE MAJOR MANAGERIAL FUNCTIONS OF DMOS (OWN DESIGN BASED ON STICKDORN & ZEHRER (2009), P.5)

As highlighted in the figure above, based on previous research (Beritelli, 2009; Bieger, 1996; Stickdorn & Zehrer, 2009), the DMOs have four major tasks: marketing, strategic planning, product development and interest representation. These four tasks, as defined by the above-mentioned researchers, are loosely based on the "Ps" of the marketing mix framework by McCarthy (Product, Price, Place, Promotion). This model has widely been adopted by researchers with additional "Ps" as suitable (McCarthy, 1960).

*Marketing (Promotion & Place)*

The first core function is the destination marketing and can be described as more advanced than the other major tasks of the DMOs. The overarching goal is to attract visitors and to enhance public relations, sales and general communication by establishing a strong, distinguishable, attractive and unique brand for the destination. Though this function is often more developed nowadays, DMOs marketing departments are still frequently facing modest resources and small budgets, that makes it challenging to reach a satisfying outcome for the destination. Specifically, in fragmented community-based destinations this is a source of conflict as some stakeholders may feel miss- or underrepresented in the marketing efforts. In additional, there is a higher tendency for "free-rider" behaviour where certain actors will not stick to the set-up marketing strategy for the destination. Because of this, it is increasingly important to co-ordinate the destination marketing with the stakeholders to mobilize them by developing an integrated marketing process. Studies have shown that even if only a limited budget is available and if working in a fragmented destination, the DMO has the ability to develop effective marketing strategies and activities through the mobilization of the stakeholders and using the combined resources of them to create synergy effects. Because of the mobilization of resources controlled by stakeholders, keeping the stakeholders engaged and participating should be a main focus of the destination marketing (Buhalis, 2000; Elbe et al., 2009; Gretzel et al., 2006; Sheehan & Ritchie, 2005; Wang & Fesenmaier, 2007).

The afore mentioned introduction of social media and Web 2.0 has changed tourism drastically. With this, it has also greatly influenced the marketing in tourism, and it plays a major role in destination marketing. Destination Marketing in relation to social media has been acknowledged as a key driver of future sustainable destination growth. Generally, Web 2.0 offers cost-effective ways of promoting a destination to a broad audience, making larger scale marketing more available to smaller destinations. Web 2.0 and SNS

(social networking sites) as well as social media (SM) encourage a dialogue between the DMOs and the destination stakeholders including the tourists, the public and private sector as well as the residents of the destinations (Hays et al., 2013; Mariani, 2020; UNWTO, 2011).

When looking at destination marketing, it is important to keep in mind the biggest limitations that the destination management organizations face. The marketers have little control over the actual experience of the visitors in the destination, specifically because the tourism product is made up of the services and products from so many actors. The marketers have low influence on the tourism acceptance in the community and thus on how tourism-friendly the residents are. The marketers can barely change issues regarding accessibility of the destination such as the development of railways, roads or airway structures. Lastly the marketers have little influence on the product development and marketing of the individual stakeholders, apart from joint promotions (Fyall, 2011; Howie, 2003; Page et al., 2010; Pike & Page, 2014).

As mentioned, this chapter deals with the supply side of the destination only. In chapter 3.0 the social media behaviour of tourists will be further discussed.

*Strategic Planning*

The second task is the strategic planning, meaning that they should overlook the development, implementation and monitoring of the destinations long-term strategy, but also the analysis of the market and the positioning in the market. Because the events and the (mega-)trends that are influencing the external environment are changing at a faster pace and increasing in complexity, planning strategically is becoming increasingly important for DMOs. Due to this fast pace, there is also a need for room for flexile and quick reaction to changes within the destination. The factors that are influencing the destination and thus make strategic planning necessary, can range from political and environmental instability to socio-demographic trends in their source markets (Formica & Kothari, 2008; Murphy, 2014; Ritchie & Ritchie, 2002; UNWTO, 2007, 2011).

To keep up with competitors in an information-intensive and fast paced environment, the ability and capacity to collect, process, analyse, interpret and act on data is essential. The organization must be able to recognize every development and change in their immediate

and external environment. However, in the flood of information a destination is facing, some developments or changes are not necessarily useful, but rather difficult to analyse, difficult to detect or not indicative of a real change. DMOs have to be able to identify the relevant information in a scanning process and analyse and interpret the relevant information to use it as a factual base in their decision making (Formica & Kothari, 2008; Johnson Tew et al., 2008; Soulard et al., 2018; UNWTO, 2007).

This factual base in the decision-making process is something that many DMOs are lacking and the focus is more on individual and subjective experiences, rather than objective facts. An issue that many DMOs that are trying to establish strategic planning are facing is the high power of governmental authorities, especially on the infrastructure. Due to this, the strategic plans of the DMOs are not always feasible if budgetary support or general consensus with these powerful authorities is lacking. A second issue when it comes to strategic planning specifically in community-based destinations, is that it can be difficult to reach meaningful changes. This can be attributed to the fragmented nature that makes a high degree of stakeholder support and stakeholder participation of the many individual stakeholders within the destination necessary to establish desired changes (Bieger & Beritelli, 2013; d'Angella & Go, 2009; Fyall, 2011; Pechlaner et al., 2013; Volgger & Pechlaner, 2014).

A recent study by Soulard et al. (2018) found, that to increase successful strategic planning in destinations, there are certain social dynamics that facilitate a positive development by increasing the stakeholder support and participation. Their results suggest, that bridging and bonding the social capital of the destination stakeholders are essential to develop, implement and evaluate the strategic plans of the destination. Bonding refers to the social ties within the industry stakeholder communities, whilst bridging refers to social ties between different stakeholder communities. Additionally, the study shows, that strategic planning that is based on building strong social capital will lead to pro-longed stakeholder support and participation. Table 2 below outlines their results and the measures they suggest for increasing the success of strategic planning through bonding and bridging. These results have previously been confirmed by various other studies and researchers, specifically the results by Flora (2004) in "Community Dynamics and Social Capital" (Flora, 2004; Hwang & Stewart, 2017; Soulard et al., 2018; Todd et al., 2017; Zahra & McGehee, 2013).

| **Recommendations for Successful Destination Planning** | |
|---|---|
| **Bonding** | **Bridging** |
| Avoiding disconnecting stakeholders from plans and objectives with ongoing consultation and consideration to their inputs whilst creating strategies and goals. | Engaging relevant agencies and building bridges between them, specifically paying attention to potentially relevant outside agencies from the tourism industry, such as transportation agencies. |
| Balancing a position of leadership and inclusion of stakeholders to guide the process and successful implementation of strategies. | Increasing the political visibility of tourism to legislatures by encouraging teaming up of stakeholders from different branches within the tourism industry (e.g.: accommodation, attractions, gastronomy) |
| Encouraging communication among stakeholders to compare and evaluate contrasting opinions and priorities, to involve stakeholders of the process, difficulties and accomplishments. | Making plans politically independent and "owned" by the industry to weather political change. The industry owned plan can partner with the governmental tourism agencies for the implementation. |
| | Keeping stakeholders onboard and their high involvement by including elements in every step of the plan that will be reached very easily and cursorily to create an initial momentum and convey success. |

TABLE 2 - RECOMMENDATIONS FOR SUCCESSFUL DESTINATION PLANNING (OWN DESIGN BASED ON SOULARD ET. AT (2018) P.197-198)

*Product Development (Product, People, Price & Process)*

The thirds task is the product development. The main goals are to create new products and turn the offered services into bundled products that can be sold to tourists, offer an overview to the existing products and supervise their quality, organizing destination wide events and activities and staff training. Product development does not necessarily include creating a completely new experience but to be the evolvement of an existing product. The primary tourism product is a key factor of heightening tourist motivation to visit a destination. The focus of the development of a region lies in the idea, of promoting a distinguishable and marketable identity of the destination and to make them more available for the consumers. The product development should be in line with the general

destination strategies and be based on the philosophy / mission statement of the destination (Benur & Bramwell, 2015; UNWTO, 2007).

A major part of the product development is the territory branding or product positioning. The territory, in the sense of a destination, is branded with the aim of creating an additional meaning and value and to make the destination distinguishable amongst the competitors. This development also aims to trigger positive associations in the eyes of the tourists and other stakeholders. The product positioning is necessary to target a specific audience. Nowadays, the positioning of a destination takes largely place online, as a majority of traveller's choses to research their holidays online. As afore mentioned, the tourism product is fragmented and made up of a combination of elements that can be intangible or tangible, which can pose as a problem to communicate the destination as a coherent product. Generally, the primary tourism product strongly relies on the physical and environmental characteristics (landscape, climate etc.) of the destination as well socio-cultural aspects (politics, history, economic activities etc.) (Benur & Bramwell, 2015; Danylyshyn et al., 2020).

A key challenge and purpose in product development is applying growth strategies for the product. One commonly referred to framework, in this regard for destinations, but also in tourism and other industries, is the Ansoff Matrix or Product/Market Expansion Grid. The original version of the matrix proposed that there are four main product market combinations that will give a choice of four strategic product development strategies as can be seen in the table below (Ansoff, 1987; Benur & Bramwell, 2015; Kotler, 1999; Meldrum & McDonald, 1995).

| | **Existing Product** | **New Product** |
|---|---|---|
| **Existing Market** | Market Penetration | New Product Development |
| **New Market** | New Market Development | Diversification |

TABLE 3 – THE ANSOFF MATRIX (OWN DESIGN, BASED ON ANSOFF (1987))

Since the original model, there have been multiple variations proposed. For instance, a version by Kotler (1999), with reference to research done by Maidique & Zirger (1984), is now commonly agreed to be a suitable extension, specifically for products with a small product-lifecycle. The matrix of Kotler (1999) adds the dimension of "modified product" in-between new and existing ones. It also splits up the market dimension into "existing markets with an existing target group" "existing geographical market with new target group", "new geographical market with an existing target group" and "new geographical market and a new target group". The matrix has been criticized due to its simplicity, as it completely disregards the competition aspect, as well as individual strengths and weaknesses. Specifically, now the issue has also been raised, that the matrix is limited to growing markets and cannot be applied to markets with a decreasing volume (Ansoff, 1987; Khongrat, 2021; Kotler, 1999; Maidique & Zirger, 1984; Meldrum & McDonald, 1995).

*Interest Representation (Politics)*

Lastly, the fourth task is the interest representation. This is often described as the primary task of the DMO and is a relatively layered one. The main goal is to find a satisfactory balance between the interests of the internal and external stakeholders of the destination but also of the internal stakeholders themselves. The role of the DMO as a networking manager is becoming increasingly important as the necessity of collaboration amongst the destination stakeholders grows. Specifically, this refers to reducing and solving conflicts among the stakeholders with different, at times conflicting interests. The task also includes upkeeping a steady flow of information to and between the stakeholders. The second major part of the interest representation is supporting the tourism awareness and a positive attitude towards tourism from the residents of the destination and all destination stakeholders (Beritelli, 2009; Bieger & Beritelli, 2013; UNWTO, 2011).

Besides this role as a networking manager and tourism awareness riser, the DMO also takes on the role as representing the interest of the internal destination stakeholders in tourism politics. Especially for the sustainable development of the destination it is essential that representatives of the destination are in constant contact with local and regional governmental and general political authorities. Specifically in regard to concrete and ongoing projects, this strong relationship building is close to necessary to achieve success (Beritelli, 2009; Stickdorn & Zehrer, 2009; UNWTO, 2007).

In addition to those four core tasks, many destinations take on operative functions within the destination such as, tourist information, ticket sales, accommodation booking, environmental management, conservation of cultural heritages and disaster planning (Stickdorn & Zehrer, 2009; UNWTO, 2007).

As mentioned in the previous chapter, in community-based destinations the DMO's build the core of the destination. However, often they only have superficial influence on the product and price repertoire of the destination, as the standalone businesses themselves make those decisions and communicate them. The role of DMO's is becoming increasingly more important as the globalization progresses and thereby global competition and rivalry is gradually increasing. This results in smaller destinations having to compete in an international context, and increases the importance of a strong and coherent destination strategy led by the DMOs and implemented by the stakeholders (Buhalis, 2000; Gálvez-Rodríguez et al., 2020).

### 2.1.3 Tourism Organisations in Austria

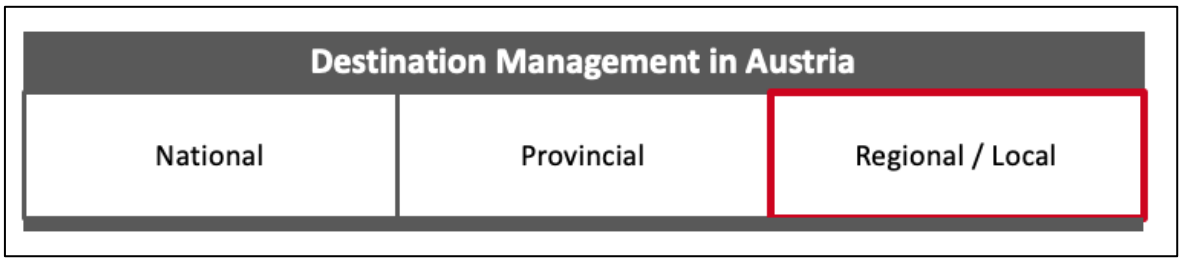


FIGURE 6- AUSTRIAN DESTINATION MANAGEMENT ORGANIZATION STRUCTURE (OWN DESIGN BASED ON KOHL & PARTNER, (2018), P.6)

The national organization of DMOs depends on the country and often on the organization system of the country. As this thesis looks into destinations in Austria, the table above highlights the organizational structure of DMOs in Austria. On a national level there is one national tourism agency called "Österreich Werbung" or "Austria Tourism" in their English appearances. The core function of the national tourism agency "Österreich Werbung" is the coherent branding of the destination Austria on a global scale and to spread knowledge and awareness to potential tourists and tourism companies internationally (Österreich Werbung, 2022).

The agency is also in direct contact with the Austrian national political authorities, which is as of the writing of this thesis as per their website still the Bundesministerium für Landwirtschaft, Regionen und Tourismus (BMLRT) / Federal Ministry Republic of Austria for Agriculture, Regions and Tourism. There has been a recent political change as highlighted in the graphic below with the resignation of the latest minister Elisabeth Köstinger (ÖVP) in May of 2022. After her resignation, which happened simultaneously to the resignation of the minister of digital and economic affairs Margarete Schramböck (ÖVP), the ministries are in the progress of reorganization. In the process of the reorganization the BMLRT will be reformed to the Federal Ministry Republic of Austria for Agriculture and Regions under the new minister Norbert Totschnig, now excluding the tourism industry. The Federal Ministry for Digital and Economic Affairs will be absorbed by the Federal Ministry of Labour under minister Martin Kocher, now called Ministry of Labour and Economic Affairs, thus excluding digital affairs. Due to this change and tourism not being represented in a ministry explicitly, Susanne Kraus-Winkler (ÖVP) was appointed to the position of secretary of state for tourism within the Ministry of Labour and Economic affairs on the 10th of May 2022. (BMLRT, 2022; ORF, 2022a, 2022b, 2022c; Österreich Werbung, 2022).

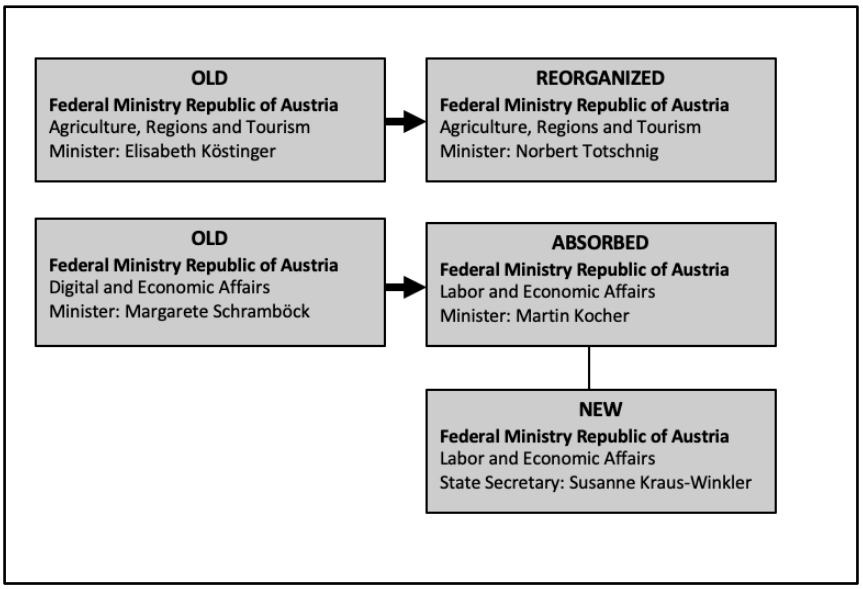


FIGURE 7 - REORGANIZATION OF THE AUSTRIAN MINISTRIES AFTER THE RESIGNATION OF KÖSTINGER AND SCHRAMBÖCK IN MAY OF 2022 (OWN DESIGN BASED ON ORF (2022A) P.1)

Moving on to the smaller tourism organizations, there are 9 provincial tourism agencies as the DMOs are divided by county (Burgenland Tourismus, Kärnten Werbung Marketing & Innovationsmanagement, Niederösterreich-Werbung, Oberösterreich Tourismus, SalzburgerLand Tourismus, Steirische Tourismus- und Standortmarketing, Tirol Werbung, Vorarlberg Tourismus, Wiener Tourismusverband). Generally, their core functions include political representation of the tourism destinations withing their province on a national level as well as coherent marketing of their provinces' tourism offer and USPs (Unique Selling Proposition) (BMLRT, 2022).

The core function of the smallest entity, the reginal or local DMOs, lies in being the central coordinator of the destination network of stakeholders. In the course of the thesis the focus will be on this the smallest entity of two regional DMOs within the provincial tourism agencies of Tirol Werbung and Vorarlberg Tourismus. In Tyrol the case that will be analysed, is of the Zillertal (Zillertal Tourismus GmbH) and in Vorarlberg the Destination Montafon (Montafon Tourismus). In chapter 4 both of the destinations will be characterized (Acosta et al., 2019; Egger et al., 2022; Montafon Tourismus, 2022d; Pikkemaat et al., 2018).

In the following chapter, the importance of these rural alpine destinations for the Austrian tourism industry and the Austrian economy will be highlighted.

### 2.1.4 Importance of Alpine Leisure Tourism and its Sustainability in Austria

Tourism is an important industry to the Austrian economy across the country. According to the Tourism Satellite Account (TSA) in 2019 5.5% of the Austrian Gross Domestic Product (GDP) can be directly attributed to the tourism industry and up to 7.5% including the indirect revenue of tourism. In 2020, a year marked by the impact of COVID-19 and as such one of the biggest tourism crisis the Austrian tourism industry has faced until now, the tourism industry still made up for 4% of the Austrian GDP directly and 5.5% including indirect value (Statistik Austria, 2021a).

Though all nine federal provinces of Austria are at least partially in alpine areas, commonly when referring to the alpine region of Austria, only the provinces that are completely within the alpine area are included in this thesis. These areas are the three most western provinces of Austria: Vorarlberg, Tyrol and Salzburg, as well as the more eastern

provinces Styria and Carinthia. The alpine region has a high importance within the Austrian tourism industry and in general the country's tourism industry is significantly shaped by the influence of alpine tourism. This is furthermore confirmed when examining the bed nights distribution across Austria. In 2019, more than half (50.7%) of the booked overnight stays in Austria were in the three most western provinces: Tyrol (28.0%), Salzburg (17.4%) and Vorarlberg (5.3%). Even more relevance to the topic of the master thesis, as can be deprived from the figure below, the bed nights per inhabitant are highest in the western regions of Austria. Especially, in those regions an efficient infrastructure, sound destination / attraction layout and a clear destination strategy in regard to tourist flow management are crucial to avoid undesirable overcrowded hotspot areas in the touristic villages and towns (Čede et al., 2018; Löffler et al., 2016; Statistik Austria, 2020). This was further confirmed by the regional tourism satellite account (R-TSA), which showed the varying results on the basis of eight federal provinces of Austria, all provinces except Vorarlberg, making them comparable on a national level. The R-TSA was first calculated in 2021 and retroactively applied for the past years starting from 2018. Per the report of the year 2018, Tyrol takes on the first rank regarding tourist spending and direct and indirect induced economic impact of tourism. Salzburg is on the third rank behind Austria's capital Vienna.

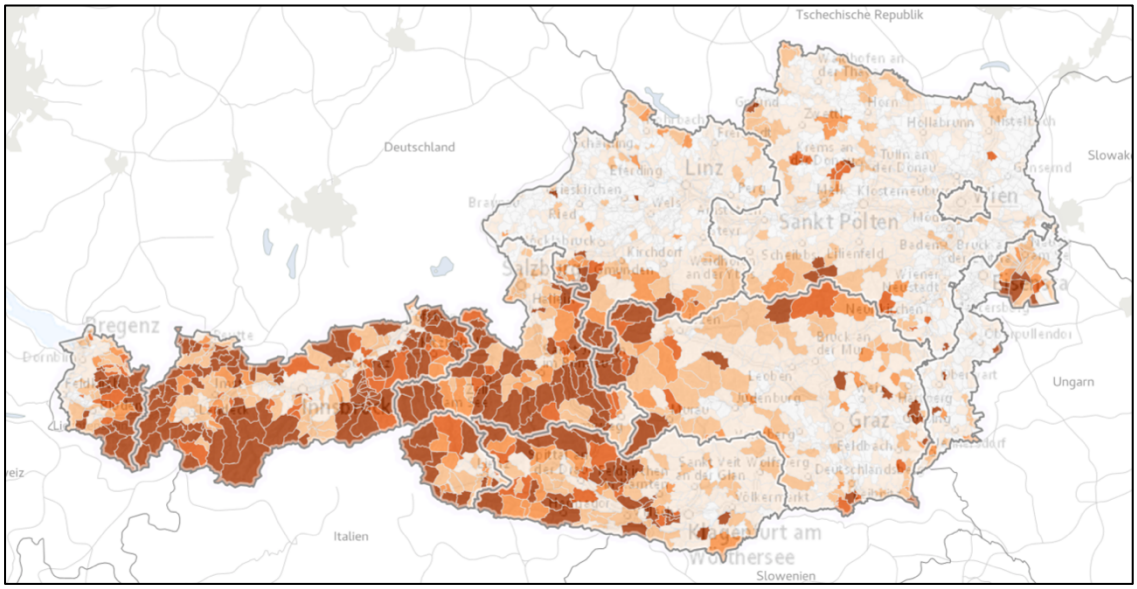


FIGURE 8 - INTERACTIVE MAP STATATLAS: BED NIGHTS IN COMPARISON TO INHABITANTS (STATISTIK AUSTRIA (2021) P.1)

As the graphic below illustrates, the defined alpine regions make up the top ranks in highest share of gross regional product: Tyrol (16.9%), Salzburg (13.7%) and Carinthia (8.0%). Styria is on the lower ranking end of the spectrum (Rank 6 behind Burgenland and Vienna) and as mentioned, Vorarlberg is not currently considered in the R-TSA. (Gühnemann et al., 2021; Laimer et al., 2014; Statistik Austria, 2021b).

| | Tourism GVA) | | Tourism employment) | |
|---|---|---|---|---|
| | direct | direct and indirect | direct | direct and indirect |
| Federal states | Share of gross regional product in % | | Share of total employment in % | |
| Burgenland | 6.0 | 6.8 | 6.2 | 6.9 |
| Carinthia | 6.8 | 8.0 | 7.4 | 8.6 |
| Lower Austria | 2.4 | 3.0 | 3.1 | 3.6 |
| Upper Austria | 2.0 | 2.6 | 2.7 | 3.2 |
| Salzburg | 11.4 | 13.7 | 11.7 | 13.6 |
| Styria | 3.8 | 4.6 | 4.6 | 5.3 |
| Tyrol | 14.3 | 16.9 | 13.8 | 16.3 |
| Vienna | 3.7 | 4.8 | 4.4 | 5.4 |
| **Austria** | 5.4 | 7.4 | 6.0 | 7.9 |

TABLE 4 - TOURISM GROSS VALUE ADDED AND EMPLOYMENT 2018 (FIGURE FROM FEDERAL STATISTICS, STATISTIK AUSTRIA (2021), P.1)

## 2.2 The Management of Tourist Flows

Having an understanding of how tourists move in the afore defined destinations is an essential part of behavioural studies in tourism. The findings from this area of research give insights on a suite of tourism industry activities including how destination management organizations choose strategies for the development of their destination layout, such as attraction planning, infrastructure etc. Understanding the tourist movement patterns between points of interest (POIs) within the destination plays an essential role for destination management and can be directly applied to the advancement of the infrastructure of the local area (McKercher et al., 2012; Wang et al., 2022). In the following chapters, tourist flows will be defined, their importance highlighted, common monitoring methods laid out and tourist flow management strategies will be explained.

### 2.2.1 Definition

The spatial behaviour of tourists has been an upcoming topic amongst researchers in the past century. The researchers focus on describing the movement patterns in a given area with an underlying network, such as a tourist destination. Specifically, in the beginning of the research, there was a lack of suitable data to describe the patterns (Dredge, 1999; Gunn & Var, 2002; Lue et al., 1993; Orellana et al., 2012; Vu et al., 2018a).

Tourist flow or visitor flow research is a measure of demand for attractions that describes spatial patterns of visitors within a defined space. This space can either be the tourist's movements from their homes to the tourism destinations or the analysis of tourist movement patterns within a defined destination. The term refers to visitors or tourists in the plural, as the goal is not to analyse individual visitors but rather groups and networks of visitors as a collective stream of movement which can anticipate and react to with their strategies. The definition frequently includes the mention of the process of visitor flow management, in which their movements are structured through an intervening managerial group, that analyses, organizes and influences the interactions between demand and supply. In this case demand is defined as the tourists, and supply is defined as the whole of the destination (Albrecht, 2017; Enseñat-Soberanis et al., 2019; Shi et al., 2017; Smeral, 2019).

In the past, tourist movements and tourist mobility have often been treated as a sort of "black box" that is to a degree based on mere luck. Nevertheless, it has become essential for decision makers in destinations to have a sound and factual understanding of the moving preferences and movement patterns of visitors, to improve the distribution of current touchpoints, and / or plan future developments for the destination layout and infrastructure (Hu et al., 2019; Lau & McKercher, 2006; Stienmetz & Fesenmaier, 2015; Vu et al., 2018b).

