MATEJ BEL UNIVERSITY, BANSKÁ BYSTRICA
FACULTY OF ECONOMICS

THE IMPACT OF CLIMATE CHANGE ON THE ENTREPRENEURSHIP IN MOUNTAIN TOURISM DESTINATIONS

MASTER THESIS

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2021 **Bc. Simona Juríková**

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Declaration

I declare that as the author of the master thesis I did not violate the principles of academic ethics, I did not use the work and ideas of other people without proper reference to the original source, I did not create imaginary results as if they were real, I did not manipulate research material, data and results presented in the master thesis.

Banská Bystrica, 15.4.2021 .....

Signature

ABSTRACT

JURÍKOVÁ, Simona, Bc. The impact of climate change on the entrepreneurship in mountain tourism destinations. [Master thesis] / Simona Juríková. – Matej Bel University, Banská Bystrica. Faculty of Economics; Department of Tourism. – Supervisor: prof. Ing. Vanda Maráková, PhD. – Qualification degree: Engineer – Banská Bystrica: Faculty of Economics, MBU, 2021. 98 p.

The master thesis examines the impact of climate change on business in mountain destinations. The aim of the thesis is to find out how tourism companies in the destination Val Gardena adapt to changing climate and how they prevent the problems related to climate change. The subject of the master thesis are the effects of climate change on business in a mountain destination. The object of the master thesis is a selected destination and selected tourism companies in the destination Val Gardena, while for the destination the criterion of altitude above 1 800 above sea level is met. A critical review of domestic and foreign literature and scientific articles is focused on the impact of climate change on mountain destinations, innovations related to mitigation the impact on the environment as well as the importance of sustainable development in mountain destinations. Empirical research aims at available non-financial indicators, information about the mountain destination and climatic data, which are supplemented by primary data obtained by a standardized interview and a processed questionnaire. The master thesis uses methods of induction, deduction, comparison, generalization, descriptive statistics, correlation analysis, detection of statistically significant differences and the method of evaluation of the questionnaire. The research results point to the seriousness of the impact of climate change on the development of tourism in mountain destinations. The outcome of the research are recommendations to companies and the destination Val Gardena, as well as general recommendations to mountain destinations and other tourism stakeholders interested in the tourism development in mountain environment, in relationship with the possibilities of adapting to changing climatic conditions in the long run.

Keywords: Climate change. Entrepreneurship. Innovation. Italy. Mountain destination.

ABSTRAKT

JURÍKOVÁ, Simona Bc. Vplyv klimatických zmien na podnikanie v horských strediskách cestovného ruchu. [Diplomová práca] / Simona Juríková. - Univerzita Mateja Bela v Banskej Bystrici. Ekonomická fakulta; Katedra cestovného ruchu. - Vedúci: prof. Ing. Vanda Maráková, PhD. - Stupeň odbornej kvalifikácie: Inžinier. - Banská Bystrica : Ekonomická fakulta UMB, 2021. 98 s.

Diplomová práca skúma vplyv klimatickej zmeny na podnikanie v horských strediskách. Cieľom diplomovej práce je zistiť, ako sa podniky cestovného ruchu v cieľovom mieste Val Gardena adaptujú na meniace sa podnebie a ako sa snažia predchádzať problémom súvisiacim so zmenou podnebia. Subjektom diplomovej práce sú dopady zmeny podnebia na podnikanie v horskom stredisku. Predmetom diplomovej práce je vybrané cieľové miesto a vybrané podniky cestovného ruchu v cieľovom mieste Val Gardena, pričom pre cieľové miesto je splnené kritérium nadmorskej výšky nad 1 800 nad morom. Kritický prehľad domácej a zahraničnej literatúry a vedeckých článkov sa zameriava na vplyv klimatickej zmeny na horské strediská, inovácie súvisiace so zmiernením vplyvu na prostredie ako aj dôležitosť udržateľného rozvoja v horských strediskách. Empirický výskum sa zameriava na dostupné nefinančné ukazovatele, informácie o horskom stredisku a klimatické údaje, ktoré sú doplnené o primárne údaje získané štandardizovaným rozhovorom a spracovaným dotazníkom. V diplomovej práci sú uplatnené metódy indukcie, dedukcie, komparácie, generalizácie, deskriptívnej štatistiky, korelačnej analýzy, detekcie štatisticky významných rozdielov a metóda vyhodnotenia dotazníka. Výsledok výskumu poukazuje na vážnosť vplyvu klimatickej zmeny na rozvoj cestovného ruchu v horských strediskách. Hlavným výstupom práce sú odporúčania podnikom a cieľovému miestu Val Gardena, ako aj všeobecné odporúčania horským strediskám a ostatným subjektom zainteresovaným na rozvoji cestovného ruchu v horskom prostredí, v súvislosti s možnosťami adaptácie sa meniacim klimatických podmienkam z dlhodobého hľadiska.

Kľúčové slová: Horské stredisko. Inovácia. Klimatická zmena. Podnikanie. Taliansko.

FOREWORD

The development of tourism in the mountain environment is important for visitors as well as businesses. The performance of other economic activities in the mountain environment is limited due to poorer availability and lack of resources or labor. Tourism entities in mountain destinations are mostly focused on economic results, while environmental issues remain behind. Stakeholders involved in the development of tourism in the mountain environment may experience a change in climatic conditions, especially in the winter season, and thus conditions for traditional sports activities may worsen. Due to climate change, mountain destinations are particularly endangered, whether in the researched Alpine environment, in the Carpathians or elsewhere in the world. Research shows that the impact of climate change on mountain destinations is significant, winter sports as well as maintaining ski conditions are at risk and changing attitude to a more environmentally sustainable entrepreneurship is necessary.

Authors of scientific articles deal with the climate change effects in the mountain environment as this phenomena will continue to accompany tourism services in the future more than before, even in more significant way. Therefore, the research aim of the master thesis is to analyze winter tourism in selected mountain destination in Italian Dolomites, to analyze the impact of climate change on entrepreneurship and the other way round, and to find out how tourism companies and the mountain destination itself adapt to changing climate and how they prevent the problems related to climate change.

The master thesis helps to understand the seriousness of climate change in the mountain environment and tries to propose possible solutions for the selected destination as well as for winter tourism in mountain destinations in general. The expected benefit of the master thesis is the elaboration of the analyzed situation of the winter season in a specific mountain destination and a possible comparison for future research focused on the impact of climate change on entrepreneurship in mountain destinations.

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tourism association in Val Gardena, Christina Demetz, for valuable information and a provided interview.

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LIST OF ABBREVIATIONS

%	percent
°C	degree Celsia
€	euro
A	Austria
Ar	arrivals
ASTAT	Alto Adige Istituto provincial di statistica
cm	centimeter
cm/m²	centimeter per square meter
Covid-19	Corona Virus Disease 2019
DE	Germany
CH/FL	Switzerland and Liechtenstein
IPCC	Intergovernmental Panel on Climate Change
IT	Italy
km	kilometer
km/h	kilometer per hour
kWh/m²a	kilowatt hours per square meter and year
m	meter
m/s	meter per second
mins	minutes
S	Amount of snow
T	temperature
UNEP	United Nations Environment Programme
UNWTO	United Nations World Tourism Organization

INTRODUCTION

Mountain destinations are visited mostly in the summer and winter season. For visitors, holidays in mountain destinations are accompanied by outdoor sport activities, relax and the interest in visiting the primary offer. Due to the changing climate, winter tourism in mountain destinations can be endangered, especially in the low-lying destinations. On the other hand, in mountain destinations at higher altitude and with high developed tourism infrastructure increases the number of visitors and thus environment can be more polluted. It is clear, that provision and consumption of tourism services is associated with high environmental pollution. Due to the fact that the supply of mountain destinations depends on primary resources, and the environment is fragile, tourism services should be provided in a more environmentally sustainable way. As changing climate is in hand with global warming, providing services and maintaining ski tourism for all mountain destinations will be a challenge in the future. As global temperatures are expected to rise by 1,5 degrees Celsius due to global warming in the middle of this century, and in mountain destinations the rise in average temperatures may be even higher, it is interesting to observe, how selected mountain destination Val Gardena perceives climate change and how the entrepreneurship in there is affected by climate change.

Therefore, the aim of the master thesis is to research how tourism companies in Val Gardena adapt to changing climate and how they prevent the problems related to climate change. The subject of the master thesis are the effects of climate change on business in a mountain destination. The object of the master thesis is a selected destination and selected tourism companies in the destination Val Gardena, while for the destination the criterion of altitude above 1 800 above sea level is met.

To meet the research aim, the master thesis is divided into three chapters. First chapter contains definitions of mountain destinations, relationship between the mountain tourism and climate change as well as possible adaptations to changing climate in the mountain environment during winter season. At the end of the first chapter, the research methodology is specified. Second chapter analyses the impact of climate change on tourism companies in Val Gardena, while the set consists of 157 tourism companies and a tourism association. Second part is based on primary climate data analysis, conducted interview as well as the processing of a questionnaire. As it is clear that changing climate is affected by the human activity as well as leisure

activities, second chapter analyses if tourism facilities reduce the impact on the environment and innovate in order to mitigate the impact.

Due to the fact that the supply of mountain destinations depends on primary resources, and the mountain environment is fragile, tourism services should be provided in a more environmentally sustainable way. Therefore, in the third chapter several proposals for mitigating the impact of tourism facilities, as well as in Val Gardena on climate are proposed. Based on theoretical concepts and results of the primary research, possible alternatives to winter tourism in Val Gardena are proposed. The second part of third chapter contains general recommendations for winter tourism in a mountain environment. Environmentally friendly recommendations for mountain destinations are generally formulated at the level of companies, destination and also at the regional and national level. In addition, possible long-term strategies for entrepreneurship in the mountain destinations are introduced.

Added value of the master thesis consists of importance of understanding the impact of development of tourism in the mountain environment, of seriousness of the effects of changing climate in the mountain environment, and of summary of possible long-term strategies for winter tourism in mountain environment affected by climate change.

1. THE THEORETICAL APPROACH TOWARDS DESTINATIONS AND THE IMPACT OF CLIMATE CHANGE ON ENTREPRENEURSHIP

Tourism development is beneficial for mountain destinations for several reasons. From an economic point of view, the development of tourism in mountain destinations has a major impact on its prosperity and employment. In the mountain environment, mainly sports and physical activities are performed, which have a positive effect on the human body. These activities include hiking, mountain biking, climbing, skiing, snowboarding, ski mountaineering and other sport-recreational activities. The motivation to visit a mountain destination is usually the need for relaxation, connection with nature, the desire to experience adrenaline, tradition or escape from stereotypical life. The mountain environment is characterized by slopes used especially in the winter, but many destinations attract visitors with the offer even during the summer season. Visiting mountain destinations during the winter season is also influenced by the fact that people take more than one holiday a year (Patúš 2004b: 11). However, in recent decades, mountain destinations have been facing the challenge called climate change, what is having a negative impact on their business activities. The warmer climate creates more unfavorable conditions for both summer and winter season, but winter becomes more economically unstable. The first part of the master thesis therefore explains the characteristics of mountain destinations, entrepreneurship in mountain destinations, the effects of climate change on businesses in mountain destinations during winter season as well as possible adaptations and innovations related to climate change.

1.1. Mountain destinations

Tourism is developing where the needs of visitors related to travel are satisfied. This place is called a tourism destination. With a destination is associated a suitable primary and secondary offer, which creates a compact tourism product. Destination product is therefore a complex of offered services. Pechlaner (2019: 4) furthermore explains that the tourism product is created on the basis of demand, and thus the motives, preferences or affinities of visitors or a specific target group.

Patúš (2004a: 8) understands the term tourism destination as an area that provides a suitable offer to visitors, where are many tourism facilities and where it is possible to observe the organization or management of destination. Patúš (2004a: 19) also notes that destination is a bounded area and, based on facilities, satisfies the demand of visitors. According to Freier (In Eisenstein, 2010: 10), a destination is a geographical, scenic, socio-cultural, or organizational unit that offers visitors interesting attractions. Gúčik (2010: 247) mentions that a tourism destination can be tourism centre, region or even a state. According to visitor´s country of origin the term can be understood as a continent too. Gúčik et al. (2012: 40) furthermore state, that a destination is a place where tourism facilities are located and where tourism businesses provide a tourism product to visitors. According to Bieger and Beritteli (2013: 6) destination is a geographical area chosen by visitors as the destination of their journey. These statements agree with the UNWTO definition, which considers a destination to be a central element of travel decision (www.unwto.org, 2020a). In the tourism system, the destination is understood as a homogeneous element that is a habitat for locals and a point of interest for various interest groups, such as investors, local politicians, service providers and visitors (Pechlaner, 2019: 14). From the aforementioned definitions it is clear authors focus on tourism destination mainly from a geographical point of view.

In the past, tourists visited mountain areas mainly in the summer season (Polderman et al. 2020: 4). This was mainly due to insufficient landscaping and a lack of cable cars. The increase in mountain attendance since 1930, and the impact of the gradual popularization of winter sports and skiing have ensured economic growth for European mountains and shifted mountain tourism to a billion-dollar industry (Denning, 2014, in Hock et al., 2019: 169). Because winter sports bring greater economic benefits for mountain destinations than summer sports, investors have decided to create such products for visitors. Development of mountain destinations, grooming of the slopes, favorable weather, and the fact that nowadays visitors travel several times a year increased the attendance of destinations in the winter season.

Tourism destination located in mountains is popular among visitors because people consider the natural environment to be a place where they relax and gain new energy. Therefore, mountain destinations are interesting area of research for both domestic (Patúš, 2004a, Patúš 2004b, Gajdošíková, 2020) as well as foreign authors (Scott, 2006, Kuščer and Dwyer, 2019, Polderman et al. 2020). Mountain destinations

are characterized by special geomorphological (terrain fragmentation), climatic (temperature, precipitation) and biogenic (ecosystems for living organisms) factors (Patúš, 2004b: 12). Mountain destinations can be identified from geographical point of view, or according to the main source of attraction, which in mountain destinations is mainly a natural attraction (Swarbroke, Horner, 2001, in Gúčik et al. 2012: 57). As Gúčik (2010: 262) and Gajdošíková (2020b: 27) state, tourism is concentrated in destinations on the basis of their attractions. The attractive primary and secondary offer ensures the development of tourism in mountain destinations, as other economic activities are considerably limited in this environment. In mountain destinations, the primary offer dominates, as a decisive factor of the interest of visitors. Mountain destinations are located at higher altitudes, so they are mostly isolated from other areas and should be well accessible (Gúčik, 2010, in Gajdošíková, 2020: 33) in order for them to be able to develop tourism there. Mountain destinations should therefore pay attention to ensure transport accessibility, as visitors use mainly cars to arrive and commute during their stay. Problems such as parking, congested transport infrastructure and air pollution are associated with this means of transport. However, in mountain destinations, road capacities as well as parking spaces are limited, ski buses or hotel shuttles can be seen there. The fact that mountain destinations have a certain capacity and carrying capacity is limiting for their further development, the support of public transport starts to be an important factor for regulation of tourist flows. According to Gajdošíková (2020a: 36), in addition to the carrying capacity, it is also important to monitor the structure of visitors, length of stay, visitor´s activities and consumer behavior. Regulation of the number of visitors can ensure the satisfaction of visitors as well as domestic residents, and finally the preservation of the environment. In destinations it is important to strengthen public transport lines to meet the requirements of visitors, because as noted by Lohmann and Duval (2014: 1), public transport does not satisfy the requirements of tourists if it is not primarily adapted to them. In the mountain environment, the use of public transport is extremely important and therefore enlightenment of the use of this form of transport should be propagated among companies as well as among visitors.

According to Patúš (2004b: 13), a mountain destination in Slovakia is considered to be a place at an altitude of 500 m above sea level with a snow cover at least 60 days a year, while the depth of snow coverage should reach at least 20 cm. The author further states, that in Alpine regions the altitude of mountain destinations

should be at least about 800 m above sea level. The altitude as well as the number of snowy days in the winter season for the classification of the environment as mountainous are not perceived by the authors equally due to the different relief and climatic conditions in individual countries. However, foreign author Abegg (1996, in Rixen et al. 2011: 233) points out that a winter sport in mountain destination can have the potential to be economically successful if the depth of snow exceeds 30 cm for 100 consecutive days in the period from December 1st to April 15th. This can be challenging especially for mountain destinations in lower altitude, but due to climate change, destinations at higher altitude are no exception as well. The snow coverage needed for the typical winter sport activities is dependent also on the features and characteristics of the soil and land. According to Scott (2006: 56), snow cover, whether natural or artificial, and the reliability of climatic conditions to ensure it, are also determining factors for the success of mountain destinations on the market.

Mountain destinations suitable for winter sports activities should provide, in addition to accommodation facilities, at least four lifts, restaurants and bars, ski schools, ski shops and rental shops, and medical facilities (Vanat, 2016, in Kuščer and Dwyer, 2019: 540). According to this statement, it would not be possible to name several, especially small family mountain destinations, a mountain destination. Each country or region is unique, has own primary and secondary offer, so it is difficult to follow one definition of a mountain destination around the world.

Being strong on the market can be challenging for businesses in mountain destinations for a variety of reasons. Entrepreneurship and tourism products in mountain destinations are influenced by seasonality as well as environmental and climatic conditions. Under the pressure of competition, tourism destinations primarily ensure their profits, but such activity may be in conflict with the protection of the environment (Patúš, 2004a:113). The importance of the development of tourism in destinations, as well as in mountain destinations, lies in the benefits for the economy, whether of the region or the state, for natural and cultural resources, for businesses, for the local population and for visitors (Gúčik et al. 2007: 47-48). On the other hand, Gajdošíková (2020b: 36-37) considers the deforestation of the environment, soil erosion, architectural pollution, construction of cable lifts and chairlifts, discharge of wastewater, overcrowding, seasonality, high level of urbanization, second homes, as well as conflicts with the domestic population to be the main negative effects of tourism development in mountain areas. From all the mentioned effects, it can be

concluded that the development of tourism in mountain destinations can have a negative impact particularly on the environment and the local population. It can be stated that the attributes cited in this subchapter belong to the basic characteristics of mountain destinations.

1.1.1. Entrepreneurship in mountain destinations

By entrepreneurship it is understood a "purposeful activity performed by the entrepreneur systematically and independently, in his own name, in his own responsibility and for the purpose of making a profit" (Kučerová, Strašík, Šebová, 2010: 7). According to Gúčik (1992, In Kučerová, Strašík, Šebová, 2010: 10), a tourism enterprise is a business entity which, in addition to the above, accepts economic risks and satisfies the needs of final consumers by producing goods and providing services.

Another definition says, a tourism enterprise is a system composed of elements as are material, financial, human resources or information, and the relationships between them (Kučerová, Šmardová, 2016: 13). "Tourism enterprises are specific in providing mainly services, have seasonal character, come of them are capital-intensive, are mostly small and medium-sized enterprises with a high share of human labor, require the qualification of employees and require cooperation in destination" (Gúčik, 2010: 191). Thus, the specific features of tourism business are the provision of a wide range of services, the dependence of demand on location and time of year, high consumption of human labor, the need for large amounts of capital, the need for multi-level cooperation and the participation of final consumers in quality of services (Kučerová, Šmardová, 2016:19). The way of cooperation in mountain destinations depends on the model of organizational structure. Gajdošíková (2020b: 32-33) describes a community model where individual companies are competitors, but at the same time they form a common product and a corporation model, where one strong company dominates, managing several activities in the destination. Best known mountain destinations are characterized by a corporation model. Accommodation facilities, restaurants, transport facilities or amusement parks can be under one governance. Their position on the market can be an advantage for the destination product. Abegg (2007: 59) considers ski conglomerates to be strong on the market,

especially in the fight against climate change in terms of risk, diversification as well as the availability of technical and financial resources.

For mountain enterprises, particularly located in the Alpine region, a typical feature is family-owned business. The reason for starting a family business, especially in Italian Alps, was decentralized management (Polderman et al. 2020: 4-5). It has several advantages, such as offering authentical product, keeping traditions, employment of domestic residents and therefore support of the local economy. Family businesses create stability in the environment of tourism development by creating ties to society, responsibilities, and the values they honour (Kučerová, Šmardová, 2016: 37). Zehrer (2019: 27-29) sees the role of family businesses similarly and considers them to be in solidarity with society and deeply rooted in the destination. The author perceives a lack of capital of family businesses as a threat, and therefore considers it necessary to cooperate with other tourism companies or obtain assistance in the form of subsidies. However, the lack of cooperation between mountain businesses may be due to geographical as well as socio-economic diversity (Weiermair, Peters, & Schuckert, 2007: 85).

Another problem mountain enterprises encounter is lack of experienced staff as well as problem with keeping the business for future generations of the family. Residents of mountain areas began to provide tourist services instead of agriculture activities, what meant they started with a lack of knowledge and qualification in tourism (Weiermair, Peters, & Schuckert, 2007: 85). Nowadays, the interest of skilled workers to work in mountainous terrain may not be sufficient. In order to employ skilled workers, what is particularly challenging in mountain destinations, it is necessary to offer an attractive workplace and be competitive on the market (Margreiter, 2016, in Innerhofer and Pechlaner, 2016: 164). It is in the best interest of companies to provide accommodation and transport for qualified employees particularly from more distant places. Abroad, especially in the mountains, family business is a tradition. In Slovakia, most family businesses are run by the first generation, what is due to the transformation to a market economy after 1989 (Kučerová, Šmardová, 2016: 35). Therefore, if the tradition of providing services to visitors in a mountain enterprise is not deeply rooted, future generations may not be interested in doing business in such an environment.

Enterprises in mountain destinations are mainly affected by the factor of seasonality and therefore their entrepreneurship is divided into summer and winter

seasons. The seasonality is not influenced just by climate conditions, but also by institutional factors such as the main holiday period, bank holidays, cultural traditions, and others. Therefore, gradually there are not just two main seasons in mountain destinations, but also part of seasons and pick season days in the period of the main winter and summer season. Abegg et al. (2007: 29) consider skiing during the holidays to be the most profitable and most in demand, also because the demand of visitors is concentrated in short periods of time. Off-season business is no exception in mountain destinations, but it is less profitable and more demanding to ensure the operation.

The more visitor requirements the destination is able to meet, the more competitive it is on the market. Patúš (2004b: 15) considers the equipment of mountain destinations with enterprises to be dependent on the requirements of visitors, carrying capacity, capacity of the area and economic efficiency. In addition to tourism infrastructure, namely accommodation facilities, restaurants, ski lifts, sport equipment rentals, or tourist information centers, there are important enterprises of general infrastructure, which do not serve just visitors. These can be for instance medical facilities, shops, banks, posts, transport facilities, gas stations or mountain rescue services, which together with the tourism product ensure the satisfaction and safety of visitors.

In addition to economic results, tourism enterprises should pay attention to social and environmental activities in accordance with applicable legislation (Kučerová, Šmardová, 2016: 13). This idea coincides with the need to shape sustainable tourism.

1.1.2. Sustainable development in mountain destinations

According to Steiger et al. (2020: 1), industries using natural resources face an uncertain future and it is in their interest to act in such a way as to ensure sustainable development. The sustainability of tourism in mountain destinations is also based on three pillars of sustainability, namely, economic, environmental, and social. When striving for economic results, it is difficult to satisfy the environmental requirements of destinations. With the development of tourism in mountain destinations and the increase in the number of visitors, tensions among the local population are growing, and have a negative impact on the social pillar of sustainability. It is therefore crucial

to find some consensus on all three pillars in order to ensure the sustainable product of mountain destinations.

According to Gajdošíková (2020b: 110-111), it is important to identify steps of mountain destinations towards sustainability separately. According to her, within the framework of environmental issues, a mountain destination can pay attention to public transport, optimization of resources, efficient waste management, limiting visitors or protection and restoration of the environment. The sustainability of the economic pillar should consist of promoting local and regional products, prolonging the stay of visitors, increasing visitors' expenses, increasing capacity utilization as well as creating an image of the destination. According to her, the social pillar of sustainability aims to increase the quality of life of local residents and employment in the region, reduce seasonality, prepare the product for various groups of the population, ensure the safety and suitability of public spaces as well as infrastructure.

Nowadays, reducing the production of greenhouse gas emissions and energy seems to be key to the sustainability of mountain destinations, but this is difficult to achieve it with the current way in which cable cars operate, artificial snow is created, slopes are groomed, and buildings are heated (Polderman et al. 2020: 2). The reason why mountain destinations are required to be more sustainable is that they are located in fragile areas. At the same time, environmental awareness of visitors is increasing, and sustainability is becoming a trend and can improve the destination's competitiveness. According to Stubelj Ars & Bohanec (2010: 2555), it is the emphasis on environmental issues that is important in mitigating climate change in mountain destinations, as eco-tourism promotes nature conservation, low impact, as well as environmental education. Mountain destinations cannot be clearly described as ecological destinations, but it can be observed that they are taking small steps to increase this awareness.

Mountain destinations can achieve sustainability in various ways, most often in the form of innovation, the creation of new sustainable products, cooperation with the local population, visitor management (Gajdošíková, 2019, in Gajdošíková 2020b: 113) or through intelligent concepts (Polderman et al. 2020: 15-16). According to him, tailor-made smart concepts can analyze energy intensity, potential sources of renewable energy and thus contribute to the sustainability and low-carbon future of mountain destinations, but they are financial, legislative, and time-consuming.

It seems to be easier to act more sustainable for larger mountain destinations. Kuščer and Dwyer (2019: 552-553) argue that larger mountain destinations located at higher altitude are more sustainably oriented, "have better stakeholder participation, political support and developed policies, are active in improving sustainability awareness and satisfaction of all stakeholders, experience less brain drain and problems with aging, have better developed ties with local communities, implement new technological developments and renewable energy, collaborate more, are innovative and creative in services, and adapt to the increasing demand for sustainable ski-related products and services". The higher the location, the more vulnerable destinations are, which means the need for more sustainable actions. However, it can be a problem if such mountain destinations are owned by developers. Botanist Šibík strongly criticizes activities of developers in mountain destinations because their only goal is profit, while local residents doing business in tourism sector protect business environment for future generations and thus contribute to sustainability (Gdovinová, 2021). In this context it is clear, small mountain areas have the sustainability deeply rooted, but their market position is uncertain, as they are not funded by any investors, are not known, nor do they have sufficient facilities to satisfy demanding visitors. It can therefore be assumed that in order to become a sustainable mountain destination, as the participation of developers is not appropriate, tourism management organizations are required to coordinate and support entrepreneurship mainly of local population.

The organization covering the promotion of sustainability in tourism is the UNWTO. The organization has adopted the 2030 Agenda for Sustainable Development to mitigate the negative effects of the problems associated with the age of consumption, also called Anthropocene. The topics covered by the 2030 Agenda for Sustainable Development are ending poverty, fighting inequality and injustice, and fixing climate change. It is striking that humanity in the 21st century is suffering from hunger and, on the other hand, consumes an extreme number of raw materials and energy, which results in changing climate. The agenda contains 17 goals and 169 targets to achieve a state of sustainability on the planet by 2030. The thirteenth goal, called climate action, is to reduce energy consumption and promote the use of renewables change (www.unwto.org, 2020b).

With regard to current pandemic hit seasons and challenging climatic conditions, in addition to sustainability of mountain destinations, it is important to

think about whether they are sufficiently resilient. Generally, resilience is by authors understood as the ability to absorb disruptive influences and maintain basic structure, identity, or behavior (Gunderson et al., 2010a; Holling, 1996, in Clifton, 2010: 76, Walker et al., 2004, in Brunner & Grêt-Regamey, 2016: 130). In the mountain environment to be a resilient tourism destination or a business, it means to recover from disorders, and bounce off in a stronger and more inventive way (Linnenluecke et al. 2012, in Wyss et al., 2014: 909). Due to the vulnerability of mountain destinations and the difficulty of maintaining a stable structure due to changing climatic conditions, adaptation to gradual change may also be considered in terms of the resilience. In the local tourism system, the interconnectedness of individual stakeholders is important in matters of climate change, as their advantage is the different perception and consideration of priorities (Wyss et al., 2014: 917). Based on this statement, it is clear that the diversity of tourism businesses, their interconnection and high level of development of tourism infrastructure can be a driving force for the destination's resilience to climate change.

1.2. The impact of climate change on mountain destinations and entrepreneurship

In general, long-term climate change is conditioned by natural influences such as changes in solar radiation intensity, changes in the Earth's orbital parameters, changes in the distribution of continents and oceans, changes in ocean currents, volcanic activity as well as impacts of large objects from space. From aforementioned activities can be seen that climate has always changed. However, it is clear that human activity is accelerating climate change, which can be observed especially in the last two centuries. Human activity produces excessive amounts of greenhouse gases, carbon dioxide, methane, nitrous oxide, and other gases. Forest burning, fossil fuel extraction, cattle breeding, landfills, and various other activities support the production of these gases, too (www.shmu.sk, 2021).

Climate change is affecting every sector of the economy in the world. According to the UNWTO and UNEP (2008: 13), the tourism sector is climate dependent, therefore the Davos Declaration was adopted, committing itself to reducing greenhouse gas emissions, adapting businesses to a changing environment, using energy-saving technologies, and helping financially poorer regions. It is obvious

there are companies and even destinations that are trying to do business sustainably and are introducing various ways to achieve it. However, worldwide consumption and convenience in connection with non-compliance with environmental protection regulations is increasing. For this reason, members of the Paris Agreement from year 2015 have committed themselves to mitigating greenhouse gas emissions that cause rising average temperatures to reduce risks and impacts of climate change (www.unfccc.int, 04.11.2020). Climatic conditions change from year to year, and it is increasingly possible to see fluctuations during the seasons accompanied by heavy rainfall, drought, or other adverse weather conditions. Earth warming is having a negative impact on equatorial regions as well as mountain regions. Several authors have been researching the impact of climate change on tourism in mountain destinations in the last four decades, although this research has been influenced by the lack of relevant data and their compatibility (Scott, Becken, 2010: 286).

Activities related to travel and stay in destinations are affected by climate change, but at the same time are associated with significant generation of greenhouse gas emissions (Grimm, 2016, In Grimm, Alcântara and Sampaio, 2018: 2). As already mentioned, climate change is not a lattern-day process, but the mountain environment is increasingly affected by it. Mountain areas have been and still are deforested, due to the construction of accommodation facilities, cable cars, or simply logging. The absence of trees reduces the height of the hills, does not retain clouds that do not create adequate precipitation. For instance, significant deforestation can be observed in Low Tatras in Slovakia, what not only supports climate change, but also supports the construction of large accommodation facilities, and attracts many visitors whose destination capacity is unable to carry.

UNWTO and UNEP (2008: 55) argue that temperatures in 21st century in Europe will rise more than the average world temperature, snow season will shorten as well as snow depth will decrease. Due to the fact that many European mountain destinations are low-lying, in the summer a drought in these places are expected. Bürki, Elsasser and Abegg (2003: 6) argue that "climate change and global warming, together with international competition, have been used as the key arguments for constructing artificial snowmaking facilities, as well as for extending existing ski runs and opening new ones in high Alpine regions (at above 3000 m)". However, the production of artificial snow is not a solution to alleviate the climate crisis. The production of artificial snow significantly affects the soil and life in it. On the positive

side, snow protects plants from frost and damage, but it delays growth and germination (Bacchiocchi et al. 2019: 964). By modifying the slopes, snow and soil are compressed, which prevents water penetration after the winter season, and chemicals and molecules from artificial snow create a different pH and change the composition of the original plants in a mountain environment (Šibík, 2020, in Gdovinová, 2021). With favorable temperatures, artificial snow can replace natural snow and satisfy the requirements of visitors, but it endangers the environment. Thus, small mountain destinations, which have a limited length of season and do not produce artificial snow, are more environmentally friendly, because they do not reduce the number of plant species or postpone the beginning of the germination process, unlike larger, well-known destinations (Bacchiocchi et al. 2019: 966).

Although climate change affects business in mountain destinations, it is largely the result of their own activities. It can therefore be assumed that not all mountain destinations have the same impact on climate change. The environment is more burdened by destinations with sufficient resources to ensure the operation of the destination even in adverse conditions, while small family destinations, which do not have sufficient resources, perceive the impact of climate change more, but support this phenomenon less.

1.2.1. Relationship between tourism in mountain destinations and climate change

Mountain ecosystems are considered to be the most vulnerable to the changing climate (Scott, 2006: 54). Lack of snow due to changing climatic conditions is a challenge for mountain destinations providing winter sports services. The winter season is considered to be economically important because it brings high profits, but it is difficult to adapt to a warmer climate and a lack of snow (Damm, Köberl, & Prettenthaler, 2014: 8). Climate change has currently a greater negative impact on lower altitude ski resorts than on higher destinations (Bürki, Elsasser and Abegg, 2003:6, Damm, Köberl, & Prettenthaler, 2014: 9, Steiger et al. 2020: 2). Mountain destinations at low elevations have significant problems caused by climate change, but it can be expected that in 2050, destinations located 2000 m above sea level will also have a problem with insufficient snow cover (Rixen, 2011). The year 2050 is not

a distant future and it is clear that many European ski areas are not higher than 2000 m above sea level.

Steiger et al. (2020: 8) believe that the recurring problem of lack of snow in some ski areas will cause visitors to move to other regions, what may negatively affect the economy of the aforementioned regions. According to Steiger and Scott (2020: 8), the pressure to support mountain destinations by the public sector will increase in the future, what will also increase the need to adapt to sustainable public funds. In mountain destinations, the product is expected to adapt to new conditions. It will also depend on the skier behavior and also on their willingness to accept subsidiary products such as skiing halls. Their construction does not depend on the climate of the destinations but is strongly dependent on the available financial resources and high level of energy consumption.

Compared to today's temperatures, travel destinations will face a serious problem if global warming raises the temperature only by 2 °C. Mountain areas will be characterized by extreme weather fluctuations, facing a 60 % loss of summer Arctic ice, a 25 % decrease in ocean ice, the loss of some plant and animal species, not least inconvenience, a drop in demand, and even overcrowding and environmental damage in less vulnerable regions (Stern, 2006, UNWTO, 2007, Moreno, 2010, Grimm et al., 2013, IPCC, 2013, PBMC, 2014, In Grimm, Alcântara and Sampaio, 2018: 6). At the same time, it can be expected that the average temperature will rise by more than 2 °C, what will cause even greater damage.

The IPCC (Masson-Delmotte et al. 2018: 4) found that between years 2006 and 2015, Earth´s surface temperature was 0,87 °C higher than the temperature between years 1850 and 1900, and the current global temperature is rising at 0,2 °C per decade. The IPCC also predicts a 1,5 °C increase in temperature between years 2030 and 2052. It is clear that human activities have a significant impact on global warming, and rising temperatures can be expected to change life on Earth as early as this century. The impact of climate change on the mountain environment varies, depending on the change in temperature during the day, altitude, and season (Hock et al., 2019: 137-138). This statement is based on the observations of several authors.

Table 1 Variations of climate change impacts in mountain areas

Warming	
- Summer and spring	- European Alps (Auer et al., 2007, Ceppi et al., 2012) - At lower elevation in Italy (Tudoroiu et al., 2016)
- Winter	- Tibetan Plateau (Liu et al., 2009, You et al., 2010) - Tibetan Plateau at maximum 4000m above sea level (Qin et al., 2009, Gao et al., 2018) - In Southern Himalaya at lower elevation (Nepal, 2016)
Risky elevation of mountain areas	- 500m above sea level (Wang et al., 2016, Qixiang et al., 2018)
Projections of rain and snowfall	
- Summer monsoon	- Himalayan-Tibetan Plateau (Panday et al., 2015, Sanjay et al., 2017)
- Winter	- European Alps (Rajczak and Schär, 2017)
Expected extreme precipitation	- Will decrease at lower elevation and increase at higher elevation (Kapnick and Delworth, 2013, O´Gorman, 2014)

Source: Hock et al., 2019: 137-139.

Table 1 shows possible differences in the impact of climate change and global warming on selected mountain destinations. While European mountains experience the results of warming especially during spring and summer, Central Asian mountains experience it during winter. Extreme rainfall is expected in the Asian mountains especially in the summer due to the monsoon season. On the contrary, Europe will experience strong fluctuations and extreme snowfall in winter, but only at higher altitudes. In general, the lower mountains are and will be more vulnerable to climate change, both in Europe and in the world.

1.2.2. Implications of climate change on mountain destinations

There are many impacts of climate change on the mountain destinations, among the most visible are warmer winters, melting permafrost, heavy rains, weather fluctuations or heat waves. Cavallaro et al. (2016: 4) consider the reduction of infrastructure maintenance costs to be a positive effect of warmer winters, but changes in climatic conditions also have negative effects such as weakening slope stability, falling trees and vegetation disturbance, filling soil water capacity as well as increasing spending associated with mountain facilities. Rutty et al. (2017: 199) investigated that an anomalously warm winter in a mountain region causes significantly lower number of cable cars to be in operation, several times more water used for artificial snow, shortening of the winter season due to the rapid melting of

snow cover, deteriorating slope quality, and increasing the costs of snow equipment for slopes. The production of artificial snow is demanding on the consumption of energy and water, causes environmental damages and the temperature needed to obtain artificial snow is currently - 2 °C (Abegg, 2007: 46). Problems with artificial snow and maintenance of slopes during mild winters can also be caused by degradation and thawing of permafrost, and increased water flow in the slopes, as the ground is weakened by these influences and can move (Hock et al., 2019: 158).

Reaching a negative temperature can be a problem for a mountain destinations, especially at the beginning of the winter season, and this can cause complications with the preparation of the slopes. Due to warmer winters, the production of artificial snow is more expensive too because destinations have more days to provide enough artificial snow for (Abegg, 2007: 46, Steiger and Scott 2020: 6, Rutty et al. 2017: 199). Another problem in artificial snow making is described by authors Damm, Köberl, & Prettenthaler (2014: 14). They claim, that despite the reduction in the number of snowmaking days due to the shortening of the season, the costs of production of artificial snow are rising, mainly due to the constant rise in the price of electricity. As the costs of preparing the slopes increase, so do prices, and the sales of ski passes could eventually decrease. The decline in ski pass sales is affected by climate change too. As noted by Demiroglu, Kučerová and Ozcelebi (2015: 8), under ceteris paribus conditions, a 1 % decrease in snow depth and visibility would disrupt ski pass sales by 1,2 % and a 1 °C increase in average temperature would result in a 6 % loss in ski pass sales. In the long run, the number of visitors in ski resorts is likely to fall precisely due to the decrease in snow depths (Damm, Köberl, & Prettenthaler, 2014: 14-16). This can be challenging for many ski resorts.

As a result of the warm winter, the quality of the terrain deteriorates, what causes a concentration of ski tourism in destinations with plenty of slopes. (Rutty et al. 2017: 201). The preference of visiting a larger and well-known winter destinations may discourage visitors from the visit due to crowded slopes or long lines. According to Steiger and Scott (2020: 6), the declining number of overnight stays as well as the increased number of tourists driving to destinations to ski have also a negative impact on the environment. This is mainly due to the fact that with a shorter length of stay, the mobility of visitors increases, as visitors can visit several mountain destinations during one holiday. Lack of snow creates uncertainty for tourists who do not book a longer holiday (Steiger and Scott, 2020: 6), and thus weakens the winter season. Lack

of snow can also discourage those visitors whose visit to selected mountain destinations is a tradition. Forecasts for the coming decades are not positive, and therefore it is already time to change the attitude of mountain destinations in the world.

Abegg. et al. (2007: 28-29) found that if half of the slopes are located above 1 500 m above sea level, in ski destinations natural snow can be expected from this level, regardless of global warming or climate change. As seen in the table 2, if the temperature increases by one °C, the line of natural snow is shifted to 1 650 m above sea level, if the temperature increases by 2 °C, the line of natural snow is shifted to 1 800 m above sea level and if the temperature rises by 4 °C, the confidence line of natural snow is shifted to 2 100 m above sea level.

Table 2 Natural snow reliability in mountain destinations

	Under present climate conditions	Warming by + 1 °C	Warming by + 2 °C	Warming by + 4 °C
Altitude in m for natural snow-reliability	1050	1200	1350	1650
	1200	1350	1500	1800
	1500	1650	1800	2100

Source: Abegg et al. (2007: 28-29).

It means very little probability of natural snow cover by increased temperature of 4 °C in the future at the altitude under 1 500 m above sea level. Of course, the conditions in the Alps are not the same as the conditions in the Carpathians or anywhere in the world, but it can be expected that a similar scenario awaits most of the mountain destinations. The number of destinations in which it will be possible to expect natural snow cover in the event of a significant increase in temperature will decrease extremely, as for instance in Slovakia most of mountain destinations are located at a lower altitude. Therefore, it is crucial in which direction mountain destinations are heading and what they are doing in the challenge of climate change.

1.2.3. Innovations related to climate change in mountain tourism destinations

Effective assessment of the challenges posed by climate change, as well as their solution, is successful if in the mountain destination several stakeholders, management and cross-sectoral companies work together on them, while it is important to encourage both economic and environmental sustainability. (Cavallaro et al., 2016: 17). However, the authors do not take into the account the social

sustainability. In spite of the fact, that mountain destinations mainly at the high altitude are not usually settled, the tourism offers job opportunities for many locals living in rural areas and small cities under mountains. Innovations in mountain destinations should be focused on environmental protection, economic security of residents and improving the quality of life and should be in harmony with sustainable principles (Lencsésová 2015: 32-33). Innovative solutions to mitigate climate change often come from destination management, but innovations can also be successfully implemented by specific companies. Mitigating climate change brings companies various benefits such as cost reduction, energy savings and a competitive advantage in the tourism market (Scott, Becken, 2010: 289).

Innovations are generally understood as the introduction of new, better products or processes on the market (Gajdošíková, 2017: 11). When implementing innovations, it is necessary to respect the phase of the life cycle of companies or the destination, because properly implemented innovations can increase the demand of visitors. If businesses or destinations are doing well, it is not necessary to introduce innovations, as they could cause excessive interest to visitors, while innovations can be implemented when new products are introduced or when visitors' interest decreases. It is important to distinguish what types of innovation are needed for an organization. According to the Oslo Manual, innovations are divided into technological and non-technological, while technological are product and process innovations and non-technological are marketing and organizational innovations (Gajdošíková, 2017: 13). She further states that, in addition to the above-mentioned innovations, it is also necessary to introduce institutional innovations too, what according to Hjalager (2010, in Gajdošíková, 2017: 16), together cover tourism innovations.

Lencsésová (2015: 34) considers non-technological innovations to have a positive effect on sustainability and not on increasing the capacity of a mountain destination. Mountain destinations and businesses affected by climate change should apply this type of innovations in particular. Such types of innovation include, product innovation, potentially in the form of summer thematic activities, price, communication, or distribution innovation (Lencsésová (2015: 39). Price innovation means the creation of a package, communication innovation connects visitors to the destination with digital technologies and social networks, and distribution innovation can ensure the sale of the packages online. It can be concluded that product

innovations are most effective in mitigating the effects of climate change, and such innovations should be implemented regardless of the phase of the destination's life cycle.

Innovations in mountain destinations, especially in the Alps, are often the result of ad hoc solutions that require courage and a willingness to take risk (Innerhofer and Pechlaner, 2016: 167). The implementation of innovations without a long-term research is conditioned by the success of Alpine destinations as well as the ability to respond to changes with innovations similar to the competition. Tourism innovations are not as radical as in other sectors of the economy, so an alternative to innovations for tourism companies is imitation, but in the long term, flexibility and adaptation to specific conditions is required (Innerhofer and Pechlaner, 2016: 167).

The authors have a different opinion on the possibilities of innovation in mountain destinations. These include the shift of the winter season, the maintenance of the slopes, the production of artificial snow, investment in other winter activities, the focus on the non-sunny sides of the slopes, the relocation of the destinations to regions at higher altitude, as well as the focus on providing summer tourism products. As noted by Demiroglu, Kučerová, and Ozcelebi (2015: 8), the shift of the season may not have a positive effect on ski destinations, because during the spring people tend to prefer other activities due to the warm weather in the place of residence. Proper preparation of slopes is a prerequisite for securing snow cover. According to Abegg (2007: 37), wind protected slopes could have about 15 days more snow, shaded slopes could have 30 days more snow than other ski destinations, and daily maintenance and clean snow increases the number of days with snow cover by 7, as the snow´s albedo increases. The key is therefore to position the slopes correctly.

Interest in visiting mountain destinations is still rising, competition is growing, and therefore the production of artificial snow is still a key strategy for adapting to rising temperatures (Rixen et al., 2011: 229). The production of artificial snow can attract visitors and thus fulfill the goal of technological innovation. In order for an aforementioned innovation to be sustainable, it is necessary to consider its impact on the environment and thus change the way in which artificial snow is produced. To make artificial snow production an effective innovation, important steps to mitigate climate change are energy and water consumption reduction (Rixen et al., 2011: 235). After considering the conditions affected by climate change, some authors agree that destinations should invest in the development of winter tourism, but not for typical

winter sports activities (Bausch, Gartner 2020: 6-7, Bonzanigo et al. 2016: 11). But Steiger et al. (2020: 8) found that visitors coming to ski resorts for skiing cannot be offered an alternative non-ski product, as they prefer destinations with favorable conditions for skiing. This view is shared by Steiger and Scott (2020: 8) too, who suggest that climate change mitigation could also lead to investment in artificial snow production facilities, relocation to higher located areas or relocation to less vulnerable regions. At this point, it is important to think about whether there are enough suitable alternatives and whether they are less vulnerable, as it is clear that higher hills require more intervention, consume more energy and are therefore less sustainable. The same opinion is shared by Demiroglu, Kučerová, and Ozcelebi (2015: 9), who add, relocating ski destinations to places at higher altitude is a costly process and can have serious environmental consequences because these ecosystems are fragile. Nevertheless, Abegg (2007: 38-39) in addition to the building of mountain destinations at higher altitude, recommends development of ski tourism on a glacier and facing north. According to him, the disadvantage of mountain destinations at higher altitude may be the lack of sunny slopes preferred by visitors, a higher amount of precipitation and financial demands. Rixen et al. (2011: 235) also recommend drawing attention to the strong part of the region to ensure quality winter as well as summer seasons in mountain destinations. However, it is important to maintain tourism in the mountain regions through other activities even though they cannot satisfy the number of skiers because of lack of snow, and thus support the society economically. Botanist Šibík sees the success of ski resorts in the sustainability in the future. According to him, the move to higher areas, as well as the offer of alternative attractions such as skis on wheels or scooters, are activities that accelerate climate change and are not in line with sustainable principles. He therefore proposes to focus the activities of small entrepreneurs in mountain destinations on the development of soft, eco-based tourism with an emphasis on traditions and cooperation throughout the region (in Gdovinová, 2021).

As the name suggests, soft tourism is an alternative to mass tourism and consumption. Soft tourism means traveling of individuals, families, or friends for a longer period, by alternative means of transport, with the aim of being active, respecting the environment as well as culture, not making noise and prioritizing experiences over buying souvenirs (Jungk, 1980, in Kagermeier, 2016: 170). Thus, soft tourism is essential for the mountain environment.

Damm, Köberl, & Prettenthaler (2014: 18) propose specific solutions for the future of mountain tourism, focusing on wellness tourism and hiking or attracting visitors even out of season. As the winter season is negatively affected by climate change, investing in the summer season (Steiger 2006: 55, UNWTO and UNEP, 2008: 7) and product diversification (Demiroglu, Kučerová, and Ozcelebi 2015: 9) can be an opportunity for today´s ski destinations. Such a strategy requires the support of all stakeholders because the vigorous product diversification has to sufficiently replace skiing and other winter sports in mountain destinations. Product diversification can be a challenge for plenty of destinations or businesses. Zehrer (2019: 27) considers family businesses to be open to innovative solutions due to their customer orientation, compared to other companies. It is therefore interesting to see how large destinations, as opposed to small family ones, are prepared to implement innovations to mitigate the effects of climate change.

Sustainable innovation in the mountains should lead to lower production of harmful gases, energy, and waste. Low-carbon activities in the tourism sector support the quality of life of local residents, reduce negative impacts on the environment and increase people's awareness of the environment (Grimm, 2016, In Grimm, Alcântara and Sampaio, 2018: 15-16). The author also points out the main areas of how to become a low-carbon industry. Tourism organizations should measure produced greenhouse gas emissions and commit to reduce it, cooperate, raise the awareness, train, inform, and promote other stakeholders and scientific events related to the low carbon economy.

An efficient project to reduce the energy costs and at the same time to protect the environment is the Italian concept of climate-houses. The agency provides certificates to its customers from 2002 and was established in order to meet the mandatory energy certification of buildings in South Tyrol. The conditions of climate-houses are reduced energy consumption for heating up to 50 kWh/m²a, the use of harmless building materials and the consumption of renewable energy. Climate-houses should also have installed a photovoltaic system or solar panels. In addition, climate-houses use rainwater or have green roof (www.agenziacasaclima.it, 2021). Climate-houses are expanding into international environment as energy consumption reduction and environment awareness are getting important. There are other projects and certifications in the world, especially in tourism sector, that think ecologically. Due to the focus of the master thesis, it does not deal with them further.

Table 3 Climate change and global warming adaptation strategies for mountain destinations

Strategy	Activity
Maintain ski tourism	- Artificial snowmaking - Development of higher terrain - Ski slope design - Cooperation
Subsidies	- Annual contributions - Single contribution
Alternatives to skiing	- Non-snow related activities - All-year tourism
Fatalism	- Business as usual - Cancel ski tourism

Source: Bürki, Elsasser and Abegg, 2003: 7.

The above-mentioned possible innovations to mitigate the effects of climate change and maintain business in mountain destinations can be divided into several groups of strategies. As can be seen in table 3, adaptation strategies for climate change and global warming are divided into: maintain ski tourism, obtain subsidies, provide winter sports alternatives, and lean towards fatal solutions. It can be stated that maintaining economically profitable ski tourism is challenging, because it depends on favorable weather conditions, requires cooperation and is not a solution for low-lying mountain destinations. Successful adaptation to the conditions created by climate change in mountain destinations should also come from the cooperation of all stakeholders, from the public sector to visitors (Polderman et al. 2020: 6). As it can be seen from table 3, the production of artificial snow and the development of higher terrain is a way of maintaining ski tourism. However, authors do not consider the impact of these activities on the environment. As they are economically and ecologically demanding processes, they can only be beneficial if they are environmentally friendly. Subsidies can be used for any activity of mentioned strategies, but they are obtained under strict conditions and are only a temporary solution. Other, than winter sport activities requiring snow, are an interesting solution for many to spend their free time in mountain destinations, but it is clear that skiers cannot be fully satisfied. In the worst-case scenario, mountain destinations that expect to be unaffected by climate change and do not take any of the adaptation actions are doomed to closure of the business.

It is extremely difficult to take a stand and choose a possible strategy to adapt to the effects of the climate crisis. To this day, however, most destinations, if they are still able to provide services, decide on the basis of the requirements of visitors, skiers

and other people doing winter sports, at the expense of pollution, deforestation, and support for climate change.

1.3. Research methodology

Subject of the master thesis are the impacts of climate change on entrepreneurship in mountain tourism destinations. Object of the master thesis is selected mountain destination and selected tourism enterprises in the destination, while the criterion of an altitude of more than 1 800 m above sea level is met. The researched mountain destination Val Gardena is located in the Dolomites, Italy.

The aim of the master thesis is to find out how tourism enterprises in mountain destination in Val Gardena adapt to the changing climate and how they try to prevent problems related to climate change. To achieve the aim of the master thesis three partial aims are formulated. The first partial objective is to identify climatic conditions in selected mountain destination abroad (2.1). The second partial objective is to analyse the impacts of climate change on selected mountain destination and enterprises (2.2). The third partial objective is to find out what steps are these companies taking to mitigate climate change (2.3). To achieve partial objectives of the master thesis following research questions are formulated:

RQ1: How has climate changed in selected mountain destination in last 40 years and what is the trend of these changes in the future?

RQ2: What problems do enterprises and selected mountain destination face due to climate change?

RQ3: To what extent do companies operating in selected mountain destination prevent the impact of climate change?

RQ4: What steps are enterprises and the destination undertaking to mitigate the impact on climate through established innovations?

RQ5: Who is the leader in innovations related to climate change in mountain destination?

The master thesis is conducted by theoretical and empirical research, while in the first chapter the theoretical research is used, in the second- and third-chapter empirical research is used. Secondary data elaborated in the first chapter are obtained from online articles in scientific journals, domestic and foreign literature in printed and electronic form. Secondary data are used in the analytical part of the master thesis

too. These are mainly quantitative data on the climate received from meteoblue.com during the winter seasons in the period between 1980 to 2020 and business performances in the destination. Primary data of the second analytical chapter are retrieved from the interview with the marketing communication manager of Val Gardena tourism association Christina Demetz. Questions asked in the interview are available in appendix 1 in German. An important part of the second analytical chapter are processed answers of tourism enterprises questionnaires collected by e-mail. Methods used in the master thesis will be analysis, comparison, deduction, induction, and generalization. From statistical methods correlation, detection of statistically significant differences and questionnaire evaluation method will be used.

The basic set consists of tourism enterprises in Val Gardena in the number of 981 accommodation facilities, 174 restaurants and other gastronomic facilities and 1 ski lift operator Dolomiti Superski. The sample is determined by the available selection of 487 companies. In addition, the sample consists of tourism association´s marketing communication manager Christina Demetz, with who a semi-structured interview will be conducted. The obtained primary data from the questionnaires as well as climatic data will be sorted and processed in Microsoft Excel and SPSS. Using the Pearson test, the dependence between the individual numerical data will be analyzed. If the p-vaue is less than 0,05, there is a dependence between the characters.

The dependence between the numerical data will be determined by Pearson test, which is calculated as:

$$r = \frac{\mathrm{cov}(x,y)}{s_x \cdot s_y}, \qquad r \in \langle -1,1 \rangle$$

where *r* is Pearson correlation coefficient, *cov* is covariance between variables X and Y, s_x is standard deviation of X, s_y is standard deviation of Y. The Pearson correlation coefficient can take on negative values when the dependence is indirect, and positive values when the dependence is direct. The closer the coefficient is to 1, the greater the dependence between the variables (Zaiontz, 2021).

The following winter climate data will be examined in selected mountain destination, in particular temperature, humidity, amount of snow, wind speed, soil temperature, cloud cover and sunny minutes. The performance of companies will be compared with the given climatic conditions. The performance of the companies can be found from the following data, and thus the number of visitors, the number of overnight stays, the average number of overnight stays, and the number of transported

passengers. Obtained data will help to clarify whether there is a relationship between climate conditions and tourism performance of businesses in the mountain destination.

A comparison of Slovak and foreign mountain destinations should have contributed to the fulfillment of the aim of the master thesis. As the business model predominates in the mountain destinations of the High and Low Tatras and the community model predominates in the mountain destination Val Gardena, the research results would significantly enrich the understanding of the impact of climate change on entrepreneurship in individual mountain areas and the adaptation of tourism businesses to the changing environment. Due to the lack of available tourism data from mountain destinations in Slovakia, the research will be conducted only on a foreign destination. Slovak and foreign data are not comparable, because in Slovakia, data are reported for districts, and specific data from mountain destinations are not separately published.

2. THE IMPACT OF CLIMATE CHANGE ON BUSINESSES IN MOUNTAIN DESTINATION VAL GARDENA

The South Tyrol region is located in the northern Italy and is popular for summer and winter sport activities. It is considered to be competitive due to its strategic location, diverse primary and secondary offer, level of development of tourism facilities and quality of provided services during summer as well as winter season. Cavallaro et al. (2016: 10) consider South Tyrol to be one of the most competitive destinations in Italy and assume winter season to be weaker than summer season due to some limitations. Due to the level of development of ski destinations in Italy, especially in the Dolomites, and the increasing number of visitors, this statement cannot be accepted. One of the most interesting mountain destinations in Italy are located in Dolomites. For mountain destinations in Dolomites a higher altitude is specific. It can be assumed that the effects of climate change will not be significant in this region at present. However, it can be assumed that some of the effects of the climate change can already be seen here, and that companies and destinations themselves are taking some steps to prevent these effects. The second chapter of the master thesis therefore deals with the issue of climate change in specific mountain destination Val Gardena in Dolomites. The first subchapter contains the characteristics of winter season in a selected mountain destination, the second subchapter contains an analysis of climate data from 1980 to 2020 and the third subchapter examines the impact of climate change on businesses in the selected destination.

2.1. Characteristics of mountain tourism destination Val Gardena

Italian mountain destination Val Gardena is located in the autonomous province South Tyrol. The lowest point of the valley is at 470 m above sea level and the highest point, the summit of Sassolungo, is at 3 181 m above sea level (www.valgardena.it, 2021). The valley is surrounded by mountain peaks such as the Sassolungo group, the Sella massif, and peaks in the Puez Geisler Natural Park. In the valley there are three villages, Selva, Santa Cristina, and Ortisei. Selva has a population of 2 587, Santa Cristina is the smallest village with 2 015 inhabitants and Ortisei is the largest village with 6 165 inhabitants (Urlaubsfibel, Dolomites Val

Gardena, 2021:6-8). People of Val Gardena are known for carving wooden figures. The woodcarving in Val Gardena dates back to the 17th century, when the locals began carving the first sacral figures and altars (Mussner, 2012: 291). This tradition has been preserved in Val Gardena to this day. Handicrafts, among them are carved figures too, are one of the main components of the whole South Tyrolean economy (Lechner, Moroder, 2012: 18). Woodcarving makes the mountain destination Val Gardena even more unique. Visitors can buy wooden figures as a souvenir or visit one of exhibition venues. Permanent exhibitions can be seen in the Vijion art gallery, Kulturhaus or Gherdëina museum (www.val-gardena.net, 2021).

In addition to handicrafts, Val Gardena's tourism product is completed by traditions such as wearing Dirndl alpine folk costumes, using of ancient Ladin language, preserving customs, and the fact that the Dolomites have been a UNESCO World Heritage Site since 2009. International sports and cultural events take place regularly at the destination. During the summer season, there is a Saslong half marathon, Hero mountain bike event, Sellaronda bike day, Val Gardena folklore festival, cultural event Unika, MTB trail hunt Val Gardena, or car event ECOdolomites Val Gardena. For the winter season are characteristic Christmas valleys during Advent time, FIS Ski World Cup, Dolomites dirndl ski day, Dolomites Val Gardena - Xtreme Up, and music event Rock the Dolomites (www.valgardena.it, 2021). Destinations' product is therefore a complex tourism product in both winter and summer season. Year-round business or off-season openings are not typical for Val Gardena's tourism businesses but can be found here as well. In 2018, 48 % of visitors visited Val Gardena in summer and 52 % of visitors in winter season (Pitscheider, 2018). This trend continues, as last year, 55 % of overnight stays was in winter and 45 % in summer (Demetz, 2021). She also states that winter season is for Val Gardena more profitable and is not as harmful for the environment as it seems.

The mountain destination Val Gardena is well accessible for visitors. One can get there by car from Bolzano, Bressanone, or via mountain passes Gardena or Sella. It is possible to use air transport to Innsbruck, Verona, or Bergamo. The nearest train station Waidbruck is located 15 km from Val Gardena. There are regular bus lines in the destination, for visitors with the Val Gardena Mobil Card buses are free of charge during the holiday, as well as train rides, even throughout the province (www.valgardena.it, 2021). Provision of the card to visitors supports public transport in the region and helps to reduce emissions from cars. However, a functioning

network of public transport lines must be a prerequisite. In addition, taxi or shuttle bus services are available for visitors too. Accommodation facilities provide shuttle bus services to visitors in order to facilitate transport to the cable cars especially in the winter season. Overall, the use of public transport or hotel minibuses minimizes the mobility of visitors by cars, what frees up space on roads and parking lots as well as protects the environment. The Val Gardena Mobil Card also encourages visitors to visit even more distant attractions without using a car. At regional level, it is an effective tool for mitigating the environmental impact of tourism transport.

From the collection of email contacts of company owners to send questionnaires to, it is clear that many of them are family businesses, as about half of the surveyed businesses have the name of the family running the business available on internet (appendix 2). According to Lechner and Moroder (2012: 18), such a division of enterprises is typical for tourism businesses in South Tyrol because they "are decentralized and widely dispersed".

Table 4 Accommodation facilities in Val Gardena in the winter season 2019/2020

Type of enterprise	Categories	Enterprises	Beds
Hospitality facilities	4-5 Stars	61	4 146
	3 Stars	140	5 054
	1-2 Stars	63	1 379
	Residence	84	2 187
	Total	348	12 766
Non-hospitality facilities	Private accommodation	567	4 633
	Farm holiday accommodation	35	296
	Other	31	439
	Total	633	5 368
Total		981	18 134

Source: www.qlikview.services.siag.it, 2021.

In the winter season 2019/2020 there were 1 155 tourism facilities, of which 981 were accommodation and 174 were dining establishments. Dining establishments in Val Gardena include restaurants, pizzerias, cottages, bars, cafes, bistros, patisseries, and après ski (Urlaubsfibel, Dolomites Val Gardena, 2021: 61-72). Some of them operate as separate businesses, some are part of accommodation facilities, but even here family ownership predominates. As it can be seen in the table 4, most of hospitality facilities are 3 stars hotels (14,3 %) and residences (8,6 %), but most of the accommodation consists of private accommodation what belongs to non-hospitality facilities (57,8 %). There were 18 134 beds in Val Gardena during the winter season

2019/2020, 70,4 % of them are in hospitality facilities and 29,6 % of them are in non-hospitality facilities.