Recent research suggests that the combination and pattern of attractions within a destination, that the tourists visits during this stay are likely to give an indication of the overall aggregate visitor spending within the destination and satisfaction with their stay in the destination (Sfandla & Björk, 2013; Tax et al., 2013; Zach & Gretzel, 2011).

### 2.2.2 Importance of Early Tourist Flow Management Measures

Tourist flow management has increasingly gained importance to the destinations as globalization and in turn a growing tourist demand leads to mass tourism. Though the ongoing pandemic has led to somewhat of a relieve in regard to overcapacities of tourists within certain destinations, research suggests that the demand will not only go back to pre-pandemic levels within few years, but actually exceed those numbers quickly. For instance, studies have already shown that even younger generations in German speaking countries, that were previously not a large-scale target group for Austrian leisure destinations, are now increasingly interested in spending their holidays in German speaking / central European destinations. Though there are many different reasons this can be acquitted to, the pandemic as well as the Russian-Ukrainian war have increased the need for a safe destination, which Austrian leisure destinations are perceived as (Acampa et al., 2020; Enseñat-Soberanis et al., 2019; ETC, 2020; Pandey & Kumar, 2022).

The management of tourist paths is important for two main reasons. The first being the satisfaction of the tourists themselves. Studies have shown that crowding has a negative effect on the perceived attractivity of the physical setting of the destination by tourists and the findings indicate that visitors' satisfaction decreases as crowding increases. The second main reasons for visitor management is minimizing the impact of visitors. The impact includes many factors such as destruction of historical sites and environmental

pollution of nature, but also social impacts on the inhabitant's cultures etc. (Stienmetz & Fesenmaier, 2019).

Though alpine areas in Austria have a long history of tourism in the form of alpinism, it was not until the rise in popularity of the so called "Sommerfrische" that first issues arose. Sommerfrische describes a type of holiday where city residents spent their summers in the rural areas to enjoy the benefits of nature. The Sommerfrische in the alpine areas started relatively late in the early 20th century, with the introduction of personal car travel and infrastructural developments that made these areas widely accessible and not dependent on the lacking railway infrastructure in these areas. With this rise in traveller numbers from upper- and middle-class families in the DACH (Germany, Austria and Switzerland) or GSA (Germany, Switzerland and Austria) area the issues of overcrowding arose (Haas, 1992; Weber et al., 2018).

In these areas, tourism is generally still appreciated by the governmental authorities and the residents of a destination, as tourism is a major generator of economic benefits. However, certain destinations or areas thereof rely on natural resources such as clean nature, calmness and fresh air to attract tourists and the mass influx of tourism poses a challenge to the conservation of exactly those resources that have attracted them in the first place. A second challenge is, that these often-historical town- and village-centres are simply too small and not laid out for masses of tourism, neither are the public infrastructure in some of these rural areas such as buses and hiking trails. Due to this overuse, some destinations have reported destroyed nature, strained resources and growing resentment towards tourists as well as less satisfaction in the experience from the tourists themselves (Enseñat-Soberanis et al., 2019; Godde et al., 2000; Hammer & Siegrist, 2008; Smeral, 2019).

Though most Austrian countryside destinations have not yet voiced much concern in regard to over tourism exceeding the carrying capacity of the destination, there are international examples of non-city destinations battling the consequences of it, such as Galapagos, the Mogao Grottoes in China or Cinque Terre on the Italian Riviera. These examples and additional research shows, that the most successful strategy when it comes to tourist flow management, is to start the strategic planning process before infrastructure is overburdened and tourism resentment has grown to an almost irreversible degree (Liang et al., 2020; Patry & Oskam, 2020; Vegnuti, 2020).

### 2.2.3 Management Strategies

There have been minimal changes in the aims of visitor management ever since the first research was done. The two main objectives remain: enhancing the experience of visitors from a demand side of view and conserving the resources and as part of this keeping the resident's tourism resentment low from a supply side of view. Thus, the main goal is to manage interactions between supply (visitors / tourists) and demand (space / destination) (Acampa et al., 2020; Kuo, 2002; Mason, 2005; Shackley, 2000).

To obtain these goals, researchers and practitioners have brought forward numerous potential strategies. Various researchers have come up with different ways to divide the strategies for tourist flow management. Commonly, Kuo (2002), and Manning and Anderson (2012) are quoted as agreed upon generic strategies.

Kuo (2002) proposes that the two primary approaches of hard or soft visitor management should be divided. Hard visitor strategies aim to control and regulate tourist flows through economic, regulatory and physical intervention. The opposing soft strategies do not aim to control and regulate, but rather to persuade, inform and appeal to the goodwill of visitors, to change tourist flows through directional information, codes of conduct and education. In practice, it is common to find both approaches in one destination, as the strategies are most likely to have positive long term effects when applied alone (Acampa et al., 2020; Kuo, 2002; Mason, 2005; Shackley, 2000). A recent study by Alazaizeh et al. (2016) suggests that tourist who want to experience culture and nature during their holiday are more likely to support both hard and soft measures, in comparison to tourists not interested in those resources for their holiday.

Manning and Anderson (2002) suggest four main strategies for managing tourist flows. The first strategy is increasing supply, which is defined as providing more options of recreational activities to the tourists, leading to the increase of tourists in certain new areas and the decrease of tourists in others. This led to a more even distribution of tourists through extension of the offer. For instance, in the Austrian alpine tourism this could be established by creating more hiking trails in summer or ski slopes in winter.
The second strategy aims to reduce the demand and has strong links to concepts of carrying capacity. This strategy is implemented through setting a maximum number of tourists

for certain areas or activities. For an effective implementation it is necessary to first analyse which activities have the highest negative impact on the mentioned resources and tourist experience. An example in Austrian alpine tourism could be similar to what is currently being tested in the hiking trails of the Italian Riviera towns of Cinque Terre, which is an automated system that counts tourist numbers on certain trails and restricts further tourists from entering once this number is reached.

The third strategy aims to disperse concentration without increasing supply or decreasing demand. This is achieved through modification of usage patterns towards less crowded areas. In alpine tourism an example is to use marketing budget, to highlight less frequented areas or make these existing areas more accessible with further public transportation.

The fourth strategy proposed is increasing the resilience of certain areas, meaning that certain areas should be made more robust for the use of tourists. For instance, in alpine tourism this could mean building stronger hiking trails or providing more bins in crowded areas. As with the previous strategies, for maximum efficiency destinations should aim to include not one but several or all of the strategies in their strategic planning (Enseñat-Soberanis et al., 2019; Manning & Anderson, 2012; Vegnuti, 2020).

The tourism industry in the Austrian alps can be described as a fragmented industry and is dominated by small and medium-sized businesses (SMEs). This can be attributed to the comparably low barriers of entry (operating cost, employee costs, investment costs etc.) from an economic point of view, but also from a socio-cultural point of view, the lifestyle and leisure preferences of the entrepreneurs make the industry appealing for SMEs. As afore mentioned, there are several advantages and disadvantages to this fragmented pattern. In tourist flow management it becomes challenging to implement tourist flow management strategies that all stakeholders are in agreement with and willing to participate due to its nature (Getz & Carlsen, 2000; Pechlaner et al., 2004; Stickdorn & Zehrer, 2009; Zehrer, 2009).

### 2.2.4 Monitoring Methods

While the aims and strategies for visitor flow management may not have changed much in the past, the monitoring methods used to study the behaviour of tourists have. Early studies have attempted to measure visitor flows through small data approaches with traditional data. This could for instance be so called travel diaries the tourists filled out

themselves on paper or recorded on video, usually complemented with a questionnaire after the journey. Another method frequently used were expert opinions collected from interviews. The general lack of suitable data led to high barriers of showing any empirical evidence in the matter of tourist flows. Both methods are prone to relatively high bias and show low reliability. Additionally, though diaries and interviews have the potential to give insightful spatiotemporal knowledge, the data size is very limited, the collection process very time intensive and therefore expensive. Moreover, the actual spatiotemporal information is less exact than the location data we have today, as will be explained below. Another more traditional approach that is still applied today, is the use of statistical data, provided by tourism industry organizations. The issue with this type of data collection is, that in most cases there is no ongoing stream of new information, but rather annual publications with a lack of information about the actual movement process in a specific destination and lack of timely information (Dredge, 1999; Jiang et al., 2021; Orellana et al., 2012; Vu et al., 2018a).

Nowadays, a whole different array of data is available to researchers and can be used for location data for exact analysis of movement patterns. Location data research is mainly based on mobile phone data records, GPS data or social media data with geotags. Practically speaking, large destinations can for instance use GPS data from public transportation statistics, there are destination guest cards with embedded chips and phone positioning databases (Ahas et al., 2008; Baggio & Scaglione, 2017, 2018; Beritelli et al., 2014; Kádár & Gede, 2013; Vu et al., 2015, 2018b).

Though GPS data has the potential to show the most exact movements of all options, the challenge with this type of data is, that for the obtaining and processing, the consent of tourists is needed, not lest due to the GDPR (General Data Protection Regulation), and generally users are hesitant or even adverse to openly share their data, specifically detailed movement trajectories (Jiang et al., 2021; Vu et al., 2018b).

Cellular data uses the records generated from telecommunication bases of the tourist mobile phone activities. This can give important insights into the movement of tourists using mobile phones frequently, specifically in cities with many telecommunication base stations. In comparison to GPS data, the precision of the location data of cellular data is somewhat lower, as the closest base station is represented as the tourist location using cell phone triangulation, which is especially challenging in rural areas with less telecommunication bases. Additionally, another issue with cellular data is, that it is only recorded

when the phone is in active use (making calls, internet connection, sending messages etc.). Locals and travellers within the "Roam like home" zone (EU member countries as well as Iceland, Lichtenstein and Norway) will mostly be connected to the internet in today's day and age, tourists from non-EU countries might not be due to high roaming costs for internet use (Jiang et al., 2021; Vu et al., 2018b).

Lastly, for the current main sources of location data, there are also publicly available traces left with geo-tagged photos on social media applications such as Twitter, Facebook and Instagram, that can be used for smaller destinations without high budgets. Individual users can post an abundance of content with geotags and can be treated as social sensors. Apart from quantitative information, social media posts are also often used for qualitative purposes as they mostly include text and other sentiments, that can be used for the analysis of destination image. In regard to the preciseness, the users choose the geotags themselves and can choose the exact location they took the picture in, for instance a certain restaurant, hotel, attraction or mountain. Thus, the preciseness depends on the user, some users choose to use a broader geotag (for instance the whole destination or even the country) whilst others are very exact. Because of this, it is necessary for researcher to pre-sort the data, for instance for visualizing exact paths, posts that are geotagged to broadly will have to be disregarded. Due to the availability of the data and data volume needed to be analysed, in current research, social media geotagged posts are mostly used to determine volume and general direction of tourist flows. In conventional research, the used monitoring methods are often inaccessible to smaller destinations, as they are often expensive and hardly scalable, due to the size of the underlying datasets. This is why geo-tagged photos on social media are a suitable solution for these smaller destinations (Ahas et al., 2008; Baggio & Scaglione, 2017, 2018; Beritelli et al., 2014; Jiang et al., 2021; Kádár & Gede, 2013; Vu et al., 2015, 2018b).

Social Media platforms have the ability to provide destination managers and researchers alike with cost-efficient user generated data from millions of people, with different demographic backgrounds, depending on the aim of the research (Hu et al., 2019). To highlight the validity of social media data, in the following chapter 2.3 the importance and influence of social networking sites on the decision-making process of tourists as well as their motivations to use social media will be laid out.

## 2.3 The Influence of SNS on Tourists' Decision Making

The analysis of tourist movement requires a large amount of data for an accurate and valuable outcome. The movement of the internet has progressed, and as a result has the use of social media data for the tourist movement analysis (Wang et al., 2022). Social media users share enormous amounts of content every day. In the following chapters, it will be explained how the use of social media in tourism has evolved, what the key drivers of social media use are, how social media has influenced the tourists' decision making process and what channels are most relevant to the industry.

### 2.3.1 Definition of Social Media

The internet has played a key role in shaping the way that people communicate, work and do business in the 21st century. The first introduction to the internet was through Web 1.0, which consisted of traditional static websites. Later there came a shift towards more interactive-based sites (Web 2.0). With these interactive websites the internet became a place to express oneself and a new way to communicate (Chu et al., 2020; Ko et al., 2005; Papacharissi & Rubin, 2000; Wang et al., 2022).

With the evolution of social media, the definition of what social media is has also shifted. In the beginning social media was defined simply as a way to directly exchange information online. Nowadays, social media describes any form of electronic communication where users create communities online and share various forms of content. This content includes, but is not limited to, videos, pictures, reviews, guides and personal messages (Hays et al., 2013; Hvass & Munar, 2012; Zeng & Gerritsen, 2014).

### 2.3.2 Social Media and Tourists Decision Making

This rapid development has provided researchers and tourism marketers with unprecedented opportunities of data to use for analysis, and ways to communicate and engage with the users and potential customers. Social media allows the users to exchange travel experiences, recommendations and general information unbureaucratically and in real time. This information communication is referred to as eWOM (electronic word-of-mouth). The eWOM has a major impact on the decision making of tourists, especially in the travel-planning process where they decided where to go and which activities to schedule. Additionally to eWOM, the term Travel 2.0 that has recently emerged highlights this

newfound importance of social media in the travel industry. The tourists that are travelling 2.0 are generally more informed through social media and will base their trip mainly on what they have found online. Their posting behaviour is mostly focused around their own trip, their experiences, recommendations and negative travel mishaps (Chu et al., 2020; Hudson & Thal, 2013; Mariani et al., 2019).

### 2.3.3 Key Drivers of Social Media Use

The growth of social media, and specifically the sub-group of social networking sites (SNSs), in the past century can be attributed to many factors. As highlighted in the figure below, various researchers have identified 14 key drivers of social media use in the past two decades. Some of them are unique to social media, and some apply to other media usage as well, such as television and the internet.

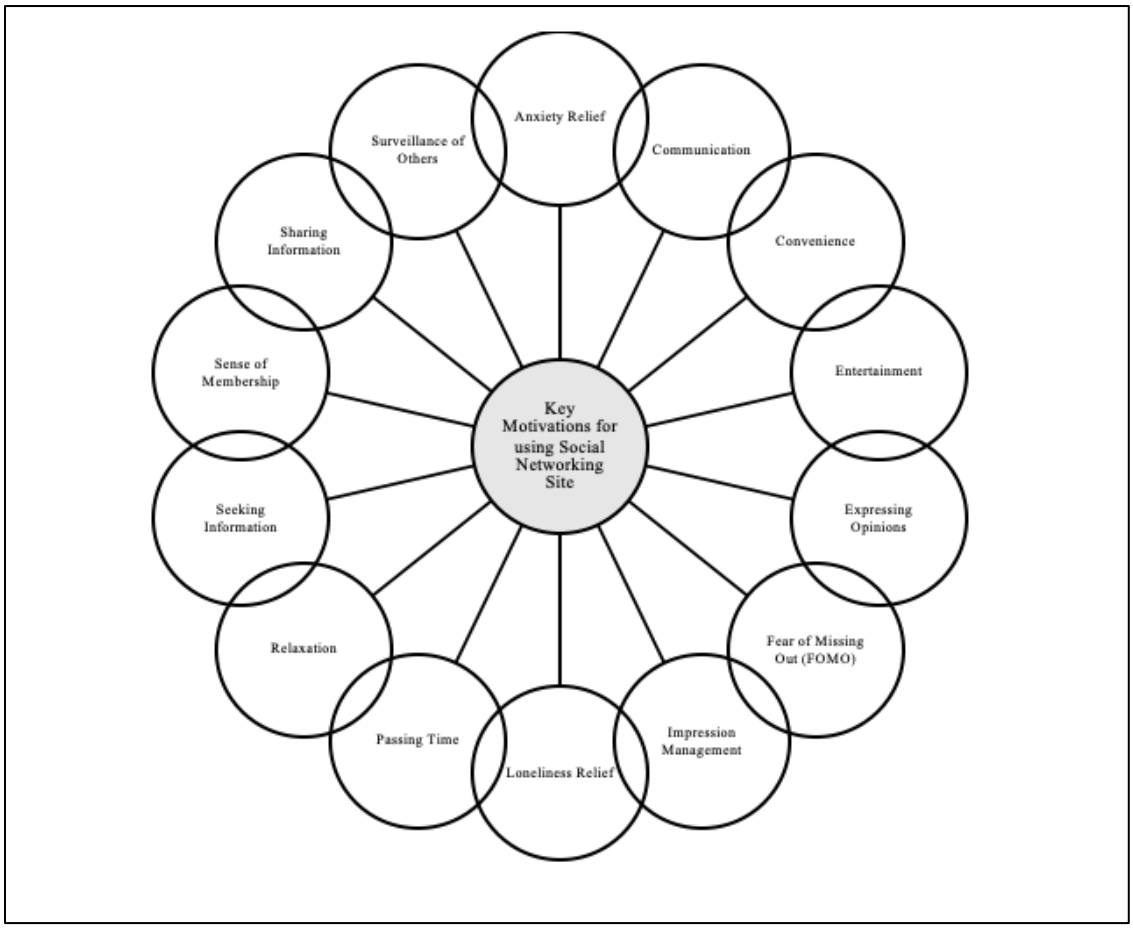


FIGURE 9 - THE 14 KEY DRIVERS OF SOCIAL MEDIA USE AS REPORTED BY USERS (OWN DESIGN BASED ON CAUBERGHE ET AL. (2021); FJORAVANTI ET AL. (2021); WHITING & WILLIAMS (2013) AND ZHU & BAO (2021))

*Anxiety relief*

Especially during the COVID-19 crisis and the associated lockdowns and isolation more diagnoses of anxiety disorder or general feelings of anxiety have been reported. Among affected individuals there was a trend towards an increase of social media use to self-regulate their emotions and achieve a better mood through fast paced exposure to different positive stimuli. This is in line with previously discovered mechanisms of mood management and coping mechanisms. SNSs are actively used to adapt thoughts and behaviour to manage the situation, depending on threats and risks perceived by the individual that they are looking to reduce (Cauberghe et al., 2021).

*Communication*

Social media use can also be defined as a tool to facilitate interpersonal communication and activities with others. More than half of social media users have identified communication as a motivation to use it. They mention that social media provides them with new topics to discuss with their social circle on- and offline. For instance, users will watch viral videos on certain social media sites and discuss them with their peers afterwards, hence the content acting as a communication facilitator (Whiting & Williams, 2013).

*Convenience*

This type of motivation for social media use can be defined as the use of the media providing convenience / usefulness to the users. 52% of social media users say that the convenience of using social media motivates them to engage with different platforms. An example for this motivation would be that it is convenient to share a holiday picture on Instagram for all to see, instead of sending it to every person separately. This allows users to communicate with many people at once. Another mentioned convenience is that SNSs can be accessed at anytime from anywhere in the world (Papacharissi & Rubin, 2000; Whiting & Williams, 2013).

*Entertainment*

Entertainment as a motivation is defined as social media use to provide enjoyment and entertainment, even as a form of escapism. Social media is largely used for entertainment through game play, funny videos, listening to music and more. Almost a third of respondents have identified entertainments as a motivator to use social media. Generally, research has found that humouring oneself via social media will lead to reduced attention towards

negative feelings, social connectedness and well-being. There is also an element of voyeurism in the motivation of entertainment as it has been found that watching other people doing entertaining things can positively influence the mood (Cauberghe et al., 2021; Ko et al., 2005; Palmgreen & Rayburn, 1979; Papacharissi & Rubin, 2000; Whiting & Williams, 2013).

*Expressing Opinions*

56% of active social media users stated that one of their motivations is the possibility of expressing their thoughts and opinions. The main activities users participated in to share their opinions is sharing posts, "liking" and commenting on posts they resonate with or disagree with and, reposting / sharing other people's posts, sometimes with their own additional comments. Others said that the anonymity of sharing their opinion is a driver for them to use social media. They see social media as an opportunity to "vent" without real life consequences (Whiting & Williams, 2013).

*Fear of missing out (FOMO)*

In current research, FOMO is often described in relation to negative psychological impacts of the pressure of never being absent from rewarding experiences others have. It was first described as a pathway for high social media engagement. SNSs can be considered an ideal tool to fulfil the individuals desires to constantly connect with the experiences of other people (Fioravanti et al., 2021). However, research has found mixed results in regard to the correlation between FOMO and high SNSs use. A 2016 study (Beyens et al., 2016) has shown a moderate correlation ($r = 0.50$) whilst another study in 2019 (Chai et al., 2019) has come to the conclusion that there is merely a weak correlation ($r = 0.21$). This can be attributed to the differences in subjects. Sociodemographic characteristics are a key factor for the correlation, as for example young users tend to report a higher level of FOMO and a higher usage of SNS, especially during the COVID-19 pandemic (Casale & Flett, 2020; Elhai et al., 2020; Fioravanti et al., 2021).

*Impression Management*

Social media users that have listed impression management as a motivator are concerned with attempting to control how they and their life are perceived by others. They have the desire to convey an image that they deem "right" to their desired audience. On SNSs users are able to form and manage the impressions of others whilst engaging in relationship

search and maintenance. Studies have found that the larger the following the less family, friends and distant relationships are amongst the follower's percentage wise and the more strangers. This is relevant as it was also found that strangers are more sensitive to inappropriate behaviours and there is an increased need to project the image of being a close to "perfect" individual. Due to this, users that have listed impression management as a key driver are likely to frequently voice concern about tarnishing their public image. For instance this can happen by sharing non positive aspects of themselves or actions that would generally be considered inappropriate behaviour, once their number of followers and therefore their audience grows larger (Oh & LaRose, 2016; Zhu & Bao, 2018).

*Loneliness relief*

Different from SNSs as a way of reducing anxiety, studies have found that unhappiness due to loneliness, specifically for users lacking real life social skills, cannot be improved through active coping on social media. Individuals reporting that they have positive social relations and a sturdy support system in real life are more likely to be able to improve feelings of loneliness, for instance in the on-going COVID-19 pandemic, through active coping on social media. One successful coping strategy is for instance the contact with their real-life peers and family via SNSs if in person contact is not possible (Cauberghe et al., 2021).

*Passing time*

This type of motivation is defined as using social media simply as a time filler to occupy the user. Individuals want neither stress nor boredom and aim to avoid both. In periods of boredom or stress avoidance there is generally a surge in social media usage. More than 70% of respondents have said they use social media when there is nothing better to do and they have idle time (Cauberghe et al., 2021; Ko et al., 2005; Palmgreen & Rayburn, 1979; Papacharissi & Rubin, 2000; Whiting & Williams, 2013).

*Relaxation*

This factor is defined as engaging in SNSs to relieve stress on a day-to-day basis. Though considered as one driver together with entertainment by some researchers, others researchers have found that the motivation behind relaxation is to relief stress, whilst the motivation behind entertainment is to enjoy oneself. Research shows that 60% of social media users are motivated by various relaxation purposes. For instance 16% of

individuals find relaxation whilst using social media and mindlessly scrolling to escape the stress of the real world (Palmgreen & Rayburn, 1979; Whiting & Williams, 2013).

*Seeking information*

This driver can be defined as using social media to self-educate on certain topics by actively seeking out information. The motivation is finding new knowledge and information. Studies have shown that around 80% of social media users have named information seeking as a main motivator. Specifically, information in regard to sales, deals, products, businesses, events and birthdays is most sought after. For self-education and to learn new skills the main sources are tutorials / how-to-instructions and guides. For instance, these guides could be videos or blogs showing a destination. It was found that for this motivation users are mostly critical of the source of the information by their own evaluation. When it comes to travelling the trust is higher in locals or influencers that the users are familiar with (Azer et al., 2021; Ko et al., 2005; Papacharissi & Rubin, 2000; Whiting & Williams, 2013).

*Sense of Membership*

Using SNSs for social interaction and to communicate with others was the core idea of the medium. The key drivers include meeting people with similar interests, companionship, socializing with others, keeping in touch with peers and staying up to date on what is happening in the own social environment. Studies have shown that up to 88% of social media users have named social interaction, or more generally interpersonal utility, as one of their main motivations for using a social media medium. Social interaction differs from the motivation of communication, as it helps provide social interactions and not communicatory utilities (Ko et al., 2005; Palmgreen & Rayburn, 1979; Papacharissi & Rubin, 2000; Whiting & Williams, 2013; Zhu & Bao, 2018).

*Sharing information*

40% of social media users state that information sharing is a motivation for social media use. The difference to the motivation of seeking information is, that the aim is not to acquire knowledge but to share their own knowledge and information about themselves. Due to the interactive nature of social media, unlike other forms of media such as television, consumers can communicate in a two-way dialogue. Information sharing on social media is vast and includes sharing personal pictures and updates, advertisements about

their business or marketing themselves or sharing not their personal information but knowledge from their area of expertise (Whiting & Williams, 2013).

*Surveillance of others*

32% of social media users state the surveillance of other people's lives and collecting knowledge about them is a motivator for them to use different social media platforms. The target of surveillance in this case can range from their own, friends, acquaintances, influencers, celebrities, politicians, businesses and more. Their aims include finding out what other people are doing, keeping up to date and / or finding out about trends. (Whiting & Williams, 2013; Zhu & Bao, 2018).

With the heightened use of social media on a range of platforms, first researchers have found that some consumers are experiencing a so-called social media fatigue. Fatigue is a phenomenon observed in various fields of research and is defined as a multidimensional subjective feeling of decreased motivation as well as increased discomfort and physical lassitude. The range of fatigue in certain situations can vary between individuals from a slight feeling of discomfort, to a state of complete exhaustion. In regard to SNS, fatigue is the users' self-evaluated feeling of exhaustion that they attribute to the (over-)use of SNS. The reported increase in SNS fatigue has a negative effect on motivation to use social media. Fatigue leads to users showing lower engagement with the accounts they follow, less posting about themselves and less active participation in activities. Generally, affected users will choose one or more of the following options: They will revert from active users to passive social media use to alleviate the feeling of exhaustion but still satisfy their personal need from social media; they will reduce the frequency of social media use until the feeling of discomfort fades or they will completely abandon social media as a whole or specifically the channels that they decide as the cause of their fatigue. For some users the latter option is not viable as they feel the afore mentioned FOMO or other inconveniences, and in turn discomfort, if they completely abandon social media (Lee et al., 2016; Maier et al., 2015; Richardson, 1995; Vu et al., 2018a; Zheng & Ling, 2021; Zhu & Bao, 2018).