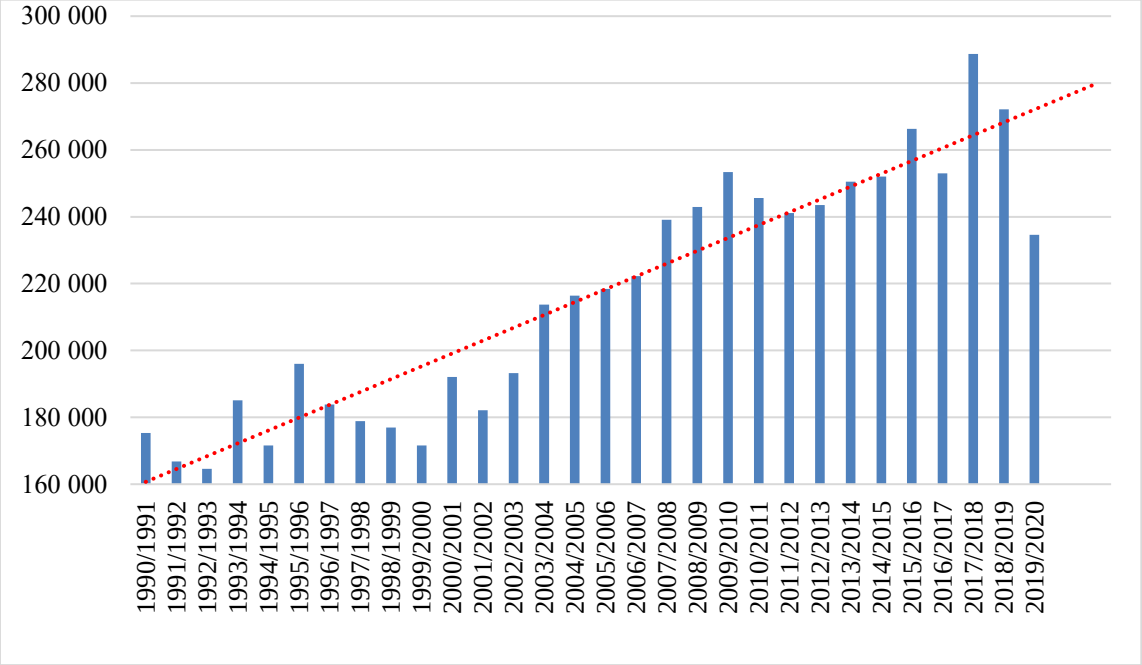
Despite the slow increase in the number of enterprises over the last decade, overall, the number of accommodation establishments has had and will continue to have a slightly declining trend (appendix 3). In the winter season 1990/1991, 1 112 companies operated in Val Gardena. During following 4 winter seasons, the number of businesses averaged 1 056. Later, this number decreased to 908 companies in the 1999/2000 season, but since then there has been stabilization and even an increase in the number of companies. In addition, it has not been possible to build new hotel buildings in Val Gardena for 20 years, because quality is preferred over quantity (Demetz, 2021). The number of beds in accommodation establishments decreased slightly from the 1990/1991 season (17 436 beds) to the 1999/2000 season (16 208 beds) but has been on an upward trend since then (appendix 4). It is therefore clear that the existing businesses in Val Gardena have adapted over the years to increasing the number of visitors and have innovated in order to increase their accommodation capacity. This can also be seen on the occupancy indicator. While in the 1990/1991 winter season the capacity utilization was 45,47 %, in the last decade, apart from the pandemic-hit winter season 2019/2020, the average use of accommodation capacity was 55,83 % (appendix 3). The use of accommodation capacity was calculated as:

$$U_{ac} = \frac{N_{os} \cdot 100}{N_{bd}}, \qquad N_{bd} = N_b * d$$

where U_{ac} is use of accommodation capacity, N_{os} is number of overnight stays, N_{bd} is number of bed days. In order to be able to calculate the use of accommodation capacity, the number of bed days was calculated first. The number of bed days was calculated as the number of beds (N_b) times the number of days (d) in operation (Gúčik – Šebová – Bajaník, 2015: 175). As the winter season begins at the end of November and ends approximately in the middle of April, number of days in operation is 142, for leap years it is 143 days.

The seasonal number of arrivals in Val Gardena is available from winter 1990/1991 to 2019/2020. According to ASTAT during the first dated season 175 350 visitors visited the destination. During the first ten years, the number of visitors fluctuated and since the 2002/2003 season started to increase rapidly. Further reduction in the number of visitors can be seen in the 2010/2011 season as well as a

year later, in the 2016/2017 season and in the 2019/2020 season, which was strongly affected by the pandemic (appendix 6).



Graph 1 Visit rate in destination Val Gardena during last 30 winter seasons
Source: www.qlikview.services.siag.it, 2021.

Despite the unfavorable last season conditions, the destination was visited by almost 235 thousand visitors. As it can be seen from the graph 1, the growing trend in the number of visitors should continue in the following years as well. It can also be seen that some seasons were extremely visited compared to others and on the contrary, during some winter seasons, the visit rate decreased disproportionately. It will therefore be interesting to compare whether climatic conditions have an impact on destination visit rate.

The average distribution of visitors' nationalities can be seen in appendix 6. In the observed period, most of visitors came to Val Gardena from Italy (47,1 %) and Germany (25,67 %). Other nationalities monitored by the State Institute for Statistics ASTAT, came to Val Gardena from the Benelux countries (7,67 %), Austria (2,14 %), and Switzerland combined with Liechtenstein (1,57 %). Interestingly, other countries account for 15,84 %. To specify the number of other countries arrivals, data from destination management organization IDM Südtirol - Alto Adige were examined. From available data it is clear that during the last complete winter season (2018/2019) the nationality of visitors was, in addition to the aforementioned, as follows, Dutch

7,8 %, Russian 3,6 %, British 3,4 %, Polish 2 %, Czech 2 %, and Swedish 1,7 %. Slovaks visited the destination Val Gardena in the ratio of 0,5 % of all visitors (Pitscheider, 2021). The number of visitors by the nationality does not differ much according to the municipalities, but as it can be seen, Selva is the most visited village, because the number of people coming here in winter is on average 51,54 %. 14,72 % of visitors stay in Santa Cristina and 33,74 % in Ortisei (appendix 7).

As can be seen from appendix 8 and 9, the number of overnight stays approximately copies the number of visitors. As the number of arrivals increases, so does the number of overnight stays. While in the 1990/1991 season the number of overnight stays totaled more than 1 125 thousand, in recent years the number of overnight stays has even been 1 400 thousand. The exception is the winter season 2019/2020, the number of overnight stays due to the pandemic was 1 246 thousand. The number of overnight stays by village is on average 53,11 % in Selva, 14,55 % in Santa Cristina and 32,34 % in Ortisei (appendix 10). It is therefore clear that visitors stay in Selva a little longer than in other villages. The reason may be the direct location on the slopes of Sella Ronda. However, it is interesting that the average number of overnight stays of visitors is gradually shortened by the winter seasons. Average number of overnight stays is calculated as:

$$A_{os} = \frac{O_s}{A}$$

where *Aos* means average number of overnight stays, *Os* means overnight stays and *A* means arrivals (Gúčik – Šebová – Bajaník, 2015: 175). When looking at the average number of overnight stays by nationality, it can be seen that in the last 30 winter seasons, the longest time in Val Gardena remained Benelux countries and other countries (both groups remained on average 6,8 nights). This may be because there are included more distant countries, whose inhabitants may prefer a longer stay, as well as stays of travel agency customers who buy weekly packages. On the other hand, Italians remained the shortest time in the destination, their stay for the observed period is on average 5,3 nights, similarly to neighboring Austrians (5,7 nights). Looking at the average number of overnight stays, there are not large differences according to the visited village, but visitors spend the longest stay in Selva (on average 6,1 nights). However, the disadvantage for the destination is the declining average number of overnight stays every year, albeit with small deviations. While in the winter season 1990/1991 average number of overnight stays was 6,4 nights, in the

winter season 2019/2020 it was only 5,3 nights (appendix 11). The average number of overnight stays of visitors can be in the future further shortened, because trends as weekend skiing, or visiting several ski destinations for one holiday are becoming popular. Another factor may be unfavorable climatic conditions. However, as this indicator decreases gradually without significant changes, it is unlikely to be affected by climatic factors.

Skiing began in Val Gardena at the end of the 19th century however it was not about leisure activities for visitors, but about facilitating the transport of locals. The beginning of winter sports in Val Gardena dates back to 1908, when the first ski club Ladinia was founded. The winter season as such began in the 1930s, when the first cable cars were built. However, the destination has started to develop rapidly since the World Ski Championships in 1970 (Mussner, 2012: 265). The destination has been on the market for several generations and has competitive advantage because of this. In addition to skiing on slopes and in fun parks, there are several cross-country trails available. Cross-country skiing is possible in Monte Pana, Vallunga (Selva), Panider Sattel (Ortisei) and Alpe di Siusi. Other sports activities carried out in the Val Gardena winter season include sledding, winter hiking and horse riding (Urlaubsfibel, Dolomites Val Gardena, 2021:40-49).

Val Gardena is one of the most important winter ski resorts in a complex of 12 ski resorts in Dolomites, as it lies directly on Sellaronda. Sellaronda is a 40 km skitour connecting 4 mountain destinations of Val Gardena, Val di Fassa, Arabba and Alta Badia. Sellaronda enables skiers to ski around the massif Sella and it is possible to ski from both directions. The Val Gardena ski area, together with the lower part, the Alpe di Siusi, offers visitors 175 km of easy, medium, and difficult slopes and enables transport at 80 cable cars. Most of cable cars and lifts are open daily from 8:30 to 17:00 approximately from the beginning of December till Easter, what is usually around mid-April. In addition, the destination is connected to all the other ski destinations in Dolomites. A total of 1 200 km of slopes and 1 177 km of cross-country trails are available to visitors (www.dolomitisuperski.com, 2021).

Ski passes can be bought for Val Gardena / Alpe di Siusi or for the whole Dolomites. Skiers may buy ½ day, 1-day, multiple days, or seasonal ticket. There is a possibility to get discount for juniors born after 28.11.2004 and seniors born before 28.11.1955 (www.valgardena.it, 2021). As it can be seen from the table 5, there is not a great difference in the price for 175 and 1 200 km ski opportunities. The price of the

ski pass also depends on the season. However, a maximum price for skiing for an adult in Val Gardena in the 2020/2021 ski season is € 59 and price for Dolomiti Superski ski pass is € 64. It is assumed, the Dolomiti Superski ski pass enables visitors greater skiing experience and is affordable. The purchase of multi-day ski passes is expected as well, as there are many ski opportunities and skiing in more destinations in Dolomites requires mobility.

Table 5 Prices of a one-day ski pass in the winter season 2020/2021 in €

Season / **Ski area**			**Val Gardena Alpe di Siusi**	**Dolomiti Superski**
Opening season	28.11.2020 - 19.12.2020	Adult Junior Senior	47 33 42	51 36 46
Season	10.01.2021 - 30.01.2021 21.03.2021 - 11.04.2021	Adult Junior Senior	53 37 48	58 41 52
High season	20.12.2020 - 09.01.2021 31.01.2021 - 20.03.2021	Adult Junior Senior	59 41 53	64 45 58

Source: www.valgardena.it, 2021.

Table 5 further shows how the ski season is divided. The peak season is during Christmas and starts again from carnival until almost the end of March. The cheapest time to ski is from the beginning of winter season to Christmas. In this time, little amount of snow can be expected. On the other hand, there are fewer visitors in the destination and therefore skiing is comfortable. Suitable conditions for winter sports can be expected in January as well as in the time from end of March to end of season. However, at the end of ski season warmer weather and thus worse conditions for preparing of artificial snow can be expected. On the other hand, it is the last possibility to ski and the climatic conditions may be satisfactory due to the altitude. As can be seen from the prices of both types of ski passes, winter sports in December are cheaper than at the end of the season, because it is assumed that in December the skiing conditions will not be as suitable as in other months.

Table 6 Data on passengers transported by cable cars

Indicator / Season	Transported passengers / Val Gardena	Degree of utilization in %	Transported passengers / South Tyrol	Proportion of transported passengers in %
2007/2008	32 529 727	-	126 451 465	25,73
2008/2009	33 500 849	-	128 609 159	26,05
2009/2010	33 459 859	16,50	129 741 711	25,79
2010/2011	32 966 316	29,80	127 614 631	25,83
2011/2012	30 683 654	28,30	120 887 187	25,38
2012/2013	31 427 515	29,30	123 887 187	25,37
2013/2014	31 630 019	-	120 916 408	26,16
2014/2015	31 749 199	-	120 768 953	26,29
2015/2016	33 532 469	30,80	126 837 616	26,44
2016/2017	31 722 754	28,40	123 026 968	25,79
2017/2018	35 821 877	30,00	132 925 002	26,95
2018/2019	36 425 087	27,95	134 430 085	27,10
2019/2020	-	-	-	-

Source: www.astat.provinz.bz.it, 2021.

From the available data from winter season 2007/2008, it can be seen that seasonally approximately 33 million passengers are transported by cable cars in Val Gardena. The capacities of the cable cars are utilized to 30 %. However, the 2009/2010 season is interesting, as the capacities of the cable cars were utilized just to 16,5 %. It can also be seen that Val Gardena is an important part of the region in passenger transport, as it seasonally transports approximately 26 % of all ski visitors in South Tyrol (table 6). Data on transported passengers are available to season 2018/2019 and in the next subchapter of the master thesis will be correlated with available seasonal climatic and visitor data.

Table 7 Detailed data about ski lift systems in winter season 2018/2018

Indicators	Values
Passenger/hour	13 312
Transport capacity	31 420 566
Number of systems	73
Average valley station elevation in m	1 640
Average attitude difference in m	235
Average length in m	960
Average number of places	8
Average speed (m/s)	3,9

Source: www.astat.provinz.bz.it, 2021.

Cable cars in Val Gardena run in parts of Kastelruth, Alpe di Siusi, Seceda, Monte Pana, Ciampinoi, Dantercepies, Plan de Gralba, Selva and others that belong to the unclassified individual systems. In the winter season 2018/2019, it was possible to transport 13 312 passengers per hour, while the total transport capacity multiplied by the height difference in meters was 31,4 million passengers (table 7). There were 73 transport systems in Val Gardena, with a valley station averaging altitude 1 640 m. Cable cars were able to transport passengers on average 950 m in length. The average height difference was 235 m, the average number of seats was 8 and the average speed of the cable cars in Val Gardena was 3,9 meters per second (m/s). The highest valley station is located in Plan de Gralba / Selva, at an altitude of 1954 m. The fastest cable cars run in the part of Seceda, where lifts run on average 6,6 m/s. The only funicular in the destination runs in this part too (www.astat.provinz.bz.it, 2021). Sufficient snow is required to operate the cable car systems. In addition to natural snow, Val Gardena produces artificial snow too. According to Demetz (2021), snowmaking systems meet the latest standard. Producing of artificial snow requires water, electricity, and a temperature of about 0 °C while no chemicals are added. She adds that electricity comes from local providers and snow blowers work with fuel, but it should be noted that they work just once a day for a few hours. It can be stated, artificial snow production in Val Gardena aims to be sustainable as there are no chemicals added and the electricity comes from local providers.

According to the performance of accommodation facilities as well as cable car systems, it can be seen that the number of visitors has been increasing over the years, although their stay in the destination is shortening. Some years show a disproportionate difference compared to the previous ones, so it is appropriate to find out whether visitors are affected by the climatic conditions in the destination. These connections will be explored in the next part of the thesis.

2.2. Results of climate and climate change research in selected mountain destination

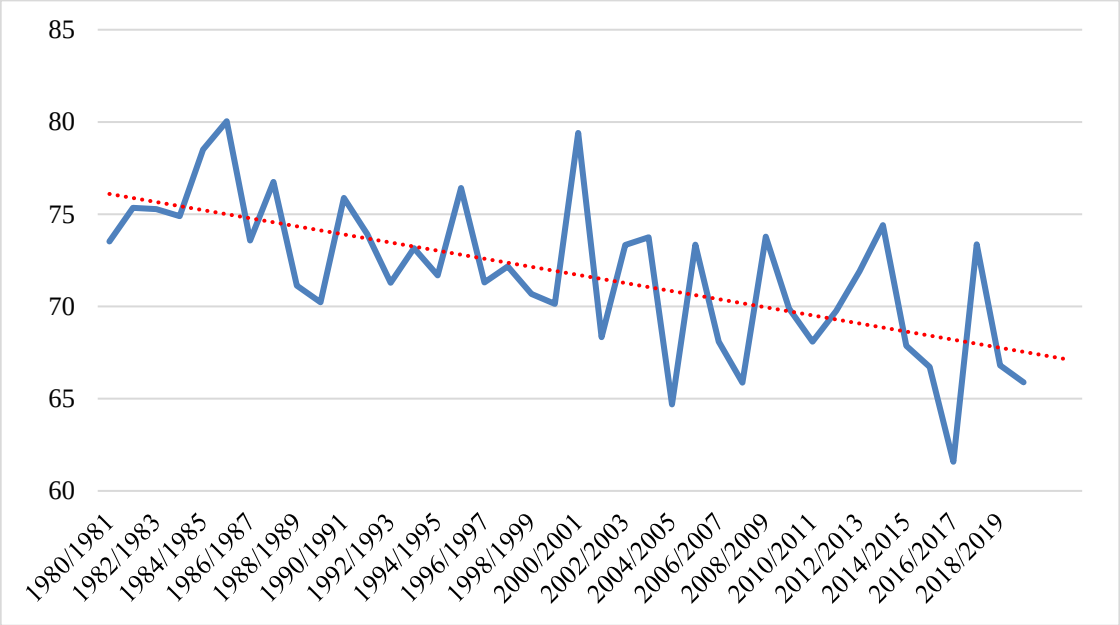
The typical climate for Dolomites is alpine. With increasing altitude, the temperature decreases sharply. Summer is characterized by pleasant days, cold nights, and a lot of precipitation. The landscape in winter is usually covered by natural snow from December to March. Winter weather is characterized by sunny days. The climate

in the Dolomites is milder than in other parts of the Alps because it is influenced by the humid climate of the Mediterranean, but cold air comes from the continental lowlands of the Danube region (www.guidedolomiti.com, 2021).

Climate data from Meteoblue were collected to determine the climate impact of winter business in Val Gardena. Climate data from Meteoblue are simulated data with high accuracy and are a result of predictions, not measurements. Such data are usually more reliable, 100 % complete and dated in detail since 1984. Compared to stations, they are more advantageous because stations can be within 50 km of the desired location and data obtained from stations are not complete or detailed (Faria, 2021). Obtained climatic data were collected by the ERA5. ERA5 is the climate reanalysis of ECMWF's Integrated Forecast System. ERA5 includes a 30 km spatial resolution, and the data are obtained in hourly time resolution. In addition, Meteoblue provides higher resolution data available from 2008. From the available data, indicators as average temperature in degrees Celsius (ºC) 2 meters above the surface, average relative humidity in percent (%) 2 meters above the surface, snowfall in centimeters per square meter (cm/m²), average wind speed in kilometers per hour (km/h) 10 meters above the surface, cloud cover in percent (%), duration of sunshine in minutes (mins), and average temperature of the earth in degrees Celsius (ºC) at the surface were selected (www.meteoblue.com, 2021).

Climatic data on the mountain destination Val Gardena are the result of processed daily data. Observed periods are winter seasons from November 1980 to middle of April 2020. From the data can be seen that climate change is affecting the destination. However, it is questionable whether climate change is significantly affecting winter tourism activities. When comparing the whole seasons, it can be seen that some indicators do not show large changes (appendix 12). This is the case with the values of wind speed, what gradually shows lower values through the seasons, but the differences in individual years are minimal. The highest wind speed was predicted for the 1999/2000 winter season, when the values were 5,02 km/h. The lowest wind speed was predicted for the 2013/2014 winter season, it was 4,35 km/h. In the observed period, the seasonal average value of wind speed is 4,69 km/h. Another relatively stable indicator is the seasonal soil temperature. Here, higher differences can be seen in the individual seasons, what may be due to the fact that each year the land was covered with snow a different number of days. It is assumed that the snow cover maintains a similar soil temperature on the surface, while the soil without the

snow cover can freeze or get warmer. Even in this indicator, slightly increasing values can be gradually observed. The soil had the lowest average temperature in the seasons 2001/2002 (-2,3 ºC), 1988/1989 (-1,74 ºC) and 1989/1990 (-1,51 ºC). The highest soil temperature was predicted for the season 2006/2007 (1,01 ºC), 2019/2020 (0,96 ºC) and 1997/1998 (0,67 ºC).

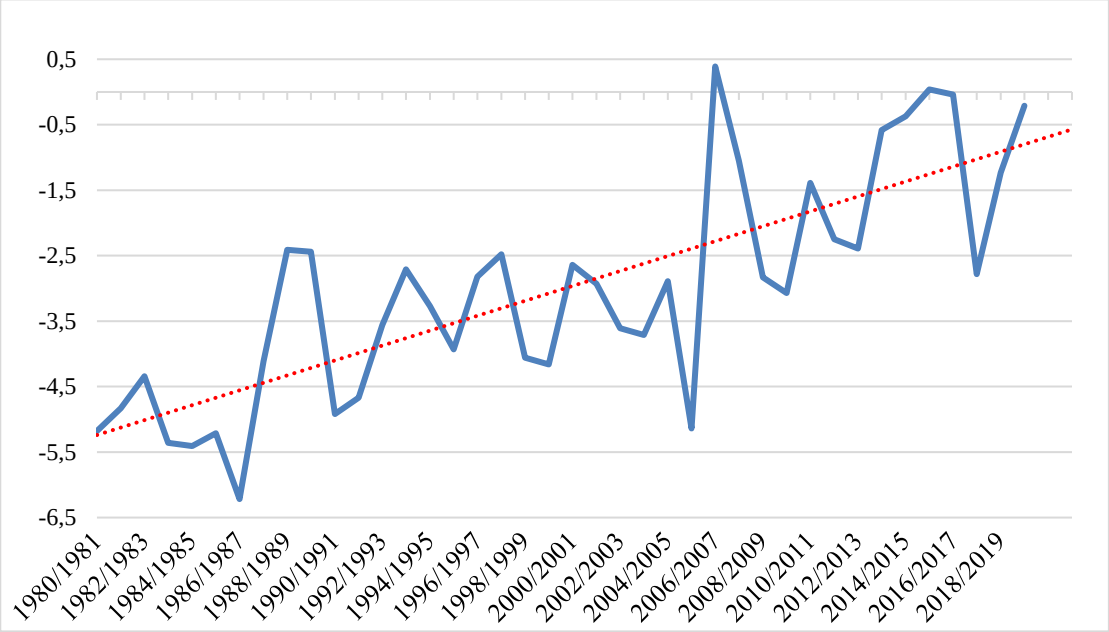


Graph 2 Average relative humidity in % in last 40 winter seasons
Source: www.meteoblue.com, 2021.

Simulated relative humidity is also an indicator that does not show extreme changes in 40 compared periods. However, it can be seen that during the time it decreased by around 5 % (graph 2). Extremely different values in some periods can be observed too. An example is the season in 1985/1986, when the seasonal relative humidity reached 80,04 % or the 2000/2001 season, with a relative seasonal humidity of 79,4 %. On the other hand, in season 2016/2017, the lowest seasonal relative humidity can be seen, whit the value of 61,58 %. It is therefore adequate to examine whether the relative humidity in Val Gardena depends on the amount of snow or the average temperature. To determine the correlation between relative humidity and average temperature at the destination Pearson test was used. Based on the p-value 0, it is clear that there is a dependence between the variables (appendix 13). Pearson test confirmed between the variables an indirect strong dependance (-0,698). Thus, with increasing temperature, a decrease in humidity is expected and vice versa. Another Pearson test was used to determine the correlation between relative humidity and

snowfall amount at the destination. Based on the p-value 0,001 it is clear that there is a dependence between the variables (appendix 14). Pearson test confirmed between the variables a direct mild dependance (0,499). As the amount of snowfall increases, so does the relative humidity.

Data on clouds and the number of hours of sunshine per day show that they are inversely proportional (appendix 12). The highest seasonal cloud cover was in the 2012/2013 season (55,21 %) and the lowest in the 2019/2020 season (33,07 %). The number of sunny hours per day in the seasons was calculated as the sum of sunny minutes divided by 60. The longest sunny days were in the 2016/2017 season, when the sun shone on average for almost 7 hours a day, and the lowest amount of sunny hours was in the 2012/2013 season, when the sun shone for less than 4 and a half hours a day.



Graph 3 Average mean simulated temperature ºC in Val Gardena
Source: www.meteoblue.com, 2021.

The average temperature in Val Gardena shows that climate change occurred despite the high altitude. It is worrying that over a period of 40 winter seasons, the average seasonal temperature has risen from -5,18 ºC to -0,21 ºC (appendix 15). According to the graph 3, an upward trend can also be seen in the following years. The coldest season was observed in 1986/1987, when the average temperature was -6,22 ºC, but since then the temperature has been rising steadily, with the exception of some colder winters, such as in 2005/2006 (-5,14 ºC). The number of days with

expected snowfall is on average 44, and there are seasons, especially in the last decade, when the number of snowy days was significantly higher. Seasons with the most days in which it snowed were in 2012/2013 (68 days) and in 2017/2018 (60 days). To conclude last decade, the average temperature was the highest in the examined period, but occasionally incomparably more snow can be observed here than in other years. In Val Gardena it snows on average almost 120 cm per winter, but this indicator shows a large fluctuation. At the beginning of the examined period, it can be seen several successive seasons with a similar amount of natural snow, such as the period from 1983/1984 to 1986/1987, when there was at least 1,5 m of snow per season. In the period from 1987/1988 to 1995/1996, the snow amount averaged only 1 m of snow per the season. Differences in other winter seasons are significant. The biggest difference can be observed between the winter 2013/2014 (almost 2,7 m of snow) and the winter 2014/2015 (less than 0,75 m of snow). Despite the relatively small amount of natural snow compared to previous year, the destination should not have a problem with artificial snow. It is interesting to examine the indicators of average temperature and the amount of snow. However, Pearson test did not confirm the dependence between these indicators, as the p-value was equal to 0,372 and therefore the hypothesis H0 that the variables are independent was not rejected (appendix 16). Thus, it is clear that rising temperatures do not affect precipitation, as seasonal temperatures are still below or just above 0 ºC. On the contrary, there is a dependence between the number of snowy days in the season and the amount of snow, because the p-value was equal to 0 (appendix 17). Pearson test evaluated a direct strong relationship between the indicators (0,705).

In summary, winter climate in Val Gardena has changed significantly over the last 40 years. Although indicators such as soil temperature or wind speed showed similar values when comparing whole seasons, the average temperature rose dangerously fast. An increase in temperature can cause melting snow on the slopes, or problems with preparation of artificial snow. On the other hand, due to the fluctuations in Val Gardena, during some seasons of the last decade it was snowing significantly more. But it is important to note, that due to weather fluctuations, after heavy snowfall, temperature can rise to spring values and then cool down again (Demetz, 2021). According to her, weather fluctuations in Val Gardena are more frequently observed in the winter season. Overall, climatic conditions do not threaten the course of winter seasons yet. The rate of increase in average temperatures in the

destination is worrying if this trend continues. However, it is questionable what specific steps tourism stakeholders in the destination take to ensure that the climatic conditions in the destination deteriorate as little as possible.

2.3. Impacts of climate change on selected mountain destination

It was assumed, there would be some dependence between climatic conditions and visitor data, although a steady increase in the number of visitors in Val Gardena could be observed. In general, weather and overall climatic conditions affect the demand of visitors for winter sports in a mountain environment. Based on this assumption, data on the average monthly temperature, the amount of snow and the number of visitors from seasons 2009/2010 to 2019/2020 were correlated. Each month, from November to April, Pearson test did not confirm the dependence, because the p-value was always higher than 0,05 (appendix 18). Although temperatures are higher every year in Val Gardena, destination is still at the level, where it is possible to prepare slopes from artificial snow if there is no natural snow. Another reason why the number of visitors is increasing may be the fact that visitors prefer Val Gardena to other ski destinations in lower altitude. In addition, Val Gardena is also internationally known for its winter sports competitions and high level of service.

Table 8 Average monthly temperature in ºC in Val Gardena

Season	November	December	January	February	March	April
2009/2010	2,25	-5,53	-7,21	-3,77	0,42	2,51
2010/2011	-6,31	-5,98	-4,30	-0,56	2,25	7,02
2011/2012	0,72	-1,90	-5,18	-7,52	2,45	2,34
2012/2013	0,96	-4,44	-3,37	-5,06	-0,22	3,04
2013/2014	-4,99	-1,62	-3,18	-0,51	1,54	4,15
2014/2015	3,82	-0,39	-2,69	-3,53	1,91	3,94
2015/2016	-2,26	0,11	-2,72	-0,79	0,93	6,31
2016/2017	0,57	-1,02	-6,58	0,07	3,86	6,96
2017/2018	-2,39	-4,66	-3,07	-5,73	-0,87	3,08
2018/2019	-1,43	-2,43	-5,47	-1,45	2,54	2,68
2019/2020	-0,20	-3,25	-1,83	0,56	1,07	5,29

Source: www.meteoblue.com, 2021.

The fact that the relationship between temperature and number of arrivals has not been confirmed can now be seen as positive. As the November data can be

observed, the temperature does not have an increasing tendency, but it is at a completely different level year after year, what may also mean a possible extension of the ski season. The average temperature for December, January, and February has an increasing trend, although colder periods can be observed too. During the months in the monitored period, the temperature was only twice predicted above 0 ºC, in December 2015/2016 and in February 2016/2017. It is therefore clear that monthly average values do not show extreme values and do not endanger the operation of tourism facilities. The average temperature in March and April may not be very suitable to maintain conditions on the slopes, but snow data depend on the season. (table 8) Despite the lack of natural snow during selected months, artificial snow can be produced at given temperatures, although the quality of such snow does not correspond to natural snow, and skiing and other sports can be challenging for visitors in these conditions.

Table 9 Monthly overview on the number of visitors

Season	November	December	January	February	March	April
2009/2010	5 513	51 839	68 149	64 208	55 171	8 458
2010/2011	4 746	49 739	68 949	63 077	56 600	2 528
2011/2012	4 676	47 247	66 620	65 463	50 810	6 266
2012/2013	5 083	48 988	58 548	67 272	60 998	2 641
2013/2014	5 151	49 504	60 359	67 346	65 759	2 411
2014/2015	4 969	48 586	66 396	69 025	54 503	8 555
2015/2016	6 159	49 207	69 685	71 888	67 223	2 094
2016/2017	5 038	52 867	63 013	71 945	57 580	2 512
2017/2018	6 005	61 662	67 179	77 550	70 703	5 594
2018/2019	5 915	59 122	64 205	74 191	65 658	3 028
2019/2020	6 162	63 208	70 176	84 841	10 210	0

Source: Pitscheider, Coordinator Performance Marketing for IDM Südtirol - Alto Adige, 2021.

As it can be seen in table 9, the number of visitors varies by month of the season. The low number of visitors in November is caused due to the season opening at the end of the month, but in the last 5 years an increase can be observed, what can be due to the earlier start of the winter season. It is assumed, that some tourism businesses start to run the business earlier if the ski conditions are well. Attendance in December is high because of the Christmas holidays, and it is growing despite increasing simulated temperatures or unstable amount of natural snow. As it can be seen, January and February are the strongest months of all seasons and in years are becoming even stronger. In March, the number of arrivals was expected to depend on

climate data, as higher temperatures as well as a lower probability of snowfall could be expected. However, the Pearson test did not show dependence among the indicators, as the p-value for temperature and number of visitors was 0,791 and the p-value for the amount of natural snow and number of visitors was 0,986. It is therefore appropriate to consider that visitors may be attracted by the discounted prices of ski passes in March, as well as pleasant weather. Visitor data vary in April, as the winter seasons end on a different day each year. In addition, normally the number of arrivals in April can be lower, as it can be assumed that the conditions for skiing are adequate for the spring and therefore not perfect. The dependency between the simulated amount of natural snow and the number of visitors was also not confirmed, as the p-values of the individual monthly correlation tests were also higher than 0,05 (appendix 19). Overall, according to numbers of arrivals, visitors are not considering Val Gardena as destination affected by climate change yet.

In addition to monthly data, seasonal data on climate and visitors were correlated too (appendix 20). Seasonal data were monitored from the season 1990/1991, what means 30 consecutive winter seasons. The dependence of seasonal temperature and average number of overnight stays on the alpha significance level was confirmed, as the p-value was 0,000. Pearson test revealed an indirect strong dependence, as the value was -0,671. After all, this dependence may be partly related to climate change, as the average number of overnight stays of visitors may decrease with increasing temperature. The reason for shortening the stay affected by climate change may be unfavorable conditions on the slopes due to high temperatures. Other factor of decreasing average number of overnight stays may be changing visitor´s trends as well as visiting more destinations in one holiday. Because the demand side is not examined, this indicator cannot be further compared. Another dependence was confirmed for indicators temperature and number of arrivals, as the p-value from the test was 0,000. Pearson correlation coefficient on value 0,632 revealed a strong direct dependence, what however, is not related to climate change, because rising temperatures would be expected to reduce the number of arrivals in the destination. Such a dependence was also confirmed between the indicators of temperature and the number of overnight stays, based on a p-value of 0,001. The test here showed a moderate dependence (0,555). The relationship between the indicators of amount of snow and visitor data has not been confirmed as the p-value was higher than 0,05.

Correlation tests on lift passengers and climate data can be seen too (appendix 21). The dependence was not confirmed between the number of transported passengers and the temperature (p-value 0,485) and the number of transported passengers and the amount of snow (p-value 0,566). At the level of alpha significance, the dependence between the number of transported passengers and the number of arrivals was confirmed. Pearson correlation coefficient showed a direct strong dependence (0,787). Given that most of climate and tourism data were not dependent, it will be interesting in the next part of the thesis to observe how companies perceive climate change and whether they take steps not to worsen the environment. Apart from the companies, due to the expected deteriorating skiing conditions, the tourism organization in Val Gardena is trying to profile Val Gardena from the ski area to a winter sports destination (Demetz, 2021). This is an interesting finding, because the support of non-ski sports activities is important for gaining the interest of visitors.

The questionnaire was sent to 487 entrepreneurs in Val Gardena. The questionnaire was available from 16.02.2021 for one month. It is estimated that due to the pandemic measures of all tourism companies, only 78 responses were received. Despite the low number of overall questionnaires, entrepreneurs had the opportunity to select more than one business they operate. Thus, a total of 157 tourism companies participated in the research. The questionnaire was distributed in Italian and translated into English for the diploma thesis (appendix 22 and 23).

As it was expected, most businesses are family owned (116). Although some entrepreneurs own more than one business, they do not belong to any groups and are considered family businesses. 13 entrepreneurs operate in rented companies and 28 entrepreneurs have the companies as members of a group. As it is known that family-owned companies provide services in the long run and more sustainably, it can be assumed that companies in Val Gardena pay attention to traditions and are interested in the environment where they do the business. From all the surveyed companies, 56 operate in Selva, 52 in Santa Cristina, 46 in Ortisei, and 3 in Alpe di Siusi. Almost all the companies run the business in summer (112) and winter (130) season, but there are 26 companies operating the whole year and 2 companies operating eventually off the season. This is a positive finding, as companies are not tied to summer and winter sports but can also provide services out of season or all year round, what is particularly appropriate in terms of climate change and seasonal mitigation.

Table 10 Division of the surveyed tourism companies in Val Gardena

Ownership	Family-owned	116
	Rented	13
	Member of a group	28
Place of business	Selva	56
	Santa Cristina	52
	Ortisei	46
	Alpe di Siusi	3
Season in operation	Summer season	112
	Winter season	130
	All-year business	26
	Off season	2
Type of business	Hotel	36
	Pension	10
	Privat accommodation	5
	Apartment	38
	Cottage	8
	Restaurant	29
	Bar	14
	Café	7
	Après ski	7
	Ski lift operator	2
	Disco	1

Source: own processing of data from the questionnaire, 2021.

From contacted companies, mostly apartments (38), hotels (36), restaurants (29), and bars (14) answered the questionnaire. In addition to the mentioned companies, the sample consisted of pensions (10), private accommodation (5), cottages (8), cafés (7), après ski (7), lift providers (2) and a disco (1) too (table 10). In the research participated companies operating from 3 to 150 years. On average, companies have been on the market for 30 years. Most commonly companies have been on the market for 40 years, and half of the sample has been on the market for 22 years (appendix 24).

The questionnaire sought attitudes towards the various factors affecting business in Val Gardena. The factors were divided into natural, economic, and social. As it can be seen in appendix 25, from natural factors mostly weather fluctuations affect the business. Other effects related to climate change such as mild winter with less natural snow, cold winter with a lot of natural snow, hot summer, or summer accompanied by heavy rains are perceived by entrepreneurs as relatively important factors influencing their business. Entrepreneurs usually have a neutral relationship to the factors of drought and natural disaster. From the cultural factors, mostly holiday period affects the business in Val Gardena. Other relative important factors are organized events, and bank holidays. Factors that could less affect the business are habits and traditions, changing structure of visitors and thus aging of the population, and availability of qualified people. Entrepreneurship is not affected by the possible

lower income level of visitors. It can be therefore assumed that Val Gardena is visited by visitors especially during holidays and events, and the purchase of services is not affected by lower income. From the economic factors, ski lift season and employees affect the business the most. Especially in the winter season, number of arrivals depends on the ski conditions. Family businesses are usually small and medium-sized enterprises, and it is important for them to have their employees present, as it is difficult to employ reliable workers during the season or shortly before the start of the season. Other factors affecting the business are revenues, market stability, competition, and Covid-19 pandemic. From the questionnaire it is clear, that companies in Val Gardena are not used to receive subsidies from the public sector as it does not affect their business.

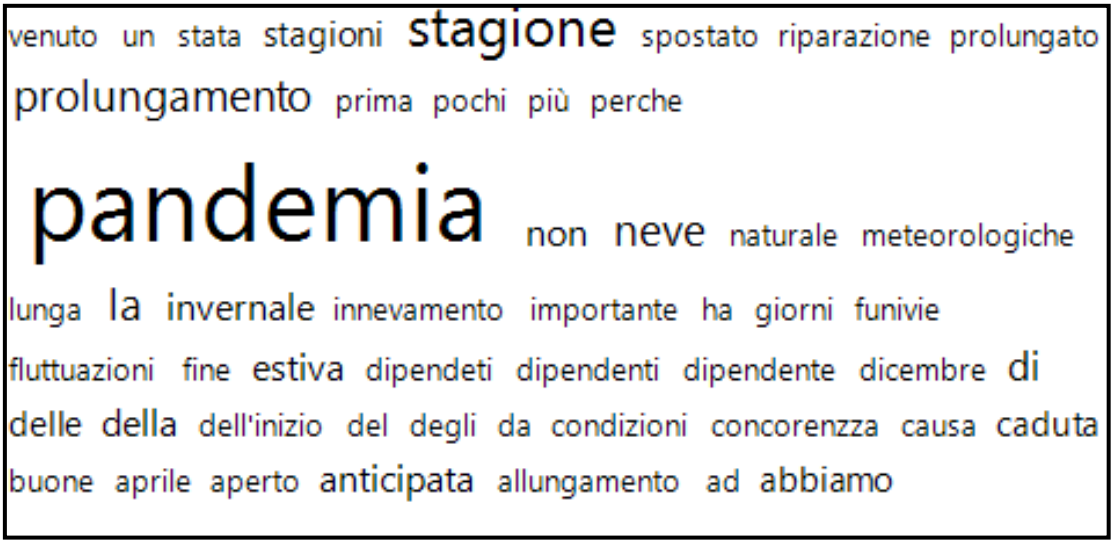
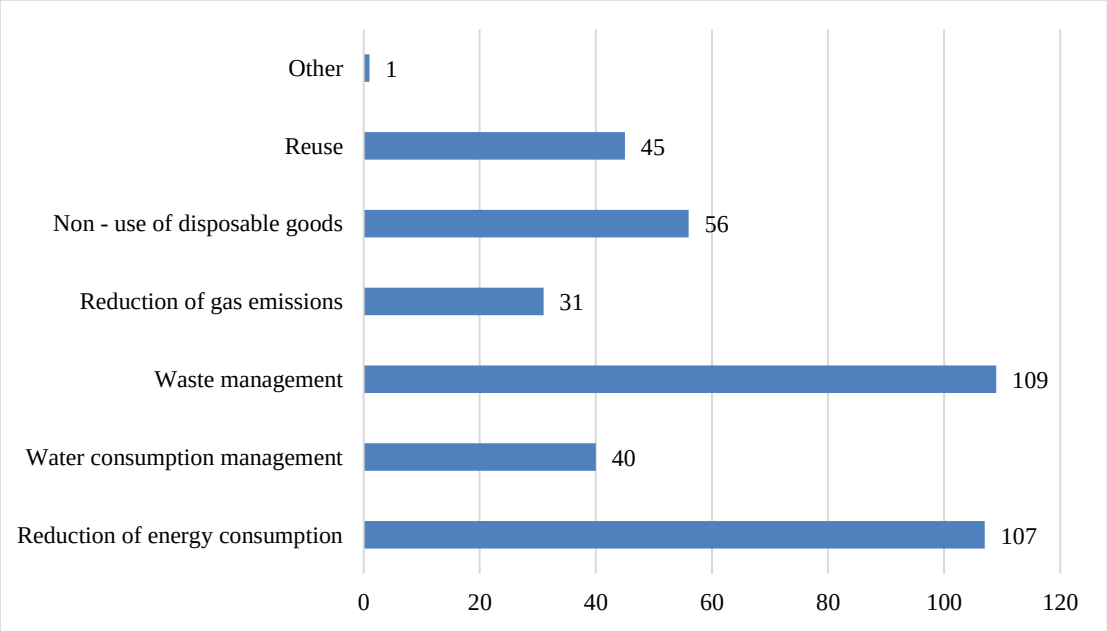


Figure 1 The most common answers to the question of what factors influenced entrepreneurs to shift the season
Source: own processing of data from the questionnaire, 2021.

As entrepreneurs consider most of the factors to be important for their business in Val Gardena, another question was, if any of them has postponed or shifted winter season in the last 40 years. In appendix 26 can be seen, that almost 64 % of respondents answered yes, 21 % answered no and 15 % did not remember. Figure 1 shows most common answers of what factor forced to shift the season. According to the current situation, the season was affected mostly by the pandemic. Other common responses were extended winter as well as summer seasons, good snow conditions, meteorological fluctuations, staff, and competition. Due to good snow conditions, the winter season has prolonged over the years, but in the long run the destination

emphasizes other outdoor activities and does not focus only on skiing or snowboarding (Demetz, 2021). It can be stated that climate change does not have very negative impact on the business as the conditions in some seasons are as good to start the season earlier. Extending the season reduces seasonality and can even attract visitors who do not sport during the holidays. Meteorological fluctuations as well the competition can be perceived negatively especially for small family businesses. If companies start the season and eventually do not have enough visitors due to the abovementioned factors, it can lead to problems. Employees are an important element in tourism business, and as mentioned, small businesses are dependent on them.

Some companies, probably due to occasional pleasant ski conditions, perceive climate change positively (15,82 %). Almost 19 % of the tourism companies in Val Gardena do not have negative nor positive attitude to climate change. It may be because the seasons tend to lengthen. Other 65,19 % of companies take into the account, that climate changes constantly, and the change is negative as the temperature rises from year to year. Two-thirds of respondents also think that the consequences of climate change will affect their business in the winter season in the coming years as well (appendix 27). It is therefore interesting to observe what specific steps companies are taking to avoid polluting the environment.



Graph 4 Common business practices to mitigate climate change
Source: own processing of data from the questionnaire, 2021.

Companies in Val Gardena have established a number of activities that support climate change mitigation. From graph 4 can be seen, that most of the companies separate waste (109), reduce the energy consumption (107), and do not use disposable goods (56). Reducing energy consumption can be achieved in several ways, but the most useful in tourism companies are thermal isolation, replacement of windows, the use of energy-saving light bulbs, the use of energy-saving equipment programs, or automatic lighting. 40 companies are trying to reduce water costs too. This can be expected especially in accommodation, as it is becoming a trend to use bed linen or towels until the guests have laid them on the floor or until they become dirty. Another example is a water purifier. 30 companies contribute to reducing greenhouse gas emissions from tourism. This is possible mainly by reducing the mobility of visitors and thus by providing shuttle buses or cooking local food and buying other local goods. One company even wrote that they buy regional products. Reducing energy and water costs is associated with new technologies and processes, so it can be expected, that most companies introduced or are about to introduce such innovations. At the destination level, Demetz (2021) emphasizes frequent transport lines, free ski buses, non-use of plastic cups and cutlery in small cottages, that work according to all standards, and no large self-service restaurants. For these activities, both destination and companies appear sustainable and environmentally friendly.

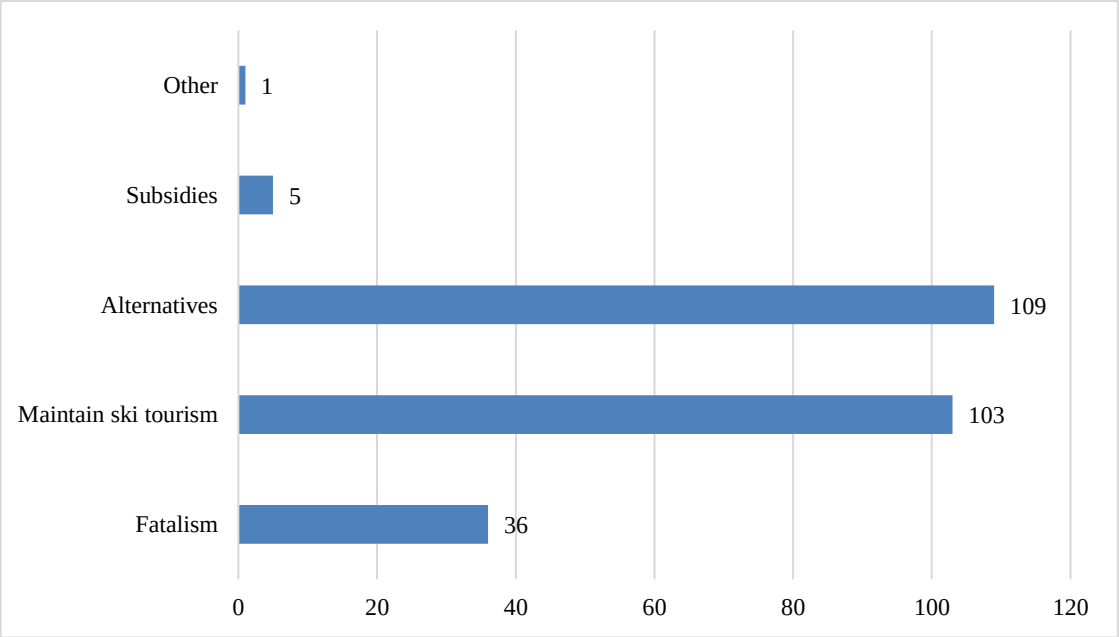
Figure 2 The most common answers to the question of what types of innovations companies have introduced in relation to climate change
Source: own processing of data from the questionnaire, 2021.

Almost 51 % of companies introduced or are planning to introduce innovation related to mitigating climate change. 16 % of companies did not want to introduce such an innovation and 33 % of companies did not decide to do so or not (appendix 28). Most of the entrepreneurs introduced innovation related to energy savings. Some companies installed solar panels or have better construction isolation. Most companies have installed solar panels or have an insulated construction. Other innovations such as use of regional products, wood chip heating, guest accommodation for at least 1-week stay, sustainable business, use of reusable bottles instead of plastic, reduced plastic consumption or even the concept of zero waste and use of reusable straws are already introduced in some companies in Val Gardena. Companies planning for innovation are mostly considering solar panels and insulation (figure 2).

These innovations promote sustainable business, reduce emissions, and thus mitigate the climate impact of tourism. On the other hand, they can attract visitors because the responsible and ecological behaviour of an individual or society is a trend. It has been examined whether there is a dependence between a negative attitude towards climate change and the introduction of climate change-related innovation. The dependence was verified using Cramer-V and since the p-value turned out to be 0,001, there is a dependence between the variables (appendix 29). Businesses that perceive climate change negatively are trying to innovate to mitigate the effects of climate change or to mitigate the impact of the business on the environment. It was also assumed that innovations related to climate change mitigation were mainly related to accommodation facilities. Therefore, responses were divided into three groups, accommodation, restaurant, and ski lift facilities. Because the data do not have a normal distribution, a nonparametric K-independent sample test was used. Based on p-value 0,698 from the Kruskall-Wallis test, it is clear that there is not statistically significant difference between the variables (appendix 30). This is mainly because entrepreneurs answered one questionnaire for all their businesses. The second reason is that behaviour of businesses across Val Gardena is sufficiently environmentally friendly as many of them plan to introduce or have already introduced innovation linked to climate change mitigation. When asked who the leader in climate change mitigation in Val Gardena is, most entrepreneurs did not clearly mention a concrete leader. However, alternative, and sustainable-minded businesses, South Tyrol region, tourism association with the green project, and thus

all stakeholders together are leaders in protecting the environment or mitigating the environmental impact of tourism (appendix 31).

In addition, the South Tyrol region has been working for years on strong climate protection issues, such as regional products, climate-house buildings, resource optimization, reducing energy consumption and the preferred use of renewable energy sources, reducing water and waste consumption, using safe substances and materials, promoting the regional economy and culture, as well as promotion of environmental communication and environmental education. According to the tourism association, Haus Pra Palmer and Mountain Design Hotel Eden Selva as well as Vitalpina Hotel Dosses, which has won the European Eco-label for Tourism award, are the leaders in climate issues in Val Gardena (Demetz, 2021). It is assumed, region supports the decentralised system even in the climate related questions and businesses are perceived by tourism association as a very important member in innovation related to climate change mitigation.



Graph 5 Possible winter tourism strategies in Val Gardena
Source: own processing of data from the questionnaire, 2021.

As already mentioned, destination Val Gardena visit rate increases even though climate conditions fluctuate or even worse from year to year. Therefore, the respondents were asked how they imagine the future winter tourism in the destination. Respondents were able to indicate several acceptable alternatives. Most companies prefer the alternative strategy (109). Alternative strategy includes suggestions such as

product diversification, all year tourism, and non-ski related activities. It can be therefore assumed that companies can attract visitors in an alternative way during winter too. 103 companies want to maintain ski tourism in Val Gardena. This strategy includes activities as production of artificial snow, eventual relocation to a higher area, construction of ski halls, and cooperation. Only 36 companies decided for the fatalism strategy. It is assumed companies chose this strategy because there is a possibility to run the business as usual. Other option offered to the companies in the fatalism strategy was to terminate the business. Very small number of companies expect the following winter seasons to be supported by subsidies (5). Thus, even today, almost no annual or one-off contribution to tourism companies is expected.

Conclusion

To fulfil the aims of the thesis, mountain destination Val Gardena was characterized, climatic conditions were examined, surveys to tourism companies were distributed and processed, and interviews with the marketing organisation IDM Südtirol - Alto Adige as well as with the tourism association Val Gardena were completed. To have a deep view into the situation in Val Gardena, 40 years of winter climate data and 30 years of tourism data were examined. In addition to the last winter season affected by the pandemic, 10 years of winter seasons were compared on a monthly basis. The view of the perception of climate change was complemented by 157 tourism companies.

It was founded, that in the observed period, climate has changed significantly but due to the higher altitude and alpine climate, differences do not affect the business in the destination yet. Although, several weather fluctuations and constant increase of the temperature are remarkable. Positive findings of some of the last decade winter seasons are significant such as occasional increased amount of natural snow and prolonging of the winter season. It was founded that destination deals with increasing arrivals, but on the other hand with decreasing average number of overnight stays. As the number of visitors increases from year to year, climate change does not have an impact on number of arrivals. It may have an eventual impact on the average number of overnight stays.

Overall, it can be stated, companies, association and even the region South Tyrol deal with climate change issues. Most of the companies indicated in the

questionnaire that their business is most often influenced by meteorological fluctuations (natural factor), holiday period (cultural factor), and availability of cable car operations (economic factor). Most of the companies think climate change is a negative phenomenon and half of them introduced or plan to introduce an innovation related to reduction of the energy consumption and costs, reduction of plastics and disposable goods, isolation of the construction or sustainable entrepreneurship in general. Besides that, in Val Gardena is not possible to build a new accommodation building since the last 20 years. Region offers free bus and train transport, ski buses and encourages companies to think environmentally friendly. Despite the currently suitable conditions for skiing, the destination is trying to increase visitors' interest in other outdoor activities and businesses are willing to switch to an alternative form of providing services to visitors in future, such as providing services all year round or not concentrating on skiing. In Val Gardena there is not a concrete leader in mitigating climate change and the impact of tourism on the climate. Overall, businesses, the region and the tourism association ensure the sustainable provision of tourism services.

Based on the obtained primary data, it can be concluded that the behaviour of stakeholders in Val Gardena can be a starting point for ensuring the sustainable development of other mountain destinations, for example in Slovakia or abroad.

3. POSSIBILITIES OF ADAPTATION OF WINTER TOURISM TO CLIMATE CHANGE

The mountain destination Val Gardena welcomes visitors from all over the world during summer tourist season and winter ski season. Because the development of tourism in Val Gardena lies on its natural resources, it is considered to be a fragile environment. Natural resources are dependent on the climate, and as the climate is constantly and dangerously changing, tourism in there may change too. On the one hand, tourism facilities in Val Gardena are affected, especially in winter season, by climate change. On the other hand, tourism stakeholders themselves influence the environment and the climate through their activities. In the third chapter, general possible recommendations for Val Gardena as well as for other mountain destinations will be introduced. The recommendations for Val Gardena are aimed at ecological sustainability, while supporting elements of economic and social sustainability of tourism. In the long term, a strong approach to an alternative strategy at the level of the whole destination is recommended. The added value of the master thesis is according to theoretical concepts and a research of the mountain destination Val Gardena, to propose a general framework as an inspiration for the business in the mountain environment affected by climate change. The aim of recommendations will be in addition to mitigating climate change to propose activities to support seasonal mitigation, increase the number of overnight stays and reduce the environmental impact of businesses.

3.1. Recommendations for winter tourism in mountain destination Val Gardena

Based on the primary data from second analytical chapter of the master thesis, several strengths and weaknesses related to climate change and mountain destination Val Gardena are identified (table 11). The recommendations are therefore aimed at mitigating the weaknesses and harnessing the strengths and will be presented gradually in the third chapter of the master thesis.

Table 11 Identified strengths and weaknesses of analyzed destination Val Gardena related to climate change

Strengths	- Free public transport - Strong relationship to traditions - Altitude and alpine climate - Waste management - Innovativeness of tourism businesses
Weaknesses	- Missing leader in climate change issues - Enterprises with a positive attitude towards climate change - Declining number of overnight stays of visitors - Increasing number of arrivals and associated potential disturbance of local population, increased mobility - Weather fluctuations - Seasonality

Source: Own processing, 2021.

Although climate change has occurred in Val Gardena over the observed period, the destination has not had difficulties to open winter seasons due to its high altitude and alpine climate, except for the 2019/2020 season, which was affected by the pandemic. Compared to lower-lying destinations, Val Gardena is in a competitive advantage. It can be assumed that the tourism association in Val Gardena and most of entrepreneurs have a negative attitude towards climate change. Climate change effects can be observed more in winter, especially in the form of meteorological fluctuations, which bring the uncertainty to the business environment. The weak point is the fact that some entrepreneurs perceive climate change positively. It is an extraordinary observation, because fluctuations in some seasons, as well as compared in a longer period, are considerable. The reason for positive altitude of businesses may be mainly the growing number of visitors, extended season as well as occasional suitable skiing conditions. Another reason may be a lack of awareness of the effects of climate change in the long term.

Nevertheless, a reasonable number of businesses act in accordance with ecological principles, such as not using plastic packages, purchasing unwrapped detergents, purchasing regional food, or sorting waste. Some entrepreneurs even produce renewable energy and reduce heating costs by thermal insulation. The region as well as the tourism association encourage the environmental sustainability of entrepreneurs as well as of visitors by promoting environmentally friendly practices of businesses. These activities are assessed very positively in relation to the environment as such and to climate change too. In addition, free public transport is available to every visitor at the destination, but from own´s experience it can be stated that according to increasing number of arrivals the mobility of cars increases and so does

the potential noise. Therefore, it can be stated, there is also a lack of awareness of the impacts of visitors on the environment.

Tourism services in Val Gardena are provided mostly in summer and winter season and high seasonality can be observed. Even though the tourism association perceives the declining stay of visitors as a threat and tries to prolong it, the increasing trend cannot be seen. As most businesses are family-owned and have been on the market for more than a generation, there is a strong emphasis on traditions, which can even inspire visitors to respect both the local population and the environment. It can also be seen how the marketing organization in Val Gardena promotes traditional events, the Ladin language, or cultural monuments.

According to the primary research it is clear that there is no leader in Val Gardena in issues of climate change. The tourism association itself perceives companies that have introduced environmental innovations as leaders and an example for other companies. It would be appropriate to have a leader responsible for climate change issues at the destination level. Although most businesses are innovative, missing leader is considered a weakness, as there is no stakeholder at the destination to lead businesses, name requirements, support in innovations, or provide information.

Given that the process of global warming and climate change cannot be stopped, only mitigated, it is necessary to think more sustainably at company, destination, and even national level and to consider long-term strategies.

Considering possible strategies from the first chapter for adapting to climate change in the mountain destinations, in Val Gardena in the long term, in addition to maintaining ski tourism, the possibility of alternatives is appropriate. Other strategies, such as fatalism and grant support, are considered inapplicable at the destination level. A fatalism strategy would be devastating for tourism businesses, especially in the long term, when businesses would be forced to close permanently. Also, doing business without any innovation and steps to mitigate the negative impact on the environment is unsustainable and can be considered irresponsible, especially in the fragile environment. Although the form of financial support for companies is effective in terms of climate change mitigation, it is impossible for all companies due to the complexity to obtain support.

As the strategy of maintaining ski tourism requires low temperatures (production of artificial snow), enough snow (adjustment of slopes) and investment

(moving to higher areas), it is not considered applicable in the view of already mentioned negative factors of climate change in the long term. In addition, relocation to higher-lying areas is unacceptable for Val Gardena tourism facilities, as it is already skiing on mountain tops, part of the environment lies in a protected park, and construction of new accommodations has been stopped at the destination since 20 years ago. In addition, relocation to high-lying areas is considered unsustainable as construction and maintenance costs are high and it is an intervention in a more fragile area. In the short term, maintaining the ski season is acceptable due to the altitude. Average temperatures in Val Gardena are usually below 0 °C and natural snow occurs not regularly, but in most cases in sufficient quantities to meet the requirements of skiers. In addition, the artificial snow is produced to ensure the ski season. To increase the quality of the slopes and the level of snow albedo, slopes are regularly adjusted. With the produced artificial snow, ski seasons tend to prolong. Despite the unused chemical additives, extending the season is considered unsustainable, as it is harmful to the environment. The reason is postponement of the germination process and thus possible extinction of certain species. However, artificial snow cannot solve the lack of natural snow. The late start of snowing, such as the 2015/2016 season, is no exception. As is clear from own experience, just the slopes were covered with snow and the destination lacked a winter atmosphere for almost 2 months from the beginning of the season, as artificial snow was not able to fully replace natural snow. The absence of natural snow, especially during the Christmas holidays, is perceived as a threat, for visitors such as for entrepreneurs. In general, the strategy supports winter tourism, but is not a solution for entrepreneurship in terms of climate change or global warming. In the short term, maintaining ski tourism can be combined with alternatives to give companies a chance to adapt to a changing environment and to meet current visitor´s requirements. In the long term, due to changing climate, a strategy of maintaining ski tourism is not recommended even in the high-lying area of Val Gardena.

If the Val Gardena has seasonally warmed by about 5 °C over 40 years, this trend can be expected in the coming period under unchanged conditions too. This would mean a seasonal average temperature of 5 °C in the winter 2060/2061, which would significantly complicate the ski season. Looking at climate data, it is not questionable whether the effects of climate change will be visible in Val Gardena, but

when significant changes in climate conditions will occur and when the ski season will be threatened. Due to the expected higher temperatures in the future, in addition to shifting the boundaries of natural snow, the chances of successful production and maintenance of artificial snow will be reduced. The ski season could be shortened, as well as the interest of visitors could fall due to the climate conditions. It is therefore in the interest of the destination to attract visitors with a suitable alternative. As climate change occurs gradually, the alternative strategy is recommended to be implemented gradually by introducing several types of innovation at each level. For Val Gardena, alternatives are presented at companies and destination level, but support should also come from the region, even the state. As there is a strong initiative in the region on climate change issues, support for alternative winter tourism in Val Gardena as well as other destinations can be expected. Alternatives are in fact a way of adapting to climate change.

Table 12 Alternative adaptation strategy for Val Gardena winter tourism

Level of adaptation	**Alternatives**	**Impact**
Companies	Off-season openings	- Compensating ski-related activities - Reducing seasonality - Encouraging in traditions, farming, and sustainability
	Flexible prices according to the number of overnight stays	- Extending of length of stay
Destination	Promoting non ski outdoor activities	- Attracting sport related visitors - Connecting activities with the Dolomiti Supersustainable card
	Promoting public transport	- Reducing number of cars at destination - Offering discounts for local products if visitors travel by public transport
	Promoting wellness and congress tourism	- Increasing number of potential visitors - Cooperation with hotels with conference rooms and wellness equipment

Source: Own processing, 2021.

Given the context of the alternative adaptation strategy from the first chapter, and the positive attitude of companies to the alternative strategy from the second

chapter, it is recommended to consider such alternatives. Alternatives may be even more sustainable for the destination Val Gardena as the current ski tourism.

As in the long term, snow amount and temperatures are not a matter of course, companies' innovations related to mitigation of the impact on the climate are not sufficient enough. A more resolute change in the current provision of services in winter season is desirable for the destination. Therefore, alternatives at companies and destination level were designed (table 12). The prerequisite for success is cooperation on individual alternatives as well as cooperation of stakeholders and at different levels. Nevertheless, the introduction of ecological principles in innovations or environmental certification of tourism businesses is strongly recommended, given that such innovations have a positive impact on the environment. With the introduction of such innovations, entrepreneurship becomes environmentally sustainable.

Off-season openings of companies in Val Gardena lie on the propagation of tourism organization, especially because the off-season openings would be an innovation, as visitors use to visit the destination during seasons. The main objective of such an alternative is to attract visitors outside the main seasons because with the instability of snow conditions, skiing as the main activity is declining in importance. In the off-season, the incomes of tourism businesses as well as cooperating local producers may increase. Employees would have year-round employment contracts and the seasonality would be reduced. The destination would develop more sustainable, soft tourism. The main activities for visitors could be a visit of local farms, tasting of domestic products with the possibility to buy local products. On farms, it could be possible to obtain information from presentation of production, eat local products and spend time together with the locals. From one's own experience, it can be stated that visitors like traditional costumes from Val Gardena, and so it could be available, especially for children, to try them out and take pictures in them during the visit of farms.

Another important tradition in Val Gardena is carving of wooden sculptures, and therefore the product associated with it could be offered by accommodation facilities too. This would include a visit of carver, where visitors would see the production of wooden figures. It would be possible to buy the product and carve the initials on it. In addition, admission to the exhibition will be included in the trip. The trip could cost a symbolic € 7. Improving visitors' relationship with locals can lead to responsible visitor behavior, respecting the environment and finally the replacement

of activities that require snow cover. On the contrary, destination could promote wellness and congress tourism, in particular during the months with the lowest visit rate. There are many accommodations that have a wellness equipment or a congress room. A list of these businesses could be published on the destination's website, so visitors, or groups of visitors, would have information online. The number of business travelers and seniors would increase, and the seasonality would decrease. The offer of wellness and congress stays could be promoted especially among the inhabitants of the region.