### 2.3.4 Relevant Social Media Channels in Tourism

After film photography, the introduction of digital photography has greatly enhanced the number of pictures tourists take during their holiday. Because of this and the rise in popularity of Web 2.0, non-professional pictures have been shared publicly at a much higher frequency and have become a key factor in the creation of the online destination image. Especially the social media platform Instagram has profited from this trend.

Instagram is a social network focusing on (moving-)picture owned by the technology company Meta Platforms Inc. Amongst others Meta Platforms Inc. also owns the social network Facebook, WhatsApp instant messaging and the software, gaming and VR (Virtual Reality) company Oculus. Whilst the platform established in 2010 initially served as an app solely for photo-sharing by the users own accounts, the functions have since been diversified. The core functions are still microblogging and audio-visual content sharing in the users' feed. Additional functions include augmented-reality-filters, Instagram-Live video sharing and Instagram Stories, which are only available for a 24-hour period if not marked as "highlights" in the users' personal feed. Due to the availability of acquisition the focus of this thesis lies on the permanent Instagram posts and not the time limited Instagram stories. When publishing permanent feed posts, users can choose between an array of features, including filters, tagging other users and geotagging the location of the content (Getz & Carlsen, 2000; Pechlaner et al., 2004; Stickdorn & Zehrer, 2009; Zehrer, 2009).

# 3 METHODOLOGY

To explore the hotspots and tourist flows within rural destinations in the Austrian alps, this study uses a step-by-step approach, loosely based on the carrying capacity methodology by Schuh et al. (2020). In the following the methodology process will be explained and in chapter 4 it will be applied to each destination individually. All data processing and visualization was done using the program "R Studio" and thus the programming language "R". In the methodology only the used packages will be mentioned, the entire code used, as well as the sources to the full package descriptions and all functions of the packages can be found in the appendix and bibliography of this thesis.

| | |
|---|---|
| **Step 1** | Destination Background |
| **Step 2** | Hashtag Choice and Data Collection |
| **Step 3** | Data Processing |
| **Step 4** | Data Visualization |
| **Step 5** | Interpretation of Visualized Data |
| **Step 6** | Findings and Recommendations |

TABLE 5 - STEP-BY-STEP APPROACH TO THE METHODOLOGY OF THIS THESIS (OWN DESIGN, BASED ON-SCHUH ET AL. (2020))

## 3.1 Step One Destination Background

To ensure a more accurate and reliable outcome, two Austrian destinations that have defined a target group that is likely to use Instagram more actively will be chosen. The indicated locations on the Instagram posts within these destinations from the past years will be used for the visualization.

For the data collection it was necessary to define one single hashtag representing one destination. For the choice of the hashtag posts from the DMOs, accommodations, tourists visiting the destination, locals and other stakeholders' Instagram posts Instagram posts

with the accompanying hashtags were observed. The frequently used hashtags were noted down and the hashtags with the most posts associated with it was chosen per destination.

## 3.2 Step Two Hashtag Choice and Data Collection

Once the hashtag for a destination was chosen, the data was acquired from the website Picodash. For each hashtag and in that for each destination, 20,000 posts in the form of time series data were acquired. For each destination a different time span could be analysed, as the past 20,000 posts is the maximum amount of posts that can be acquired due to Instagram's data protection policy as per an e-mail from Picodash in April 2022 (see appendix). The data collected are public posts users have shared on Instagram, extracted via the chosen hashtag. Picodash formats the raw data into csv (comma separated values) files and sends them via E-Mail to be used for further processing and analysis.

## 3.3 Step Three Data Processing

In the third step the data had to be further processed to be analysed. First, the various csv files were consolidated into one csv file containing all data from one destination.

Using this data file, an analysis could be made on how many posts were actually delivered. For all destinations it was less than the acquired 20,000 posts, due to private posts and other Instagram security issues, as per an email by Picodash in June 2022.

Posts / Year Table

With this full dataset, an analysis was conducted to reveal the distribution of the posts per year. For this analysis the data was mutated to year and a table was produced. An example for such a table from the destination Montafon can be seen below. This table was necessary to determine, which years should be continued to be included in the analysis. For instance, with the table below, there were only an accumulated amount of 35 posts for the years 2016 to 2020, whilst for the whole year of 2021 there were 13,041 posts and for the first four months of 2022 5,428. Hence the posts from the years 2016 to 2020 were omitted. From this table it also becomes clear, that only 18,504 posts were received as above mentioned, this is less than the actually acquired 20,000 posts.

| | year | n |
|---|---|---|
| | <dbl> | <int> |
| 1 | 2016 | 1 |
| 2 | 2017 | 1 |
| 3 | 2018 | 14 |
| 4 | 2019 | 7 |
| 5 | 2020 | 12 |
| 6 | 2021 | 13041 |
| 7 | 2022 | 5428 |

FIGURE 10 - DISTRIBUTION OF ACQUIRED POSTS USING #MONTAFON PER YEAR (OWN DESIGN)

Monthly Development of Posts

With the range of years to be analysed defined, an additional line graph was plotted showing the development of posts per month during the chosen times. To do so, the date was filtered depending on the starting point decided on, the date was grouped by month using the package 'ggplot2' and the line graph was plotted. Creator Hadley Wickham (2016) explains 'ggplot2' as a simple system that needs the data and additional information about the graphical primitives that shall be used, the map variables and the design, to create graphics based on "The Grammar of Graphics". Below is an example of the results of this visualization.

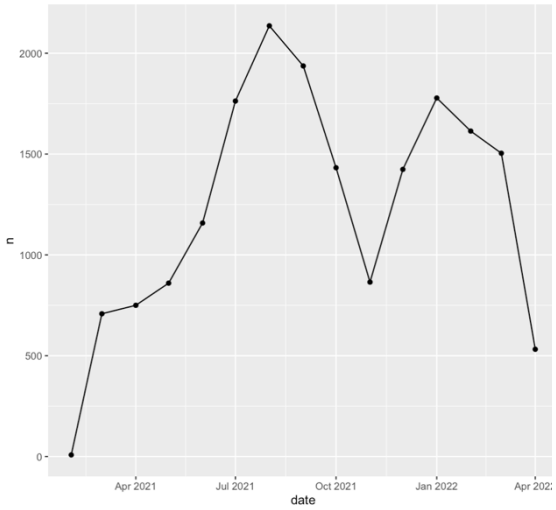


FIGURE 11- DEVELOPMENT OF ACQUIRED POSTS USING #MONTAFON SINCE FEBRUARY 2021 (OWN DESIGN)

## Top Locations

As a last step of data analysis before the visualization a table to show the top locations tagged within the destination was created. This was done with the command rank and by grouping and counting by location name and then arranging the 15 most posted places in descending order. Following the development of the posts of the 5 top locations per month was shown with the same procedure as above with the total development of posts in the destination. Below is the example for the destination Montafon.

| | location_name | lng | lat | n |
|---|---|---|---|---|
| | <chr> | <dbl> | <dbl> | <int> |
| 1 | Montafon, Austria | 9.96 | 47.0 | 804 |
| 2 | Gargellen, Vorarlberg, Austria | 9.92 | 47.0 | 496 |
| 3 | Schruns | 9.92 | 47.1 | 465 |
| 4 | Vorarlberg | 9.89 | 47.2 | 411 |
| 5 | Bartholomäberg | 9.92 | 47.1 | 305 |
| 6 | Gaschurn, Vorarlberg, Austria | 10.0 | 47.0 | 269 |
| 7 | Erlebnisberg Golm Montafon | 9.87 | 47.1 | 233 |
| 8 | Silvretta-Stausee | 10.1 | 46.9 | 226 |
| 9 | Lünersee | 9.75 | 47.1 | 217 |
| 10 | Montafon Gaschurn | 10.0 | 47.0 | 215 |
| 11 | Sankt Gallenkirch, Vorarlberg,… | 9.97 | 47.0 | 207 |
| 12 | Silbertal, Vorarlberg, Austria | 9.98 | 47.1 | 196 |
| 13 | Tschagguns | 9.87 | 47.0 | 185 |
| 14 | Hochjoch | 9.99 | 47.1 | 159 |
| 15 | Panoramagasthof Kristberg | 9.98 | 47.1 | 143 |

FIGURE 13 - TABLE OF 25 MOST FREQUENTLY TAGGED LOCATIONS USING #MONTAFON (OWN DESIGN)

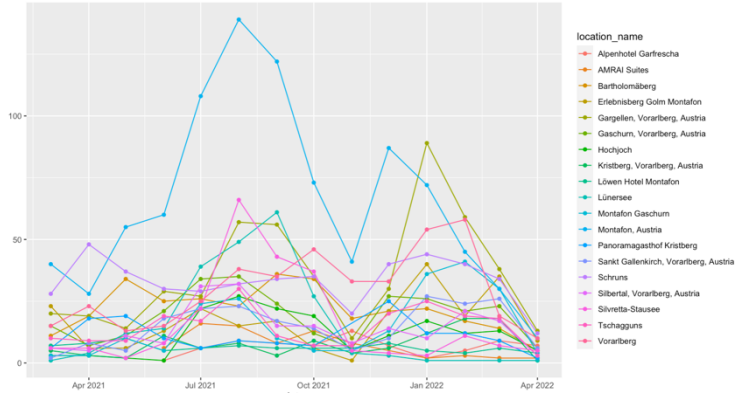


FIGURE 12 - VISUALISATION OF THE DEVELOPMENT OF 19 MOST FREQUENTLY TAGGED LOCATIONS USING #MONTAFON (OWN DESIGN)

## Additional Omitted Posts Going Forward

For the visualization certain additional posts, besides yearly posts, had to be omitted. This includes posts with not geotags and posts with geotags outside of the defined area. For instance, there were posts under the chosen hashtag “Montafon”, that included pictures from the destination, were geotagged to a location in another country such as the Netherlands, Germany and Switzerland. An example of this can be seen in the cropped figure below, of a visualized plot. There is also a clearly visible clustering of posts in the targeted destination, confirming that most users use the locations and hashtag combination as expected. Thirdly posts geotagged with an inexact location were omitted. For instance, for the hashtag Montafon posts with the location of an amenity or one specific village such as Schruns, Tschagguns, Gaschurn etc. were regarded as they provide some insights. However, for the visualization posts that were tagged with the destination itself

(Montafon) or broader (Austria, Vorarlberg etc.) were disregarded as they did not provide additional insights for the visualization.

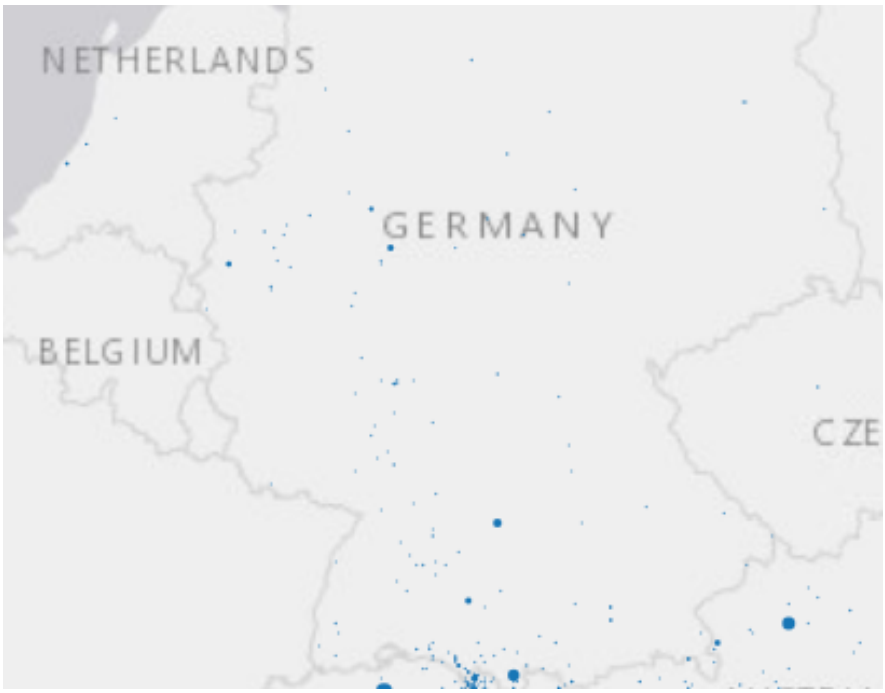


FIGURE 14 - EXAMPLES OF GEOTAGGED POSTS USING #MONTAFON THAT WILL BE DISREGARDED IN THE DATA VISUALISATION DUE TO THE LOCATION BEING OUTSIDE OF THE DEFINED DESTINATION (OWN DESIGN)

## 3.4 Step Four Data Visualization

Once the data was collected and prepared, in the fourth step it was visualized to show the distribution of posts within the destinations. For the visualization three variants were chosen: Visualizing with a traditional heatmap, visualizing the posts by circles on the location tagged, the circle size expanding in relation to the number of posts and lastly visualizing the paths tourists took. The first two visualizations were chosen to display where users are mostly posting from and places that are less frequented by users to determine the places that may need attention depending on the chosen strategy. Similarly, the third visualization using the paths was chosen to visualize what the common amenity combination among users were and if there are possibilities for intervention etc., again depending on the strategy.

Visualizing posts as a traditional hotspot heatmap

The first visualization were heatmaps for each destination. Heatmaps can be applied in different scenarios such as revealing common gaze points in eye tracking studies or in this case revealing AOIs (Areas Of Interest) in a defined geographical area. In this heatmap the data is not constrained by stiff grids, but every post is associated with a post ID that radiates in the geotagged location. If posts accumulate in one location, they are totalled together leading to a different colour pattern. This visualization included the use of the packages 'leaflet', 'leaflet.extras' and 'rosm'. 'leaflet' is a JavaScript open-source library used for interactive maps. Thus the 'R' package leaflet is used to create and customize interactive maps (Cheng et al., 2022). 'leaflet.extras' gives additional functionalities to the base package leaflet using plugins (Karambelkar & Schloerke, 2018). 'rosm' has functions to simply create basemaps as well as adding hillshade to vector-based maps by downloading and plotting tiled map sources such as Open Street Maps or Bing Maps (Dunnington, 2022).

For the visualization the columns 14 lat : 15 lng (latitude and longitude) were read and files with no entry in these columns (n/a) i.e. no geotag were omitted. With this information input, using the afore mentioned packages the heatmap is created revealing the AOIs of the destination. The zoom can then be manually adjusted to fit the desired area, for instance below is the whole output for the hashtag "Montafon", that was later cropped to show only posts attached to a location within the destination.

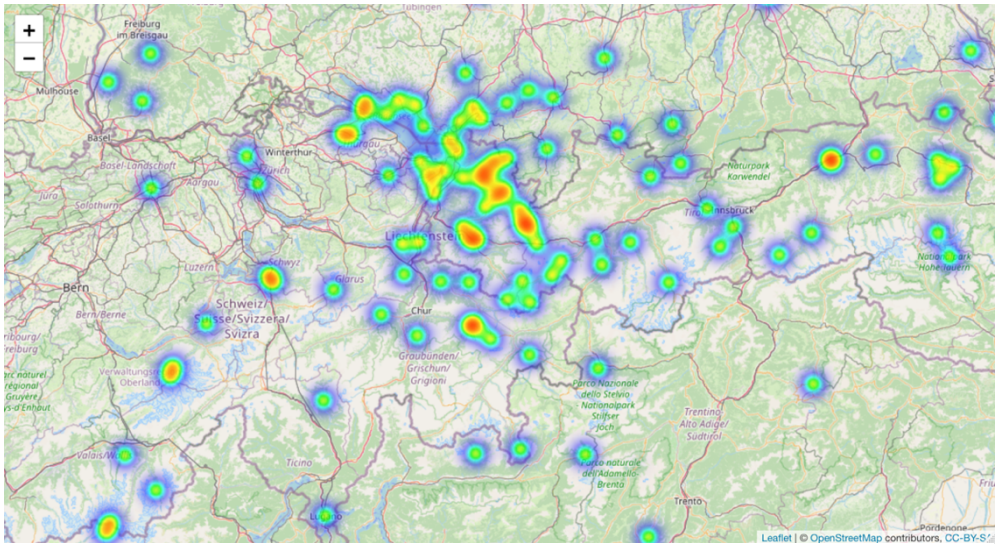


FIGURE 15 - HEATMAP VISUALISATION OF POSTS USING #MONTAFON (OWN DESIGN)

As can be observed from the example above, the heatmap shows the intensity of posts using a sequential colours ramp, the red areas being areas with the highest intensity, followed by yellow, green and finally light blue for the lowest intensity.

Visualizing posts as a proportional circle heatmap

For this second visualization variant the additional package 'leaflet.minicharts' as well as the package 'basemaps' were used. 'leaflet.minicharts' is explained as an extension of the 'leaflet' package, meant to create more complex interactive maps with 'R', representing multiple variables in one plot (Bachelier et al., 2021). 'basemaps' is a package that allows access to spatial maps from various open source maps such as Open Street Map, Carto or Mapbox (Schwalb-Willmann, 2021).

To visualize using 'leaflet.minicharts' the columns 14 lat : 15 lng were read and files with no entry in these columns (n/a) were omitted. The posts per location were represented as circles, increasing in size in relation to the number of posts. To display exact data labels inside of the circles, the parameter 'showLabels=true' was chosen. Below an example of part of the visualisation from the destination Montafon.

As with the previous visualisation, the zoom can then be manually adjusted to fit the desired area, for instance below is the whole output for the hashtag "Montafon", that was later cropped to show only posts attached to a location within the destination.

FIGURE 16 - PROPORTIONAL CIRCLES VISUALISING THE INTENSITY OF POSTS USING #MONTAFON PER LOCATION (NOT CROPPED TO FIT DESTINATION; OWN DESIGN)

The proportional circles, as shown in the example figure above, indicate the intensity of posts using size and the intensity is also exactly indicated in the data labelling, depending on the zoom there are more or less exact labels visible. In comparison to the traditional heatmap this gives a clearer view of which location exactly has a high intensity of posts. This will be displayed along with the afore mentioned development of top posts per month for a clearer understanding.

Visualizing posts as paths per user

Lastly the paths of the users that have posted most frequently were visualized. For the visualisation the package 'ggmap' was used. 'ggmap' is used for the spatial visualisation of the above described 'ggplot2'. It is explained as a library of functions for the visualisation of spatial models and spatial data using a static map as a base. The static map is taken from online sources such as Google Maps or Stamen.

In regard to the visualisation for the thesis, first the longitude and latitude borders were cropped to approximately fit the destinations outlines. In the second step all users that have only posted once were omitted, as they do not produce paths. The remaining users were listed descending in regard to their number of posts. Next the range of users' paths to be visualised was chosen, in the case of this thesis this was done user by user. Lastly the chosen data was plotted to visualize the path of one frequent user. This process was repeated ten or more times, to visualize the top ten posters in frequency, omitting users that have assigned all their posts to the same location.

This additional step of visualising each of the top ten posters separately was taken, to allow better recognition of the individual paths. Below in figure 18 is an example of what ten paths accumulated into one map would look like and figure 19 is a comparison showing what the path one user took will approximately look like.

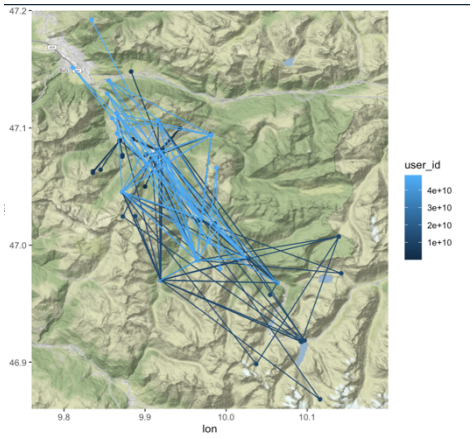


FIGURE 17 – PATHS OF 10 FREQUENT USERS OF #MONTAFON (OWN DESIGN)

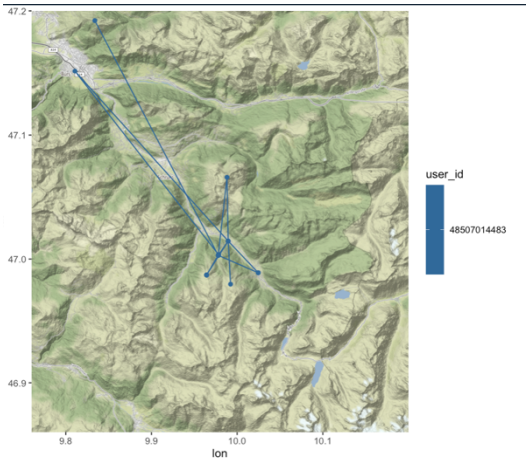


FIGURE 18 – PATH OF 1 FREQUENT USER OF #MONTAFON (OWN DESIGN)

As above mentioned, there were also some users observed that posted from one location only. One user posted 167 times from the location 'Panoramagasthof Kristberg" as can be observed in the red circle of figure 20. These users were disregarded as they give no deeper insights into the paths of tourists in the destination.

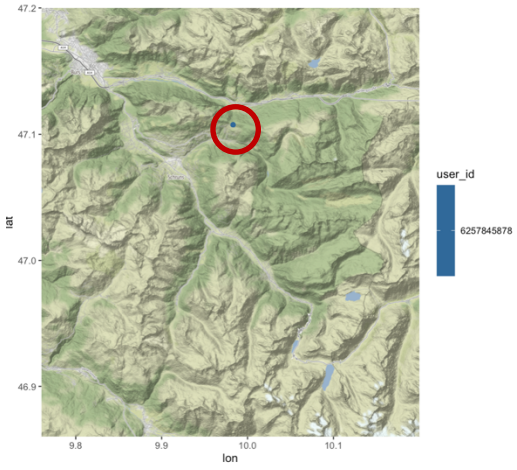


FIGURE 19 - PATH OF MOST FREQUENT USERS OF #MONTAFON (OWN DESIGN)

## 3.5 Step Five Interpretation of Visualized Data

In the fifth step the visualized data will be interpreted. The interpretation will rely on identifying the hotspots, analysing what the possibilities are, why they are hotspots and other interpretations depending on the case.

## 3.6 Step Six Findings and Recommendations

In the last step the findings, recommendations and conclusion are discussed. The findings are based on the interpretation of the data from three case studies. The recommendations are formulated to the specific and overarching situations found in the destinations and are based on the theories and implications from the chapter 2.0 Literature Review. Specifically, chapter 2.2.3 Management Strategies will be the ground for the general strategy choice, whilst the other chapters will be the basis for the decision on specific policies.

In the course of the individual case studies as well as the general findings the following eight hypotheses will be addressed:

Hypothesis 1:

**$H_0$:** There are no seasonal differences visible in the general post frequency.

**$H_1$:** There are seasonal differences visible in the general post frequency.

Hypothesis 2:

**$H_0$:** Similar patterns of post frequency can be observed among all locations.

**$H_1$:** The patterns of post frequency differ among locations.

Hypothesis 3:

**$H_0$:** There are no hotspots of posts visible in the destination.

**$H_1$:** There are hotspots of posts visible in the destination.

Hypothesis 4:

**$H_0$:** No concentration of tourist in the towns / villages of the destinations.

**$H_1$:** Concentration of tourist in the towns / villages of the destinations.

Hypothesis 5:

**$H_0$:** No concentration of tourist in the mountains of the destinations.

**$H_1$:** Concentration of tourist in the mountains of the destinations.

Hypothesis 6:

**$H_0$:** There are no blank spaces with no posts observed in the destination.

**$H_1$:** There are blank spaces with no posts observed in the destination.

Hypothesis 7:

**$H_0$:** A majority of the tourists will have the same or very similar paths.

**$H_1$:** A majority of the tourists will have different paths.

Hypothesis 8:

**$H_0$:** Tourist paths will centre around the middle of the destination.

**$H_1$:** Tourist paths will not centre around the middle of the destination.

# 4 CASE STUDIES

In this chapter the two case studies of the chosen rural alpine destination in Austria: Montafon and Zillertal will be laid out.

## 4.1 Case Study Montafon

### 4.1.1 Destination Background

The first case discussed is the destination "Montafon". The valley is located in Vorarlberg, a province made up of six defined tourism destinations: Bodensee-Vorarlberg, Bregenzerwald, Alpenregion Bludenz, Kleinwalsertal, Arlberg and Montafon. Montafon is one of the tourism regions of the province Vorarlberg with the highest economic value, as can be observed from the tourist arrivals in the figure below. Between 2015 to 2021 the destination Montafon constantly stayed the destination with the second most arrivals in Vorarlberg, behind Bodensee-Vorarlberg and sharing this second place with the destination Bregenzerwald. Montafon is made-up of eight individual entities throughout the valley: Bartholomäberg, Gargellen, Gaschurn-Partnen, Schruns-Tschagguns, Silbertal, St.Anton im Montafon, St.Gallenkirch-Gortiphol and Vandans (Paul & Rücker, 2017, 2018, 2020, 2022a, 2022b; Petrovic & Rücker, 2019).