As the price innovation is considered the most effective in mitigating climate change, flexible prices are recommended too. Accommodations could have flexible prices according to the number of overnight stays. It is known that accommodations offer different prices according to the season, but in order to increase the average number of overnight stays, prices could vary too. A stay of up to three nights could be on average € 5 per night more expensive compared to a stay of more than three nights. However, the price should not be significantly higher so as not to discourage visitors. In addition to price innovation, accommodations could also offer leisure activities for several days during the reservation process, which would motivate visitors to stay at the destination longer. Activities could be offered as a package of services and would vary according to the requirements of visitors. The promotion of activities by videos could be effective. A non-binding offer of leisure sports activities would be for free, but trips for a fee would also be offered. Buying a stay longer than one week would mean a discount on offered trips for a fee at the destination. Trips should be offered only at the destination in order not to increase the mobility of visitors, and also to promote local production and relationship with locals.

Figure 3 Design of Dolomiti Supersustainable logo
Source: Own processing, 2021.

Promoting other outdoor activities than skiing at the destination level would be beneficial, especially in the long term. This alternative could raise the interest of visitors in the all-year tourism in Val Gardena, as the activities could be suitable in any season. Slogan for the winter season is “Dolomiti Superski”, for the summer season is “Dolomiti Supersummer”, and an alternative slogan could be “Dolomiti Supersustainable”. Such a slogan would reflect a path to more sustainable tourism in times of climate change in Val Gardena as well as in other destinations of the Dolomites. It would mean promoting different winter sports activities in all 12 destinations of the Dolomites. A logo for Dolomiti Supersustainable product (figure 3) is designed to retain its original form. The plant next to the text shows diversity, and it can be deduced, that the product is diverse and can be provided even throughout the year. The alternative winter product should include leisure activities that may require cable cars in operation, but the snow cover is not necessarily needed. For the Dolomiti Supersustainable product, in addition to information in brochures or on the Internet, it should be possible to buy a ticket for cable car rides. Ticket should also include discounts on certain sports such as paragliding, mini golf or climbing equipment. In the Dolomiti Supersustainable program, it may also be possible to rent winter hiking equipment or a winter cycling bike from local providers.

SuperSustainable could become a kind of brand for companies published on the website if they were involved in the product. The criteria would be the provision of services out of the winter and summer seasons, flexible prices according to the number of overnight stays, provision accommodation for wellness and congress groups, the presentation and rental of equipment of alternative sports activities, innovations to mitigate the impact on the environment, or cooperation with local producers. Meeting at least three of these criteria would mean being able to obtain the Super Sustainable brand. Visitors would therefore know which companies are involved in the project and it could be gradually building an alternative, more sustainable product for Val Gardena as well as the entire Dolomites.

Insufficient proposals for activities other than skiing are perceived as a weak point of destination promotion. From the figure 4 can be seen a possible photo material used for promoting winter walking in Val Gardena. Visitors link Val Gardena with the ski holiday and other activities remain in the background. If tourism association and marketing organization would have separate bookmarks on the websites containing tips for winter walking, cycling or other activities, visitors would

not lose the interest to visit Val Gardena even in the case of unacceptable skiing conditions in the future. As there are ski schools today, the new product could provide mountain guide service.

Figure 4 Design of advertising photos for winter walking in Val Gardena
Source: Own photos, 2021.

Two winter walks suitable for a half-day trip were proposed. Alpe di Brogles winter walking requires bus transport to Ortisei to the station of cable car Rasciesa (appendix 32). From there, a flat path leads to Malga Brogles hut, where refreshment is possible. In winter, it is recommended to take the same route back to the cable car. If there is no continuous layer of snow or ice on the paths, it is possible to continue through the Pana wind gap. Another winter walk is Juac – Firence – Odles Cottages winter walking (appendix 33). Starting point can be Selva or Daunei. The route leads around three cottages and ends at the top station of the Col Raiser cable car. After the walk, bus transport is recommended to return to Selva, because the valley station of the cable car is in the village Santa Cristina. Both hikes are planned to use public transport as well as cable cars.

From own´s experience, it is clear that the destination, especially accommodations, promote public transport. Nevertheless, it is still the custom of visitors to use cars in Val Gardena. Visitors could be encouraged to travel by public transport if they could use marked (used) Mobil Card to obtain discounts on the purchase of local products or single cable car rides. In addition to reducing the number of cars on the roads, and reducing emissions, visitors would be motivated to buy small souvenirs and support the local production. Another way to reduce the car

mobility of visitors is to charge for all car parks in Val Gardena, strengthen the public transport network and add stops outside the main road.

Due to the current pandemic situation, tourism in Val Gardena will have to recover in the coming seasons. Despite the growing number of visitors in recent years and the international popularity during the winter and summer seasons, the Post-Covid recovery period will be challenging. For recovery would be suitable the introduction of innovation associated with alternative tourism activities. The introduction of an alternative strategy is strongly recommended for Val Gardena, as mitigating the effects of tourism on climate change is not sufficient, in few decades the snow conditions may become a history, and the destination as a whole appears resilient to change. The survey showed the interconnected relationship among tourism stakeholders at the destination, as entrepreneurs own several businesses, and the participation of a tourism association and marketing organization can be perceived too. In addition, there is a general emphasis on tradition and a large number of businesses are family owned. Therefore, the resilience of the destination can be assumed. Businesses can get through the pandemic crisis and should be able to adapt to slowly changing environment caused by climate change as well.

3.2. Framework of long-term strategy for mountain destinations

Apart from Val Gardena, the climate in all world's mountain destinations has been gradually changing over the years. It can be already seen how endangered the ski season in the lower-lying areas is, and conversely, how higher-lying areas face an increase in the number of visitors. Therefore, a coherent strategy to mitigate the impact of climate change on business in mountain destinations around the world cannot be recommended. Individual destinations differ in natural factors (altitude, climate, fauna, and flora), social factors (national composition of visitors, visitor segment, visitor´s incomes, locals, customs and traditions of the region or country) and economic factors (market position, economic situation, employees, possibility to get subsidies).

In general, mountain tourism businesses should innovate in order to mitigate the impact on the environment. As the number of visitors increases, so does the degree of pollution, and it is in the interest of businesses, and in particular of local people, to live and work in a clean environment. Val Gardena companies can be

considered as an example, as there can be seen several environmentally friendly practices.

Table 13 Environmental practices recommendations for mountain destinations

Companies level	- Shuttle bus service - Waste separation - Thermal-insulated windows and construction - Solar energy
Destination level	- Public transport network - Waste management - Local renewable energy, local hydropower plant promotion
Regional and national level	- Climate-houses promotion - Local energy producers support - Environmental awareness promotion - Artificial snow production without chemical additives

Source: Own processing, 2021.

As can be seen from table 13, environmental practices vary according to stakeholder they are addressed to, so they are applicable regardless of altitude. Companies should innovate towards more sustainable energy consumption. Related to this are insulation, installation of thermal-insulated windows, or solar panels. The Italian concept of climate-houses or other environmentally friendly certification is also recommended for companies, as in addition to the environmental approach, it mainly reduces costs for proprietors and last but not least, it increases competitiveness. Separating the waste is the basis for environmentally friendly entrepreneurship and requires cooperation with the region as the waste should be regularly collected. In addition to waste sorting, particularly important is reducing waste generation and reusing. To decrease the mobility of visitors some accommodations provide shuttle bus service. Usually, visitors want to get to similar places, and it would be effective to drive them by company´s minibus or car. It would reduce the air pollution, reduce the traffic, and visitors would appreciate it as a benefit. If some companies do not have a shuttle bus, there could be one, owned by the destination or village, which could drive visitors from different places at the destination. Visitors would order a ride by text message, but the service should be offered regularly. It would be an effective way to transport visitors if public transport is limited.

Alternative to the shuttle bus service is public transport network. To motivate visitors to drive by bus or train, the service should be provided for free. It is a courageous recommendation, but Val Gardena is an example, that the free public

transport encourages visitors to use it. Together with the shuttle bus services, there would be dense network to satisfy visitor´s needs and to protect the environment with decreased amount of exhaust gases. If business owners in a mountain destination could provide visitors a card for traveling by public transport, awareness of this mean of transport would increase. At the destination level, promotion of public transport as well as of waste management could be effective. In the mountains the diversity of employment is limited, so the destination should promote locals in producing and providing renewable energy as well as tourism businesses that think sustainably and meet environmental standards.

The aim of the region and state in the mitigation of the impact on climate should not only be promotion, but particularly support. These include support in information, availability of projects, certifications as well as financial support. Entrepreneurs and locals would have the exact requirements to fulfil. As the primary research found that there are also some companies that have positive or no opinion on climate change, it is important to inform them of the negative effects of climate change on society as a whole and on mountain destinations in particular. In addition to natural phenomena, the responsibility for climate change lies with human activity, and businesses should change their approach and seek to reduce this impact. Regions should also support the production of artificial snow without added chemical additives as well as not prolonging the winter season, as it would delay the germination process.

As the mitigation of the climate change impact is considered to be not sufficient, mountain destinations should consider possible strategies for coming winter seasons according to the altitude and other factors. Uncertainty in the amount of natural snow and, in particular, rising temperatures, which can even jeopardize the production of artificial snow, are undoubtedly considered a weak point. Therefore, mountain destinations should consider one of the following strategies.

Table 14 Maintaining ski tourism strategy recommendations for mountain destinations

Activities	Recommendations
Artificial snow	- Using local energy - Using only water without chemical additives - Extending the winter season only by suitable natural ski conditions
Relocation to higher terrain	- Respecting environment and protected parks - Prevention of construction of new buildings, investments in already built buildings - Respecting carrying capacity
Design of slopes	- Ensuring white snow and high level of snow albedo - Slopes facing the shady, windless sides
Cooperation	- In the terms of promotion sustainable companies, local energy providers - With local producers - At the regional and national level
Proposal for more sustainable thinking	- Extension of length of stay - Reducing mobility of visitors - Providing an authentic product

Source: Own ideas based on statements of Bürki, Elsasser and Abegg, 2003: 7 and the primary research.

As for many entrepreneurs maintaining ski tourism is the most important requirement of the entrepreneurship in mountain destinations in winter season, the original strategy is introduced in more sustainable way (table 14). Nevertheless, maintaining the ski season is not considered a long-term strategy, mainly for small destinations at lower altitude and with lack of finances to provide artificial snow, precisely because of the aforementioned warming and the likely shift in the boundaries of natural snow. Nowadays it is necessary to produce the artificial snow even though ski conditions are suitable, because as researched, the climate is unstable. However, it is strongly recommended to avoid adding chemical additives to the water for production of artificial snow. Extending the ski season by adjusting the slopes with artificial snow is considered unsustainable and should not be allowed, especially in fragile mountain areas. On the other hand, it is recommended to use local, maybe even renewable, energy for production of artificial snow, because it supports local providers and may improve the name of the destination.

Relocation to the higher located areas may be, especially for small family companies difficult, because it requires investment. On the other hand, it can be seen that developers build new slopes or accommodations, and it is considered to be in conflict with an environmental understanding, as higher terrain is considered to be more fragile. Therefore, tourism facilities should not necessarily relocate from the

lower altitude as the environment is mostly located in a protected area or national park. As it can be seen in case of Slovak Tatras, developers do not respect it, and are gradually destroying entire parks. However, by potential relocation to higher terrain should be strictly respected the carrying capacity of the area. In order to protect the primary sources, some mountain destinations should freeze the permit to build new buildings, as has been the case in Val Gardena for 20 years and invest in the renovation of dilapidated buildings.

Slopes should be clean so the sun's rays could be reflected, and the heat would not be absorbed. In addition, destinations should prefer less windy and sunny slopes, even though visitors like the sunny sides more. For maintaining ski tourism, a cooperation among the stakeholders is important. To strengthen the competitiveness of the destination, cooperation with local producers and with the region as such may help. Promotion should be handled in particular by the tourist association and the region.

According to the primary research, general recommendation for ski tourism was introduced. If destinations want to continue in the ski tourism as such, entrepreneurs should lengthen the average length of stay of visitors and at the same time reduce the mobility and provide an authentic product. If the average length of stay increases and the mobility decreases, it is a prerequisite for more sustainable ski tourism. Variable prices, activities offered online before the arrival to spend free time of visitors as well as ecological awareness can motivate visitors to stay in a mountain destination longer. Visitors tend to have daily questions for employees or entrepreneurs during their stay about which places they can visit during the day. Businesses and tourism associations could be publishing offers of activities in the form of a product. The offer would be addressed to a specific segment and could regularly change. Therefore, visitors would have answers to some questions before the arrival. In addition, providing authentic and traditional products can increase visitors' interest in re-visiting the destination. From own´s experience, it is clear that repeated visits to the same destination will create a relationship and will ensure more tolerant behavior towards the environment as well as the local population.

As many mountain destinations face and will face more drastic change caused by climate in the winter, another strategy, related to long term solutions should be introduced. As companies in Val Gardena showed the interest in alternative strategy,

it can be generally considered worldwide in the mountain environment. Alternative strategy can be applied according to the interest of companies at the destination, but as destination offers a complex product to visitors, it is recommended to adapt to the strategy as a whole. The more resilient the destination is, the better it adapts to significant changes or challenges.

Table 15 Alternative framework for mountain tourism

Non-snow related activities	- Outdoor sport activities - Indoor sport activities - Providing other forms of tourism
All-year tourism	- Emphasis on relations with locals - Reducing seasonality
General recommendations	- Raising environmental awareness - Providing public transport - Environmentally friendly innovations of businesses o Reducing water and energy consumption - Waste management

Source: Own ideas based on statements of Bürki, Elsasser and Abegg, 2003: 7 and the primary research.

Based on recommendations for mountain destination Val Gardena, general alternatives for winter tourism in mountain destinations can be introduced. Alternatives are divided into non-snow related activities, all-year tourism, and general recommendations (table 15). Mountains are visited mostly because of sport opportunities, clean environment, and possibility to relax. As snow conditions will not be suitable at many slopes in the coming seasons, destinations should promote other winter sports too. Winter hiking, mountain biking and other activities can replace ski sports, as long as the destinations have plenty of bike paths, suitable trail markings, sports equipment rentals, cable cars in operation, and sport alternatives are sufficiently promoted. In addition to outdoor sports activities, it is possible to promote sports in indoor halls. Swimming pools, climbing walls, and even ski slopes in the halls can satisfy the demand of visitors. However, the additional construction of indoor halls is generally not recommended, as the construction as well as the maintenance are associated with high energy consumption and an intervention to the natural environment. Destinations could also promote other, even more sustainable forms of tourism. Connecting visitors with locals, active involvement of visitors, acceptance of the environment, or agrotourism are steps to successful soft tourism, that should take place in the mountain environment in general. In addition, wellness, health treatments or congress events could attract new segments of visitors outside of the season. Each

mountain destination is unique, with its primary and secondary offer, and therefore the same long-term recommendation for adapting to a warmer climate is not appropriate.

The above-mentioned activities may even contribute to the reduction of seasonality, as the difference between the winter and summer seasons will gradually become smaller. The services available throughout the year will increase the quality of life and income of locals and tourism businesses. If quality is prioritized over quantity, sustainable tourism can be fully developed in mountain destinations.

To achieve the prosperity of mountain areas, environmental awareness should be promoted at national, regional, and even business level. Public transport network should be provided, in order to minimize car mobility. Innovations with the aim of reducing water and energy consumption should be rewarded at the destination level and supported at the regional or national level. Waste separation, but in particular the reduction of waste generation should be accepted by all stakeholders.

Despite the difficult period associated with pandemic measures, and closed mountain destinations, they may be sufficiently resilient and able to recover from difficulties. It is the resumption of tourism in mountain destinations that should become flexible and ready for change. The identification of weaknesses and measures to strengthen them should be the key to relaunching more sustainable mountain tourism. It is assumed that those mountain destinations that will visitors see as more sustainable, will be more competitive. Given that visitors' needs may change, especially in the post-Covid period, the success of an alternative strategy can be expected. Visitors will prefer destinations where they will be able to perform outdoor activities in a large space and may even look for cheaper winter holidays. They will want to feel safe and stay healthy. On the contrary, people lack social contact and therefore will want to socialize, whether with their loved ones or by getting to know the locals. From that perspective, mountain destinations from Central and Eastern Europe could become popular, even if there ski conditions will not be suitable. It is therefore essential to start changing the attitude towards climate change and consider environmentally sustainable alternative tourism in all mountain destinations.

CONCLUSION

The master thesis presents the impact of climate change on entrepreneurship in destinations located in the mountain environment. In general, climate change has a negative impact on business as such, and on mountain destinations in particular, as with changing climatic conditions and global warming, the conditions for skiing may become unfavorable. Due to global warming, the boundaries of natural snow may even shift, and destinations at lower altitude may not be suitable for providing services to visitors interested in winter sports, which require snow cover.

The aim of the master thesis was to find out how tourism companies in the mountain destination Val Gardena adapt to the changing climate and how they try to prevent problems related to climate change. According to the researched area, the future direction of winter tourism in Val Gardena as well as general framework applicable to mountain destinations with regards to changing climatic conditions was proposed. Future strategies of winter mountain tourism were proposed in the third part of the master thesis, which is considered to be an added value of the thesis. The fulfillment of the aim of the master thesis consisted in the fulfillment of partial aims, which focused on identifying climatic conditions in Val Gardena, analyzing the impacts of climate change on mountain destinations as well as tourism enterprises and identifying steps to mitigate the impact on the environment. The fulfillment of partial aims can be confirmed by answering five research questions, namely:

RQ1: How has climate changed in selected mountain destination in last 40 years and what is the trend of these changes in the future?

RQ2: What problems do enterprises and selected mountain destination face due to climate change?

RQ3: To what extent do companies operating in selected mountain destination prevent the impact of climate change?

RQ4: What steps are enterprises and the destination undertaking to mitigate the impact on climate through established innovations?

RQ5: Who is the leader in innovations related to climate change in mountain destination?

In order to successfully meet the research aim, the first chapter defined the theoretical basis of mountain destinations, the impact of climate change on business in

mountain destinations and innovations to mitigate the climate impacts. The second chapter, research in the mountain destination Val Gardena, focused on answering research questions. The sample consisted of 157 tourism companies and the tourism association in Val Gardena. Research was focused primarily on the impact of climate change during the winter season. The research also included evaluation of climatic conditions of last 40 winter seasons from the end of November to mid-April. The aim of the third chapter was to propose appropriate solutions to mitigate the environmental impacts of businesses, as well as climate change adaptation strategies in Val Gardena and in mountain destinations in general.

RQ1: How has climate changed in selected mountain destination in last 40 years and what is the trend of these changes in the future?

The selected destination Val Gardena is located in the Italian Dolomites and climate is alpine. Climatic conditions change over time, but it is clear that the change is more evident due to human activity. With the development of tourism in mountain destinations, the impact on the environment is also growing, whether through energy consumption, deforestation, or pollution. According to the research, climate change in Val Gardena can be observed especially in winter and is accompanied by weather fluctuations and a significant increase in average temperatures. From the primary research it is also clear, that simulated average temperatures in a selected mountain destination have increased during the winter seasons more than the global average temperature so far. The amount of natural snow, the number of days with snowfall, the average soil temperature, and the average number of hours of sunshine per day are indicators, that show the highest fluctuation when comparing seasons and have a slightly increasing trend. On the contrary, relative humidity shows a declining trend during the period. Of concern is the increase in average temperatures, which rose to values just below 0 degrees Celsius during the observed period. This means that the impact of climate change on business in Val Gardena is not significant, as average temperatures are not too high to prepare ski slopes. Ski conditions are even favourable during some seasons due to fluctuations. Results of the primary research confirmed the claim of the secondary research, namely that climate change in high-lying mountain destinations results in fluctuations accompanied by an excessive amount of snowfall. On the contrary, during the observed period some seasons that had a significant lack of natural snow can be seen. That could affect the quality of the slopes

or the winter atmosphere, but the operation was not suspended. During the years, winter season was even extended. However, this is an interesting finding, because comparing monthly values, due to climate change, the amount of natural snow decreases in November, December, and April, while in January, February, and March it increases. Due to the fact that a further increase in temperatures is expected in the future, an overall deterioration of the conditions for the performance of ski sports as well as for the provision of slopes is expected, either by modifying natural or producing artificial snow.

RQ2: What problems do enterprises and selected mountain destination face due to climate change?

Due to climate change, mountain destinations at lower altitude have more significant problems worldwide compared to higher lying destinations. Due to the fact that destinations at lower altitude are often family destinations with a lack of capital, they are unable to provide, especially in the winter season, suitable conditions to satisfy the requirements of visitors. As a result, Val Gardena and other destinations at higher altitude are experiencing an increase in the number of visitors, increased mobility of visitors as well as a greater burden on the environment. The increase in the number of visitors is considered to be a secondary effect of climate change, as visitors prefer destinations with suitable conditions for skiing, and Val Gardena is such a place so far. The threat to the destination Val Gardena, as well as to businesses, is the shortening length of stay of visitors, what results in even higher mobility, and has a negative impact on the environment. In addition, some seasons in Val Gardena face the direct impact of climate change, namely the lack of natural snow, especially at the beginning and end of the season. However, this does not have a significant effect on the number of incoming visitors, as the dependence between the indicators in the research has not been confirmed. The increase in average temperatures, which will be even higher in the future, is worrying. At present, however, businesses in Val Gardena are not threatened by rising temperatures.

RQ3: To what extent do companies operating in selected mountain destination prevent the impact of climate change?

The increase in the number of visitors in the destination Val Gardena is not limited, but based on the primary research, it is clear that the tourism association has

the interest in reducing mobility and extending the average length of stay of visitors. From own experience it is clear that both accommodation facilities and the destination try to minimize driving of visitors during their stay by providing transport services, either by providing free public transport or by transporting visitors by hotel minibuses. These activities have a positive impact on the environment. Due to climate change, the amount of snow cover in some seasons is insufficient, especially at the beginning and end of the season. In the destination, slopes are regularly adjusted to ensure their cleanliness, so the sun's rays are not absorbed, but are reflected back. In addition to natural snow, Val Gardena produces artificial snow. During the production of artificial snow, no chemical additives are added to the water and electricity from local producers is used for production. Due to this, the production of artificial snow in Val Gardena is considered to be environmentally friendly, but the prolongation of the winter season causing a shift in the germination process as well as the possible death of plant species is considered unfavorable.

RQ4: What steps are enterprises and the destination undertaking to mitigate the impact on climate through established innovations

Some tourism companies also provide services outside the summer and winter seasons, what can reduce the seasonality and allows the product to gradually diversify. In the long run, this is an important step in the development of tourism in mountain destinations following the effects of climate change. Businesses in Val Gardena separate waste, and from the research it is clear, that some businesses are trying to reduce the amount of used plastic boxes, either by buying non-packaging products or by buying reusable products. Businesses in Val Gardena are trying to reduce energy production and water consumption, innovating by thermal insulation, or using energy from renewable sources, such as installing solar panels. In addition, businesses buy local products. Some businesses have even introduced the custom of accepting visitor bookings only for stays exceeding one week. At destination level, public transport is provided free of charge to visitors, what has the effect of reducing visitor’s driving as well as reducing pollution.

RQ5: Who is the leader in innovations related to climate change in mountain destination?

Decentralized management of tourism businesses can be observed in the mountain destination Val Gardena. Most businesses are family-owned and provide services for several generations. There is one operator of passenger transport services at the destination, while some lifts are managed by entrepreneurs themselves. In addition to accommodation and restaurant facilities, and providers of additional services in the destination, there is a marketing organization and tourism association. Based on research, it is clear that, despite the highly developed tourism infrastructure, climate change issues are not managed by one specific entity, but by several innovative companies. The tourism association itself considers three specific accommodations to be leaders in the innovations related to climate change, operating in accordance with ecological principles and introducing sustainable innovations. Although there is no single leader in the destination, businesses, the region as well as the tourism association are considered leaders by some respondents, given the introduction of environmentally friendly innovation, the promotion of environmentally sustainable practices and business-oriented requirements. Although there is a lack of leadership in climate change innovation, there is an awareness of climate change as well as innovativeness among companies themselves. It can be stated that the destination creates a complex product for visitors and the issues related to climate change are perceived as complementary decisions of innovative companies, the number of which is constantly increasing.

Important information from the theoretical part of the thesis were findings of authors that climate change is intensely perceived by large mountain destinations at higher altitude, but also by family businesses, whose business is a deep-rooted tradition. Based on the analytical part of the thesis, this statement is confirmed, because Val Gardena is part of 12 interconnected mountain destinations of the Dolomites, and tourism services are mainly provided by family businesses. The analysis showed that companies perceive the impact of climate change and introduce environmentally friendly innovation. Based on the statements of the authors in the theoretical part of the thesis, the emphasis on the sustainability of mountain destinations was placed. The key concept from the theoretical part of the thesis for the third part of the work was the adoption of suitable alternative strategies for winter

tourism in mountain destinations. Based on the empirical research of a selected mountain destination, it can be stated that:

- climate change is affecting business in the Alpine environment, especially during the winter season,

- the selected destination as well as the region take steps to develop sustainability, by stopping the construction of new buildings and providing public transport free of charge, and thus respect the carrying capacity of the destination,

- the initiative is seen in reducing seasonality as well as gradually increasing the average length of stay, which can be considered as elements of economic sustainability.

Due to changing climatic conditions, taking in account theoretical and empirical research, possible adaptation strategies for winter tourism in Val Gardena to support the development of tourism have been proposed. In the long term, tourism in Val Gardena should be developed even more environmentally sustainable, whose services do not require sufficient whether natural or artificial snow cover on slopes. It is clear that skiing will be at risk in a few decades, so it is important to raise awareness of alternatives that would reduce seasonality, emphasize the connection between the traditions and relationship of locals and visitors, and promote other sport activities.

Based on the diversity of mountain destinations in the world, strategies for environmentally friendly ski tourism have generally been proposed as well as strategy with a strong emphasis on the development of alternative activities. The basis for businesses in mountain destinations is ecological awareness, reducing seasonality and mobility and increasing the average length of stay of visitors. However, it is questionable how ski destinations will be able to change the product and how much visitors will be willing to change their requirements for winter holidays in the mountains.

The availability of theoretical and practical research focusing on the impact of climate change in mountain destinations and the possibility of comparing other mountain destinations with the researched mountain destination Val Gardena in the long run are considered to be an author's contribution. In addition, the outcomes of the thesis can be used for further research and assessment of the direction of destinations, tourism organizations as well as the regions themselves. With regard to the fulfillment of the partial aims, full answers to research questions and the proposal of the strategy

for the selected destination as well as mountain destinations in general, the research aim is considered to be fulfilled.

SUMMARY

Diplomová práca prezentuje vplyv klimatickej zmeny na podnikanie v cieľových miestach položených v horskom prostredí. Všeobecne má klimatická zmena negatívny vplyv na podnikanie ako také, a na horské strediská obzvlášť, nakoľko s meniacimi sa klimatickými podmienkami a globálnym otepľovaním sa podmienky na vykonávanie lyžiarskych športov komplikujú. Vplyvom otepľovania sa hranice prírodného snehu môžu dokonca posunúť a nižšie položené cieľové miesta tak nemusia byť vhodné na poskytovanie služieb návštevníkom zaujímajúcim sa o zimné športy, ktorých podmienkou je snehová pokrývka.

Cieľom výskumu diplomovej práce bolo zistiť, ako sa podniky cestovného ruchu v horskom stredisku Val Gardena adaptujú na meniace sa podnebie a ako sa snažia predchádzať problémom súvisiacim so zmenou podnebia Podľa skúmanej oblasti bolo navrhnuté budúce smerovanie zimného cestovného ruchu vo Val Gardene, ako aj všeobecný rámec použiteľný pre horské strediská s ohľadom na meniace sa klimatické podmienky. V tretej časti diplomovej práce boli navrhnuté budúce stratégie zimnej horskej turistiky, čo sa považuje za pridanú hodnotu práce. Naplnenie cieľa diplomovej práce spočívalo v naplnení čiastkových cieľov, ktoré sa zameriavali na identifikáciu klimatických podmienok vo Val Gardene, analýzu dopadov zmeny podnebia na horské strediská, ako aj na podniky cestovného ruchu a identifikáciu krokov na zmiernenie dopadu na prostredie. Splnenie čiastkových cieľov možno potvrdiť zodpovedaním piatich výskumných otázok, a to:

RQ1: Ako sa zmenilo podnebie vo vybranom horskom stredisku za posledných 40 rokov a aký je vývoj týchto zmien v budúcnosti?

RQ2: Akým problémom čelia podniky a vybrané cieľové miesto v dôsledku zmeny podnebia?

RQ3: Do akej miery bránia podniky pôsobiace vo vybranom cieľovom mieste dopadom zmeny podnebia?

RQ4: Aké kroky podnikajú podniky a cieľové miesto na zmiernenie vplyvu na podnebie prostredníctvom zavedených inovácií?

RQ5: Kto je lídrom v oblasti inovácií týkajúcich sa zmeny podnebia vo vybranom cieľovom mieste?

Pre úspešné splnenie výskumného cieľa boli v prvej kapitole definované teoretické východiská horských stredísk, vplyv zmeny podnebia na podnikanie v horských strediskách a inovácie na zmiernenie klimatických dopadov. V druhej kapitole sa primárny výskum horského strediska Val Gardena zameral na zodpovedanie výskumných otázok. Výberovým súborom bolo 157 podnikov cestovného ruchu a združenie cestovného ruchu vo Val Gardene. Výskum sa primárne zameriaval na vplyv klimatickej zmeny počas zimnej sezóny. Súčasťou výskumu bolo aj sledovanie klimatických podmienok posledných 40 zimných sezón v čase od konca novembra do polovice apríla. Cieľom tretej kapitoly bolo navrhnúť vhodné riešenia na zmiernenie environmentálnych dopadov podnikania, ako aj stratégií adaptácie na zmenu podnebia vo Val Gardene a v horských strediskách všeobecne.

RQ1: Ako sa zmenilo podnebie vo vybranom horskom stredisku za posledných 40 rokov a aký je vývoj týchto zmien v budúcnosti?

Vybrané cieľové miesto Val Gardena leží v talianskych Dolomitoch a je preň charakteristické vysokohorské podnebie. Klimatické podmienky sa časom menia, no je zrejmé, že vplyvom ľudskej činnosti je zmena evidentnejšia. Rozvojom cestovného ruchu v horských strediskách rastie aj vplyv na prostredie, či už spotrebou energií, odlesňovaním, alebo znečistením. Podľa výskumu možno zmenu podnebia vo Val Gardene pozorovať najmä v zimnom období a je sprevádzaná výkyvmi počasia a výrazným nárastom priemerných teplôt. Množstvo prírodného snehu, počet dní so snehovými zrážkami, priemerná teplota pôdy a priemerný počet slnečných hodín denne sú ukazovatele, ktoré vykazujú pri porovnávaní sezón najvyššiu fluktuáciu, a majú mierne rastúci trend. Naopak, relatívna vlhkosť v skúmanom období vykazuje klesajúci trend. Znepokojujúci je nárast priemerných teplôt, ktorý za sledované obdobie vzrástol na hodnoty tesne pod 0 stupňov Celzia. Znamená to však, že zatiaľ vplyv klimatickej zmeny na podnikanie vo Val Gardene nie je výrazný, pretože priemerné teploty nedosahujú nadmerne vysoké hodnoty a vplyvom fluktuácií sú snehové podmienky počas niektorých sezón priaznivé. Výsledky primárneho výskumu potvrdili tvrdenie sekundárneho výskumu a to také, že výsledkom klimatickej zmeny vo vysoko položených horských strediskách môžu byť fluktuácie sprevádzané nadmerným množstvom snehových zrážok. Naopak, za sledované obdobie možno vidieť aj sezóny, ktoré mali výrazný nedostatok prírodného snehu, čo síce mohlo ovplyvniť kvalitu svahov a atmosféru, no prevádzka nebola pozastavená.