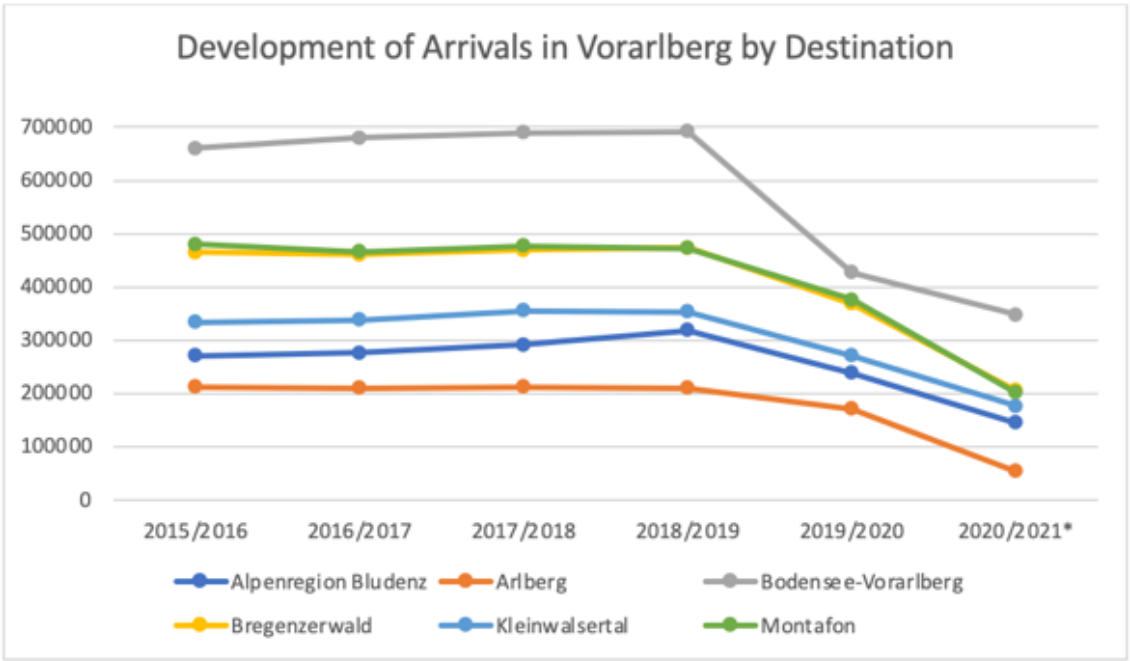


FIGURE 20 - DEVELOPMENT OF ARRIVALS IN VORARLBERG BY DESTINATION (OWN DESIGN BASED ON (PAUL & RÜCKER, 2017, 2018, 2020, 2022A, 2022B AND PETROVIC & RÜCKER, 2019)

In regard to the development of arrivals in the Montafon itself, the numbers have been relatively constant between the years 2015 and 2019, 2015 being the strongest year on record in regard to the arrivals. With the second half of the tourism year 2019/2020 and especially in the whole tourism year of 2020/2021 (tentative results) came the Covid-19 pandemic and with it a sudden plummet in tourist arrivals. As this is the most current data available from the statistical authority of Vorarlberg, it is yet to be seen how much arrivals the destination could gain back and how well the individual villages have recovered from the hold off in tourists.

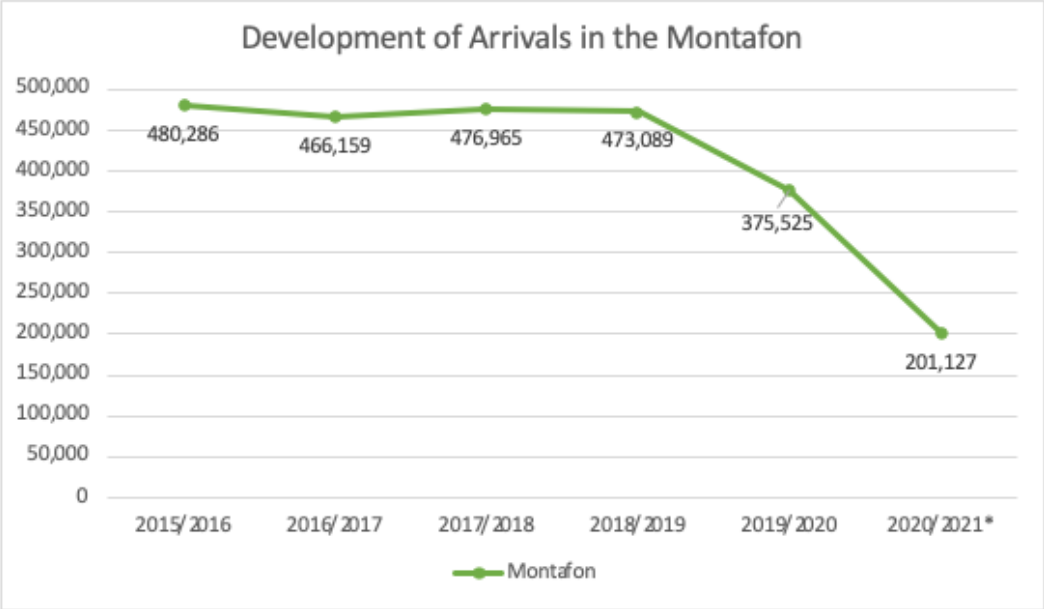


FIGURE 21 - DEVELOPMENT OF ARRIVALS IN MONTAFON (OWN DESIGN BASED ON (PAUL & RÜCKER, 2017, 2018, 2020, 2022A, 2022B AND PETROVIC & RÜCKER, 2019)

**Tentative Results*

Montafon Tourismus, the local DMO of the valley, has defined five key values that represent their positioning in their tourism guideline: historic, pioneering, rustic, hardworking and unconventional. All these values are deeply rooted in the culture of the community in the valley. This is underlined by their main slogan for the brand guideline: 'The Montafon – the most personal experience you will have in the living environment of the alps'. Additionally, it is highlighted through their communication strategy using residents as their brand ambassadors. A total of 175 residents including hotel owners, influencers, guides, athletes, farmers etc. are currently listed as official brand ambassadors. This makes keeping the native culture intact and communicating the culture to a key mission

of the DMO. As found in the literature review, this is only possible with the participation and motivation of the destination stakeholders, especially the residents of the destination, which is higher if they do not feel that their everyday life is disrupted by tourists (Montafon Tourismus, 2022b, 2022a, 2022e)

Besides the social sustainability, managing director of the DMO, Manuel Bitschnau, was recently quoted saying 'A tourism destination is obligated to act sustainable, to ensure that the destination can continue existing.' In connection with this the DMO has launched the project "PIZ Montafon" for sustainable tourism. PIZ stands for progressive innovative and future-oriented (German: progressiv, innovativ, zukunftsorientiert) (Montafon Tourismus, 2022c)

### 4.1.2 Hashtag Choice and Data Collection

In regard to social media marketing the destination has defined their own hashtag "Mein-Montafon" that they encourage visitors to use in their social media posts. They commonly share this hashtag on their own account which as of June 2022 has 20.4 thousand followers. The hashtag currently has 44.5 thousand posts on Instagram. In comparison other location specific hashtags using the term Montafon or versions thereof are "Montafon" (158 thousand posts) "SilvrettaMontafon" (44.5 thousand posts), "MontafonMoments" (5 thousand posts), "Muntafu" (3.4 thousand posts) and "MontafonErleben" (3.3 thousand posts). To ensure that the hashtag users and tourists specifically will most likely use is chosen, the most frequently used on "Montafon" with 158 thousand posts was chosen for the data acquisition, rather than the DMO proposed on "MeinMontafon" with 44.5 thousand posts (Instagram, 2022; Montafon Tourismus, 2022a).

Based on this hashtag research the 20,000 last posts using the hashtag "Montafon" were acquired via the platform Picodash and processed in the following chapter.

### 4.1.3 Data Processing

In the third step the data had to be further processed as described in the methodology. The first data output created was the distribution of posts over the years. For the destination Montafon this output was already explained in the methodology and can be seen in the graphic below, thus the posts starting from March 2021 were regarded.

The first output from this was the development of posts per month since March 2021 as can be observed from the figure below.

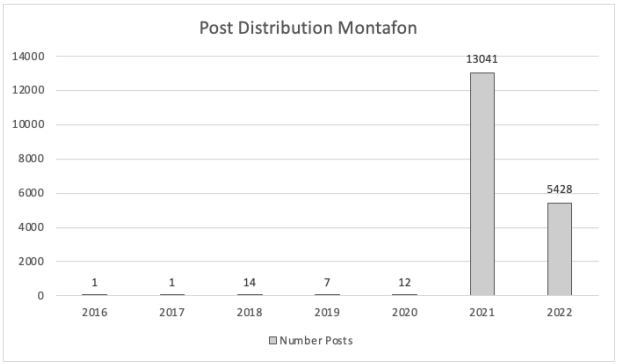


FIGURE 22 - POST DISTRIBUTION OF ACQUIRED DATA FOR MONTAFON (OWN DESIGN)

Posts / Month

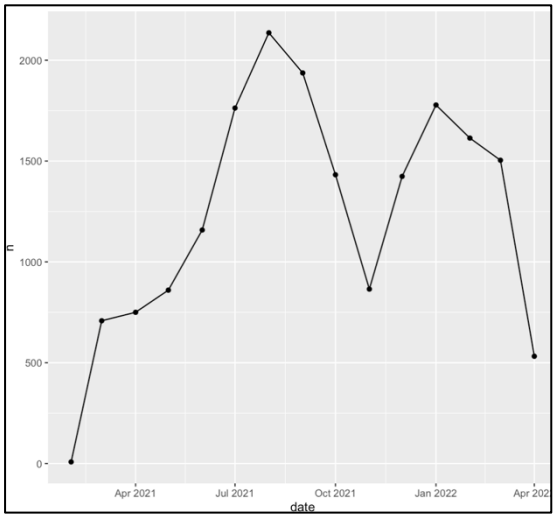


FIGURE 23 - DEVELOPMENT OF ACQUIRED POSTS USING #MONTAFON SINCE FEBRUARY 2021 (OWN DESIGN)

As can be observed from the figure above, the acquired posts start accumulating at a realistic number in March 2021 with an average of around 750 posts per months from March to May 2021. In the month of June of 2021, with the beginning of the summer season in the destination and the opening of much of the tourist infrastructure such as cable cars, there a first jump to over 1,100 posts. Following is an even bigger increase to 1,750 posts in July 2021. In August 2021 the posts reach their peak with over 2,000 posts

within the month. After this peak in the high season of summer the amount of posts using the hashtag "Montafon" decreases to just under 2,000 in September 2021 and just under 1,500 posts in October 2021. With the start of the off season in November 2021 the number of posts continues to rapidly decrease to around 800 posts. Following there is another considerable growth with the beginning of the winter season with just under 1,500 posts in December 2021, mirroring the post number of October 2021 and 1,750 posts in January 2022, mirroring the post number of July 2021. After the holiday months a moderate decline in post numbers is visible with an average of around 1,550 posts in the months of February and March 2022. From the figure a rapid plunge can be observed, however that is due to the data being acquired in the beginning of April 2022.

Looking at this development hypothesis 1 "**$H_0$:** There are no seasonal differences visible in the general post frequency." is rejected and "**$H_1$:** There are seasonal differences visible in the general post frequency." is accepted for the case of the destination Montafon.

Top post development

As can be observed from the figure below, the hashtag Montafon the most tagged location is the whole valley, Montafon. Following are Gargellen, Schruns, Vorarlberg. The decline in post numbers between the location IDs is relatively gradual, with a bigger decrease (308 posts) between the top location Montafon and the second most tagged location Gargellen. There is also a slight drop (106 posts) between the location Vorarlberg, ranked 4th and Bartholomäberg ranked 5th.

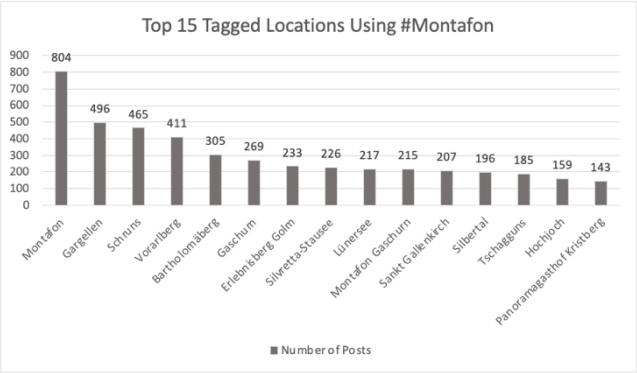


FIGURE 24 - TOP 15 TAGGED LOCATIONS USING #MONTAFON (OWN DESIGN)

The development of the top 5 tagged posts is illustrated in the figure above, this includes Montafon, Gargellen, Schruns, Vorarlberg and Bartholomäberg. It can be observed that there is no obvious pattern amongst the locations. This could be an indication, that different locations are more or less popular during different seasons. For instance, the geotag of the village Gargellen has its peak in December 2021, whilst this is a month were the geotag of the village Bartholomäberg is close to the lowest of the year observed. The geotag Montafon had reached its peak in April 2021, which was generally a month were other locations were tagged less frequently than in most other months. Lastly an observation made is that the location Gargellen shows the highest peak in December 2021, apart from the location tag of the entire valley Montafon, but Gargellen also is the location with the strongest decline, being the location with the least posts per month in November 2021 and this being the month and location combination with the least frequency over the whole year observed.

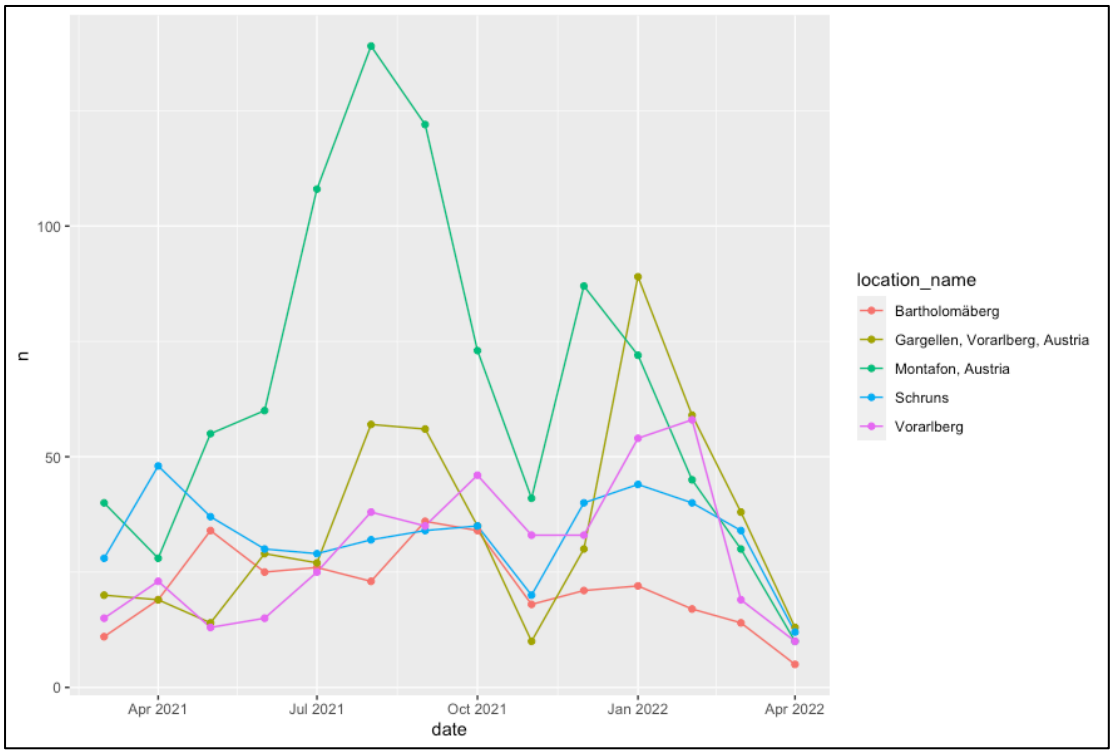


FIGURE 25 - DEVELOPMENT OF MOST TAGGED LOCATIONS USING #MONTAFON; TOP 1 TO 5 (OWN DESIGN)

Observing this development hypothesis 2 "**$H_0$:** Similar patterns of post frequency can be observed among all locations." is rejected and "**$H_1$:** The patterns of post frequency differ among locations." is accepted for the destination Montafon.

### 4.1.4 Data Visualization & Interpretation of Visualized Data

Traditional Hotspot Heatmap

The first visualisation in the figure below is a traditional hotspot heatmap of the frequency of posts using the hashtag “Montafon” per tagged location.

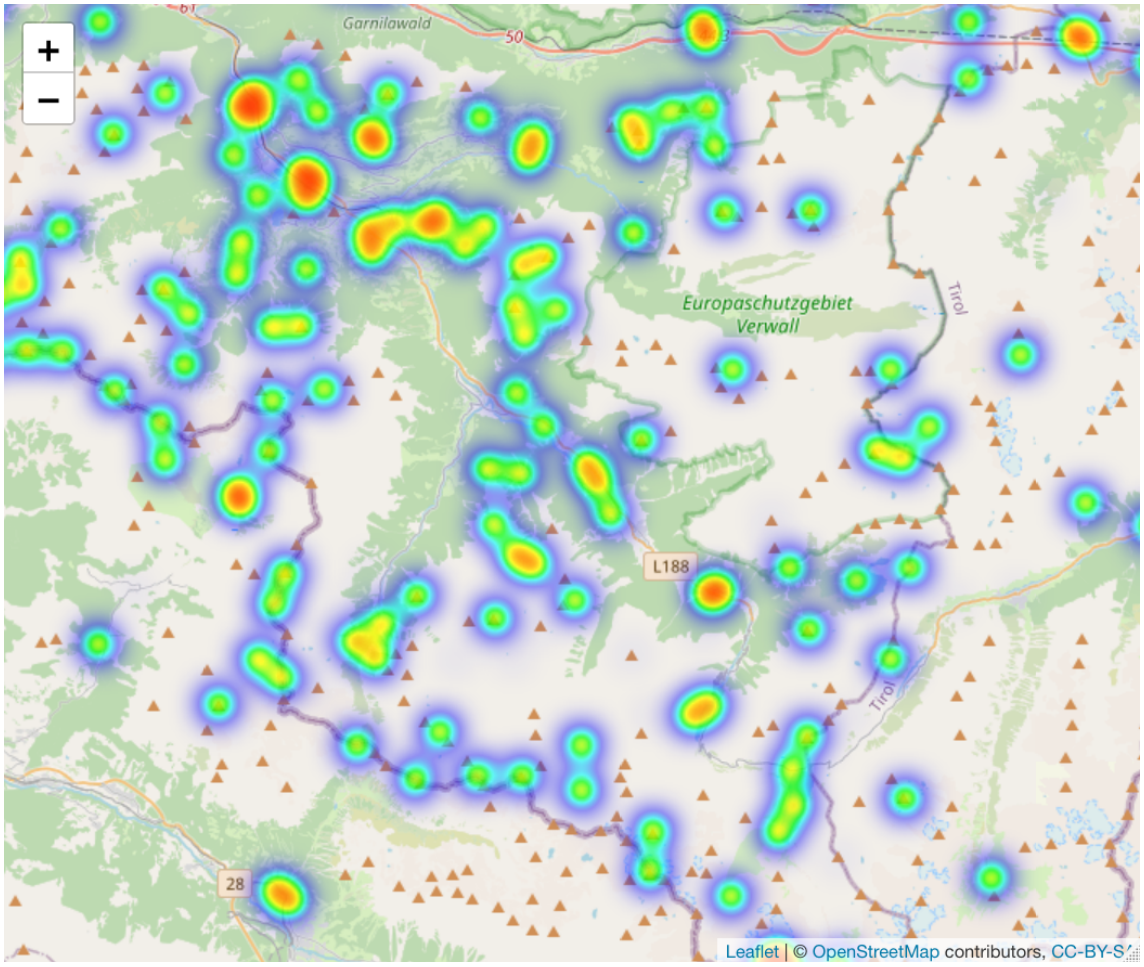


FIGURE 26 - TRADITIONAL HEATMAP OF POSTS USING #MONTAFON (OWN DESIGN)

Observing the heatmap, there is no outlier with extreme clustering visible. However, there are several hotpots (red spots) where a higher frequency of posts can be observed than in other places. Based on these observations, Hypothesis 3 “**$H_0$:** There are no hotspots of posts visible in the destination.” is rejected and “**$H_1$:** There are hotspots of posts visible in the destination.” is accepted for the destination Montafon.

Additionally, it is clearly visible that the clustering is restrained to certain areas of the destination. There are more areas in the destination that have no posts affiliated then there are locations with posts visible, leading to blank spots in the map. Based on the figure

and this observation hypothesis 6 "**$H_0$:** There are no blank spaces with no posts observed in the destination." is rejected and "**$H_1$:** There are blank spaces with no posts observed in the destination." is accepted for the destination Montafon.

Proportional Circles Heatmap

Similarly, to the hotspot heatmap, the proportional circles heatmap was visualised for the destination.

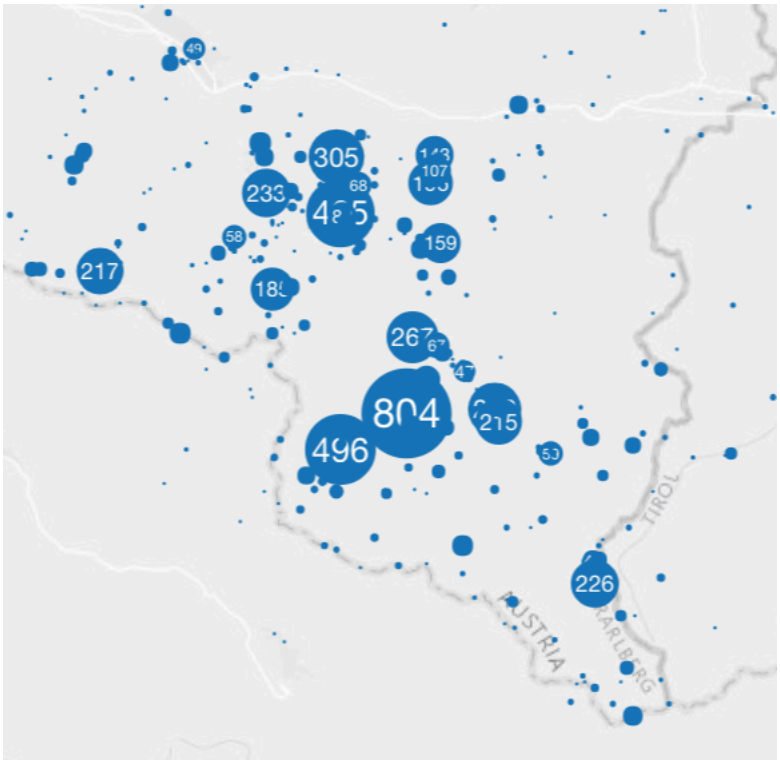


FIGURE 27 - PROPORTIONAL CIRCLES OF POSTS USING #MONTAFON (OWN DESIGN)

This heatmap reveals two main clusters of posts with one somewhat outlying cluster. One includes the 804 posts that can be attributed to the location "Montafon" giving no real meaningful insights as the definition is too broad. These clusters can be observed in the figure below.


FIGURE 28 – COMPARISON OF CLUSTERS IN THE DESTINATION MONTAFON (OWN DESIGN)

In the same area as the location tag Montafon, there is also a cluster of popular location tags Gargellen (496 posts), Gaschurn (269 posts), Montafon Gaschurn (215 posts) and St. Gallenkirch (267 posts)). This cluster is made up entirely of villages.

The second cluster is on the outskirts of the destination and consists of Schruns (465 posts), Bartholomäberg (305 posts), Erlebnisberg Golm Montafon (233 posts), Silbertal (196 posts), Tschagguns (185 posts), Hochjoch (159 posts) Kristberg (Panoramagasthof 143 posts and Genießerberg 107 posts). This cluster is made up of a combination of villages (Schruns, Barholomäberg, Silbertal and Tschagguns) and mountain areas made accessible via cable cars (Erlebnisberg Golm Montafon, Hochjoch and Kristberg).

Lastly there is a cluster that lies further from the others surrounding the location tag Silvretta Stausee (226 posts) and Silvretta Bielerhöhe (98 posts). This cluster lies in the mountains, accessible not by cable car but by car and bus via a mountain pass where a toll fee has to be paid.

With this observation it can be concluded that Hypothesis 4 "**$H_0$:** No Concentration of tourist in the towns / villages of the destinations." is rejected and **$H_1$:** Concentration of tourist in the towns / villages of the destinations." is accepted for the destination Zillertal.

Additionally, based on these observations the Hypothesis 5 "**$H_0$:** No Concentration of tourist in the mountains of the destinations." is rejected and **$H_1$:** Concentration of tourist in mountains of the destinations." is accepted for the destination Zillertal.

Tourist Paths

The last visualisation is of the tourist paths in the destination. The paths of the top ten most frequently posting users have been visualised individually in the graphic below.

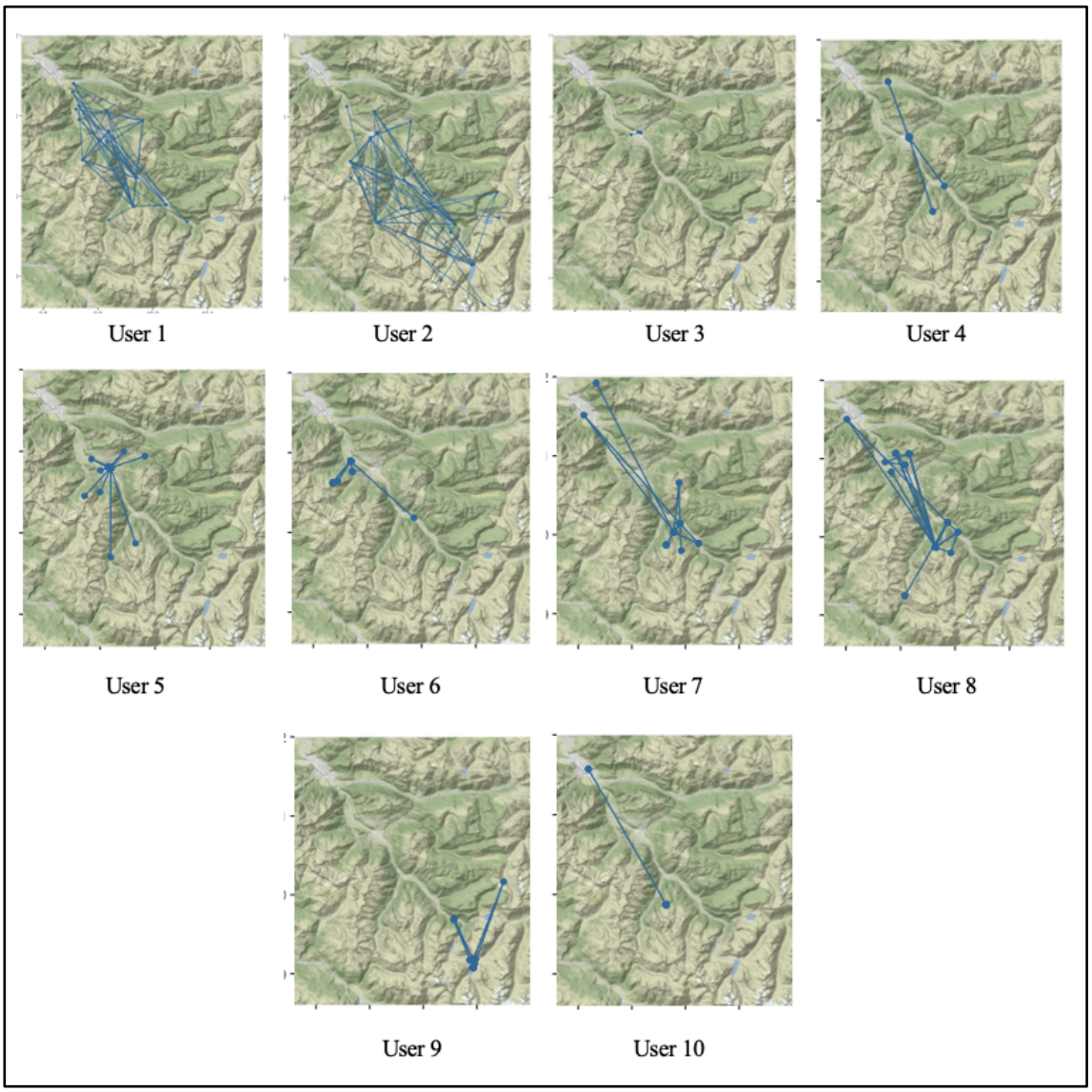


FIGURE 29 - INDIVIDUAL PATHS OF USERS USING #MONTAFON (OWN DESIGN)

As can be observed, there is no clear trend in the paths and most of them show vast differences. All of the paths shown have a tendency to accumulate most posts in the centre of the destination. However, some paths are leaning more towards the outer part of the valley and some more towards the inner part of the valley. There are also vast differences in how many different locations the users tag. Some users have posts using the hashtag "Montafon" tagged with more than ten different locations, whilst others with a comparable amount of posts have posts only tagged with two locations. Additionally, as afore

mentioned there were users with large amounts of posts that have tagged the same location in all of the posts. From the top ten posters, five only posted from one single location. In regard to the hypothesis 7, "**$H_0$:** A majority of the tourists will have the same or very similar paths." is rejected and "**$H_1$:** A majority of the tourists will have different paths." is accepted for the destination Montafon based on the observations from the figures.