V sledovanom období bola sezóna dokonca predĺžená. Je to zaujímavé zistenie, pretože porovnávajúc mesačné hodnoty, vplyvom klimatickej zmeny množstvo prírodného snehu klesá v mesiacoch november, december a apríl, zatiaľ čo v mesiacoch január, február a marec má rastúci charakter. Vzhľadom na to, že sa predpokladá ďalší nárast teplôt, v budúcnosti sa očakáva celkové zhoršenie podmienok na vykonávanie lyžiarskych športov ako aj na zabezpečenie svahov či už úpravou prírodného alebo výrobou umelého snehu.

RQ2: Akým problémom čelia podniky a vybrané cieľové miesto v dôsledku zmeny podnebia?

Vplyvom zmeny podnebia majú nižšie položené horské strediská celosvetovo výraznejšie problémy v porovnaní s vyššie položenými horskými strediskami. Vzhľadom na to, že ide často o rodinné strediská s nedostatkom kapitálu, nedokážu zabezpečiť, najmä v zimnej sezóne, vhodné podmienky pre uspokojenie požiadaviek návštevníkov. Dôsledkom toho zaznamenáva Val Gardena ako horské stredisko vo vysokej nadmorskej výške nárast v počte návštevníkov, zvýšenú mobilitu návštevníkov ako aj väčšie zaťaženie prostredia. Nárast v počte návštevníkov sa považuje za sekundárny vplyv zmeny podnebia, nakoľko návštevníci uprednostňujú cieľové miesta s vhodnými podmienkami na vykonávanie lyžiarskych športov, a takýmto miestom zatiaľ Val Gardena je. Hrozbou pre cieľové miesto Val Gardena ako aj pre podniky, je skracujúca sa dĺžka pobytu návštevníkov, ktorej výsledkom je ešte vyššia mobilita, ktorá negatívne vplýva na prostredie. Okrem toho čelí Val Gardena niektoré sezóny priamemu vplyvu klimatickej zmeny, a to nedostatku prírodného snehu, najmä na začiatku a na konci sezóny. Nemá to však výrazný vplyv na počet prichádzajúcich návštevníkov, nakoľko sa závislosť medzi ukazovateľmi vo výskume nepotvrdila. Znepokojujúci je nárast priemerných teplôt, ktorý v budúcnosti bude ešte vyšší. V súčasnosti však podniky vo Val Gardene nie sú ohrozené nárastom teplôt.

RQ3: Do akej miery bránia podniky pôsobiace vo vybranom cieľovom mieste dopadom zmeny podnebia?

Nárast počtu návštevníkov v cieľovom mieste Val Gardena nie je limitovaný ale na základe primárneho prieskumu je jasné, že združenie cestovného ruchu má v záujme znížiť mobilitu a predĺžiť priemernú dĺžku pobytu návštevníkov. Z vlastnej

skúsenosti je zrejmé, že ako ubytovacie zariadenia tak aj cieľové miesto sa snažia znížiť mobilitu návštevníkov počas pobytu, poskytovaním prepravy či už verejnou dopravou bez doplatku alebo prepravou návštevníkov hotelovými minibusmi. Tieto aktivity majú pozitívny vplyv na prostredie. Vplyvom klimatickej zmeny je množstvo snehovej pokrývky najmä na začiatku a na konci sezóny nedostatočné. V cieľovom mieste sa pravidelne upravujú svahy, čím sa zabezpečí ich čistota a slnečné lúče sa nevstrebávajú, ale odrážajú sa späť. Okrem prírodného snehu je vo Val Gardene vyrábaný umelý sneh. Počas výroby umelého snehu sa do vody nepridávajú žiadne chemické prísady a na výrobu je použitá elektrická energia od lokálneho poskytovateľa. Vzhľadom na to je výroba umelého snehu vo Val Gardene považovaná za šetrnú k prostrediu, avšak predlžovanie zimnej sezóny spôsobujúce posun procesu klíčenia ako aj možný úhyn rastlinných druhov sa považuje za nepriaznivé.

RQ4: Aké kroky podnikajú podniky a cieľové miesto na zmiernenie vplyvu na podnebie prostredníctvom zavedených inovácií?

Niektoré podniky poskytujú služby aj mimo letnej a zimnej sezóny, čím sa zmierňuje sezónnosť a produkt sa tak postupne môže diverzifikovať. Z dlhodobého hľadiska je to dôležitý krok na rozvoj cestovného ruchu v horských strediskách po vplyve zmeny klímy. Podniky separujú odpad a z výskumu je zrejmé, že niektoré podniky sa snažia redukovať množstvo použitých nádob či už nákupom bezobalových produktov alebo nákupom znovu použiteľných výrobkov. Podniky vo Val Gardene sa snažia znížiť produkciu energie a spotrebu vody, inovujú spôsobmi zateplenia, alebo využitia energie z obnoviteľných zdrojov, ako napríklad inštaláciou solárnych panelov. Okrem toho podniky nakupujú lokálne výrobky. Niektoré podniky dokonca zaviedli zvyk akceptovať rezerváciu návštevníkov len na pobyt presahujúci jeden týždeň. Na úrovni cieľového miesta sa poskytuje verejná doprava návštevníkom zdarma, čo má vplyv na zmiernenie mobility ako aj zníženie úrovne znečistenia.

RQ5: Kto je lídrom v oblasti inovácií týkajúcich sa zmeny podnebia vo vybranom cieľovom mieste?

V cieľovom mieste Val Gardena možno pozorovať decentralizované riadenie podnikov cestovného ruchu. Väčšina podnikov je rodinných, a služby poskytujú niekoľko generácií. V cieľovom mieste je jeden prevádzkovateľ služieb osobných dopravných zariadení, pričom niektoré vleky sú pod správou samotných majiteľov

zariadení cestovného ruchu. Okrem ubytovacích a stravovacích zariadení a poskytovateľov doplnkových služieb v cieľovom mieste pôsobí marketingová organizácia a združenie cestovného ruchu. Na základe výskumu je zrejmé, že napriek rozvinutej infraštruktúre cestovného ruchu otázky klimatickej zmeny neriadi jeden konkrétny subjekt, ale niekoľko inovatívnych podnikov. Samotné združenie cestovného ruchu považuje za lídrov v boji proti klimatickej zmene tri konkrétne ubytovacie zariadenia, ktoré podnikajú v súlade s ekologickými princípmi a zaviedli udržateľné inovácie. Napriek tomu, že v cieľovom mieste nie je jednotný líder, podniky, región ako aj združenie cestovného ruchu sú niektorými respondentmi považované za lídrov, vzhľadom na zavedenie ekologických inovácií, propagáciu ekologicky udržateľných praktík a požiadavky smerujúce na podniky. Síce v oblasti inovácií týkajúcich sa zmeny podnebia v cieľovom mieste chýba líder, naprieč podnikmi je cítiť povedomie o klimatickej zmene ako aj inovatívnosť samotných podnikov. Možno konštatovať, že tak ako cieľové miesto vyvára komplexný produkt pre návštevníkov, tak aj otázky týkajúce sa zmeny podnebia sú vnímané ako navzájom dopĺňajúce sa rozhodnutia inovatívnych podnikov, ktorých počet neustále pribúda.

Dôležitými informáciami teoretickej časti práce boli zistenia autorov, že klimatickú zmenu intenzívne vnímajú veľké vysokohorské strediská, ale aj rodinné podniky, ktorých podnikanie je hlboko zakorenenou tradíciou. Na základe analytickej časti práce je toto tvrdenie potvrdené, pretože Val Gardena je súčasťou 12 prepojených horských stredísk Dolomitov. Služby cestovného ruchu sú prevažne poskytované rodinnými podnikmi a z analýzy vyplynulo, že podniky vnímajú vplyv klimatickej zmeny snažia sa zmierniť vplyv svojej činnosti na prostredie rôznymi environmentálnymi inováciami. Na základe vyjadrení autorov v teoretickej časti práce sa v práci kládol dôraz na udržateľnosť horských stredísk. Kľúčovými konceptmi z teoretickej časti práce pre návrhovú časť práce bolo práve prijatie vhodných alternatívnych stratégií zimného cestovného ruchu v horských strediskách. Na základe empirického prieskumu na vybranom horskom stredisku je možno konštatovať, že:

- klimatická zmena ovplyvňuje podnikanie v alpskom prostredí najmä počas zimnej sezóny,
- vybrané cieľové miesto ako aj región podnikajú kroky na rozvoj udržateľnosti, ako napríklad zastavením výstavby nových budov a zabezpečením verejnej

dopravy návštevníkom zdarma, čím rešpektujú únosnú kapacitu cieľového miesta,

- je vidieť iniciatívu v zmiernení sezónnosti ako aj postupnému predlžovaniu priemernej dĺžky pobytu, čo je možné považovať za prvky ekonomickej udržateľnosti.

Vzhľadom na rýchlo sa meniace klimatické podmienky boli pre zimný cestovný ruch vo Val Gardene na základe teoretického a empirického prieskumu navrhnuté možné adaptačné stratégie, ktorých cieľom bolo podporovať rozvoj cestovného ruchu, avšak udržateľnejšie a ktorých poskytované služby nevyžadujú dostatok snehovej pokrývky na svahoch či už prírodného alebo umelého snehu. Je zrejmé, že o niekoľko desaťročí budú lyžiarske športy ohrozené a preto je dôležité rozširovať povedomie o alternatívach, ktorých výsledkom by bolo zníženie sezónnosti, dôraz na prepojenie tradícií a vzťahu domácich obyvateľov s návštevníkmi ako aj zachovanie ostatných športových aktivít.

Na základe rozmanitosti horských stredísk vo svete boli všeobecne navrhnuté stratégie udržania lyžiarskeho cestovného ruchu aj ako silný dôraz na rozvoj alternatívnych aktivít. Základom pre podniky v horských strediskách je ekologická uvedomelosť, znižovanie sezónnosti a mobility a rast priemernej dĺžky pobytu návštevníkov. Je však otázne, ako budú v budúcnosti lyžiarske cieľové miesta schopné zmeniť produkt a do akej miery budú návštevníci ochotní zmeniť svoje požiadavky na zimnú dovolenku v horách.

Za autorský prínos sa považuje dostupnosť teoretických aj praktických východísk zameriavajúcich sa na vplyv klimatickej zmeny v horských strediskách a možnosť porovnania sa ostatných horských stredísk so skúmaným horským strediskom Val Gardena aj z dlhodobého hľadiska. Okrem toho sú výstupy práce využiteľné na ďalšie skúmanie a na posúdenie smerovania cieľových miest, organizácií cestovného ruchu ako aj samotných regiónov. Vzhľadom na naplnenie parciálnych cieľov, plnohodnotné zodpovedanie výskumných otázok a navrhnutie stratégie pre vybrané horské stredisko ako aj horské strediská všeobecne sa považuje výskumný cieľ za naplnený.

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APPENDICES

Appendix 1 Questions for the interviews in German

1. Das Klima ändert sich ständig und die Temperatur in Val Gardena steigt von Jahr zu Jahr. Beobachten Sie häufige Wetterschwankungen? Wenn ja, mit denen Val Gardena während der Wintersaison konfrontiert ist? Sind solche Situationen in der Winter- oder Sommersaison häufiger?
2. Ich gehe davon aus, dass die Auswirkungen des Klimawandels auf die Destination aufgrund der Meereshöhe nicht groß sind. Denken Sie das jeweils in der Zukunft? In welchem Zeitraum wird Val Gardena zu Probleme mit Klima kommen?
3. Wie werden die Pisten in der Skigebiet gepflegt und präpariert (gibt es eine alternative oder nachhaltige Art des Kunstschnees, benutzt man chemische Mitteln, gibt es Umweltregeln, welche Bedingungen sind erforderlich, um Beschneiungssysteme zu betreiben)?
4. In welcher Saison kommen mehr Besucher? Welche Jahreszeit bringt mehr Gewinn und welche ist umweltverträglicher?
5. Der Tourismussystem in Südtirol sieht man als dezentralisierter. Ist das bei Val Gardena der Fall? Ist dies bei allen Arten von Unternehmen der Fall (Unterkunft, Verpflegung, Zusatzeinrichtungen, Seilbahnen)? Wie sieht die Zusammenarbeit zwischen Tourismusunternehmen in der Destination aus? Arbeitet Val Gardena als Zielort mit Unternehmen zusammen, um den Klimawandel zu bekämpfen?
6. Wer ist der größte Leader im Bereich Klimaschutz in Val Gardena und warum?
7. Welche konkreten Schritte unternimmt Val Gardena, um die Wintersaison nachhaltiger (weniger umweltschädlich) zu gestalten?
8. Hat Val Gardena Schritte unternommen, um sich an den Klimawandel anzupassen? Hat sich die Wintersaison verschoben, verkürzt oder verlängert?
9. Welche Innovationen hat Val Gardena eingeführt, um die Umweltauswirkungen des Tourismus zu minimieren?
10. Da der stetige Anstieg der Besucherzahlen im Laufe der Jahre zu beobachten ist, es ist zu erwarten, dass sich dieser Trend fortsetzt, da Val Gardena sich in großer Meereshöhe befindet und einen Wettbewerbsvorteil hat. Werden die steigende Besucherzahlen im Val Gardena positiv oder negativ

wahrgenommen? Versuchen sie, die Aufenthaltsdauer zu verlangen, da die Aufenthaltsdauer im Laufe der Jahre abnimmt?

Source: Own processing, 2021.

Appendix 2 List of companies to which the questionnaire was sent

Enterprise	E-mail contact	Family name
Mountain Residence Merk	info@residence-merk.com	-
B&B Cudlea	info@cudlea.it	-
Hotel Alpino Plan	info@hotel-alpino.com	-
Albergo Silvana	info@hotel-silvana.it	-
Garni Hotel Wildbach	info@garni-wildbach.com	Longhi
Hotel Jagdhof	info@jagdhof.bz	-
Apartments Janon	info@apartmentsjanon.it	-
Hotel Cesa Alpina	info@hotelalpinhaus.com	-
Residence Frea	info@residencefrea.it	-
Stoffelapartments	info@stoffel.it	Nocker
Hotel Ingram	info@hotelingram.com	Lussardi
Hotel Edda	info@hoteledda.it	Dander
Garni Ortles Angelo	info@ortles-angelo.com	Mussner / Leitner
Garni la Grambla	info@la-grambla.com	-
Boutique Hotel Pralong	info@hotelpralong.it	-
Savoy Dolomites Luxury Hotel Spa	info@savoy-dolomites.com	-
Mountain Design Hotel Eden Selva	info@edenselva.com	Demetz
Hotel Genziana	info@hotel-genziana.it	-
Residence Carin	info@residencecarin.it	-
Apartments Rondula	info@rondula-selva.it	Gluck
Albergo Schenk	info@garni-schenk.it	Schenk
Giardin BOutique Hotel B&B	info@giardin.it	Feller
Chalet Elisabeth	info@chaletelisabeth.it	Senoner
HOtel Laurin	info@hotel-laurin.it	-
Hotel Corona	info@hotel-corona.it	Vinatzer
Hotel Sun Valley	info@hotelsunvalley.it	Nogler
Chalet Aldian	info@aldian.it	-
Hotel Scoiatollo	scoiattolo@rolmail.net	-
Residence Risaccia	info@risaccia.it	Perathoner
Hotel Continental	mail@hotelcontinental.eu	Linder
Pension Villa Erna Snc di Mussner	info@villa-erna.com	Mussner
App. Cesa Helene	info@ciaslat.it	-
Cedepuent de sot	info@cedepuent.it	Senoner-Mussner
Residence Katiusca	info@katiuscia.net	Demetz
Ap. a garni Sunela	info@sunela.com	-
Ap. a garni Sunela	info@garni-bonega.it	-
Plazola	info@hotelplazola.com	-
Garni Charlotte	info@garnicharlotte.com	-

Apartment WURDENGEJA	app.johanna@wurdengeja.it	Senoner Streimar
Apartment Edelraut	info@edelraut.com	-
Residence Udera	info@udera.it	Bauer
Pension Daniel	info@pension-daniel.com	Senoner
Soleiga	info@soleiga.com	-
Residence Ariola	info@ariola.it	-
Hotel Granbaita	info@hotelgranbaita.com	-
Boutique Hotel Nives	info@hotel-nives.com	-
Hotel Mignon	info@hotel-mignon.it	Designori
Linder	info@linder.it	-
Antares hotel	antares@residencehotels.com	-
Garni Miara	info@garnimiara.com	Perathoner
Solaia	info@hotel-solaia.com	-
Oswald hotel	info@hoteloswald.com	-
Armin	info@hotelarmin.com	Fam. Pitscheider
Des Alpes	hotel@desalpes.info	-
Hotel Posta al Cervo	info@hotelpostaalcervo.com	-
Apartments Everest	info@apartments-everest.com	Soppelsa
Residence Vila Leck	info@leck.it	-
Alpsonn residence	info@alpsonn.it	-
Hotel Belevue	info@hotelbellevue.info	Kelder
Spinaces	info@spinaces.com	-
B&B Bel pra	info@belpra.com	-
privatpension fudle	info@fudle.com	Demetz
Hotel Piccolo	info@hotel-piccolo.com	Prinoth
Predes	info@predes.it	-
Residence Angelica	info@residence-angelica.com	-
Arjentel	arjentel@amonit.bz.it	Senoner-Mussner
Hotel Alpenroyal	info@alpenroyal.com	-
Garni Profanter	info@hausprofanter.com	Profanter
Hotel Welponer	info@welponer.it	Welponer
Arthotel Antherleghes	info@arthotel.bz	-
Apartments Valantin	info@valantin.it	-
Chalet Val Gardena	info@chaletvalgardena.it	-
Hotel La Pineta	info@hotel-la-pineta.com	Mussner
Hotel Promenade	info@promenade.bz	-
Apartment Mauriz	info@mauriz.it	-
Hotel Flora	info@flora.bz	-
Garni La Bercia	info@garnilabercia.com	-
Appartments Fussel	info@apartmentsfussel.it	Perathoner
Albergo Dolomie	info@dolomieu.eu	-

Hotel Miravalle	info@hotelmiravalle.it	-
Haus Gabriella	info@hausgabriella.com	Frontull
Garni Hotel "Arya Alpine Lodge"	info@aryaalpinelodge.com	Insam
Villa Evelin	info@villaevelin.com	Obletter
Villa Maria	info@garni-maria.com	Senoner Werner
Apartments Splendid	info@apartmentssplendid.com	-
Apartments Isgla	info@apartmentsfrisch.com	-
Hotel Somont	info@hotelsomont.com	-
Hotel Else	info@hotelelse.com	-
Villa Sobosch	info@sobosch.it	Nocker
Hotel Valpudra	info@valpudra.com	-
Residence Sassolungo	sassolungovalgardena@gmail.com	-
Garni Wolf	info@garniwolf.it	-
Hotel Meisules	info@hotelmeisules.it	-
Hotel Sella	info@hotelsella.it	-
Hotel Muliac	info@muliac.com	Kostner
Garni Hotel Rosengarten	info@garnihotelrosengarten.it	-
Residence Villa Funtanes	info@funtanes.com	-
Hotel Alaska	INFO@HOTELALASKA.IT	-
La Majon Apartments	info@lamajon.it	De Sisti
Apartments Tinahof	info@tinahof.com	Lardschneider
Garni Morene	info@morene.it	-
Residence Crespeina	info@crespeina.com	Lardschneider
Pension Belsté	info@belste.it	Perathoner
App. Sun Burdengeja	app.dejaco@gmail.com	Dejaco
Apartments Belaut	info@belaut.it	Senoner
Apartments Dolores	info@app-dolores.it	Gasser/Senoner
Agroturismo Gutonhof	info@gutonhof.com	Perathoner
Ap. Valin	info@valin.it	-
Hotel Val	info@hotelval.it	Mussner
La Stua	info@la-stua.com	-
Luislkeller	info@luislkeller.com	-
Baita Ciavaz	info@baitaciavaz.it	Mussner
Gran Paradiso	annette.perathoner@gmx.at	-
Albergo Piz Seteur	info@pizseteur.it	-
Baita Ciadinat	info@ciadinat.it	-
Baita Vallongia	info@baita-vallongia.com	-
Rifugio Comici	info@rifugiocomici.com	-
Cafe Mozart	info@cafe-mozart.it	-
Villa Frainela	info@villafrainela.it	Comploj
Rifugio Panorama	info@baitapanorama.it	Mussner

Dantercepies Mountain Lounge	hannes.demetz@gmail.com	-
Baita Ciampac	info@baitaciampac.it	-
La Bula Restaurant	info@la-bula.com	-
Braustube Maciaconi	maciaconi@gardenahotels.com	-
Winebar L´Medel	medel@gardenahotels.com	-
Grand Hotel Wolkenstein	info@wolkenstein.it	-
Boutique & Fashion hotel Maciaconi	info@hotelmaciaconi.com	-
Hotel Gardenia	hotelgardenia@gardenahotels.com	-
Villa Gardena	villagardena@gardenahotels.com	-
Residence Garden	residencegarden@gardenahotels.com	-
L Muline	info@muline.it	-
Ristorante B24	info@bistrot24.eu	-
Chalet Gerard	INFO@CHALET-GERARD.COM	-
Hotel Europa	info@pensioneuropa.it	Costa
Restaurant Rustclea	info@rusctlea.com	Pitscheider
Speckkeller	info@speckkeller.com	-
Hotel Sochers	HOTELSOCHERS@SASLONG.IT	-
Suinson Tyrol	info@tyrolhotel.it	-
Rifugio Juac	info@juac.it	-
Baita Ciaulonch	ciaulonch@cisles.it	-
Rifugio Firenze	info@rifugiofirenze.com	Perathoner
Almhotel Col Raiser	info@colraiser.com	Schenk
Baita Gamsblit Hutte	info@gamsblut.it	Runggaldier
Baita Odles	info@odles.info	Perathoner
Malga Nëidia Hütte	neidia@virgilio.it	-
Malga Lech Sant	info@lechsant.it	Runggaldier
Baita Cuca	info@cuca.it	-
Rifugio Fermeda	info@fermeda.com	-
Baita Daniel	daniel@seceda.cc	Demez
Baita Troier	info@troier.com	Runggaldier
Sofie Hutte	info@seceda.com	Prinoth
Ristorante Seceda	info@restaurantseceda.com	-
Baita Curona	info@curona.it	Stuflesser
Baita Seurasas Hutte	info@seurasas.it	Runggaldier
Rifugio VIcenza	info@rifugiovicenza.com	-
Hotel Cendevaves	info@cendevaves.it	Stuffer
Sporthotel Monte Pana	info@montepana.it	-
Chalet L Piz	INFO@LPIZ.IT	-
Apartments Cesa Sasplat	info@sasplat.com	-
Villa Montes	info@villamontes.com	-

Bruna Residence	info@residencebruna.com	Runggaldier
Arpa Chalet	info@arpachalet.com	
Apartments Prensanueva	info@prensanueva.it	Stuffer
Cesa Pana Mountain Lodge	info@cesa-pana.com	-
Mesc da Paratoni	info@paratoni.com	Insam
La Baita	info@labaita.net	-
Agroturismo Prauleta	info@prauleta.it	Herbert
Villa Pastura	info@villapastura.it	Delago
Apartments La Mana	info@lamana.it	Senoner
Appartamenti La Rojula	info@larojula.com	Galiani
App. Puze-Hof	info@puzehof.com	Senoner
Apartments Emi	info@apartments-emi.com	Senoner
Luxury Chalet Lefiro	info@lefiro.it	-
Residence Garni Bellavista	info@residencebellavista.eu	-
La Stua Apartments	info@la-stua.it	-
Apartments Salieta	info@salieta.com	Demetz
Apartments Belste	info@belste.com	Runggaldier
Appartamenti Etruska	info@apartments-etruska.it	Demetz
Residence Oberaldoss	info@oberaldoss.com	-
Apatments Mujnei	mujnei@apartment4.holiday	-
Cesa Antermejes	info@antermejes.it	-
Apartments Perteut	info@perteut.it	-
Apartments Praverd	praverd@yahoo.it	-
Garni Residence Soraiser	info@soraiser.com	Kostner
Hotel Jägerheim	INFO@JAEGERHEIM.IT	Zingerle
Cesa Paula	info@cesa-paula.com	-
Apartments Chalet Regina	info@chalet-regina.com	Runggaldier
Hotel Pra Tlusel	info@pratlusel.com	Demetz
Apartment Betty	betty@betty.bz.it	-
Apartments Konstanze	info@konstanze.it	-
Apartments CHalet Romy	info@apartmentsromy.com	Demetz
Hotel Rodella	info@rodella.it	Planker
Apartments Rosalpina	info@rosalpina.info	-
Chalet Val Gardena	info@chaletvalgardena.it	-
App. Villa Gardis	info@villa-gardis.com	Grass
Apartments Antines	info@antines.com	Perathoner
App. Martina	roman.planker@yahoo.de	-
App. Plancker	info@plancker.com	Plancker
App. a Sosta	info@asosta.it	-
Hotel Interski	info@hotel-interski.com	-
Hotel Bel Mont	info@hotelbelmont.it	Perathoner

Alpenhotel Plaza	info@alpenhotelplaza.it	Schenk
Vitalpina Hotel Dosses	info@dosses.it	Turini
Garni Puez	info@garnipuez.it	-
Garni Max	info@garnimax.com	-
Residence Anna	info@residenceanna.com	-
Ferienwohnungen Sonnenberg	info@sonnenberg.bz	-
Apartamento Berghaus Felderer	info@berghausfelderer.it	Perathoner
Apartments Roman	roman.senoner@rolmail.net	Senoner
Apartments Olympic	info@olympicholiday.it	Insam
Hotel Villa Martha	info@villamartha.it	Tettamanti
Apartments Inaz	INFO@APARTMENTS-INAZ.COM	-
Hotel Kristiania	info@hotel-kristiania.com	Stuffer
Bäckerei Uberbacher	info@baeckerei-ueberbacher.it	-
Hotel TOuring	info@hoteltouring.bz	Insam
Steakhouse La Tambra	info@tambra.it	-
Apartments Comploj	info@apartments-comploj.com	-
Pra de Metz Apartments	info@prademetz.it	Goller - Comploi
Apartments Cesa Pizuela	info@pizuela.eu	-
Apartments Benedet	info@benedet.eu	Demetz
Panoramik	info@panoramik.bz.it	Gantioler
Hotel Carmen	info@hotel-carmen.com	Perathoner
Iman apartments	info@imanhof.com	-
Casa Serena	info@haus-serena.com	-
Appartamenti Elisabeth	info@app-elisabeth.com	Senoner
Kedul Alpine Lodge	info@kedul-lodge.com	Mussner
Villa Ladinia	info@villaladinia.info	-
Bergheim	EDITH.SENONER@ROLMAIL.NET	Senoner
Charni le Chalet	info@lechalet.it	-
Apartment Sabrina	info@apartment-sabrina.com	-
Residence Mezdi	info@residence-mezdi.com	-
Appartamenti Soval	info@soval.eu	-
Garni Ariston	info@garniariston.com	Nogler
Garni Geier	info@garnigeier.com	Geier
Garni Walter	info@garniwalter.com	Schrott
Apartments Miara	miara@apartment4.holiday	Insam
Villa Miramonti	info@villamiramonti.com	-
Hotel Uridl	info@uridl.it	-
Villa Moroder	info@villamoroder.it	Moroder
Garni Cir	info@garni-cir.com	Rabanser
Appartment Tramont	info@tramont.info	Senoner

Villa Arnika	villa.arnika@gmail.com	Senoner
Residence Boe	info@residencehotels.com	-
Dorfhotel Beludei	info@beludei.com	-
Apartments Ploner	info@plonervalgardena.it	-
Mayr Natur Apartments	info@mayr-apartments.com -	-
Residence Sovara	info@sovara.it	-
Garni Montbblanc	info@garnimontblanc.com	Senoner
Apartment Hetty	info@apartment-hetty.com	Costa
Apartments Jalvé	info@jalve.com	Perathoner Elmar
Apartments Cnodla	info@cnodla.it	-
Christeinerhof	info@christeinerhof.com	Demetz
Smart Hotel Saslong	info@saslong.eu	-
Apartments Soplases	info@soplases.com	Comploj Insam
Pension Grohmann	pension@grohmann.info	Ploner
Apartments Elbrus	info@app-elbrus.it	Insam
Diamant Spa Resort Hotel	info@diamantsparesort.it	Mussner
Brunello Hotel	info@brunello-it.com	-
Residence Ornella	info@residenceornella.com	-
Alpin Garden Luxury Maison & Spa	info@alpingarden.com	-
Alpinchalet Luispeck	info@alpinchalet.it	Hofer
Mountain Chalet Ghilga	info@ghilga.it	Perathoner
Alpenheim Charmin Hotel & Spa	info@alpenheim.i	-
Garni Floreal	info@garnifloreal.com	Kelder / Morson
Residence Prapoz	info@residence-prapoz.com	Nupieri
Arieda	info@arieda.it	Stuffer
Restaurant Tubladel	info@tubladel.com	Demetz
Pedracia	thomas.insam0@gmail.com	Insam
Gasthof Albergo Somont	info@somont.it	Insam
Hotel Ansitz Jakoberhof	info@hotel-tianes.com	Pizzolruaz
Chalet Dumbria	valgardenaholidays@gmail.com	Perathoner
Apartments Greta	info@appartamenti-ortisei.eu	-
Apartments Pitla Cesa	request@pitlacesa.com	Senoner
Appartamenti Alpenrose	info@apartment-alpenrose.it	-
Villa Insam	info@villainsam.it	-
Residence La Selva	info@selva-apartments.com	-
Hotel Belaval	info@belaval.it	-
Hotel CHalet Dlaces	info@dlaces.it	-
Mountain Chalet Pra Ronch	info@chaletpraronch.com	-
Granvara Relais & Spa Hotels	info@granvara.com	-
Garni Martlhof	info@martlhof.com	-
Villa Bernardi	villabernardi@noleggioselva.com	-

Pozzamanigoni	info@pozzamanigoni.it	Senoner
Apres Ski Snowbar	a.snowbar@gmail.com	-
Apartment Pivan	info@pivan.it	-
Hotel Florian	info@florian.bz.it	-
Aura Dolomiti	info@auradolomiti.it	-
Apartments Edera	info@edera.bz	-
Residence Ruacahof	info@ruaciahof.com	Demetz
Ristorante L Fudle	ristorante@fudle.it	-
Hotel Cristallo	info@cristallo.bz	Perathoner
Residence La Grambla	info@lagrambla.com	-
Garni Ossi	garni.ossi@dnet.it	-
Garni Marina	info@garnimarina.com	-
Ristorante La Posta	info@la-posta.eu	Senoner
Mi Coa	info@micoa.it	Perathoner
Haus Vroni	info@hausvroni.it	Runggaldier
Appartamenti Artitsch	info@artitsch.com	Senoner
Garni Tannenheim	info@garnitannenheim.it	-
Villa Otto Apartments	info@villaotto.it	Mussner
Residence Telemark	info@residencetelemark.com	Perathoner
Apartments La Rives	info@larives.it	Irsara / Senoner
Suliva	info@suliva.it	Baumgartner Comploi
Appartamenti Ruiel	info@ruiel.it	-
Apartments Latemar	info@apartments-latemar.it	Comploi Insam
Garni Conturina	info@conturina.it	-
Apartment Ansciuda	info@ansciuda.it	-
Apartments Puciacia	info@puciacia.com	-
Pasticceria Perathoner	info@strudel.bz	Perathoner
Bar Sport	shop@cafedolomit.com	-
Apartments Waldheim	mail.waldheim@gmail.com	-
Residence Ciastel	INFO@RESIDENCE-CIASTEL.COM	Perathoner
Aúartments N7	info@apartments-n7.com	-
Garni Hubertus	info@garnihubertus.com	Mahlknecht
Garni Ivo	info@garni-ivo.it	Turin - Mahlknecht
Apartments Palmer	info@apartments-palmer.com	Insam
Residence Palmai	info@palmai.com	-
Palmerhof	info@prapalmer.com	-
Apartments Furdenan	info@furdenan.com	-
Garni Hotel August	info@garniaugust.com	Insam
Alpenhotel Rainell	info@rainell.com	-
Hotel Ronce	info@hotelronce.com	-