Additionally, based on those observations, hypothesis 8 "**$H_0$:** Tourist paths will centre around the middle of the destination" is retained for the destination Montafon.

## 4.2 Case Study Zillertal

### 4.2.1 Destination Background

The second case discussed is the destination "Zillertal". The valley is located in Tyrol, a province made up of 34 defined tourism destinations. The top fourteen destinations by arrival are, as highlighted in the figure below: Achensee, Innsbruck und seine Feriendörfer, Mayrhofen, Ötztal Tourismus, Seefeld, Stubai Tirol, Tiroler Zugspitz Arena, Zillertal, Kitzbühel Tourismus, Osttirol, Paznaun-Ischgl, Serfaus-Fiss-Ladis, Tiroler Oberland and Wilder Kaiser. Zillertal is one of the tourism regions of the province Tyrol with the highest economic value, peaking at just over 500,000 arrivals in 2019. Between 2015 to 2021 the destination Zillertal has experienced slight changes in their ranking compared to the other destinations and varied between 5$^{th}$ and 7$^{th}$ top destination regarding arrivals. Thus, Zillertal constantly stayed withing the top ten ranking destinations in Tyrol. It should also be mentioned, that the DMO Mayrhofen is geographically part of the Zillertal making tourism in the area even more economically important. This differentiation within the valley stay from a merger of 250 Tyrolean DMOs in the 1990s to the 34 existing ones, where Mayrhofen decided to remain as its own destination. They are however still included in Zillertal Tourismus DMO activities; thus, the area will be regarded as part of the destination Zillertal going forward (Landesstatistik Tirol, 2022a, 2022b; Tirol Werbung, 2020).

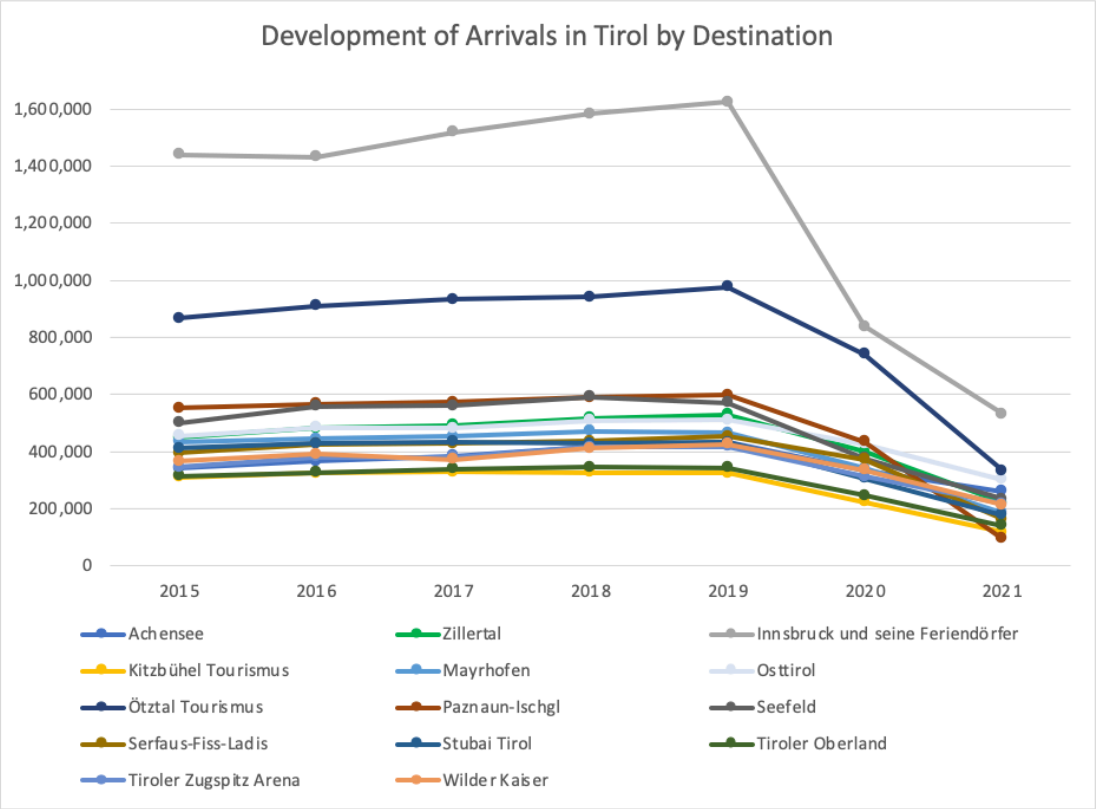


FIGURE 30 - DEVELOPMENT OF ARRIVALS IN TYROL BY DESTINATION (OWN DESIGN AND OWN CALCULATION BASED ON LANDESSTATISTIK TIROL 2022A & 2022B)

In regard to the development of arrivals in the Zilltertal itself, the numbers have remained relatively constant between the years 2015 and 2019 as can be observed in the figure below. In this timespan there was a slight rise in numbers every year, peaking in 2019. With 2020 the Covid-19 pandemic hit and lead to a sudden plummet in tourist arrivals, that continued in 2021 with the destinations lowest number of arrivals since the beginning of records. As this is the most current data available from the statistical authority of Tyrol, it is yet to be seen how much arrivals the destination could gain back and how well the individual villages have recovered from the lack of tourists. Zillertal is made-up of five individual sub-regions throughout the valley: Fügen-Kaltenbach, Zell-Gerlos, Mayrhofen-Hippack, Tux-Finkenberg and Hochgebirgs-Naturpark Zillertaler Alpen (Landesstatistik Tirol, 2022a, 2022b).

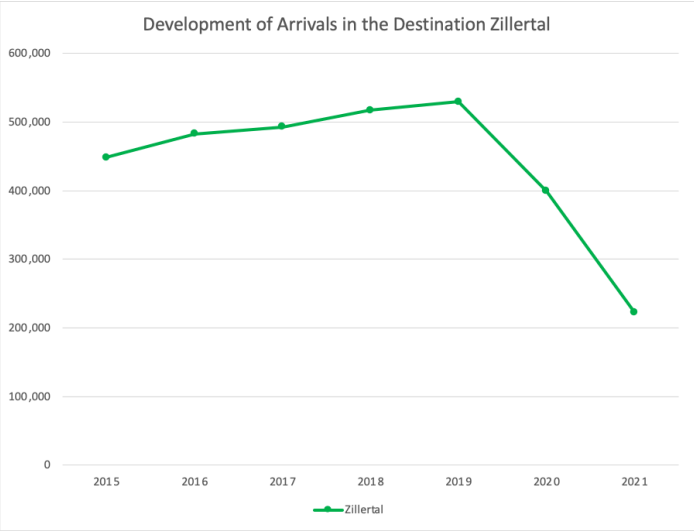


FIGURE 31 - DEVELOPMENT OF ARRIVALS ZILLERTAL (OWN DESIGN AND OWN CALCULATION BASED ON LANDESSTATISTIK TIROL, 2022A & 2022B)

There is not much available in terms of information about destination mission or strategy by the DMO Zillertal Tourismus. The last strategy publicly available was published ten years ago in 2012. In this report the importance of upkeeping the image and atmosphere of a traditional Tyrolean mountain valley and the interrelated high quality of life. It is acknowledged that vast changes in the short-term and long-term planning are necessary to achieve this goal, specifically in regard to land use planning. Another core topic was providing high quality tourism and an excellent guest experience to the visitors of Zillertal through a long-term sustainability strategy. Lastly, another mentioned important topic for the destination was investing in public transportation to increase mobility to and inside of the destination, whilst decreasing the volume of traffic (Geisler, 2012).

### 4.2.2 Hashtag Choice and Data Collection

In regard to social media marketing the destination has defined their own hashtag "Zillertal" that they encourage visitors to use in their social media posts. They commonly share this hashtag on their own account which as of June 2022 has 64.7 thousand followers. The hashtag currently has 510 thousand posts on Instagram. In comparison other location specific hashtags using the term Zillertal or versions thereof are "ZillertalArena"

(70.7 thousand posts) “Zillertal_Tirol” (19.6 thousand posts), “Zillertaleralpen” (15 thousand posts), “ZillertalAlps” (6.8 thousand posts) and “LoveZillertal” (2.9 thousand posts. To ensure that the hashtag users and tourists specifically will most likely use is chosen, the most frequently used on “Zillertal” with 510 thousand posts was chosen for the data acquisition, which is also the DMO proposed on hashtag (Instagram, 2022; Zillertal Tourismus, 2022).

Based on this hashtag research the 20,000 last posts using the hashtag “Zillertal” were acquired via the platform Picodash and processed in the following chapter.

### 4.2.3 Data Processing

As in the first case study, the first data output created for further processing from the destination Zillertal is to determine which timespan should be continued to be included in the analysis. To do so the distribution of acquired posts over the years was plotted. As can be observed from the graphic below, there were only an accumulated amount of 24 posts for the years 2018 to 2021. For the first half year of 2022 there were 20,082 posts. Hence, the posts from the years 2018 to 2021 were omitted. Different to the data from Montafon, the total number of posts accumulated to more than the acquired 20,000 posts.

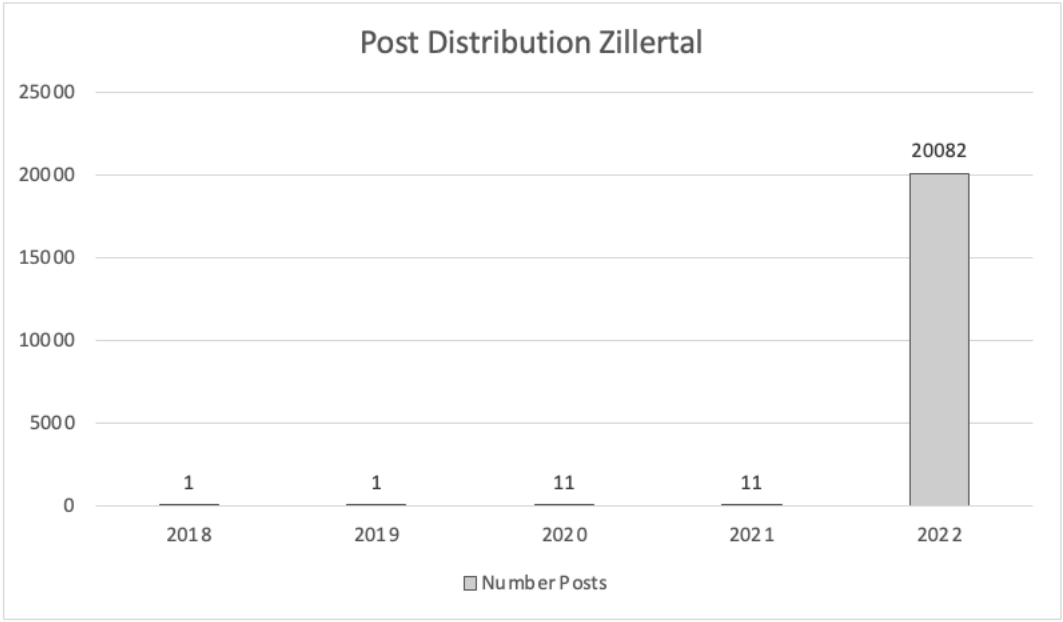


FIGURE 32 - POST DISTRIBUTION FOR POSTS USING #ZILLERTAL (OWN DESIGN)

Posts / Month

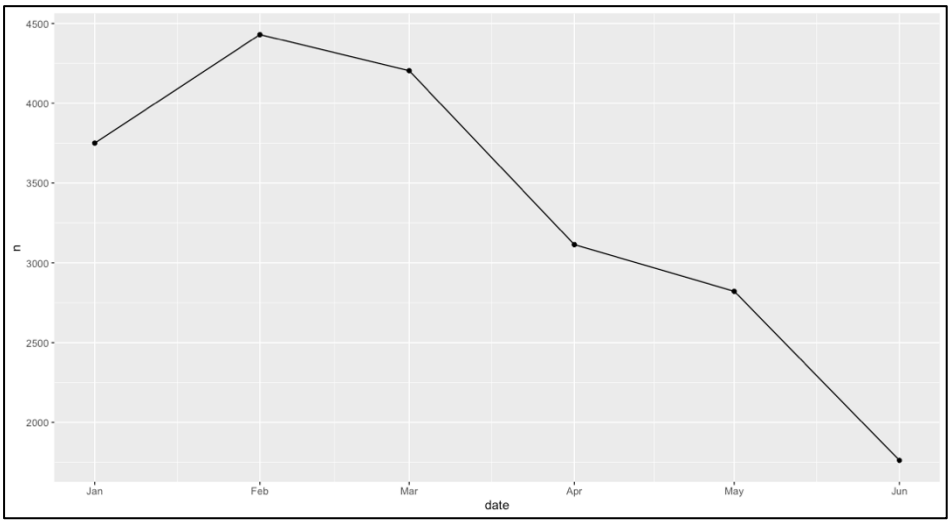


FIGURE 33 - DEVELOPMENT OF ACQUIRED POSTS USING #ZILLERTAL SINCE JANUARY 2022 (OWN DESIGN)

As can be observed from the figure above, the acquired posts start accumulating at a realistic number in January 2022, with 3,750 posts. In the month of February, the peak of the amount of posts per month is reached, with almost 4,500 posts. In the following month there is a moderate decrease to just below 4,250 posts. In March with the beginning of the lower season, a substantial plunge to just above 3,000 posts can be observed. This downward trend continues in May, however less rapid, bottoming out at 3,800 posts. In the last observed month of June 2022 there was another rapid drop, however this was due to the data being acquired in the beginning of that month, thus not representing all of the posts published from the point of data acquisition going forward.

It is not possible to acquire more than 20 thousand posts from the past and in the case of this destination, 20 thousand posts do not cover a full year. A seasonal pattern is observable in the low season in spring, but it is not possible to observe whether such a pattern is continued in the low season in autumn.

Looking at this development hypothesis 1 "**$H_0$:** There are no seasonal differences visible in the general post frequency." is rejected and "**$H_1$:** There are seasonal differences visible in the general post frequency." is partially accepted for the case of the destination Zillertal with the available data.

Top Post Development

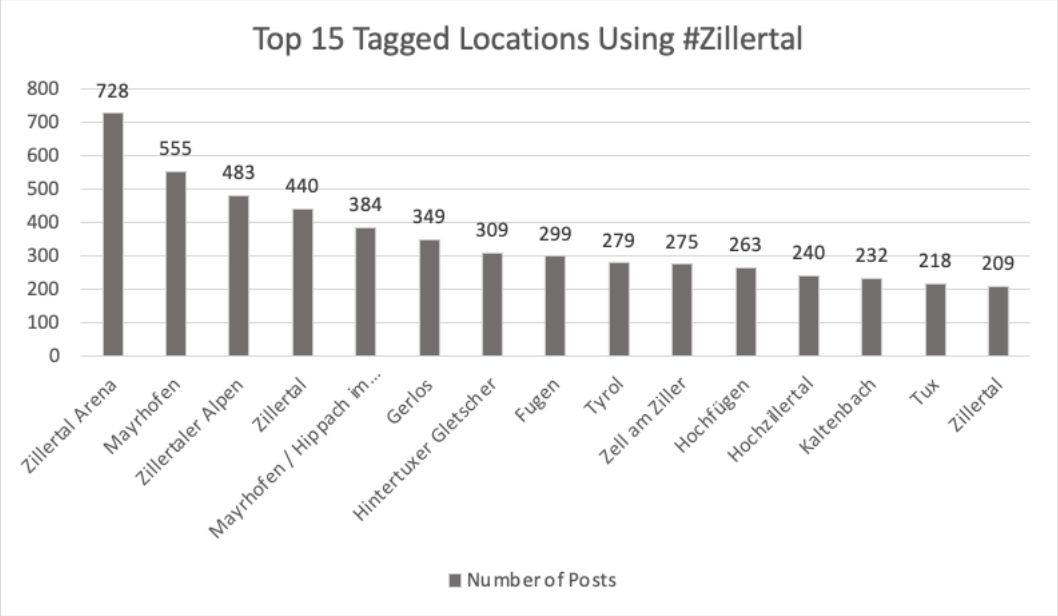


FIGURE 34 - TOP 15 TAGGED LOCATIONS USING #ZILLERTAL (OWN DESIGN)

The second step in the data processing was to determine what the top tagged locations are. As can be observed from the figure above, the hashtag Zillertal has the most geo tagged posts in the location Zillertal Arena, the largest skiing / hiking area of the destination. Following is the village Mayrhofen, the mountain range Zillertaler Alpen and the general geotag for Zillertal. Included in the 15 top locations are also several villages besides Mayrhofen: Hippach, Gerlos, Fugen, Zell am Ziller, Hochfügen, Kaltenbach and Tux. In regard to mountains, besides the Zillertal Arena and the Zillertaler Alpen the top 15 locations include the glacier Hintertuxer Gletscher. Additionally, it can be observed, that there are two frequently used geotags called “Zillertal” in different locations. Mayrhofen is also listed twice, once including the neighbouring village of Hippach. Generally, the decline in post numbers among the locations is very gradual indicating an even distribution. There is however a distinct drop in numbers between the top location Zillertal arena and the second most tagged location Mayrhofen (173 posts).

Below is a graphic highlighting the development of the posts in the top five locations on a timeline. It can be observed that there is no obvious pattern amongst the location. This could be an indication, that the different locations are more or less popular in different

seasons. For instance, the geotag of the skiing / hiking area Zillertal Arena has its peak in a month withing the high season of winter, February. The post numbers plummet in May, which is a month were most of the cable cars connecting the mountain to the valley are not in operation for at least part of the month. Contrasting the mountain range of Zillertaler Alpen peak in the month of May, which could be an indication that with the cable cars being unavailable more tourists choose to go to the more accessible mountains of the alps. Generally, the month of May was where 4 of the five destinations bottom out. Besides Zillertal Arena this includes Mayrhofen, Mayrhofen / Hippach and Zillertal. It can be observed, that the locations Zillertaler Alpen and Mayrhofen have an opposing development between each other in the months January to May. Whenever there is an increase in posts from one month to the next in Zillertaler Alpen, there is a decrease in Mayrhofen and vice versa. This development only stops in the month of June where both decrease as the month could not be fully observed. Lastly it can be observed that Zillertal Arena and Mayrhofen are the only months that are already showing an upwards trend in the beginning month of June. This is an indication that June will be a very strong month for those two locations in particular, as there are already more posts than in the preceding month without all of the month having passed.

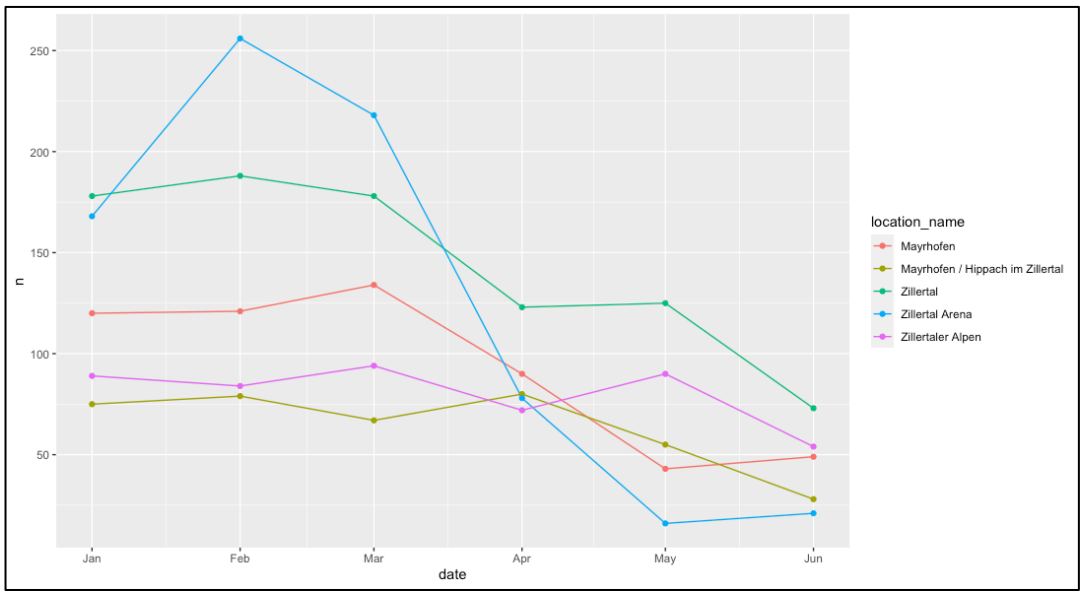


FIGURE 35 – DEVELOPMENT OF THE TOP FIVE TAGGED LOCATIONS USING #ZILLERTAL (OWN DESIGN)

Observing this development hypothesis hypothesis 2 "**$H_0$:** Similar patterns of post frequency can be observed among all locations." is rejected and "**$H_1$:** The patterns of post frequency differ among locations." is accepted for the destination Zillertal.

### 4.2.4 Data Visualization & Interpretation of Visualized Data

Traditional Hotspot Heatmap

The first visualisation as can be observed below is a traditional hotspot heatmap of frequency of postings using the hashtag "Zillertal" per tagged location.

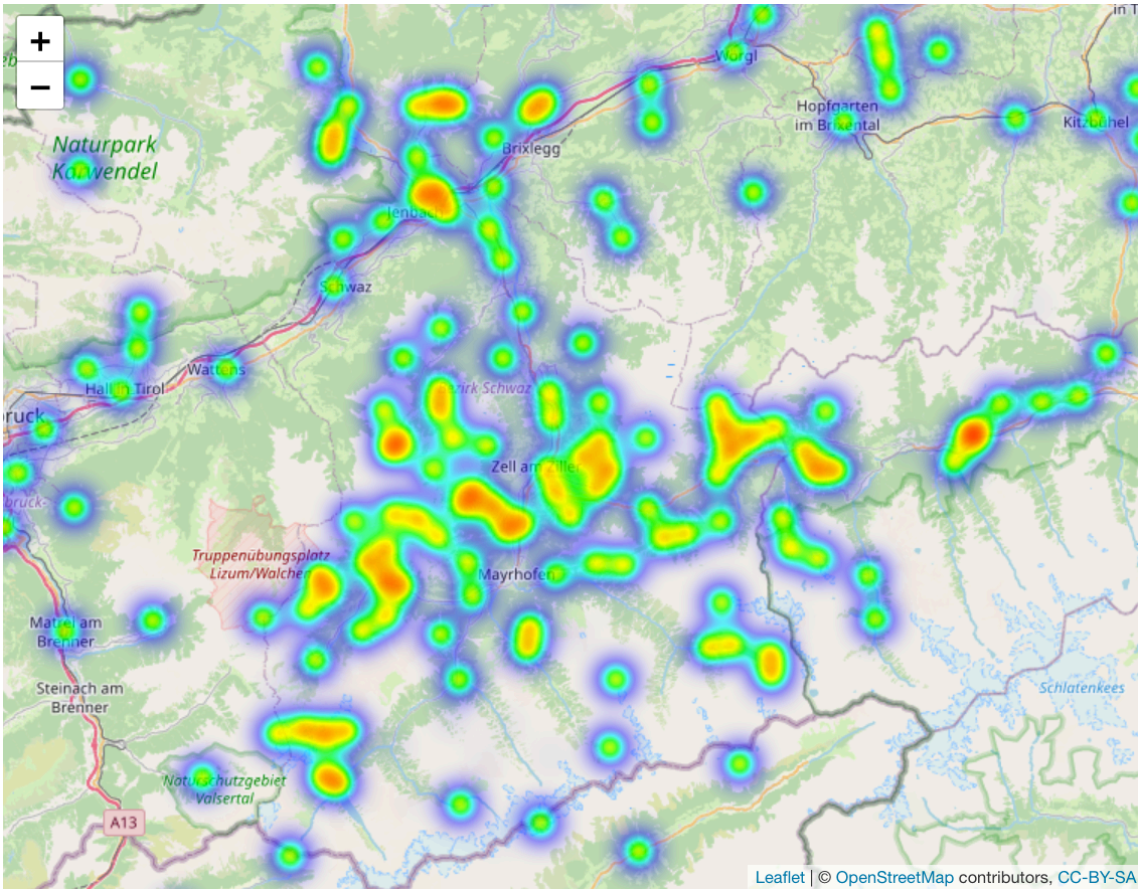


FIGURE 36 - TRADITIONAL HEATMAP OF POSTS USING #ZILLERTAL (OWN DESIGN)

Observing the heatmap, there are no outliers where extreme clustering of posts is visible. However, there are several hotspots with a high frequency of posts that can be observed from the map. Based on this observation, Hypothesis 3 "**$H_0$:** There are no hotspots of posts visible in the destination." is rejected and "**$H_1$:** There are hotspots of posts visible in the destination." is accepted for the destination Zillertal.