Hotel Pradell	info@pradell.com	-
Garni Panoramik	info@panoramik.it	-
Chalet Sophia	info@chaletsophia.com	-
Garni Rives Dolomites	info@garnirives.it	-
Hotel Garni Walter	info@garniwalter.it	-
Garni Toni	info@garnitoni.com	-
Apartments Miraval	miraval@val-gardena.com	Perathoner
Gardena CHalets	INFO@GARDENACHALETS.IT	-
Gardena Hotel	info@gardena.it	-
Hotel Hell	info@hotelhell.it	-
Ristorante Pizzeria Mar Dolomit	info@restaurant-mardolomit.it	-
Hotel Cosmea	info@hotelcosmea.it	-
Hotel Alpe di Siusi Urthaler	urthaler@seiseralm.com	Urthaler
Ristorante Lamm	lamm@kelder.bz	-
Alpin & Vital Hotel La Perla	hotel@laperlahotel.info	Kelder
Hotel Rodes	info@hotel-rodes.com	Obletter
Vila Erni	info@villaerni.it	Codispoti
Garni Brunely	info@brunely.it	-
Apartments Bellaria	info@apartmentsbellaria.it	-
Digart	info@digart.it	Stuflesser
Hotel Digon	info@hoteldigon.com	Stuflesser
Hotel Niblea	info@niblea.com	-
Leni Apartments	info@apartments-leni.it	Perathoner
Cesa Zinch	info@zinch.it	-
Apartments Leniar	INFO@LENIAR.IT	Mahlknecht
Garni Alara	alara@apartment4.holiday	-
Appartments Gravina	info@gravina.bz.it	Goller
Apartments Mirandula	mirandula@apartment4.holiday	Vinatzer
Apartments Cesa Ploner	info@cesaploner.com	-
B&B Ulrike	info@ulrike.it	-
Alpin Sport Aparments	info@alpin-sport.com	Kasslatter
Apartments Bea	info@apartmentsbea.com	-
Naturhotel La Cort	info@lacort.it	-
Chalet Alpina	alpina@apartment4.holiday	-
Stroblhof	info@stroblhof.net	Perathoner
Hotel Albion Mountain Spa Resort	info@albionhotel.net	Rier
Urlaub auf dem Bauernhof Untertalhof	info@untertalhof.com	-
Hotel Scherlin	info@hotelscherlin.com	-
Hotel Pinei Nature & Spirit	info@panidersattel.com	-
Almgasthof Mont Seuc	info@montseuc.it	-
Malga Schgaguler	info@schgagulerschwaige.com	-

Sporthotel Sonne	info@sporthotelsonne.com	-
Baita Il Cavalino Bianco	info@cavallino-bianco.com	-
Malga Sanon	info@sanon.it	-
Malga Contrin	info@contrin.it	Nogler / Kostner
Vitalpina Hotel Icaro	INFO@HOTELICARO.COM	Sattler
Albergo Monte Piz	info@montepiz.com	-
Hotel Ritsch	info@ritschschwaige.com	Malfertheiner
Apartment Mooshutte	INFO@MOOSHUETTE.IT	-
Rauchhutte	rauchhuette@rolmail.net	Lageder
Malga Roemer	info@roemerschwaige.com	-
Brunelle Seiser Alm Lodge	info@hotel-brunelle.com	-
Saltria hotel	hotel@saltria.com	-
Silvesterhutte	info@radauerhof.com	Trocker
Tirlerhof	info@tirlerhof.it	-
Rifugio Williams	info@williamshuette.it	-
Zallinger	info@zallinger.com	-
Stampfeter Schwaige	info@stampfeterhof.com	Rabanser
Rifugio Sasso Piatto	info@plattkofel.com	Kasseroler
Appartment Illyria	monica@moroder.bz.it	-
Apartments Chalet Anna	INFO@CHALET-ANNA.IT	Welponer
Villa Luisa Pension	info@villaluise.com	-
Apartment Salman	info@apartmentsrella.com	Moroder
Casa Condor	info@casacondor.it	Rifesser
Hotel Grones	info@hotelgrones.com	Grones / Feichter
Apartments Promenade	info@apartments-promenade.com	-
Apartments Hofer Hermann	app.hofer@gmail.com	-
Pensione Belaval	info@pension-belaval.it	-
Apartment Paladina	info@apartmentpaladina.com	-
Apartments Janon	info@janon.it	Rabanser
Villa Hubertus	info@villahubertus.com	-
Cesa Sotriffer	Sotriffer@T-Online.de	-
Cavallino Bianco Family Spa Grand Hotel	info@cavallino-bianco.com	-
Mauriz Keller	INFO@MAURIZKELLER.COM	-
Adler Dolomiti Spa & Sport Resort	info@adler-dolomiti.com	-
Café Demetz	info@cafedemetz.com	-
Villa Aquila	info@villa-aquila.com	-
Affitto stagionale	info@appartamenti-centrale.it	Comploj
Appartments Tlusel	info@tlusel.com	-
Cafe Corso	info@cafecorso.com	Senoner
Hotel Maria	info@hotelmaria.cc	-

Apartments La Zipla	info@apartments-lazipla.com	-
Restaurant & Bar VIves	info@stubevives.it	-
Albergo Planaces	info@garniplanaces.it	-
Apartment Gabriel	bianca.maria.esposito1@gmail.com	-
Hotel Dolomiti Madonna	info@hotel-madonna.com	Schieder
Residence Fever	info@residencefever.com	-
Aurelia apartments	info@villaaurelia.info	-
Apartments Ester	info@ester.bz.it	-
Apartments Dolomie	info@dolomie.it	-
Squisitzze Gioia Koestlichkeiten	fabian@gioia-val-gardena.com	-
Ustaria Da Checo	info@da-checco.it	-
Residence Cristal	info@residence-cristal.it	Kelder / Holzknecht
Avita suites	info@avitasuites.com	-
Hotel Genziana	info@hotelgenziana.it	Bernardi
Vedl Mulin	info@vedlmulin.com	-
Garni Citadella B&B	info@garni-cittadella.it	Taibon
Restaurant Pizzeria SASKIA	info@saskia.it	-
Hotel Luna Mondschein	info@hotel-luna.com	Perathoner
Villa Costa	costa@dnet.it	-
Apartments Isabella	info@apisabella.com	-
Apartments Fill	info@rifesser.com	-
Garni Vanadis	info@hotelvanadis.com	Pitscheider
Monpiër de Gherdëina	info@monpier-gherdeina.it	-
de Cuer	info@decuer.it	Kostner
Garni Salegg	info@salegg.com	Stuflesser
Apartments Senoner	karl@senoner.com	Senoner
Residence Ben Ste	info@benste.com	-
Apartments Agnes	info@apartmentsagnes.com	-
Classic apartments	info@classicapartments.it	-
Hotel Fortuna	info@hotel-fortuna.it	Obletter
Cesa Pancheri	info@cesa-pancheri.it	-
Residence Albierch	info@granvara.it	-
Hotel Villa Emilia	info@hotel-emilia.com	-
Samont apartments	info@samont-apartments.com	-
Apartments Schmalzl	info@schmalzl.it	Schmalzl
Senoner Walter apartments	info@senonerwalter.com	Senoner
Apartments Alma	info@riffeser.com	-
Apartments Scurcia	info@scurcia41.it	-
Residence Gran Tubla	info@grantubla.com	-
Residence Appartamenti Larciunei	info@larciunei.it	-
Apartments Ortisei Greta	info@appartamenti-ortisei.eu	-

Apartments Rainer	info@apartmentsrainer.com	-
Garni & Apartments Planlim	INFO@PLANLIM.COM	-
Casa al Sole	info@casa-alsole.it	-
Ansciuda apartments	info@ansciuda.com	-
Sneton Ristorante	info@sneton.it	-
Cesa Valeria	info@cesavaleria.it	-
Apartments Cesa Zorz	info@mussner-zorz.com	-
Residence Villa Stella	info@villa-stella.it	Riffeser
Cesa Reseda	cesa.reseda@hotmail.com	-
Restaurant Concordia	info@restaurantconcordia.com	-
Furmescer Apartment	furmescer@amonit.bz.it	-
Cafe Suredl	haus.locia@bzgsaltenschlern.it	-
Apartments Stefania	info@app-stefania.com	-
Garni Rumanc	info@rumanc.com	-
Residence Granriva Solen	info@granriva.com	Perathoner
Apartments Victoria	info@apartmentsvictoria.it	-
Chalet Solen	info@chaletsolen.com	-
Montatiola	montaniola_resciesa@montaniola.it	Kostner
Residence Cesa Sassela	info@sassela.com	Rella
Appartements Desmin	info@desmin.it	-
Residence Soleil	info@residencesoleil.it	-
Residence Lastei	info@lastei.com	Moroder Kostner
Cesa Marmolada	info@apartments-marmolada.com	Ghetta - Crepaz
Apartments Erika	info@apperika.it	Thaler
Apartments Cudan	info@cudan.it	-
Chalet Tiscion	info@tiscion.it	Rabanser
Milanhof	info@milanhof.it	-
Apartment Puntedla	info@puntedla.it	-
Chalet Resciesa	info@resciesa.com	-
Apartments Ciancel	andrea@ciancel.com	Ciechi
Garni Dolomitenblick	info@garnidolomitenblick.com	Bergmeister
Apartments Miraortisei	info@miraortisei.it	-
Hotel Grien	info@hotel-grien.com	Avesani
Hotel Talblick	info@talblick.com	-
Garni Mariandl	info@garni-mariandl.com	-
La Plates	info@laplates.eu	Holzknecht
Mountain Apartment Hapeli	hapeli@apartment4.holiday	-
Sule - Hof	info@sule-hof.com	Demetz
Apartments Manuela	info@apartmentsrella.com	-
Hotel Arnaria	info@arnaria.com	-
Apartment.4holiday	info@apartment4.holiday	-

Apartment Hotel Elvis	info@residence-elvis.com	Scherlin

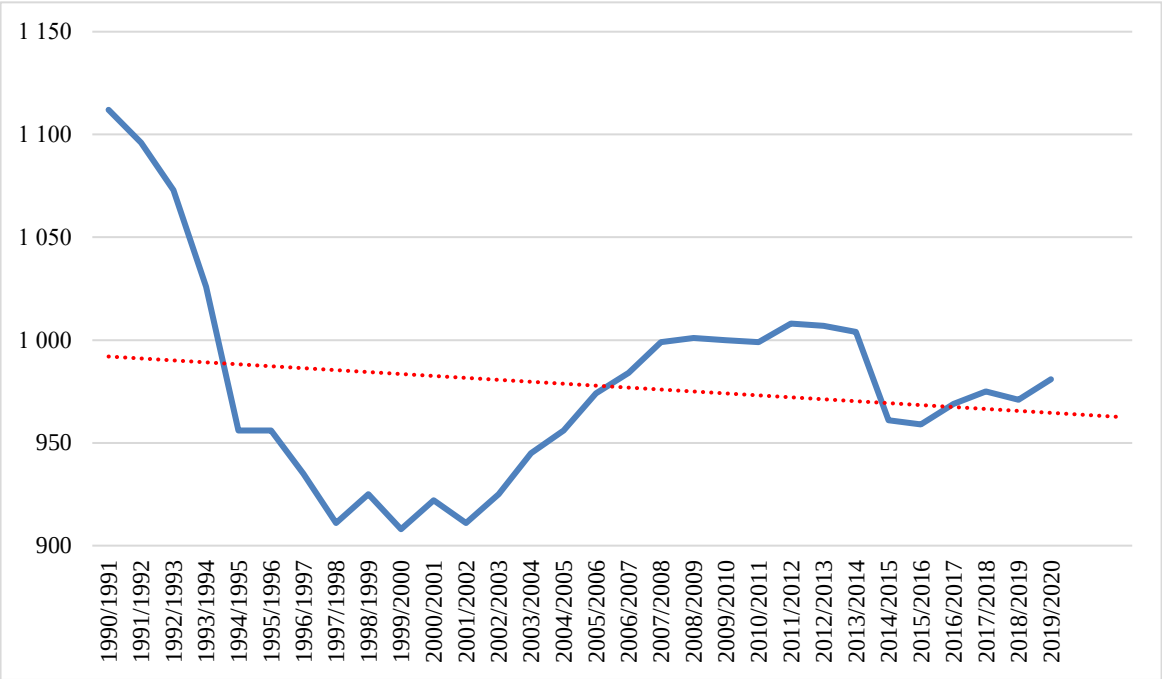
Source: Own processing, 2021.

Appendix 3 Accommodation facilities´ data from winter season 1990/1991 to 2019/2020

Winter season	Number of overnight stays	Number of enterprises	Number of beds	Number of bed days	Use of accommoda-tion capacity in %
1990/1991	1 125 895	1 112	17 436	2 475 912	45,47
1991/1992	1 078 440	1 096	17 315	2 476 045	43,55
1992/1993	1 037 656	1 073	17 401	2 470 942	41,99
1993/1994	1 186 569	1 026	16 985	2 411 870	49,20
1994/1995	1 109 035	956	17 043	2 420 106	45,83
1995/1996	1 275 928	956	17 041	2 436 863	52,36
1996/1997	1 179 983	935	16 513	2 344 846	50,32
1997/1998	1 116 818	911	16 485	2 340 870	47,71
1998/1999	1 098 565	925	16 704	2 371 968	46,31
1999/2000	1 042 177	908	16 208	2 317 744	44,97
2000/2001	1 163 799	922	16 327	2 318 434	50,20
2001/2002	1 126 659	911	16 415	2 330 930	48,34
2002/2003	1 168 323	925	16 505	2 343 710	49,85
2003/2004	1 284 389	945	16 619	2 376 517	54,05
2004/2005	1 313 032	956	16 873	2 395 966	54,80
2005/2006	1 298 030	974	17 072	2 424 224	53,54
2006/2007	1 312 694	984	17 249	2 449 358	53,59
2007/2008	1 412 262	999	17 402	2 488 486	56,75
2008/2009	1 415 290	1 001	17 579	2 496 218	56,70
2009/2010	1 458 640	1 000	17 531	2 489 402	58,59
2010/2011	1 411 777	999	17 709	2 514 678	56,14
2011/2012	1 390 472	1 008	17 929	2 563 847	54,23
2012/2013	1 377 612	1 007	17 942	2 547 764	54,07
2013/2014	1 394 676	1 004	17 880	2 538 960	54,93
2014/2015	1 385 462	961	17 684	2 511 128	55,17
2015/2016	1 452 144	959	17 796	2 544 828	57,06
2016/2017	1 377 660	969	17 956	2 549 752	54,03
2017/2018	1 531 109	975	18 047	2 562 674	59,75
2018/2019	1 458 463	971	17 987	2 554 154	57,10
2019/2020	1 246 865	981	18 134	2 593 162	48,08

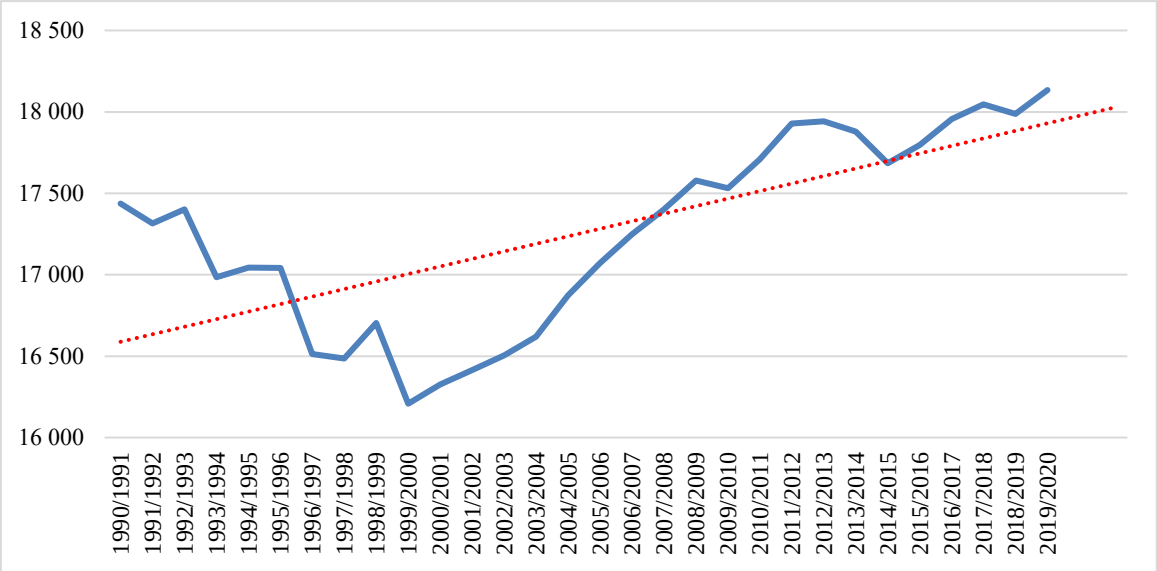
Source: Own data processing from www.qlikview.services.siag.it, 2021.

Appendix 4 Number of accommodation facilities in Val Gardena



Source: Own data processing from www.qlikview.services.siag.it, 2021.

Appendix 5 Number of beds in Val Gardena



Source: Own data processing from www.qlikview.services.siag.it, 2021.

Appendix 6 Number of arriving visitors by country

Country / Season	IT	DE	A	CH / FL	Benelux	Other	Total
1990/1991	106 153	48 335	4 451	952	10 294	5 165	175 350
1991/1992	109 301	37 624	3 793	1 091	9 987	4 964	166 760
1992/1993	109 561	37 002	3 483	884	8 227	5 431	164 588
1993/1994	105 851	55 011	4 229	1 161	11 102	7 732	185 086
1994/1995	89 861	57 237	4 430	1 137	10 751	8 177	171 593
1995/1996	91 778	71 850	5 440	1 515	13 854	11 606	196 043
1996/1997	82 593	68 471	4 773	1 385	14 238	12 343	183 803
1997/1998	86 889	59 708	4 160	1 350	12 935	13 836	178 878
1998/1999	89 222	56 106	3 761	1 139	13 250	13 431	176 909
1999/2000	91 986	48 592	3 566	1 037	12 146	14 302	171 629
2000/2001	93 748	60 378	4 033	1 250	13 609	19 051	192 069
2001/2002	87 432	55 749	3 574	1 487	15 221	18 622	182 085
2002/2003	97 483	52 400	3 883	1 818	15 728	21 946	193 258
2003/2004	104 683	56 533	4 382	2 453	16 784	28 846	213 681
2004/2005	103 488	58 802	4 233	2 496	16 712	30 668	216 399
2005/2006	113 058	48 619	3 740	2 798	16 381	33 806	218 402
2006/2007	113 824	48 103	3 945	2 955	16 473	36 899	222 199
2007/2008	115 510	52 129	3 876	3 002	18 789	45 785	239 091
2008/2009	116 041	52 845	4 765	3 285	19 154	46 830	242 920
2009/2010	122 193	53 471	4 740	3 454	20 058	49 422	253 338
2010/2011	116 143	49 716	4 683	4 078	18 641	52 378	245 639
2011/2012	101 920	55 927	4 732	5 136	18 889	54 478	241 082
2012/2013	98 993	59 971	4 959	5 534	17 581	56 492	243 530
2013/2014	93 700	63 194	6 252	6 141	19 674	61 569	250 530
2014/2015	98 416	61 921	5 974	6 801	20 779	58 143	252 034
2015/2016	106 730	64 777	5 671	7 551	22 751	58 776	266 256
2016/2017	101 786	56 153	5 408	7 340	21 430	60 838	252 955
2017/2018	115 670	65 873	6 273	8 283	25 363	67 231	288 693
2018/2019	102 555	60 238	6 651	7 977	25 431	69 267	272 119
2019/2020	90 813	49 680	5 295	6 714	21 627	60 468	234 597
Total arrivals	3 057 381	1 666 415	139 155	102 204	497 859	1 028 502	6 491 516
Percentage by country	47,10	25,67	2,14	1,57	7,67	15,84	-

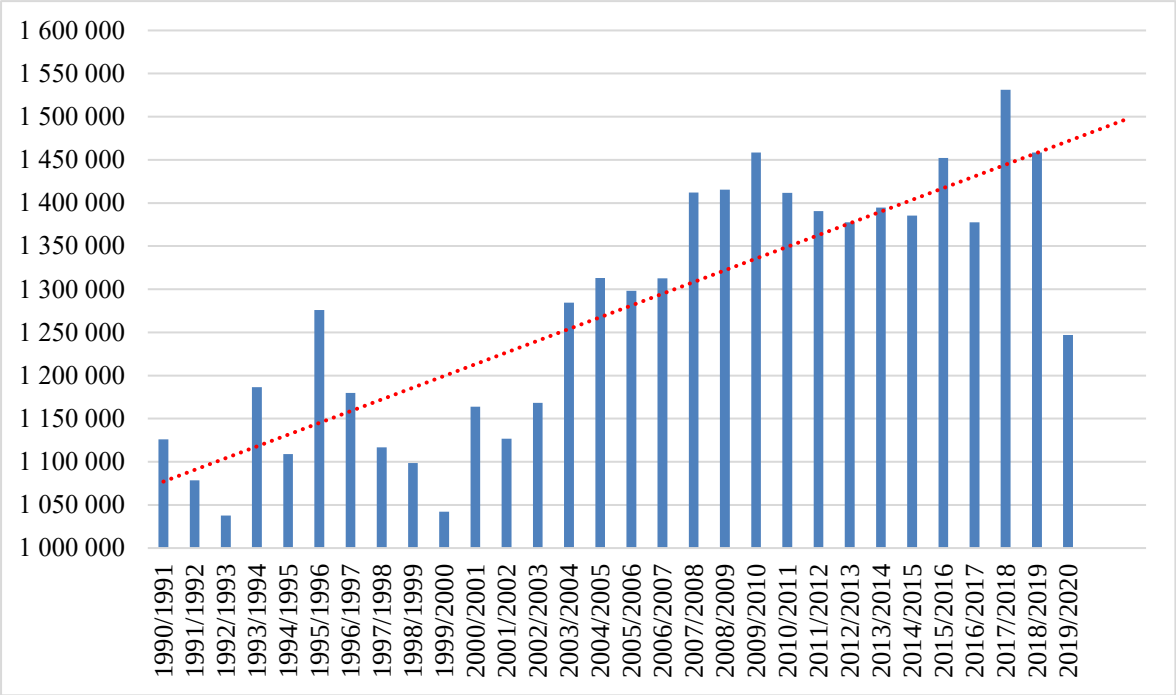
Source: Own data processing from www.qlikview.services.siag.it, 2021.

Appendix 7 Number of arriving visitors by village

Village / Season	Selva	Santa Cristina	Ortisei	Total
1990/1991	95 033	25 305	55 012	175 350
1991/1992	91 183	22 777	52 800	166 760
1992/1993	92 044	21 699	50 845	164 588
1993/1994	99 280	25 392	60 414	185 086
1994/1995	90 443	23 690	57 460	171 593
1995/1996	103 164	28 331	64 548	196 043
1996/1997	96 348	26 244	61 211	183 803
1997/1998	96 642	24 957	57 279	178 878
1998/1999	94 621	25 350	56 938	176 909
1999/2000	93 256	24 155	54 218	171 629
2000/2001	102 949	28 101	61 019	192 069
2001/2002	98 149	27 224	56 712	182 085
2002/2003	99 877	28 235	65 146	193 258
2003/2004	111 815	30 544	71 322	213 681
2004/2005	112 486	31 625	72 288	216 399
2005/2006	113 168	30 692	74 542	218 402
2006/2007	113 328	31 762	77 109	222 199
2007/2008	122 497	34 549	82 045	239 091
2008/2009	125 856	33 907	83 157	242 920
2009/2010	129 497	36 025	87 816	253 338
2010/2011	124 810	35 729	85 100	245 639
2011/2012	121 018	37 342	82 722	241 082
2012/2013	122 966	37 804	82 760	243 530
2013/2014	125 163	39 301	86 066	250 530
2014/2015	125 986	38 512	87 536	252 034
2015/2016	131 102	40 911	94 243	266 256
2016/2017	124 688	39 317	88 950	252 955
2017/2018	141 541	45 790	101 362	288 693
2018/2019	133 204	43 012	95 903	272 119
2019/2020	113 839	37 343	83 415	234 597
Total arrivals	3 345 953	955 625	2 189 938	6 491 516
Percentage by village	51,54	14,72	33,74	-

Source: Own data processing from www.qlikview.services.siag.it, 2021.

Appendix 8 Seasonal overnight stays graph in Val Gardena



Source: Own data processing from www.qlikview.services.siag.it, 2021.

Appendix 9 Overnight stays in Val Gardena by country

Winter season	IT	DE	A	CH / FL	Benelux	Other	Total
1990/1991	629 361	338 412	30 756	6 473	79 690	41 203	1 125 895
1991/1992	641 851	283 311	26 901	8 236	77 946	40 195	1 078 440
1992/1993	628 806	271 112	23 742	7 034	64 950	42 012	1 037 656
1993/1994	602 493	393 442	29 060	9 336	86 560	65 678	1 186 569
1994/1995	514 430	402 918	31 721	8 140	83 421	68 405	1 109 035
1995/1996	528 605	504 318	38 952	10 619	104 149	89 285	1 275 928
1996/1997	483 558	473 064	30 042	9 236	99 806	84 277	1 179 983
1997/1998	488 973	408 667	25 346	8 110	89 734	95 988	1 116 818
1998/1999	504 749	384 209	22 474	7 167	89 781	90 185	1 098 565
1999/2000	511 132	324 642	21 579	6 863	82 108	95 853	1 042 177
2000/2001	520 604	390 520	24 555	8 030	90 682	129 408	1 163 799
2001/2002	492 372	374 881	21 678	8 613	103 410	125 705	1 126 659
2002/2003	544 290	336 714	22 018	11 960	106 156	147 185	1 168 323
2003/2004	583 698	363 592	25 339	14 403	112 782	184 575	1 284 389
2004/2005	580 618	377 439	23 999	15 212	112 978	202 786	1 313 032
2005/2006	623 087	304 402	20 434	16 951	108 242	224 914	1 298 030
2006/2007	614 964	301 431	21 737	18 237	109 112	247 213	1 312 694
2007/2008	619 173	323 306	21 441	17 261	122 748	308 333	1 412 262
2008/2009	615 068	318 845	25 586	18 528	124 141	313 122	1 415 290
2009/2010	638 046	318 896	25 493	19 216	129 631	327 358	1 458 640
2010/2011	595 111	297 313	24 376	23 776	120 175	351 026	1 411 777
2011/2012	514 613	335 266	25 064	29 784	122 496	363 249	1 390 472
2012/2013	476 753	353 526	25 944	31 350	112 874	377 165	1 377 612
2013/2014	443 056	354 722	29 331	34 574	122 688	410 305	1 394 676
2014/2015	448 364	358 442	28 617	38 430	131 219	380 390	1 385 462
2015/2016	482 333	376 742	27 304	42 247	143 602	379 916	1 452 144
2016/2017	460 279	326 855	25 526	42 228	134 970	387 802	1 377 660
2017/2018	506 434	374 450	28 730	45 657	156 723	419 115	1 531 109
2018/2019	456 113	344 251	30 145	44 271	156 661	427 022	1 458 463
2019/2020	397 893	279 880	23 408	37 103	133 622	374 959	1 246 865
Total overnight stays	16 146 827	10 595 568	781 298	599 045	3 313 057	6 794 629	38 230 424
Percentage by country	42,24	27,72	2,04	1,57	8,67	17,77	-

Source: Own data processing from www.qlikview.services.siag.it, 2021.

Appendix 10 Overnight stays in Val Gardena by village

Village / Season	Selva	Santa Cristina	Ortisei	Total
1990/1991	613 095	169 332	343 468	1 125 895
1991/1992	592 419	150 248	335 773	1 078 440
1992/1993	580 619	141 517	315 520	1 037 656
1993/1994	647 895	165 742	372 932	1 186 569
1994/1995	597 498	156 782	354 755	1 109 035
1995/1996	680 917	188 692	406 319	1 275 928
1996/1997	632 406	170 194	377 383	1 179 983
1997/1998	616 263	154 636	345 919	1 116 818
1998/1999	603 398	158 267	336 900	1 098 565
1999/2000	582 753	145 216	314 208	1 042 177
2000/2001	643 360	167 321	353 118	1 163 799
2001/2002	624 089	164 636	337 934	1 126 659
2002/2003	623 517	168 756	376 050	1 168 323
2003/2004	689 291	183 208	411 890	1 284 389
2004/2005	702 138	189 252	421 642	1 313 032
2005/2006	692 809	180 029	425 192	1 298 030
2006/2007	693 885	184 052	434 757	1 312 694
2007/2008	744 128	203 269	464 865	1 412 262
2008/2009	750 447	198 360	466 483	1 415 290
2009/2010	766 624	209 946	482 070	1 458 640
2010/2011	741 757	203 158	466 862	1 411 777
2011/2012	728 317	209 752	452 403	1 390 472
2012/2013	721 883	211 720	444 009	1 377 612
2013/2014	724 316	211 334	459 026	1 394 676
2014/2015	720 808	205 231	459 423	1 385 462
2015/2016	745 130	216 176	490 838	1 452 144
2016/2017	703 778	206 211	467 671	1 377 660
2017/2018	777 953	232 561	520 595	1 531 109
2018/2019	740 045	222 477	495 941	1 458 463
2019/2020	622 664	193 276	430 925	1 246 865
Total overnight stays	20 304 202	5 561 351	12 364 871	38 230 424
Percentage by country	53,11	14,55	32,34	-

Source: Own data processing from www.qlikview.services.siag.it, 2021.