Additionally to this observation, the map also shows that the clustering is not spread evenly across the area, but is restrained to certain areas of the destination. Besides these clusters there is a large part of the area with no posts tagged, leading to blank spots on the map. Based on the figure above and this observation hypothesis 6 "**$H_0$:** There are no blank spaces with no posts observed in the destination." is rejected and "**$H_1$:** There are

blank spaces with no posts observed in the destination." is accepted for the destination Montafon.

Proportional Circles

Similarly, to the hotspot heatmap, the proportional circles heatmap was visualised for the destination Zillertal in the figure below.

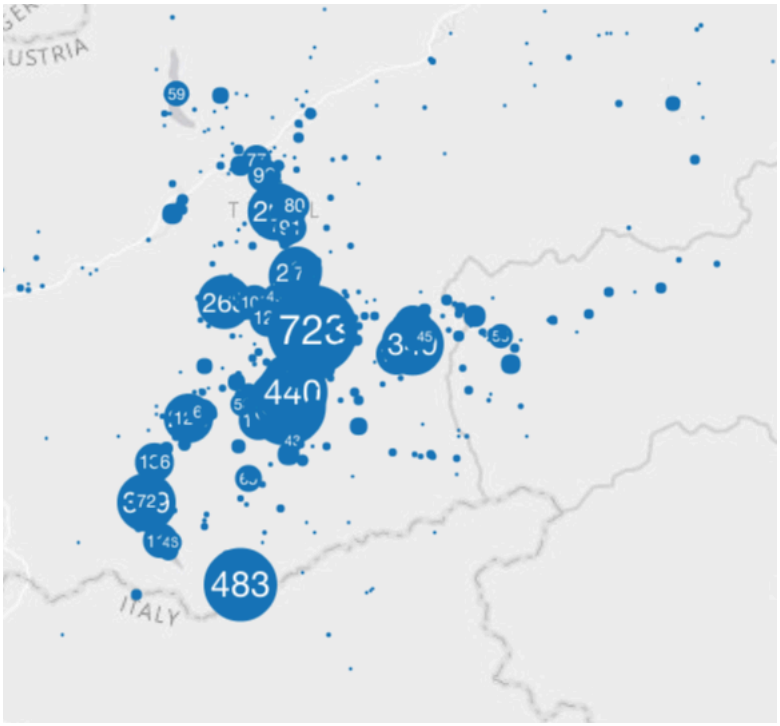


FIGURE 37 - PROPORTIONAL CIRCLES OF POSTS USING #ZILLERTAL (OWN DESIGN)

This heatmap reveals an ongoing cluster in the centre of the destination where most of the villages lie. There is one slight outlier, which is a cluster just right to the centre of the map. A larger zoom reveals three separate larger clusters that can be identified as visualised in the figure below.

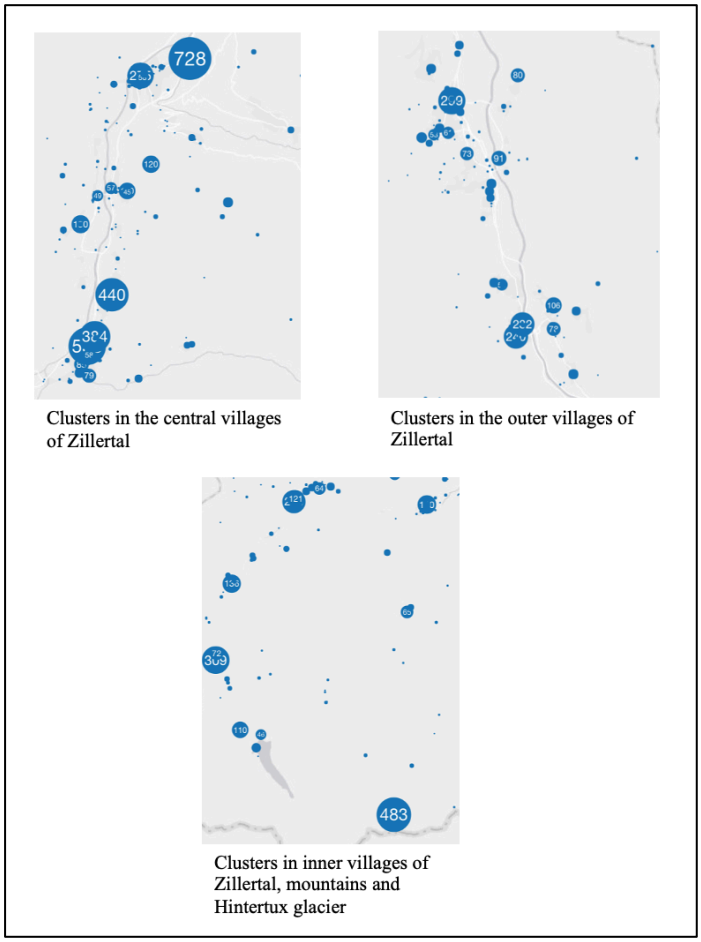


FIGURE 38 - COMPARISON OF CLUSTERS IN THE DESTINATION ZILLERTAL (COMPARISON)

The first cluster can be observed in the central villages of Zillertal, which includes the location tag for Mayrhofen (555 posts), Mayrhofen / Hippach (384 posts) and Gerlos (304 posts) amongst others. Regarding mountains there is a cluster in this area for the Zillertal Arena (728 posts). This area also includes the general location tag for Zillertal, giving no real meaningful insights as the definition is too broad.

The second cluster is located in the outer villages of Zillertal. This area includes clusters in the villages Fugen (299 posts) and Kaltenbach (232 posts), as well as the the cluster of villages Hochzillertal (240 posts).

The third cluster formed around the inner villages of Zillertal, this includes: Zell am Ziller (275 posts) and Hintertux (138 posts). This cluster also includes the glacier Hintertuxer Gletscher (309 posts) and the Zillertaler Alpen (483 posts)

With this observation it can be concluded that Hypothesis 4 "**$H_0$:** No Concentration of tourist in the towns / villages of the destinations." is rejected and **$H_1$:** Concentration of tourist in the towns / villages of the destinations." is accepted for the destination Zillertal.

Additionally, based on these observations the Hypothesis 5 "**$H_0$:** No Concentration of tourist in the mountains of the destinations." is rejected and **$H_1$:** Concentration of tourist in mountains of the destinations." is accepted for the destination Zillertal.

Tourist Paths

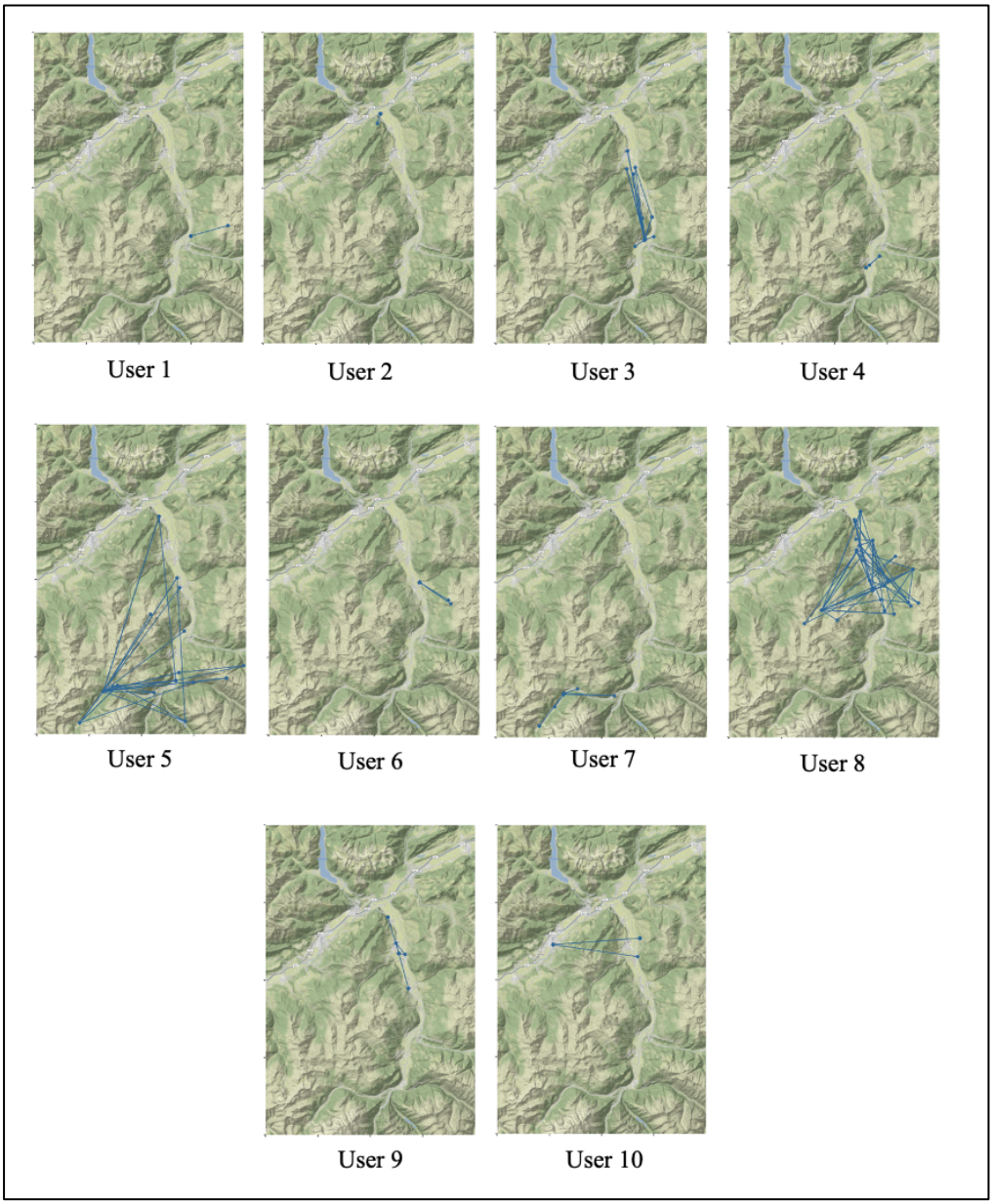


FIGURE 39 - INDIVIDUAL PATHS OF USERS USING #ZILLERTAL (OWN DESIGN)

The last visualisation is of the tourist paths in Zillertal. The paths of the top ten most frequently posting users have been visualised individually in the graphic above.

As can be observed, there is no clear trend in the paths and most of them are visibly different. All the users have a tendency to accumulate most of their movement in the valley and centre of the destination. However, there are some that lean more towards the outer part of the valley and some that are centred more around the inner part of the village. There are also differences in how many different locations the users tag. Most of the users (users 1, 2, 4, 6, 7, 9 and 10) have posted from a relatively small variety of locations, whilst others (users 3, 5 and 8) have posted from many different locations. As mentioned in the methodology this is excluding users that have posted from one single location. From the top ten posters, three were omitted due to this.

In regard to the hypothesis 7, "**$H_0$:** A majority of the tourists will have the same or very similar paths." is rejected and "**$H_1$:** A majority of the tourists will have different paths." is accepted for the destination Zillertal based on the observations from the figures.

Additionally, based on those observations, hypothesis 8 "**$H_0$:** Tourist paths will centre around the middle of the destination" is retained for the destination Zillertal.

# 5 FINDINGS

This chapter will lay out the results of the visualisation and analysis of the 38.5 thousand Instagram posts spread across the two destinations Montafon and Zillertal. First an overview over the (partially) accepted and rejected hypotheses based on the findings of the two case studies is given in the table below.

## 5.1 Hypotheses

| | | M | Z |
|---|---|---|---|
| **Hypothesis 1** | **$H_0$:** There are no seasonal differences visible in the general post frequency. | | |
| | **$H_1$:** There are seasonal differences visible in the general post frequency. | ✓ | **part.** |
| **Hypothesis 2** | **$H_0$:** Similar patterns of post frequency can be observed among all locations. | | |
| | **$H_1$:** The patterns of post frequency differ among locations. | ✓ | ✓ |
| **Hypothesis 3** | **$H_0$:** There are no hotspots of posts visible in the destination. | | |
| | **$H_1$:** There are hotspots of posts visible in the destination. | ✓ | ✓ |
| **Hypothesis 4** | **$H_0$:** No concentration of tourist in the towns / villages of the destinations. | | |
| | **$H_1$:** Concentration of tourist in the towns / villages of the destinations. | ✓ | ✓ |
| **Hypothesis 5** | **$H_0$:** No concentration of tourist in the mountains of the destinations. | | |
| | **$H_1$:** Concentration of tourist in the mountains of the destinations. | ✓ | ✓ |
| **Hypothesis 6** | **$H_0$:** There are no blank spaces with no posts observed in the destination. | | |
| | **$H_1$:** There are blank spaces with no posts observed in the destination. | ✓ | ✓ |
| **Hypothesis 7** | **$H_0$:** A majority of the tourists have the same or very similar paths. | | |
| | **$H_1$:** A majority of the tourists have different paths. | ✓ | ✓ |
| **Hypothesis 8** | **$H_0$:** Tourist paths will centre around the middle of the destination | ✓ | ✓ |
| | **$H_1$:** Tourist paths will not centre around the middle of the destination | | |

TABLE 6 - OVERVIEW OVER THE HYPOTHESES (OWN DESIGN)

In total seven of the hypotheses $H_1$ were accepted, one of them partially due to a lack of data availability in Zillertal. This includes hypothesis one through seven, one being the partially accepted one. For one hypothesis, that being hypothesis eight, $H_0$ was accepted.

Other comparisons between the development of posts and geographical distribution of posts in the destinations that could be found are listed in the following.

## 5.2 Destination Comparison

From the research of the hashtag choice and regarding the DMO it was found that Zillertal has substantially more followers (64.7 thousand followers) and a higher hashtag frequency (510 thousand posts under the most frequented hashtag). This results in the posts acquired for this thesis accumulating to an average of 3,347 posts per month, in the observed six months. In comparison Montafon has around a third of the followers (20.4 thousand followers) and around a third of the posts under the most frequently used hashtag (158 thousand posts). This results in the posts acquired for this thesis accumulating to an average of 1,420 posts per month, in the observed 13 months. This is less than half of the average number of posts per month observed in Zillertal. Additionally, it could also be observed, that the DMO of Zillertal is promoting the further use of the most frequently used hashtag "Zillertal" in their profile description. Contrarily the DMO of Montafon aims to further establish their own hashtag "MeinMontafon" through their profile description, though it is not the most frequently used one.

The second comparisons focus on the visualisations themselves.

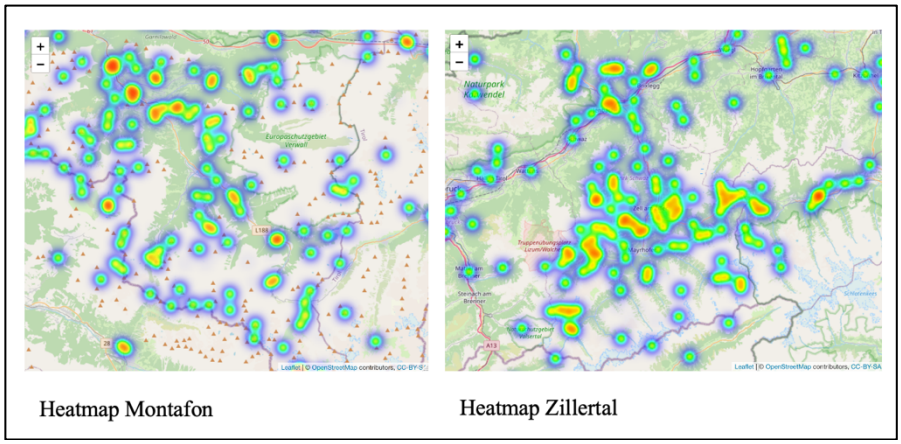


FIGURE 40 - COMPARISONS OF FREQUENCY HEATMAPS BETWEEN DESTINATIONS (OWN DESIGN)

The figure below shows a comparison of the frequency heatmaps. As can be observed there are more dark red clusters in the destination Zillertal. However, both destinations show certain hotspots of posts.

In the second visualisation, the proportional circles based on number of posts, there is a larger cluster that can be observed in the destination Zillertal. There is in total also a higher number of individual clusters in the destination Zillertal, but it appears that the general distribution is more even in Montafon. In both destinations the clusters can be found in the villages as well as the mountains of the region.

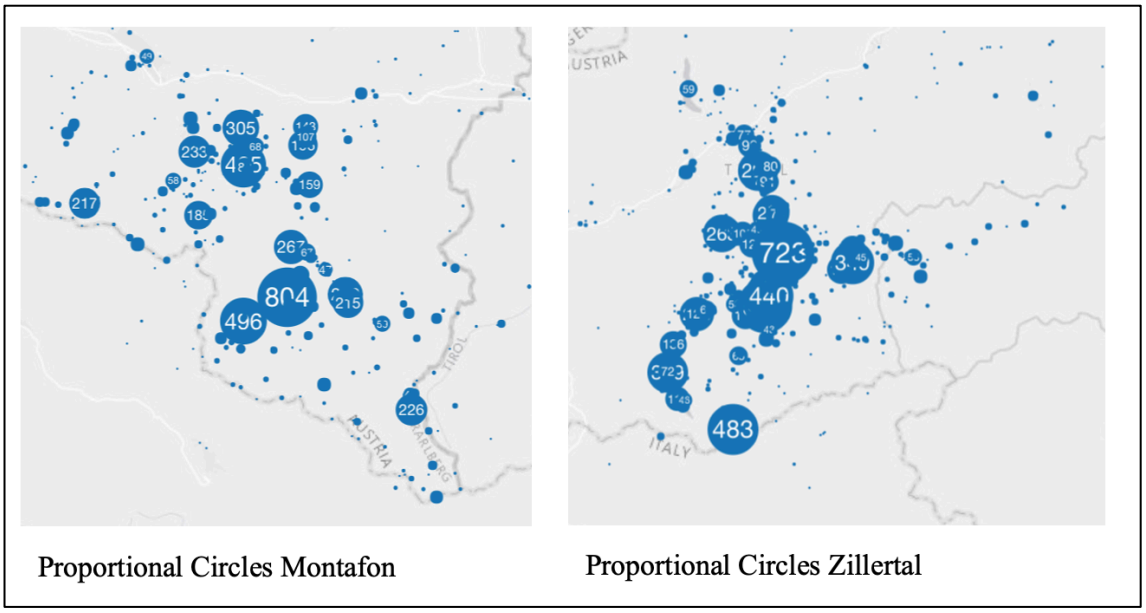


FIGURE 41 – PROPORTIONAL CIRCLES HEATMAP DESTINATION COMPARISON (OWN DESIGN)

Lastly, concluding the comparison of visualisations, it was found that there is a difference in movement patterns. In Zillertal there was substantially less movement between locations in the top ten posters in comparison to the movement of the top ten users in Montafon.

# 6 CONCLUSION

As mentioned in the introductory chapter one, the research questions this thesis aims to answer is “How can the identification of common tourist paths and hotspots through social media data in the past years help to improve decision making in regard to new implementations to destinations in the rural Alpine regions of Austria for destination management organizations and their stakeholders?”

Based on the previous chapters, specifically the literature review and the case studies discussed, this research question can be answered in the following.

In the first step the differentiating characteristics of rural alpine destinations in Austria were shown. Through the existing literature it was found, that tourism in the western and most alpine regions of Austria are a key economic contributor for the state. Due to this it is essential to have a key strategy for sustainable development of the destination, to keep the quality of tourist experiences as well as the participation and motivation of the residents high.

To ensure these two factors it is necessary for DMOs to be knowledgeable about the movement of their tourists and residents. Hence, the second step explores tourists flows and their management. Specifically, in rural destinations with a high emphasis on an authentic experience and a general aversity to mass tourism, is has been found to be essential to set measures as early as possible, before problematic hotspots and paths form. The strategies that are applied to drive change are divided into hard and soft strategies as a base, followed by four generalizable strategies of supply increase, demand reduction, concentration dispersion and resilience increase. It was found through the literature that a destination should apply more than one or all of these strategies to have a maximum influence on the tourist movement within the destination.

In the third step it was identified, that especially smaller destinations often lack resources and budgetary requirements for large scale analysis of tourist movement. A less expensive alternative is the acquisition of geotagged social media data. Specifically, the social networking site Instagram could be identified as a platform where tourists often share their holiday experiences due to a vast array of motivations.

To explore whether this data is useful to the destinations two case studies were conducted, using historic Instagram data to visualise tourist paths and hotspots. Through these visualisations it could be found that this method shows seasonal difference if the timespan of posts exceeds one year. It was found that there are different patterns of post frequency in different locations depending on their seasonal accessibility and other factors. Hotspots could clearly be identified, as could clusters of posts in the village and mountains of the destinations observed. In regard to the paths it could be identified that they generally are more likely to be centred around the centre of the destination and there are vast differences in movement between tourists within a destination as well as when comparing tourists from the two destinations.

DMOs and other destination stakeholders can use this knowledge in combination with tourist flow management strategies they chose as an objective basis for their decision making.

## 6.1 Limitations and Critical Reflexion

Despite the insights achieved, the conducted research has faced some limitations. The three main limiting factors are budget, data availability and methodology.

As the data acquisition is financed through a limited Merit research scholarship, only two destinations could be analysed. A more in-depth analysis of a larger number of destinations within the alpine leisure destinations of Austria would be able to give more generalizable and reliable findings. It is likely that through the higher diversification of destinations, there would also be a higher variation of findings.

Regarding the data availability, due to restrictions put into place by Meta Platforms Inc., the owner of Instagram, it is not possible to buy more than the past 20,000 destinations per hashtag. There was also limitation regarding the data selection, as the provider “Picodash” that was used does not have the possibility to buy posts geotagged within longitude and latitude frame. Rather a work around had to be used and all the posts available tagged with the respective locations hashtags as defined by the DMOs were acquired. This also included a relatively high number of posts with no geotags and geotags outside of the destination. For instance, some geotags were simply “Austria” or pictures that were

taken in the respective destination but tagged with were they were posted, including places such as America and Asia. Because of this the data availability was further limited. Additionally, there is currently no option to realistically conclude what percentage of the posts were made by tourists and what percentage by inhabitants themselves. However, given these restrictions, the maximum of the availability per destination was utilized, which covered between half a year to a year worth of posts. Lastly regarding the availability, there is currently no option under the given circumstances to analyse the Instagram stories which were introduced in mid 2016, as they are only available for 24 hours. Currently stories are Instagram's most used features and on average story content is posted quicker after the occurrence or often simultaneously which could give deeper insights into the ongoings of the destination.

Lastly, for the key limitations, in regard to the methodology, it is necessary to question the meaningfulness of the data itself. A quantitative approach was chosen and there is no understanding of the motivations of the tourists and their behaviour, that could give deeper and more meaningful insights. Ideally there should have also been a more varied combination of data sources, basing the analysis on different forms of digital footprint. It should also be taken into consideration that this thesis has only highlighted past data, acquired at different points in time. A better, yet much more complex, solution would be to work with ongoing real time data.

## 6.2 Future research

The conducted research opens a set of avenues for academics to further research in the future. As afore mentioned in the limitations of the research, a mixed methods approach, where the qualitative perspective is taken into consideration as well, aside from quantitative, would enrich the findings of the research to give a deeper understanding on what has led people to choose these attractions, why they decided to post them and especially to identify and evaluate other hotspots that might be overlooked, as they are not frequently posted on Instagram or social media in general. This would include for instance places not generally designed for atmosphere or shareability on social media but rather convenience and necessity, such as public transportation, supermarkets etc. Nevertheless, they may be subject to crowding due to (over-)tourism. A qualitative approach could also aim to give further insights on how to incentivize change in the tourist behaviour. For instance, an exploration into how to get tourists to explore places beyond the commonly known

attractions, divide the flow and paths more evenly over the time of day to avoid rush hour times etc.

Second, future studies need to take a wider range or destinations / regions / countries etc. into consideration. To draw even more meaningful conclusions city and leisure destinations could be compared, as could community- or corporate based destinations or similar destinations in different countries etc. There is a vast array of opportunities for further research with a higher quantity of destinations.

Third, as mentioned in the limitations this study has worked solely with a relatively limited number of solely historic data. The use of real time data / big data and data from other sources of the digital footprint of tourists (other social media sites, tracking devices in smartphones via Google Maps etc.) in future research could give deeper insights and make the tool more useful as it will be more up to date, as well as more reliable as there will be a more realistic picture of the tourist behaviour within the destination.

Fourth, this research has not touched on the visual aspects of the social media platform Instagram. Future research could lay a focus on visual methods to harvest value from the historic Instagram data or as mentioned above real-time big data from Instagram. This avenue has the potential to give a deeper understanding of similarities of popular Instagram hotspots and in turn can be used for either the highlighting of further suitable places to tourists or if applicable the artificial creation of such places and attractions.

Fifth, another avenue to explore would be to consider the outreach of the posts, which could potentially make the results more valid. For instance, geotagged posts from influencers will reach a much larger audience than from average users. In turn the hypothesis could be made, that in heatmaps these posts should be viewed at a higher regard as they will most likely attract more visitors who may not post their own content, in comparison to posts with less engagement.

Lastly, another interesting route for future research would be to look further into the success of the recommended methods for influencing tourist behaviour. For instance, the connection between the marketing plans and activities of the destination management and if they are successful in controlling tourist behaviour, specifically their flows.

# BIBLIOGRAPHY

Acampa, G., Grasso, M., Marino, G., & Parisi, C. M. (2020). Tourist Flow Management: Social Impact Evaluation through Social Network Analysis. *Sustainability*, *12*(2), 731. https://doi.org/10.3390/su12020731

Acosta, M., Cudré-Mauroux, P., Maleshkova, M., Pellegrini, T., Sack, H., & Sure-Vetter, Y. (Eds.). (2019). *Semantic Systems. The Power of AI and Knowledge Graphs: 15th International Conference, SEMANTiCS 2019, Karlsruhe, Germany, September 9–12, 2019, Proceedings* (Vol. 11702). Springer International Publishing. https://doi.org/10.1007/978-3-030-33220-4

Ahas, R., Aasa, A., Roose, A., Mark, Ü., & Silm, S. (2008). Evaluating passive mobile positioning data for tourism surveys: An Estonian case study. *Tourism Management*, *29*(3), 469–486. https://doi.org/10.1016/j.tourman.2007.05.014

Alazaizeh, M. M., Hallo, J. C., Backman, S. J., Norman, W. C., & Vogel, M. A. (2016). Value orientations and heritage tourism management at Petra Archaeological Park, Jordan. *Tourism Management*, *57*, 149–158. https://doi.org/10.1016/j.tourman.2016.05.008

Albrecht, J. N. (Ed.). (2017). *Visitor management in tourism destinations*. CABI.

Alter, C., & Hage, J. (Eds.). (2016). Interorganizational Network Systems: A New Institution and Governance Mechanism. In *Morality, rationality and efficiency: New perspectives on socio-economics*.

Ansoff, I. (1987). *Corporate Strategy*. Penguin.

Azer, J., Blasco-Arcas, L., & Harrigan, P. (2021). #COVID-19: Forms and drivers of social media users' engagement behavior toward a global crisis. *Journal of Business Research*, *135*, 99–111. https://doi.org/10.1016/j.jbusres.2021.06.030

Bachelier, V., Zawam, J.-E., Thieurmel, B., & Guillem, F. (2021). *Package: "leaflet.minicharts": Mini Charts for Interactive Maps* (Version 0.6.2). CRAN. https://cran.r-project.org/web/packages/leaflet.minicharts/leaflet.minicharts.pdf

Baggio, R., & Scaglione, M. (2017). Strategic Visitor Flows (SVF) Analysis Using Mobile Data. In R. Schegg & B. Stangl (Eds.), *Information and Communication Technologies in Tourism 2017* (pp. 145–157). Springer International Publishing. https://doi.org/10.1007/978-3-319-51168-9_11

Baggio, R., & Scaglione, M. (2018). Strategic visitor flows and destination management organization. *Information Technology & Tourism*, *18*(1–4), 29–42. https://doi.org/10.1007/s40558-017-0096-1

Bätzing, W. (2016). Die räumliche Konzentration des Tourismus in den österreichischen Alpen. In *Die Welt verstehen-eine geographische Herausforderung* (pp. 377–389). Geographie Innsbruck Selbstverlag.

Benur, A. M., & Bramwell, B. (2015). Tourism product development and product diversification in destinations. *Tourism Management*, *50*, 213–224. https://doi.org/10.1016/j.tourman.2015.02.005

Beritelli, P. (2009). Herausforderung Destinationsentwicklung und Destinationsmanagement. In *Schriftenreihe Tourismus- & Freizeitwirtschaft*.

Beritelli, P., Bieger, T., & Laesser, C. (2007). Destination Governance: Using Corporate Governance Theories as a Foundation for Effective Destination Management. *Journal of Travel Research*, *46*(1), 96–107. https://doi.org/10.1177/0047287507302385

Beritelli, P., Bieger, T., & Laesser, C. (2014). The New Frontiers of Destination Management: Applying Variable Geometry as a Function-Based Approach. *Journal of Travel Research*, *53*(4), 403–417. https://doi.org/10.1177/0047287513506298

Beyens, I., Frison, E., & Eggermont, S. (2016). "I don't want to miss a thing": Adolescents' fear of missing out and its relationship to adolescents' social needs, Facebook use, and Facebook related stress. *Computers in Human Behavior*, *64*, 1–8. https://doi.org/10.1016/j.chb.2016.05.083

Bieger, T. (1996). *Management von Destinationen und Tourismusorganisationen*. Oldenbourg.

Bieger, T., & Beritelli, P. (2013). *Management von Destinationen* (8., aktualisierte und überarb. Aufl). Oldenbourg.

BMLRT. (2022). *Organisation des österreichischen Tourismus*. https://info.bmlrt.gv.at/themen/tourismus/tourismus-in-oesterreich/organisation.html

Bodega, D., Cioccarelli, G., & Denicolai, S. (2004). New inter-organizational forms: Evolution of relationship structures in mountain tourism. *Tourism Review*, *59*(3), 13–19. https://doi.org/10.1108/eb058437

Buhalis, D. (2000). Marketing the competitive destination of the future. *Tourism Management*, *21*(1), 97–116. https://doi.org/10.1016/S0261-5177(99)00095-3

Bui, H. T., Jones, T. E., Weaver, D. B., & Le, A. (2020). The adaptive resilience of living cultural heritage in a tourism destination. *Journal of Sustainable Tourism*, *28*(7), 1022–1040. https://doi.org/10.1080/09669582.2020.1717503

Butler, R. (2015). The evolution of tourism and tourism research. *Tourism Recreation Research*, *40*(1), 16–27. https://doi.org/10.1080/02508281.2015.1007632

Casale, S., & Flett, G. (2020). Interpersonally-based fears during the COVID-19 pandemic: Reflections on the fear of missing out and the fear of not mattering constructs. *Clinical Neuropsychiatry*, *17*(2), 88–93. https://doi.org/10.36131/CN20200211

Cauberghe, V., Van Wesenbeeck, I., De Jans, S., Hudders, L., & Ponnet, K. (2021). How Adolescents Use Social Media to Cope with Feelings of Loneliness and Anxiety During

COVID-19 Lockdown. *Cyberpsychology, Behavior, and Social Networking*, *24*(4), 250–257. https://doi.org/10.1089/cyber.2020.0478

Čede, P., Deissl, G., Löffler, R., & Steinicke, E. (2018). The Eastern Austrian Alps – Their Exceptional Demographic Status in the Alpine Region. *European Countryside*, *10*(4), 634–651. https://doi.org/10.2478/euco-2018-0035

Chai, H.-Y., Niu, G.-F., Lian, S.-L., Chu, X.-W., Liu, S., & Sun, X.-J. (2019). Why social network site use fails to promote well-being? The roles of social overload and fear of missing out. *Computers in Human Behavior*, *100*, 85–92. https://doi.org/10.1016/j.chb.2019.05.005

Cheng, J., Karambelkar, B., & Xie, Y. (2022). *Package 'leaflet'—Create Interactive Web Maps with the JavaScript Leaflet* (2.1.1). CRAN. https://cran.r-project.org/web/packages/leaflet/leaflet.pdf

Chong, K. L. (2020). The side effects of mass tourism: The voices of Bali islanders. *Asia Pacific Journal of Tourism Research*, *25*(2), 157–169. https://doi.org/10.1080/10941665.2019.1683591

Chu, S.-C., Deng, T., & Cheng, H. (2020). The role of social media advertising in hospitality, tourism and travel: A literature review and research agenda. *International Journal of Contemporary Hospitality Management*, *32*(11), 3419–3438. https://doi.org/10.1108/IJCHM-05-2020-0480

Cooper, C., Fletcher, J., Gilbert, D., Fyall, A., & Wanhill, S. (Eds.). (2005). *Tourism: Principles and practice* (3rd ed). Financial Times Prentice Hall.

Cucari, N., Wankowicz, E., & Esposito De Falco, S. (2019). Rural tourism and Albergo Diffuso: A case study for sustainable land-use planning. *Land Use Policy*, *82*, 105–119. https://doi.org/10.1016/j.landusepol.2018.11.050

d'Angella, F., & Go, F. M. (2009). Tale of two cities' collaborative tourism marketing: Towards a theory of destination stakeholder assessment. *Tourism Management*, *30*(3), 429–440. https://doi.org/10.1016/j.tourman.2008.07.012

Danylyshyn, B., Bondarenko, S., Niziaieva, V., Veres, K., & Kovalenko, L. (2020). Branding a Tourist Destination in the Region's Development. *International Journal of Advanced Research in Engineering and Technolog*, *11*(4), 312–323.

Dettmer, H., Eisenstein, B., Gruner, A., Hausmann, T., Kaspar, C., Oppitz, W., Pircher-Friedrich, A. M., & Schoolmann, G. (2005). *Managementformen im Tourismus*. R. Oldenbourg Verlag. https://doi.org/10.1524/9783486700268

Dickinger, A., & Lalicic, L. (2017). Tourist-driven innovations in social media. In *Advances in Social Media for Travel, Tourism and Hospitality* (1st ed., pp. 41–53). Routledge.

Dredge, D. (1999). Destination place planning and design. *Annals of Tourism Research*, *26*(4), 772–791. https://doi.org/10.1016/S0160-7383(99)00007-9

Dunnington, D. (2022). *Package 'rosm'—Plot Raster Map Tiles from Open Street Map and Other Sources* (0.2.6). CRAN. https://cran.r-project.org/web/packages/rosm/rosm.pdf

Echtner, C. M. (1999). The semiotic paradigm: Implications for tourism research. *Tourism Management*, *20*(1), 47–57. https://doi.org/10.1016/S0261-5177(98)00105-8

Egger, R., Gumus, O., Kaiumova, E., Mükisch, R., & Surkic, V. (2022). Destination Image of DMO and UGC on Instagram: A Machine-Learning Approach. In J. L. Stienmetz, B. Ferrer-Rosell, & D. Massimo (Eds.), *Information and Communication Technologies in Tourism 2022* (pp. 343–355). Springer International Publishing. https://doi.org/10.1007/978-3-030-94751-4_31

Elbe, J., Hallén, L., & Axelsson, B. (2009). The destination-management organisation and the integrative destination-marketing process. *International Journal of Tourism Research*, *11*(3), 283–296. https://doi.org/10.1002/jtr.695

Elhai, J. D., Rozgonjuk, D., Liu, T., & Yang, H. (2020). Fear of missing out predicts repeated measurements of greater negative affect using experience sampling methodology. *Journal of Affective Disorders*, *262*, 298–303. https://doi.org/10.1016/j.jad.2019.11.026

Enseñat-Soberanis, F., Frausto-Martínez, O., & Gándara-Vázquez, M. (2019). A visitor flow management process for touristified archaeological sites. *Journal of Heritage Tourism*, *14*(4), 340–357. https://doi.org/10.1080/1743873X.2018.1529179

Fioravanti, G., Casale, S., Benucci, S. B., Prostamo, A., Falone, A., Ricca, V., & Rotella, F. (2021). Fear of missing out and social networking sites use and abuse: A meta-analysis. *Computers in Human Behavior*, *122*, 106839. https://doi.org/10.1016/j.chb.2021.106839

Flagestad, A., & Hope, C. A. (2001). Strategic success in winter sports destinations: A sustainable value creation perspective. *Tourism Management*, *22*(5), 445–461. https://doi.org/10.1016/S0261-5177(01)00010-3

Flora, C. B. (2004). Community Dynamics and Social Capital. In R. Diane & C. Francis (Eds.), *Agronomy Monographs* (pp. 93–107). American Society of Agronomy, Crop Science Society of America, Soil Science Society of America. https://doi.org/10.2134/agronmonogr43.c7

Formica, S., & Kothari, T. H. (2008). Strategic Destination Planning: Analyzing the Future of Tourism. *Journal of Travel Research*, *46*(4), 355–367. https://doi.org/10.1177/0047287507312410

Frechtling, D. C. (2010). THE TOURISM SATELLITE ACCOUNT. *Annals of Tourism Research*, *37*(1), 136–153. https://doi.org/10.1016/j.annals.2009.08.003

Freyer, W. (2009). *Tourismus-Marketing: Marktorientiertes Management im Mikro- und Makrobereich der Tourismuswirtschaft* (6., überarb. und ergänzte Aufl). Oldenbourg.

Fyall, A. (Ed.). (2011). Destination Management Challenges and Opportunities. In *Destination marketing and management: Theories and applications* (pp. 340–358). CABI.

Fyall, A., & Garrod, B. (2020). Destination management: A perspective article. *Tourism Review*, *75*(1), 165–169. https://doi.org/10.1108/TR-07-2019-0311

Gajdošík, T., Gajdošíková, Z., Maráková, V., & Flagestad, A. (2017). Destination structure revisited in view of the community and corporate model. *Tourism Management Perspectives*, *24*, 54–63. https://doi.org/10.1016/j.tmp.2017.07.009

Gálvez-Rodríguez, M. del M., Alonso-Cañadas, J., Haro-de-Rosario, A., & Caba-Pérez, C. (2020). Exploring best practices for online engagement via Facebook with local destination management organisations (DMOs) in Europe: A longitudinal analysis. *Tourism Management Perspectives*, *34*, 100636. https://doi.org/10.1016/j.tmp.2020.100636

Garau-Vadell, J. B., Gutierrez-Taño, D., & Diaz-Armas, R. (2018). Economic crisis and residents' perception of the impacts of tourism in mass tourism destinations. *Journal of Destination Marketing & Management*, *7*, 68–75. https://doi.org/10.1016/j.jdmm.2016.08.008

Geisler, J. (2012). *Strategieplan Zillertal Ziele, Strategien und Leitmaßnahmen für die Zukunft unseres Tales*. Planungsverband Zillertal.

Getz, D., & Carlsen, J. (2000). Characteristics and goals of family and owner-operated businesses in the rural tourism and hospitality sectors. *Tourism Management*, *21*(6), 547–560. https://doi.org/10.1016/S0261-5177(00)00004-2

Godde, P. M., Price, M. F., & Zimmerman, F. M. (Eds.). (2000). *Tourism and development in mountain regions*. CABI Pub.

Gössling, S., Scott, D., & Hall, C. M. (2021). Pandemics, tourism and global change: A rapid assessment of COVID-19. *Journal of Sustainable Tourism*, *29*(1), 1–20. https://doi.org/10.1080/09669582.2020.1758708

Gretzel, U., Fesenmaier, D. R., Formica, S., & O'Leary, J. T. (2006). Searching for the Future: Challenges Faced by Destination Marketing Organizations. *Journal of Travel Research*, *45*(2), 116–126. https://doi.org/10.1177/0047287506291598

Gühnemann, A., Kurzweil, A., & Mailer, M. (2021). Tourism mobility and climate change—A review of the situation in Austria. *Journal of Outdoor Recreation and Tourism*, *34*, 100382. https://doi.org/10.1016/j.jort.2021.100382

Gunn, C. A., & Var, T. (2002). *Tourism planning: Basics, concepts, cases* (4th ed). Routledge.

Haas, H. (1992). Die Sommerfrische – Ort der Bürgerlichkeit. In *Durch Arbeit, Besitz, Wissen und Gerechtigkeit*. Böhlau.

Hammer, T., & Siegrist, D. (2008). Protected Areas in the Alps: The Success Factors of Nature-Based Tourism and the Challenge for Regional Policy. *GAIA - Ecological Perspectives for Science and Society*, *17*(1), 152–160. https://doi.org/10.14512/gaia.17.S1.13

Hays, S., Page, S. J., & Buhalis, D. (2013). Social media as a destination marketing tool: Its use by national tourism organisations. *Current Issues in Tourism*, *16*(3), 211–239. https://doi.org/10.1080/13683500.2012.662215

Howie, F. (2003). *Managing the tourist destination*. Continuum.

Hu, F., Li, Z., Yang, C., & Jiang, Y. (2019). A graph-based approach to detecting tourist movement patterns using social media data. *Cartography and Geographic Information Science*, *46*(4), 368–382. https://doi.org/10.1080/15230406.2018.1496036

Hudson, S., & Thal, K. (2013). The Impact of Social Media on the Consumer Decision Process: Implications for Tourism Marketing. *Journal of Travel & Tourism Marketing*, *30*(1–2), 156–160. https://doi.org/10.1080/10548408.2013.751276

Hvass, K. A., & Munar, A. M. (2012). The takeoff of social media in tourism. *Journal of Vacation Marketing*, *18*(2), 93–103. https://doi.org/10.1177/1356766711435978

Hwang, D., & Stewart, W. P. (2017). Social Capital and Collective Action in Rural Tourism. *Journal of Travel Research*, *56*(1), 81–93. https://doi.org/10.1177/0047287515625128

Hysa, B., Karasek, A., & Zdonek, I. (2021). Social Media Usage by Different Generations as a Tool for Sustainable Tourism Marketing in Society 5.0 Idea. *Sustainability*, *13*(3), 1018. https://doi.org/10.3390/su13031018

Instagram. (2022). *Instagram Hashtag Search*. https://www.instagram.com/explore/search/keyword/?q=montafon

Jamal, T. B., & Getz, D. (1995). Collaboration theory and community tourism planning. *Annals of Tourism Research*, *22*(1), 186–204. https://doi.org/10.1016/0160-7383(94)00067-3

Jiang, W., Xiong, Z., Su, Q., Long, Y., Song, X., & Sun, P. (2021). Using Geotagged Social Media Data to Explore Sentiment Changes in Tourist Flow: A Spatiotemporal Analytical Framework. *ISPRS International Journal of Geo-Information*, *10*(3), 135. https://doi.org/10.3390/ijgi10030135

Johnson Tew, P., Lu, Z., Tolomiczenko, G., & Gellatly, J. (2008). SARS: Lessons in strategic planning for hoteliers and destination marketers. *International Journal of Contemporary Hospitality Management*, *20*(3), 332–346. https://doi.org/10.1108/09596110810866145

Kádár, B., & Gede, M. (2013). Where Do Tourists Go? Visualizing and Analysing the Spatial Distribution of Geotagged Photography. *Cartographica: The International*

*Journal for Geographic Information and Geovisualization*, *48*(2), 78–88. https://doi.org/10.3138/carto.48.2.1839

Kahle, D., Wickham, H., & Korpela, M. (2019). *Package "ggmap": Spatial Visualization with ggplot2* (3.0.0). CRAN. https://github.com/dkahle/ggmap

Karambelkar, B., & Schloerke, B. (2018). *Package 'leaflet.extras'—Extra functionality for "leaflet" Package* (1.0.0). CRAN. https://cran.r-project.org/web/packages/leaflet.extras/leaflet.extras.pdf

Khongrat, E. (2021). Destination Branding, Destination image and Influenced by Destination Selection oleh Meeting Planners Existing Destination. *Journal of Event, Travel and Tour Management*, *1*(1), 1–6. https://doi.org/10.34013/jett.v1i1.613

Ko, H., Cho, C.-H., & Roberts, M. S. (2005). INTERNET USES AND GRATIFICATIONS: A Structural Equation Model of Interactive Advertising. *Journal of Advertising*, *34*(2), 57–70. https://doi.org/10.1080/00913367.2005.10639191

Kotler, P. (1999). *Kotler on marketing: How to create, win, and dominate markets*. Simon & Schuster.

Kuo, I.-L. (2002). The effectiveness of environmental interpretation at resource-Sensitive tourism destinations. *International Journal of Tourism Research*, *4*(2), 87–101. https://doi.org/10.1002/jtr.362

Laimer, P., Ehn-Fragner, S., & Smeral, E. (2014). *Ein Tourismus-Satellitenkonto für Österreich. Methodik, Ergebnisse und Prognosen für die Jahre 2000 bis 2015*. WIFO - Österreichisches Institut für Wirtschaftsforschung.

Landesstatistik Tirol. (2022a). *Zeitreihe Ankünfte und Nächtigungen—Sommersaison 2000—2021*. Land Tirol.

Landesstatistik Tirol. (2022b). *Zeitreihe Ankünfte und Nächtigungen—Wintersaison 2000—2021*. Land Tirol.

Lau, G., & McKercher, B. (2006). Understanding Tourist Movement Patterns in a Destination: A GIS Approach. *Tourism and Hospitality Research*, *7*(1), 39–49. https://doi.org/10.1057/palgrave.thr.6050027

Lee, A. R., Son, S.-M., & Kim, K. K. (2016). Information and communication technology overload and social networking service fatigue: A stress perspective. *Computers in Human Behavior*, *55*, 51–61. https://doi.org/10.1016/j.chb.2015.08.011

Lee, J. W., & Syah, A. M. (2018). Economic and Environmental Impacts of Mass Tourism on Regional Tourism Destinations in Indonesia. *The Journal of Asian Finance, Economics and Business*, *5*(3), 31–41. https://doi.org/10.13106/JAFEB.2018.VOL5.NO3.31

Lee, T. H., & Jan, F.-H. (2019). Can community-based tourism contribute to sustainable development? Evidence from residents' perceptions of the sustainability. *Tourism Management*, *70*, 368–380. https://doi.org/10.1016/j.tourman.2018.09.003

Liang, J., Deng, D., Zhou, X., & Liu, K. (2020). The Ecosystem Protection and Promotion of Mogao Grottoes. *E3S Web of Conferences*, *199*, 00010. https://doi.org/10.1051/e3sconf/202019900010

Line, N. D., Hanks, L., & Miao, L. (2018). Image Matters: Incentivizing Green Tourism Behavior. *Journal of Travel Research*, *57*(3), 296–309. https://doi.org/10.1177/0047287517697848

Löffler, R., Čede, P., Beismann, M., Walder, J., & Steinicke, E. (2016). Current Demographic Trends in the Alps. Nothing Quiet on the Western Front—Quiet in the East. *The Alps in Movement: People, Nature, Ideas*, 134–169.

Lue, C.-C., Crompton, J. L., & Fesenmaier, D. R. (1993). Conceptualization of multi-destination pleasure trips. *Annals of Tourism Research*, *20*(2), 289–301. https://doi.org/10.1016/0160-7383(93)90056-9

Luft, H. (2007). *Destination Management in Theorie und Praxis: Organisation und Vermarktung von Tourismusorten und Tourismusregionen*. KSB-Media.

Maidique, M. A., & Zirger, B. J. (1984). A study of success and failure in product innovation: The case of the U.S. electronics industry. *IEEE Transactions on Engineering Management*, *EM-31*(4), 192–203. https://doi.org/10.1109/TEM.1984.6447537

Maier, C., Laumer, S., Eckhardt, A., & Weitzel, T. (2015). Giving too much social support: Social overload on social networking sites. *European Journal of Information Systems*, *24*(5), 447–464. https://doi.org/10.1057/ejis.2014.3

Manning, R. E., & Anderson, L. E. (2012). *Managing outdoor recreation: Case studies in the national parks*. CAB International.

Mariani, M. (2020). Web 2.0 and Destination Marketing: Current Trends and Future Directions. *Sustainability*, *12*(9), 3771. https://doi.org/10.3390/su12093771

Mariani, M., Ek Styven, M., & Ayeh, J. K. (2019). Using Facebook for travel decision-making: An international study of antecedents. *International Journal of Contemporary Hospitality Management*, *31*(2), 1021–1044. https://doi.org/10.1108/IJCHM-02-2018-0158

Mariani, M. M., Buhalis, D., Longhi, C., & Vitouladiti, O. (2014). Managing change in tourism destinations: Key issues and current trends. *Journal of Destination Marketing & Management*, *2*(4), 269–272. https://doi.org/10.1016/j.jdmm.2013.11.003

Mason, P. (2005). Visitor Management in Protected Areas: From 'Hard' to 'Soft' Approaches? *Current Issues in Tourism*, *8*(2–3), 181–194. https://doi.org/10.1080/13683500508668213

Mayer, M., Kraus, F., & Job, H. (2013). „South of the border“ – die touristische Erschließung der Alpen im Vergleich zwi- schen Bayern und Westösterreich. In *Tourismus und Grenzen* (pp. 27–40). Verl. MetaGIS-Systems.

McCarthy, E. J. (1960). *Basic marketing: A managerial approach*. R.D. Irwin.

McKercher, B., Shoval, N., Ng, E., & Birenboim, A. (2012). First and Repeat Visitor Behaviour: GPS Tracking and GIS Analysis in Hong Kong. *Tourism Geographies*, *14*(1), 147–161. https://doi.org/10.1080/14616688.2011.598542

Meldrum, M., & McDonald, M. (1995). The Ansoff Matrix. In M. Meldrum & M. McDonald, *Key Marketing Concepts* (pp. 121–126). Macmillan Education UK. https://doi.org/10.1007/978-1-349-13877-7_24

Melián-González, A., & García-Falcón, J. M. (2003). Competitive potential of tourism in destinations. *Annals of Tourism Research*, *30*(3), 720–740. https://doi.org/10.1016/S0160-7383(03)00047-1

Meriläinen, K., & Lemmetyinen, A. (2011). Destination network management: A conceptual analysis. *Tourism Review*, *66*(3), 25–31. https://doi.org/10.1108/16605371111175302

Miles, R. E., & Snow, C. C. (1986). Organizations: New Concepts for New Forms. *California Management Review*, *28*(3), 62–73. https://doi.org/10.2307/41165202

Montafon Tourismus. (2022a). *Der Markenprozess: Mit Herzblut für's Montafon*. https://www.montafon.at/marke/de/Der-Markenprozess

Montafon Tourismus. (2022b). *Echte Montafonerinnen und Montafoner: Eine Auswahl unserer Markenbotschafter im Portrait*. https://www.montafon.at/marke/de/Markenbotschafter?page=6

Montafon Tourismus. (2022c). *Podcast Folge „Nachhaltiges Montafon" PIZ Montafon*. https://open.spotify.com/episode/6nQouk5YC6lzia4cB7VaxU

Montafon Tourismus. (2022d). *Unser Montafoner Tourismus-Leitbild: Das sind wir—Unsere Markenprinzipien—Unser Steuerelement*. https://www.montafon.at/marke/de/Der-Markenprozess/Tourismus-Leitbild

Morrison, A. M., Lehto, X. Y., & Day, J. G. (2018). *The tourism system* (eight edition). Kendall Hunt.

Mou, N., Zheng, Y., Makkonen, T., Yang, T., Tang, J., & Song, Y. (2020). Tourists' digital footprint: The spatial patterns of tourist flows in Qingdao, China. *Tourism Management*, *81*, 104151. https://doi.org/10.1016/j.tourman.2020.104151

Murphy, P. E. (2014). *Tourism: A community approach*. Routeldge. https://library.dctabudhabi.ae/sirsi/detail/394193

Murphy, P., Pritchard, M. P., & Smith, B. (2000). The destination product and its impact on traveller perceptions. *Tourism Management*, *21*(1), 43–52. https://doi.org/10.1016/S0261-5177(99)00080-1

Nordin, S., & Svensson, B. (2005). The significance of governance in innovative tourism destinations. *Innovation in Tourism: Creating Customer Value*, *47*(1), 159–170.

Oh, H. J., & LaRose, R. (2016). Impression management concerns and support-seeking behavior on social network sites. *Computers in Human Behavior*, *57*, 38–47. https://doi.org/10.1016/j.chb.2015.12.005

Oliveira, T., Araujo, B., & Tam, C. (2020). Why do people share their travel experiences on social media? *Tourism Management*, *78*, 104041. https://doi.org/10.1016/j.tourman.2019.104041

Önder, I., Koerbitz, W., & Hubmann-Haidvogel, A. (2016). Tracing Tourists by Their Digital Footprints: The Case of Austria. *Journal of Travel Research*, *55*(5), 566–573. https://doi.org/10.1177/0047287514563985

Orellana, D., Bregt, A. K., Ligtenberg, A., & Wachowicz, M. (2012). Exploring visitor movement patterns in natural recreational areas. *Tourism Management*, *33*(3), 672–682. https://doi.org/10.1016/j.tourman.2011.07.010

ORF. (2022a, May 9). *ÖVP: Kurz-Vertraute Köstinger tritt zurück*. https://orf.at/stories/3264525/

ORF. (2022b, May 9). *Per Videobotschaft: Nach Köstinger tritt auch Schramböck zurück*. https://orf.at/stories/3264605/

ORF. (2022c, May 10). *Nehammer baut um: Drei Neue und Kocher wird aufgewertet*. https://orf.at/stories/3264748/

Österreich Werbung. (2022). *Aufgaben der Oesterreich Werbung*. https://www.austriatourism.com/ueber-uns/aufgaben-der-oesterreich-werbung/

Page, S. J., Yeoman, I., Connell, J., & Greenwood, C. (2010). Scenario planning as a tool to understand uncertainty in tourism: The example of transport and tourism in Scotland in 2025. *Current Issues in Tourism*, *13*(2), 99–137. https://doi.org/10.1080/13683500802613519

Palmgreen, P., & Rayburn, J. D. (1979). Uses and Gratifications and Exposure To Public Television: A Discrepancy Approach. *Communication Research*, *6*(2), 155–179. https://doi.org/10.1177/009365027900600203

Pan, S.-Y., Gao, M., Kim, H., Shah, K. J., Pei, S.-L., & Chiang, P.-C. (2018). Advances and challenges in sustainable tourism toward a green economy. *Science of The Total Environment*, *635*, 452–469. https://doi.org/10.1016/j.scitotenv.2018.04.134

Pandey, D. K., & Kumar, R. (2022). Russia-Ukraine War and the global tourism sector: A 13-day tale. *Current Issues in Tourism*, 1–9. https://doi.org/10.1080/13683500.2022.2081789

Papacharissi, Z., & Rubin, A. M. (2000). Predictors of Internet Use. *Journal of Broadcasting & Electronic Media*, *44*(2), 175–196. https://doi.org/10.1207/s15506878jobem4402_2

Papatheodorou, A., Rosselló, J., & Xiao, H. (2010). Global Economic Crisis and Tourism: Consequences and Perspectives. *Journal of Travel Research*, *49*(1), 39–45. https://doi.org/10.1177/0047287509355327

Patry, M., & Oskam, J. A. (2020). Growing… Growing… Gone: Tourism and Extinctions in Galapagos. In *The Overtourism Debate* (pp. 211–226). Emerald Publishing Limited. https://doi.org/10.1108/978-1-83867-487-820201014

Paul, S., & Rücker, E. (2017). *Tourismusdaten Wintersaison, Sommersaison und Jahresdaten 2015/2016*. Amt der Vorarlberger Landesregierung.

Paul, S., & Rücker, E. (2018). *Tourismusdaten Wintersaison, Sommersaison und Jahresdaten 2016/2017*. Amt der Vorarlberger Landesregierung.

Paul, S., & Rücker, E. (2020). *Tourismusdaten Wintersaison, Sommersaison und Jahresdaten 2018/2019*. Amt der Vorarlberger Landesregierung.

Paul, S., & Rücker, E. (2022a). *Tourismusdaten Wintersaison, Sommersaison und Jahresdaten 2019/2020*. Amt der Vorarlberger Landesregierung.

Paul, S., & Rücker, E. (2022b). *Tourismusjahr 2020/2021: Vorläufiges Ergebnis*. Amt der Vorarlberger Landesregierung.

Pechlaner, H., & Osti, L. (2002). Reengineering tourism organizations—The case of Italy. *Tourism Review*, *57*(1/2), 13–21. https://doi.org/10.1108/eb058374

Pechlaner, H., Pichler, S., & Volgger, M. (2013). Vom Destination Management zur Destination Governance—Steuerungsperspektiven im Spannungsfeld von Destination und Tourismusorganisation. In *Governance von Destinationen: Neue Ansätze für die erfolgreiche Steuerung touristischer Zielgebiete* (pp. 63–80). Schmidt.

Pechlaner, H., Raich, F., Zehrer, A., & Peters, M. (2004). Growth perceptions of small and medium-sized enterprises (SME's)—The case of South Tyrol. *Tourism Review*, *59*(4), 7–13. https://doi.org/10.1108/eb058442

Petrovic, J., & Rücker, E. (2019). *Tourismusdaten Wintersaison, Sommersaison und Jahresdaten 2017/2018*. Amt der Vorarlberger Landesregierung.

Pike, S., & Page, S. J. (2014). Destination Marketing Organizations and destination marketing: A narrative analysis of the literature. *Tourism Management*, *41*, 202–227. https://doi.org/10.1016/j.tourman.2013.09.009

Pikkemaat, B., Peters, M., & Chan, C.-S. (2018). Needs, drivers and barriers of innovation: The case of an alpine community-model destination. *Tourism Management Perspectives*, *25*, 53–63. https://doi.org/10.1016/j.tmp.2017.11.004

Powell, W. (1991). Neither Market nor Hierarchy: Network Forms of Organization. In *Reserach in Organizational Behavior* (pp. 295–336). Springer VS. https://doi.org/10.1007/978-3-658-21742-6

Rasoolimanesh, S. M., Ramakrishna, S., Hall, C. M., Esfandiar, K., & Seyfi, S. (2020). A systematic scoping review of sustainable tourism indicators in relation to the sustainable development goals. *Journal of Sustainable Tourism*, 1–21. https://doi.org/10.1080/09669582.2020.1775621

Ravindran, T., Yeow Kuan, A. C., & Hoe Lian, D. G. (2014). Antecedents and effects of social network fatigue: Antecedents and Effects of Social Network Fatigue. *Journal of the Association for Information Science and Technology*, *65*(11), 2306–2320. https://doi.org/10.1002/asi.23122

Richardson, A. (1995). Fatigue in cancer patients: A review of the literature. *European Journal of Cancer Care*, *4*(1), 20–32. https://doi.org/10.1111/j.1365-2354.1995.tb00049.x

Ritchie, J. R. B., & Crouch, G. I. (Eds.). (2003). *The competitive destination: A sustainable tourism perspective*. CABI. https://doi.org/10.1079/9780851996646.0000

Ritchie, R. J. B., & Ritchie, J. R. B. (2002). A framework for an industry supported destination marketing information system. *Tourism Management*, *23*(5), 439–454. https://doi.org/10.1016/S0261-5177(02)00007-9

Schuh, B., Derszniak-Noirjean, M., Gaugitsch, R., Sedlacek, S., Weismayer, C., Zekan, B., Gunter, U., Dann, D., Nixon, L., Mihalic, T., Kuscer, K., & Novak, M. (2020). *Carrying capacity methodology for tourism—Final Report"*. ESPON EGTC.

Schwalb-Willmann, J. (2021). *Package 'basemaps'—Accessing Spatial Basemaps in R* (0.0.1). https://cran.r-project.org/web/packages/basemaps/basemaps.pdf

Sfandla, C., & Björk, P. (2013). Tourism Experience Network: Co-creation of Experiences in Interactive Processes: Tourism Experience Network. *International Journal of Tourism Research*, *15*(5), 495–506. https://doi.org/10.1002/jtr.1892

Shackley, M. L. (Ed.). (2000). *Visitor management: Case studies from World Heritage sites*. Butterworth-Heinemann.

Sheehan, L. R., & Ritchie, J. R. B. (2005). Destination Stakeholders Exploring Identity and Salience. *Annals of Tourism Research*, *32*(3), 711–734. https://doi.org/10.1016/j.annals.2004.10.013

Shi, B., Zhao, J., & Chen, P.-J. (2017). Exploring urban tourism crowding in Shanghai via crowdsourcing geospatial data. *Current Issues in Tourism*, *20*(11), 1186–1209. https://doi.org/10.1080/13683500.2016.1224820

Smeral, E. (2019). Overcrowding of tourism destinations. In *Overtourism: Tourism management and solutions.* (pp. 276–298). ROUTLEDGE.

Soulard, J., Knollenberg, W., Boley, B. B., Perdue, R. R., & McGehee, N. G. (2018). Social capital and destination strategic planning. *Tourism Management*, *69*, 189–200. https://doi.org/10.1016/j.tourman.2018.06.011

Statistik Austria. (2020). *Westen Österreichs als Tourismusmotor, unterschiedliche Märkte in einzelnen Bundesländern*. https://www.statistik.at/web_de/statistiken/wirtschaft/tourismus/123054.html

Statistik Austria. (2021a). *Tourismus-Satellitenkonto für Österreich, basierend auf "Recommended Methodological Framework (RMF) 2008";*

Statistik Austria. (2021b). *Economic importance of tourism varies from region to region; three federal provinces are above the Austrian average in 2018*. Statistik Austria. https://www.statistik.at/web_en/statistics/Economy/tourism/tourism_satellite_accounts/127032.html

Stickdorn, M., & Zehrer, A. (2009). *Service Design in Tourism: Customer Experience Driven Destination Management*. 7–23.

Stienmetz, J. L., & Fesenmaier, D. R. (2015). Estimating value in Baltimore, Maryland: An attractions network analysis. *Tourism Management*, *50*, 238–252. https://doi.org/10.1016/j.tourman.2015.01.031

Stienmetz, J. L., & Fesenmaier, D. R. (2019). Destination Value Systems: Modeling Visitor Flow Structure and Economic Impact. *Journal of Travel Research*, *58*(8), 1249–1261. https://doi.org/10.1177/0047287518815985

Streimikiene, D., Svagzdiene, B., Jasinskas, E., & Simanavicius, A. (2021). Sustainable tourism development and competitiveness: The systematic literature review. *Sustainable Development*, *29*(1), 259–271. https://doi.org/10.1002/sd.2133

Tax, S. S., McCutcheon, D., & Wilkinson, I. F. (2013). The Service Delivery Network (SDN): A Customer-Centric Perspective of the Customer Journey. *Journal of Service Research*, *16*(4), 454–470. https://doi.org/10.1177/1094670513481108

Tirol Werbung. (2020). *Die Tourismusverbände in Tirol*. https://www.tirolwerbung.at/tiroler-tourismus/tourismusverbaende

Todd, L., Leask, A., & Ensor, J. (2017). Understanding primary stakeholders' multiple roles in hallmark event tourism management. *Tourism Management*, *59*, 494–509. https://doi.org/10.1016/j.tourman.2016.09.010

Towner, J., & Wall, G. (1991). History and tourism. *Annals of Tourism Research*, *18*(1), 71–84. https://doi.org/10.1016/0160-7383(91)90040-I

UNWTO (Ed.). (2007). *A practical guide to tourism destination management*. WTO.

UNWTO. (2011). *Policy and practice for global tourism*.

Vanhove, N. (2018). *The economics of tourism destinations: Theory and practice* (Third edition). Routledge, Taylor & Francis Group.

Vegnuti, R. (2020). Cinque Terre, Italy - a case of place branding: From opportunity to problem for tourism. *Worldwide Hospitality and Tourism Themes*, *12*(4), 471–483. https://doi.org/10.1108/WHATT-05-2020-0032

Volgger, M., & Pechlaner, H. (2014). Requirements for destination management organizations in destination governance: Understanding DMO success. *Tourism Management*, *41*, 64–75. https://doi.org/10.1016/j.tourman.2013.09.001

Vu, H. Q., Li, G., Law, R., & Ye, B. H. (2015). Exploring the travel behaviors of inbound tourists to Hong Kong using geotagged photos. *Tourism Management*, *46*, 222–232. https://doi.org/10.1016/j.tourman.2014.07.003

Vu, H. Q., Li, G., Law, R., & Zhang, Y. (2018a). Travel Diaries Analysis by Sequential Rule Mining. *Journal of Travel Research*, *57*(3), 399–413. https://doi.org/10.1177/0047287517692446

Vu, H. Q., Li, G., Law, R., & Zhang, Y. (2018b). Tourist Activity Analysis by Leveraging Mobile Social Media Data. *Journal of Travel Research*, *57*(7), 883–898. https://doi.org/10.1177/0047287517722232

Wang, Y., & Fesenmaier, D. R. (2007). Collaborative destination marketing: A case study of Elkhart county, Indiana. *Tourism Management*, *28*(3), 863–875. https://doi.org/10.1016/j.tourman.2006.02.007

Wang, Z., Koroll, L., Höpken, W., & Fuchs, M. (2022). Analysis of Instagram Users' Movement Pattern by Cluster Analysis and Association Rule Mining. In J. L. Stienmetz, B. Ferrer-Rosell, & D. Massimo (Eds.), *Information and Communication Technologies in Tourism 2022* (pp. 97–109). Springer International Publishing. https://doi.org/10.1007/978-3-030-94751-4_10

Weber, F., Juschten, M., Fanninger, C., Brandenburg, C., Jiricka-Pürrer, A., Czachs, C., & Unbehaun, W. (2018). Chapter 1: 'Sommerfrische' in Times of Climate Change: A Qualitative Analysis of Historical and Recent Perceptions of the Term. In T. Ohnmacht, J. Priskin, & J. Stettler (Eds.), *Advances in Culture, Tourism and Hospitality Research* (Vol. 15, pp. 7–23). Emerald Publishing Limited. https://doi.org/10.1108/S1871-317320180000015003

Weismayer, C., Gunter, U., & Önder, I. (2021). Temporal variability of emotions in social media posts. *Technological Forecasting and Social Change*, *167*, 120699. https://doi.org/10.1016/j.techfore.2021.120699

Weiss, T. (2004). Tourism in America before World War II. *The Journal of Economic History*, *64*(02). https://doi.org/10.1017/S0022050704002712

Whiting, A., & Williams, D. (2013). Why people use social media: A uses and gratifications approach. *Qualitative Market Research: An International Journal*, *16*(4), 362–369. https://doi.org/10.1108/QMR-06-2013-0041

Wickham, H. (2016). *ggplot2: Elegant Graphics for Data Analysis* (2nd ed. 2016). Springer International Publishing : Imprint: Springer. https://doi.org/10.1007/978-3-319-24277-4

Wiederhold, B. K. (2019). Instagram: Becoming a Worldwide Problem? *Cyberpsychology, Behavior, and Social Networking*, *22*(9), 567–568. https://doi.org/10.1089/cyber.2019.29160.bkw

Williamson, O. E. (1991). Comparative Economic Organization: The Analysis of Discrete Structural Alternatives. *Administrative Science Quarterly*, *36*(2), 269. https://doi.org/10.2307/2393356

Wondirad, A., & Ewnetu, B. (2019). Community participation in tourism development as a tool to foster sustainable land and resource use practices in a national park milieu. *Land Use Policy*, *88*, 104155. https://doi.org/10.1016/j.landusepol.2019.104155

Yin, R. K. (1981). The Case Study Crisis: Some Answers. *Administrative Science Quarterly*, *26*(1), 58. https://doi.org/10.2307/2392599

Zach, F., & Gretzel, U. (2011). Tourist-Activated Networks: Implications for Dynamic Bundling and EN Route Recommendations. *Information Technology & Tourism*, *13*(3), 229–238. https://doi.org/10.3727/109830512X13283928066959

Zahra, A., & McGehee, N. G. (2013). VOLUNTEER TOURISM: A HOST COMMUNITY CAPITAL PERSPECTIVE. *Annals of Tourism Research*, *42*, 22–45. https://doi.org/10.1016/j.annals.2013.01.008

Zehrer, A. (2009). Service experience and service design: Concepts and application in tourism SMEs. *Managing Service Quality: An International Journal*, *19*(3), 332–349. https://doi.org/10.1108/09604520910955339

Zekan, B., Weismayer, C., Gunter, U., Schuh, B., & Sedlacek, S. (2022). Regional sustainability and tourism carrying capacities. *Journal of Cleaner Production*, *339*, 130624. https://doi.org/10.1016/j.jclepro.2022.130624

Zeng, B., & Gerritsen, R. (2014). What do we know about social media in tourism? A review. *Tourism Management Perspectives*, *10*, 27–36. https://doi.org/10.1016/j.tmp.2014.01.001

Zheng, H., & Ling, R. (2021). Drivers of social media fatigue: A systematic review. *Telematics and Informatics*, *64*, 101696. https://doi.org/10.1016/j.tele.2021.101696

Zhu, X., & Bao, Z. (2018). Why people use social networking sites passively: An empirical study integrating impression management concern, privacy concern, and SNS fatigue. *Aslib Journal of Information Management*, *70*(2), 158–175. https://doi.org/10.1108/AJIM-12-2017-0270

Zillertal Tourismus. (2022). *Profile Zillertal.at*. https://www.instagram.com/zillertal.at/

# APPENDICES

## Appendix 1: Picodash E-Mail Communication

**Email 1**

**From: Katharina Ladurner**

**To: info@picodash.com**

Dear Picodash Team,

I am buying Instagram data by hashtag for several destinations for my master thesis and was wondering if it was possible to buy the data by years, instead of by number of posts?

Most likely the years I need the posts for would span over more than 10,000 posts per destination.

First this would be for the hashtag "Montafon" and I will see from there how many more destinations my scholarship will cover.

Thank you in advance and all the best,

Katharina Ladurner

**E-Mail 2**

**To: info@picodash.com**

**From: Katharina Ladurner**

we can export up to 20K posts, Instagram has limitation for export

## Appendix 2: Code Montafon

**# Overview Posts per year**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Montafon")
data <- read.csv("daily.csv",1)
lab_month <- c('Jänner', 'Februar', 'März', 'April',
        'Mai', 'Juni', 'Juli', 'August',
        'September', 'Oktober', 'November', 'Dezember')
tbl <- data %>%
 mutate(year = as.numeric(substr(date_GMT, 1, 4)),
     month = factor(substr(date_GMT, 6,7), labels = lab_month))
tbl %>% group_by(year) %>% count()
```

**# Ranking posts per location_name**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Montafon")
data <- read.csv("daily.csv",1)
rank <- data[!is.na(data$lat) & !is.na(data$lng), ] %>%
 group_by(location_name, lng, lat) %>%
 count() %>%
 arrange(desc(n))
head(rank, 10)
```

**# Posts / Month (Liniendiagramm alle Posts)**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Montafon")
data <- read.csv("daily.csv",1)
data_line <- data[!is.na(data$location_name), ] %>%
 mutate(date = as.Date(date_GMT)) %>%
 filter(as.Date(date_GMT) >= as.Date("2021-01-01"))
```

```
rank_line <- data_line%>%
 group_by(location_name, lng, lat) %>%
 count() %>%
 arrange(desc(n))
data_line %>%
 group_by(date= floor_date(as.Date(date_GMT), "month")) %>%
 count() %>%
 ggplot(aes(x = date, y = n)) +
 geom_line() +
 geom_point()
```

**# Posts / Month Top XYZ (Liniendiagramm aufgeteilt)**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Montafon")
data <- read.csv("daily.csv",1)
data_line <- data[!is.na(data$location_name), ] %>%
 mutate(date = as.Date(date_GMT)) %>%
 filter(as.Date(date_GMT) >= as.Date("2021-01-01"))
rank_line <- data_line%>%
 group_by(location_name, lng, lat) %>%
 count() %>%
 arrange(desc(n))
anz <- 21
loc <- rank_line$location_name[2:anz]
data_line %>% filter(location_name %in% loc) %>%
 group_by(location_name, date = floor_date(as.Date(date_GMT), "month")) %>%
 count() %>%
 ggplot(aes(x = date, y = n)) +
```

```
 geom_line(aes(color = location_name)) +
 geom_point(aes(color = location_name))
```

**#Traditional Heatmap**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Montafon")
data <- read.csv("daily.csv",1)
data<-read.csv("daily.csv",1)
datashort<-data[,c(14:15)]
datashort<-na.omit(datashort)
library(rosm)
library(leaflet)
library(leaflet.extras)
leaflet() %>%
 setView(10,47,zoom=8) %>%
 addTiles() %>%
 addHeatmap(lng=datashort[,2],lat=datashort[,1],blur=25,max=.05,radius=13)
```

**#Proportional Circles**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Montafon")
data <- read.csv("daily.csv",1)
library(leaflet.minicharts)
dataagg<-datashort %>% count(lat,lng)
tilesURL <- 'http://server.arcgisonline.com/ArcGIS/rest/services/Canvas/World_Light_Gray_Base/MapServer/tile/{z}/{y}/{x}'
basemap <- leaflet(width = "100%", height = "400px") %>%
 addTiles(tilesURL)
basemap %>%
 addMinicharts(
```

```
  dataagg$lng,dataagg$lat,
  chartdata=dataagg$n,
  showLabels=TRUE,
  width=45
 )
```

**# Pfade**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Montafon")
data <- read.csv("daily.csv",1)
left <- 9.76
bottom <- 46.86
right <- 10.20
top <- 47.2
data_path <- data %>%
 filter(location_name != "" & !is.na(location_name) & lng >= left & lng <= right & lat >= bottom & lat <= top)
user <- data_path %>%
 group_by(user_id) %>%
 count() %>%
 filter(n > 1) %>%
 arrange(desc(n))
user <- user[10:15, ]
path <- data_path %>%
 filter(user_id %in% user$user_id) %>%
 group_by(user_id) %>%
 arrange(user_id, as.Date(date_GMT)
head(path[, c('user_id','date','lat','lng')])
```

```
map <- get_stamenmap(bbox = c(left = left,
                bottom = bottom,
                right = right,
                top = top),
              zoom = 12)
ggmap(map) +
 geom_point(aes(x=lng, y=lat, color=user_id), data = path) +
 geom_path(aes(x=lng, y=lat, group=user_id, color = user_id), data = path)
```

## Appendix 3: Code Zillertal

```
library(xlsx)
library(dplyr)
library(lubridate)
library(ggmap)

# Übersicht Anzahl Posts pro Jahr
setwd("/Users/KatharinaLadurner/Masterarbeit/Zillertal")
data <- read.csv("zillertal.csv",1)
lab_month <- c('Jänner', 'Februar', 'März', 'April',
       'Mai', 'Juni', 'Juli', 'August',
       'September', 'Oktober', 'November', 'Dezember')
tbl <- data %>%
 mutate(year = as.numeric(substr(date_GMT, 1, 4)),
    month = factor(substr(date_GMT, 6,7), labels = lab_month))
tbl %>% group_by(year) %>% count()

# Ranking posts pro location_name
setwd("/Users/KatharinaLadurner/Masterarbeit/Zillertal")
data <- read.csv("zillertal.csv",1)
rank <- data[!is.na(data$lat) & !is.na(data$lng), ] %>%
 group_by(location_name, lng, lat) %>%
 count() %>%
 arrange(desc(n))
head(rank, 20)

# Posts / Month (Liniendiagramm alle Posts)
```

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Zillertal")
data <- read.csv("zillertal.csv",1)
data_line <- data[!is.na(data$location_name), ] %>%
 mutate(date = as.Date(date_GMT)) %>%
 filter(as.Date(date_GMT) >= as.Date("2022-01-01"))
rank_line <- data_line%>%
 group_by(location_name, lng, lat) %>%
 count() %>%
 arrange(desc(n))
data_line %>%
 group_by(date= floor_date(as.Date(date_GMT), "month")) %>%
 count() %>%
 ggplot(aes(x = date, y = n)) +
 geom_line() +
 geom_point()
```

**# Posts / Month Top XYZ (Liniendiagramm aufgeteilt)**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Zillertal")
data <- read.csv("zillertal.csv",1)
data_line <- data[!is.na(data$location_name), ] %>%
 mutate(date = as.Date(date_GMT)) %>%
 filter(as.Date(date_GMT) >= as.Date("2022-01-01"))
rank_line <- data_line%>%
 group_by(location_name, lng, lat) %>%
 count() %>%
 arrange(desc(n))
```

```
anz <- 6
loc <- rank_line$location_name[2:anz]
data_line %>% filter(location_name %in% loc) %>%
 group_by(location_name, date = floor_date(as.Date(date_GMT), "month")) %>%
 count() %>%
 ggplot(aes(x = date, y = n)) +
 geom_line(aes(color = location_name)) +
 geom_point(aes(color = location_name))
```

**#Traditional Heatmap**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Zillertal")
data <- read.csv("zillertal.csv",1)
datashort<-data[,c(14:15)]
datashort<-na.omit(datashort)
library(rosm)
library(leaflet)
library(leaflet.extras)
leaflet() %>%
 setView(10,47,zoom=11) %>%
 addTiles() %>%
 addHeatmap(lng=datashort[,2],lat=datashort[,1],blur=25,max=.05,radius=13)
```

**#Proportional Circles**

```
setwd("/Users/KatharinaLadurner/Masterarbeit/Zillertal")
data <- read.csv("zillertal.csv",1)
library(leaflet.minicharts)
dataagg<-datashort %>% count(lat,lng)
```

```
tilesURL <- 'http://server.arcgisonline.com/ArcGIS/rest/services/Canvas/World_Light_Gray_Base/MapServer/tile/{z}/{y}/{x}'

basemap <- leaflet(width = "100%", height = "400px") %>%
 addTiles(tilesURL)

basemap %>%
 addMinicharts(
  dataagg$lng,dataagg$lat,
  chartdata=dataagg$n,
  showLabels=TRUE,
  width=45
 )


# Pfade

setwd("/Users/KatharinaLadurner/Masterarbeit/Zillertal")

data <- read.csv("zillertal.csv",1)

left <- 11.6

bottom <- 47.1

right <- 12.00

top <- 47.5

data_path <- data %>%
 filter(location_name != "" & !is.na(location_name) & lng >= left & lng <= right & lat >= bottom & lat <= top)

user <- data_path %>%
 group_by(user_id) %>%
 count() %>%
 filter(n > 1 ) %>%
 arrange(desc(n))

user <- user[12:12, ]
```

```
path <- data_path %>%
 filter(user_id %in% user$user_id) %>%
 group_by(user_id) %>%
 arrange(user_id, as.Date(date_GMT))
head(path[, c('user_id','date','lat','lng')])
map <- get_stamenmap(bbox = c(left = left,
              bottom = bottom,
              right = right,
              top = top),
            zoom = 12)
ggmap(map) +
 geom_point(aes(x=lng, y=lat, color=user_id), data = path) +
 geom_path(aes(x=lng, y=lat, group=user_id, color = user_id), data = path)
```