Appendix 11 Average number of overnight stays in Val Gardena

Country / Season	IT	DE	A	CH / FL	Bene-lux	Other	Santa Cristi-na	Selva	Ortis-ei	Val Gar-dena
1990/1991	5,9	7,0	6,9	6,8	7,7	7,6	6,7	6,5	6,2	6,4
1991/1992	5,9	7,5	7,1	7,5	7,8	8,1	6,6	6,5	6,4	6,5
1992/1993	5,7	7,3	6,8	8,0	7,9	7,6	6,5	6,3	6,2	6,3
1993/1994	5,7	7,2	6,9	8,0	7,8	8,3	6,5	6,5	6,2	6,4
1994/1995	5,7	7,0	7,2	7,2	7,8	8,4	6,6	6,6	6,2	6,5
1995/1996	5,8	7,0	7,2	7,0	7,5	7,6	6,7	6,6	6,3	6,5
1996/1997	5,9	6,9	6,3	6,7	7,0	6,7	6,5	6,6	6,2	6,4
1997/1998	5,6	6,8	6,1	6,0	6,9	6,9	6,2	6,4	6,0	6,2
1998/1999	5,7	6,8	6,0	6,3	6,8	6,6	6,2	6,4	5,9	6,2
1999/2000	5,6	6,7	6,1	6,6	6,8	6,7	6,0	6,2	5,8	6,1
2000/2001	5,6	6,5	6,1	6,4	6,7	6,7	6,0	6,2	5,8	6,1
2001/2002	5,6	6,7	6,1	5,8	6,8	6,6	6,0	6,4	6,0	6,2
2002/2003	5,6	6,4	5,7	6,6	6,7	6,6	6,0	6,2	5,8	6,0
2003/2004	5,6	6,4	5,8	5,9	6,7	6,4	6,0	6,2	5,8	6,0
2004/2005	5,6	6,4	5,7	6,1	6,8	6,5	6,0	6,2	5,8	6,1
2005/2006	5,5	6,3	5,5	6,1	6,6	6,5	5,9	6,1	5,7	5,9
2006/2007	5,4	6,3	5,5	6,2	6,6	6,6	5,8	6,1	5,6	5,9
2007/2008	5,4	6,2	5,5	5,7	6,5	6,6	5,9	6,1	5,7	5,9
2008/2009	5,3	6,0	5,4	5,6	6,5	6,6	5,9	6,0	5,6	5,8
2009/2010	5,2	6,0	5,4	5,6	6,5	6,6	5,8	5,9	5,5	5,8
2010/2011	5,1	6,0	5,2	5,8	6,4	6,6	5,7	5,9	5,5	5,7
2011/2012	5,0	6,0	5,3	5,8	6,5	6,6	5,6	6,0	5,5	5,8
2012/2013	4,8	5,9	5,2	5,7	6,4	6,6	5,6	5,9	5,4	5,7
2013/2014	4,7	5,6	4,7	5,6	6,2	6,6	5,4	5,8	5,3	5,6
2014/2015	4,6	5,8	4,8	5,7	6,3	6,4	5,3	5,7	5,2	5,5
2015/2016	4,5	5,8	4,8	5,6	6,3	6,4	5,3	5,7	5,2	5,5
2016/2017	4,5	5,8	4,7	5,8	6,3	6,3	5,2	5,6	5,3	5,4
2017/2018	4,4	5,7	4,6	5,5	6,2	6,1	5,1	5,5	5,1	5,3
2018/2019	4,4	5,7	4,5	5,5	6,2	6,1	5,2	5,6	5,2	5,4
2019/2020	4,4	5,6	4,4	5,5	6,2	6,1	5,2	5,5	5,2	5,3
Average values	5,3	6,4	5,7	6,2	6,8	6,8	5,9	6,1	5,7	5,9

Source: Own data processing from www.qlikview.services.siag.it, 2021.

Appendix 12 Climatic data processed from Meteoblue

	Average relative humidity in %	Wind km/h mean	Average daily cloud cover in %	Average soil temperature	Sunny hours per day
1980/1981	73,53	4,68	42,13	0,52	5,76
1981/1982	75,34	4,76	46,87	-0,73	5,38
1982/1983	75,27	4,85	45,46	0,11	5,21
1983/1984	74,89	4,81	45,47	-1,28	5,37
1984/1985	78,51	4,62	50,21	-0,59	4,84
1985/1986	80,04	4,47	53,88	-0,14	4,40
1986/1987	73,58	4,71	42,85	-0,72	5,43
1987/1988	76,75	4,68	48,04	-0,21	4,84
1988/1989	71,12	4,43	33,61	-1,74	6,51
1989/1990	70,22	4,55	32,69	-1,51	6,51
1990/1991	75,88	4,60	43,07	0,34	5,69
1991/1992	73,93	4,59	33,31	-0,16	6,37
1992/1993	71,29	4,85	34,04	-0,31	6,49
1993/1994	73,16	4,85	45,86	-0,08	5,24
1994/1995	71,69	4,99	40,30	-0,19	5,93
1995/1996	76,42	4,45	46,31	-0,51	5,22
1996/1997	71,30	4,77	34,59	0,27	6,69
1997/1998	72,17	4,99	41,37	0,67	6,00
1998/1999	70,67	4,79	42,70	-1,32	5,54
1999/2000	70,14	5,02	37,77	0,02	6,20
2000/2001	79,40	4,77	51,80	0,57	4,74
2001/2002	68,34	4,60	35,19	-2,30	6,57
2002/2003	73,33	4,57	42,97	0,05	5,78
2003/2004	73,75	4,77	47,52	0,06	5,21
2004/2005	64,69	4,75	38,60	-1,33	5,99
2005/2006	73,35	4,82	44,49	-0,52	5,55
2006/2007	68,09	4,49	38,45	1,01	6,17
2007/2008	65,87	4,79	42,69	-0,51	5,69
2008/2009	73,78	4,46	48,26	-0,24	5,26
2009/2010	69,88	4,80	52,11	-0,89	4,48
2010/2011	68,09	4,70	43,38	-0,28	5,78
2011/2012	69,75	4,77	40,38	-0,43	5,82
2012/2013	71,90	4,57	55,21	-0,17	4,32
2013/2014	74,40	4,35	45,17	-0,48	5,56
2014/2015	67,87	4,79	46,65	0,34	5,27
2015/2016	66,72	4,57	41,92	0,10	5,53
2016/2017	61,58	4,63	32,47	-0,79	6,87
2017/2018	73,36	4,66	53,64	-0,76	4,57
2018/2019	66,80	4,76	38,84	-0,66	6,11
2019/2020	65,89	4,63	33,07	0,96	6,61

Source: Own data processing from www.meteoblue.com, 2021.

Appendix 13 Correlation between humidity and temperature

Correlations			
		Humidity	Temperature
Humidity	Pearson Correlation	1	-.698**
	Sig. (2-tailed)		.000
	N	40	40
Temperature	Pearson Correlation	-.698**	1
	Sig. (2-tailed)	.000	
	N	40	40
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Output from SPSS, 2021.

Appendix 14 Correlation between humidity and snowfall

Correlations			
		Humidity	Snowfall
Humidity	Pearson Correlation	1	.499**
	Sig. (2-tailed)		.001
	N	40	40
Snowfall	Pearson Correlation	.499**	1
	Sig. (2-tailed)	.001	
	N	40	40
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Output from SPSS, 2021.

Appendix 15 Climatic data processed from Meteoblue

Season \ Indicator	Number of snowy days	Average temperature in °C	Snowfall total in cm
1980/1981	39	-5,18	66,92
1981/1982	52	-4,83	98,70
1982/1983	47	-4,34	125,09
1983/1984	48	-5,36	166,11
1984/1985	52	-5,41	170,80
1985/1986	54	-5,21	175,07
1986/1987	47	-6,22	169,26
1987/1988	42	-4,11	115,22
1988/1989	35	-2,41	106,12
1989/1990	27	-2,44	82,11
1990/1991	36	-4,92	115,29
1991/1992	37	-4,67	108,99
1992/1993	27	-3,56	102,27
1993/1994	47	-2,71	100,73
1994/1995	45	-3,27	109,06
1995/1996	47	-3,93	92,61
1996/1997	36	-2,82	56,70
1997/1998	44	-2,48	114,10
1998/1999	46	-4,06	102,27
1999/2000	34	-4,16	83,93
2000/2001	54	-2,64	153,16
2001/2002	32	-2,93	72,73
2002/2003	34	-3,61	68,81
2003/2004	55	-3,71	167,37
2004/2005	29	-2,89	68,53
2005/2006	55	-5,14	122,99
2006/2007	35	0,39	112,42
2007/2008	43	-1,05	92,61
2008/2009	56	-2,83	229,18
2009/2010	55	-3,07	165,48
2010/2011	42	-1,39	96,81
2011/2012	39	-2,25	61,11
2012/2013	68	-2,39	142,59
2013/2014	54	-0,58	268,38
2014/2015	42	-0,37	74,90
2015/2016	46	0,04	141,33
2016/2017	26	-0,04	48,51
2017/2018	60	-2,78	154,35
2018/2019	44	-1,23	115,57
2019/2020	32	-0,21	74,62

Source: own data processing from www.meteoblue.com, 2021.

Appendix 16 Correlation between snowfall and temperature

Correlations			
		Snowfall	Temperature
Snowfall	Pearson Correlation	1	-.145
	Sig. (2-tailed)		.372
	N	40	40
Temperature	Pearson Correlation	-.145	1
	Sig. (2-tailed)	.372	
	N	40	40

Source: Output from SPSS, 2021.

Appendix 17 Correlation between snowfall and snowy days

Correlations			
		Snowfall	Snowy days
Snowfall	Pearson Correlation	1	.705**
	Sig. (2-tailed)		.000
	N	40	40
Snowy days	Pearson Correlation	.705**	1
	Sig. (2-tailed)	.000	
	N	40	40
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Output from SPSS, 2021.

Appendix 18 Monthly correlations between temperature and arrivals

		T November	Ar November
T November	Pearson Correlation	1	0,050
	Sig. (2-tailed)		0,884
	N	11	11
Ar November	Pearson Correlation	0,050	1
	Sig. (2-tailed)	0,884	
	N	11	11
		T December	Ar December
T December	Pearson Correlation	1	-0,077
	Sig. (2-tailed)		0,821
	N	11	11
Ar December	Pearson Correlation	-0,077	1
	Sig. (2-tailed)	0,821	
	N	11	11
		T January	Ar January
T January	Pearson Correlation	1	0,113
	Sig. (2-tailed)		0,741
	N	11	11
Ar January	Pearson Correlation	0,113	1
	Sig. (2-tailed)	0,741	
	N	11	11
		T February	Ar February
T February	Pearson Correlation	1	0,309
	Sig. (2-tailed)		0,356
	N	11	11
Ar February	Pearson Correlation	0,309	1
	Sig. (2-tailed)	0,356	
	N	11	11
		T March	Ar March
T March	Pearson Correlation	1	-0,091
	Sig. (2-tailed)		0,791
	N	11	11
Ar March	Pearson Correlation	-0,091	1
	Sig. (2-tailed)	0,791	
	N	11	11
		T April	Ar April
T April	Pearson Correlation	1	-0,563
	Sig. (2-tailed)		0,071
	N	11	11
Ar April	Pearson Correlation	-0,563	1
	Sig. (2-tailed)	0,071	
	N	11	11

Source: Output from SPSS, 2021.

Appendix 19 Monthly correlations between amount of snow and arrivals

		S November	Ar November
S November	Pearson Correlation	1	-0,119
	Sig. (2-tailed)		0,728
	N	11	11
Ar November	Pearson Correlation	-0,119	1
	Sig. (2-tailed)	0,728	
	N	11	11
		S December	Ar December
S December	Pearson Correlation	1	0,164
	Sig. (2-tailed)		0,629
	N	11	11
Ar December	Pearson Correlation	0,164	1
	Sig. (2-tailed)	0,629	
	N	11	11
		S January	Ar January
S January	Pearson Correlation	1	-0,425
	Sig. (2-tailed)		0,193
	N	11	11
Ar January	Pearson Correlation	-0,425	1
	Sig. (2-tailed)	0,193	
	N	11	11
		S February	Ar February
S February	Pearson Correlation	1	-0,254
	Sig. (2-tailed)		0,451
	N	11	11
Ar February	Pearson Correlation	-0,254	1
	Sig. (2-tailed)	0,451	
	N	11	11
		S March	Ar March
S March	Pearson Correlation	1	0,006
	Sig. (2-tailed)		0,986
	N	11	11
Ar March	Pearson Correlation	0,006	1
	Sig. (2-tailed)	0,986	
	N	11	11
		S April	Ar April
S April	Pearson Correlation	1	0,071
	Sig. (2-tailed)		0,835
	N	11	11
Ar April	Pearson Correlation	0,071	1
	Sig. (2-tailed)	0,835	
	N	11	11

Source: Output from SPSS, 2021.

Appendix 20 Seasonal correlation tests

		Amount of Snow	Overnight Stays
Amount of Snow	Pearson Correlation	1	0,326
	Sig. (2-tailed)		0,079
	N	30	30
Overnight Stays	Pearson Correlation	0,326	1
	Sig. (2-tailed)	0,079	
	N	30	30
		Amount of Snow	Arrivals
Arrivals	Pearson Correlation	1	0,301
	Sig. (2-tailed)		0,106
	N	30	30
Amount of Snow	Pearson Correlation	0,301	1
	Sig. (2-tailed)	0,106	
	N	30	30
		Amount of Snow	Length of stay
Amount of Snow	Pearson Correlation	1	-0,062
	Sig. (2-tailed)		0,746
	N	30	30
Length of stay	Pearson Correlation	-0,062	1
	Sig. (2-tailed)	0,746	
	N	30	30
		Temperature	Overnight Stays
Overnight Stays	Pearson Correlation	1	.555**
	Sig. (2-tailed)		0,001
	N	30	30
Temperature	Pearson Correlation	.555**	1
	Sig. (2-tailed)	0,001	
	N	30	30
		Temperature	Arrivals
Temperature	Pearson Correlation	1	.632**
	Sig. (2-tailed)		0,000
	N	30	30
Arrivals	Pearson Correlation	.632**	1
	Sig. (2-tailed)	0,000	
	N	30	30
		Temperature	Length of stay
Temperature	Pearson Correlation	1	-.671**
	Sig. (2-tailed)		0,000
	N	30	30
Length of stay	Pearson Correlation	-.671**	1
	Sig. (2-tailed)	0,000	
	N	30	30

Source: Output from SPSS, 2021.

Appendix 21 Correlation tests between ski lift passengers, climate data and number of arrivals

Correlations			
		Transported Passengers	Temperature
Transported Passengers	Pearson Correlation	1	-0,224
	Sig. (2-tailed)		0,485
	N	12	12
Temperature	Pearson Correlation	-0,224	1
	Sig. (2-tailed)	0,485	
	N	12	13
		Transported Passengers	Amount of Snow
Transported Passengers	Pearson Correlation	1	0,185
	Sig. (2-tailed)		0,566
	N	12	12
Amount of Snow	Pearson Correlation	0,185	1
	Sig. (2-tailed)	0,566	
	N	12	13
		Transported Passengers	Arrivals
Transported Passengers	Pearson Correlation	1	.787**
	Sig. (2-tailed)		0,002
	N	12	12
Arrivals	Pearson Correlation	.787**	1
	Sig. (2-tailed)	0,002	
	N	12	13
****. Correlation is significant at the 0.01 level (2-tailed).**			

Source: Output from SPSS, 2021.

Appendix 22 Questionnaire in Italian

Gentile intervistato,

Sono una studentessa del 2.anno di studi di ingegneria presso la Facoltà di Economia, Università Matej Bel di Banská Bystrica, Slovacchia, Dipartimento di Economia e Management del Turismo. La mia tesi si concentra sull'analisi dell'impatto del cambiamento climatico sul business nelle destinazioni di montagna. Il cambiamento climatico è uno dei principali problemi della società odierna e dipende da noi come affrontarlo. Lo scopo del questionario è scoprire l'atteggiamento delle imprese nei confronti del cambiamento climatico nella destinazione della Val Gardena. Per questo motivo, vi chiedo di compilare questo questionario. Il questionario è ANONIMO.

Grazie in anticipo per la vostra disponibilità e collaborazione.
Bc. Simona Juríková

1. I seguenti fattori possono essere classificati come naturali. Per favore, indicate quale ha influenzato maggiormente la vostra attività commerciale nella destinazione di Val Gardena negli ultimi 40 anni.
(1 Sono totalmente d'accordo, 2 Sono d'accordo, 3 Non so, 4 Non sono d'accordo, 5 Sono totalmente in disaccordo)

a. Fluttuazioni meteorologiche
b. Inverno mite con minore innevamento
c. Inverno freddo e molte precipitazioni
d. Estate calda
f. Estate con forti piogge
e. Siccità
g. Disastro naturale

2. I seguenti fattori possono essere classificati come socio-culturali. Per favore, indicate quale ha influenzato maggiormente la vostra attività commerciale nella destinazione di Val Gardena negli ultimi 40 anni.

(1 Sono totalmente d'accordo, 2 Sono d'accordo, 3 Non so, 4 Non sono d'accordo, 5 Sono totalmente in disaccordo)

a. Eventi organizzati nella destinazione
b. Periodo di vacanza
c. Giorni festivi
d. Abitudini e tradizioni
e. Struttura mutevole dei visitatori
f. Livello di reddito inferiore dei visitatori
g. Invecchiamento della popolazione
h. Disponibilità di persone qualificate nella destinazione

3. I seguenti fattori possono essere classificati come economici. Per favore, indicate quale ha influenzato maggiormente la vostra attività commerciale nella destinazione di Val Gardena negli ultimi 40 anni.
(1 Sono totalmente d'accordo, 2 Sono d'accordo, 3 Non so, 4 Non sono d'accordo, 5 Sono totalmente in disaccordo)

a. Stagione degli impianti di risalita e delle funivie
b. Ricavi
c. Stabilità sul mercato
d. Dipendenti
e. Concorrenza
f. Fornito sussidi dal settore pubblico
g. Pandemia

4. Qualcuno dei fattori, che avete indicato nelle domande precedenti, ha causato un spostamento della vostra stagione invernale negli ultimi 40 anni?

a. No
b. Sì
c. Non ricordo

5. Se sì, quali fattori hanno costretto a cambiare la vostra stagione?

…….

6. Come percepite i cambiamenti delle condizioni climatiche durante la vostea attività nel settore turistico?

a. Positivamente

b. Negativamente

c. Non lo so

7. Temi che la vostra attivita commerciale sarà minacciata dai cambiamenti climatici durante le prossime stagioni invernali?

a. Sono molto preoccupato

b. Sono preoccupato

c. Non ho opinioni al riguardo

d. Non sono preoccupato

e. Non sono affatto preoccupato

8. Esiste una delle pratiche ambientali adottate nella vostra impresa? (scelta multipla)

a. Riduzione dei consumi energetici

b. Riduzione del consumo di acqua

c. Gestione dei rifiuti

d. Ridurre le emissioni di gas serra

è. Non utilizzare beni usa e getta

f. Riutilizzare

g. Altro …….

9. State considerando o avete introdotto innovazioni per mitigare l'impatto del cambiamento climatico?

a. No

b. Sì

c. Non lo so

10. Se sì, in che modo pensate di implementare o avete implementato l'innovazione?

…….

11. La vostra attività si trova in una destinazione ad un'altitudine maggiore, ma in futuro dovrete fare i conti con l'adattamento ai cambiamenti climatici. Quale strategia vi piace di più? (scelta multipla)

a. Mantenere il turismo sciistico (neve artificiale, spostamento in una zona più alta, comprensori sciistici, cooperazione)
b. Agevolazioni (contributo annuale o unico)
c. Alternative (diversificazione del prodotto, turismo annuale, attività non legate allo sci)
d. Fatalismo (business as usual, cessazione dell'attività)
e. Altro (per favore, descrivere) ……

12. Nella destinazione, chi è il leader nella mitigazione degli effetti negativi del cambiamento climatico e perché?

…….

13. Per quanto la vostra attività si trovi ad un altitudine più elevata, negli ultimi 40 anni avete percepito un aumento del numero di visitatori?

(le regioni basse possono avere un problema con un numero ridotto di visitatori, quindi ci si può aspettare che viaggino verso regioni più alte)

a. Sono assolutamente d'accordo
b. Sono d'accordo
c. Nè d'accordo né in disaccordo
d. Non sono d'accordo
e. Sono fortemente in disaccordo

14. In quale periodo fornite i vostri servizi ai visitatori? (selta multipla)

a. Stagione estiva
b. Stagione invernale
d. Tutto l'anno
e. Fuori stagione
f. Altro …….

15. In che tipo di impresa turistica operate? (scelta multipla)

a. Hotel
b. Pensione
c. Alloggio privato
d. Appartamento
e. Rifugio
f. Ristorante
g. Bar
h. Caffè
i. Apres ski
j. Funzionamento degli impianti di risalita
k. Altro …….

16. Come può essere caratterizzata la vostra impresa?
    a. Impresa familiare
    b. Affitto
    c. Membro di un gruppo
    d. Altro …….

17. Da quanti anni è presente sul mercato del turismo la vostra impresa?
    …….

18. Dove si trova la vostra impresa?
    a. Selva Gardena, Val Gardena
    b. Santa Cristina, Val Gardena
    c. Ortisei, Val Gardena
    d. Un altro posto: …….

Source: Own processing, 2021.

Appendix 23 Questionnaire in English

Dear respondent,

I am a student of the 2nd year of engineering studies at the Faculty of Economics, Matej Bel University in Banská Bystrica, Slovakia, Department of Economics and Tourism Management. My diploma thesis focuses on the analysis of the impact of climate change on business in mountain destinations. Climate change is one of the main problems of today's society and it is up to us how we deal with it. The purpose of the questionnaire is to find out the attitude of companies to climate change in Val Gardena. For this reason, I kindly ask you to complete this questionnaire. The questionnaire is ANONYMOUS.

Thank you in advance for your availability and cooperation.
Bc. Simona Juríková

1. Following factors can be classified as natural. Please indicate which affected your business in the mountain destination Val Gardena the most in the last 40 years.
(1 I totally agree, 2 I agree, 3 I do not know, 4 I do not agree, 5 I completely disagree)

a. Weather fluctuations
b. Mild winter with less snow coverage
c. Cold winter and a lot of precipitation
d. Hot summer
e. Summer with heavy rains
f. Drought
g. Natural disaster

2. Following factors can be classified as socio-cultural. Please indicate which affected your business in the mountain destination Val Gardena the most in the last 40 years.
(1 I totally agree, 2 I agree, 3 I do not know, 4 I do not agree, 5 I completely disagree)

a. Organized events in the destination

b. Holiday period
c. Bank holidays
d. Habits and traditions
e. Changing structure of visitors
f. Lower income level of visitors
g. Aging of the population
h. Availability of qualified people in the destination

3. Following factors can be classified as economic. Please indicate which affected your business in the mountain destination Val Gardena the most in the last 40 years.

(1 I totally agree, 2 I agree, 3 I do not know, 4 I do not agree, 5 I completely disagree)

a. Ski lifts and cable cars season
b. Revenues
c. Stability on the market
d. Employees
e. Competition
f. Provided subsidies from public sector
g. Pandemic

4. Has any of factors, you marked in the previous questions, caused shift any of your winter season over the last 40 years?

a. No
b. Yes
c. I do not remember

5. If yes, what factors forced to shift your season?

…….

6. How do you perceive changes in climatic conditions during your business in the tourism sector?

a. Positively
b. Negatively

c. I do not know

7. Are you worried that your business will be threatened by climate change during the coming winter seasons?

a. I´m very worried
b. I´m worried
c. I don´t have opinion about it
d. I´m not worried
e. I´m not worried at all

8. Is any of your environmental practices in place in your business? (multiple choice)

a. Energy consumption reduction
b. Water consumption reduction
c. Waste management
d. Reducing greenhouse gas emissions
e. Non-use of disposable goods
f. Reuse
g. Other …….

9. Are you considering or have you introduced innovations to mitigate the impact of climate change?

a. No
b. Yes
c. I do not know

10. If yes, in which way do you plan to implement or have you implemented the innovation?

…….

11. Your business is located in a destination at higher altitude, but in the future, you will have to deal with the adaptation to climate change. Which strategy do you like the most? (multiple choice)

a. Maintain ski tourism (artificial snow, move to a higher area, ski halls, cooperation)

b. Subsidies (annual or single contribution)
c. Alternatives (product diversification, all year tourism, non-ski related activities)
d. Fatalism (business as usual, termination of business)
e. Other (please describe) …….

12. In the destination of your business, who is the leader in mitigating the negative effects of climate change and why?

…….

13. As your business is located in environment at higher altitude, do you perceive an increase in the number of visitors over the last 40 years?

(low-lying regions may have a problem with decreased number of visitors, so it can be expected their travel to higher-lying regions)

a. I strongly agree
b. I agree
c. Neither agree nor disagree
d. I disagree
e. I strongly disagree

14. During what period do you provide your services to visitors?

a. Summer season
b. Winter season
c. Summer and winter season
d. All year business
e. Off-season
f. Other …….

15. What kind of tourism enterprise do you operate?

a. Hotel
b. Pension
c. Private accommodation
d. Apartment house
e. Ski hut

f. Restaurant
g. Bar
h. Café
i. Après ski
j. Ski lift operation
k. Other …….

16. How can your enterprise be characterized?

a. Family owned
b. Rent
c. Member of a group
d. Other …….

17. How many years has your business been on the tourism market?

…….

18. Where is your business located?

a. Selva Gardena, Val Gardena
b. Santa Cristina, Val Gardena
c. Ortisei, Val Gardena
d. Another place: …….

Source: Own processing, 2021.

Appendix 24 Descriptive statistics on the companies´ number of years on the market

Statistics		
How many years has your business been on the tourism market?		
N	Valid	157
	Missing	0
Mean		30,01
Median		22,00
Mode		40
Std. Deviation		26,861

Source: Output from SPSS, 2021.

Appendix 25 Attitudes of companies to individual factors influencing business

		I completely agree	I agree	I do not know	I do not agree	I completely disagree
Q.1	Weather fluctuations	68	79	5	5	0
	Mild winter with less snow coverage	32	79	17	28	1
	Cold winter and a lot of precipitation	29	82	25	19	2
	Hot summer	34	100	15	7	1
	Summer with heavy rains	20	69	46	22	0
	Drought	6	44	48	47	12
	Natural disaster	19	45	68	19	6
Q.2	Organized events in the destination	64	83	6	2	2
	Holiday period	83	68	5	1	0
	Bank holidays	44	99	14	0	0
	Habits and traditions	22	91	39	4	1
	Changing structure of visitors	21	76	47	13	0
	Lower income level of visitors	20	57	46	31	3
	Aging of the population	26	54	43	34	0
	Availability of qualified people in the destination	36	80	38	3	0
Q.3	Ski lifts and cable cars season	104	43	8	2	0
	Revenues	51	95	10	1	0
	Stability on the market	56	91	8	2	0
	Employees	79	59	12	7	0
	Competition	29	85	30	13	0
	Provided subsidies from public sector	6	49	60	32	10
	Pandemic	75	77	5	0	0

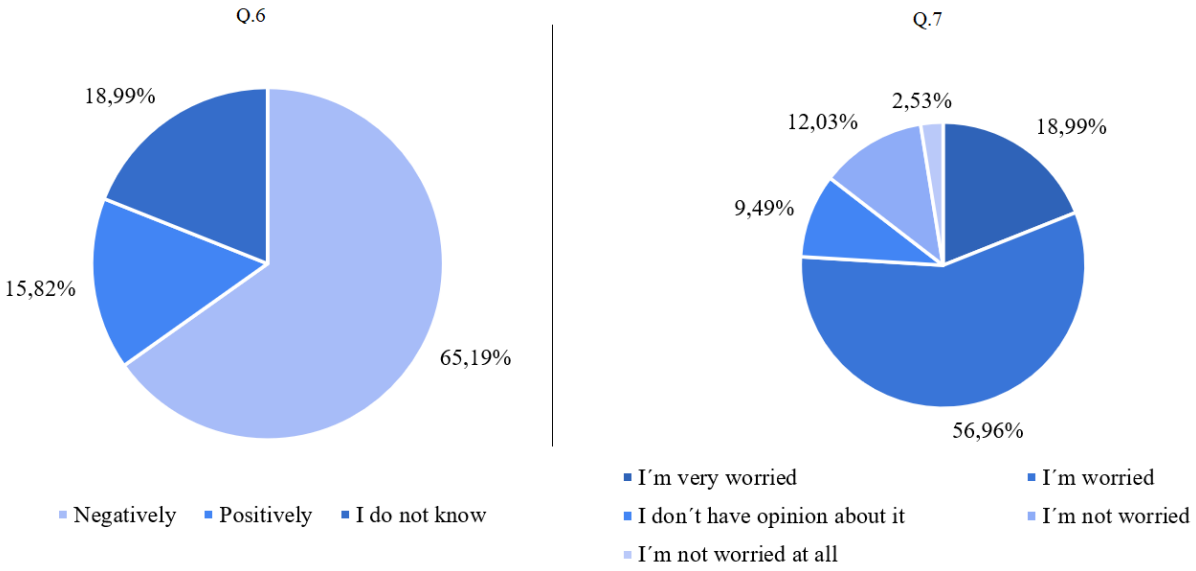
Source: Own processing, 2021.

Appendix 26 Distribution of answers to the question of whether entrepreneurs postponed the season due to the mentioned factors

Has any of aforementioned factors caused shift any of your winter season over the last 40 years?					
Q.4		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	33	21,02	21,02	21,02
	Yes	100	63,69	63,69	84,71
	I do not remember	24	15,29	15,29	100
	Total	157	100	100	

Source: Output from SPSS, 2021.

Appendix 27 Answers to question 6 and 7



Source: Own processing, 2021.

Appendix 28 Proportion of innovative companies in Val Gardena

Q.9	Are you considering or have you introduced innovations to mitigate the impact of climate change?	
Answer	Number of answers	Percentage
No	25	15,92
Yes	80	50,96
I do not know	52	33,12

Source: Output from SPSS, 2021.

Appendix 29 Dependence between attitude on climate change and innovation

Symmetric Measures[c]							
		Value	Approximate Significance			Total answers of Q.10	Total answers of Q.6
Nominal by Nominal	Phi	0,889	0,001	Q.6 Attitude	Negative	44	102
	Cramer's V	0,628	0,001		Positive	14	25
N of Valid Cases		157			Neutral	21	30
				Total		79	157

Source: Output from SPSS, 2021.

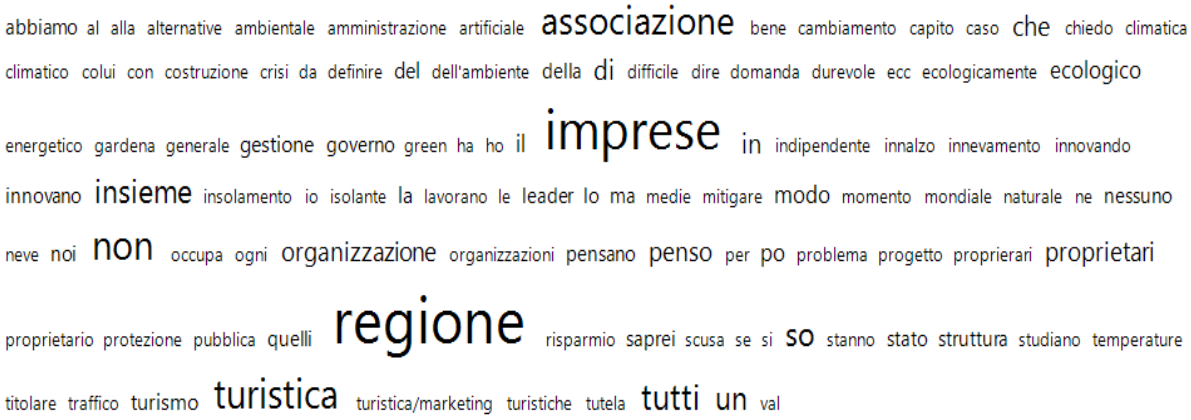
Appendix 30 Kruskal Wallis Test showing the statistical difference between the variables

Ranks			
NewQ15		N	Mean Rank
NewQ.9	1	97	81,08
	2	58	75,54
	3	2	78,25
	Total	157	

Test Statistics[a,b]	
	NewQ.9
Kruskal-Wallis H	0,719
df	2
Asymp. Sig.	0,698
a. Kruskal Wallis Test	
b. Grouping Variable: NewQ15	

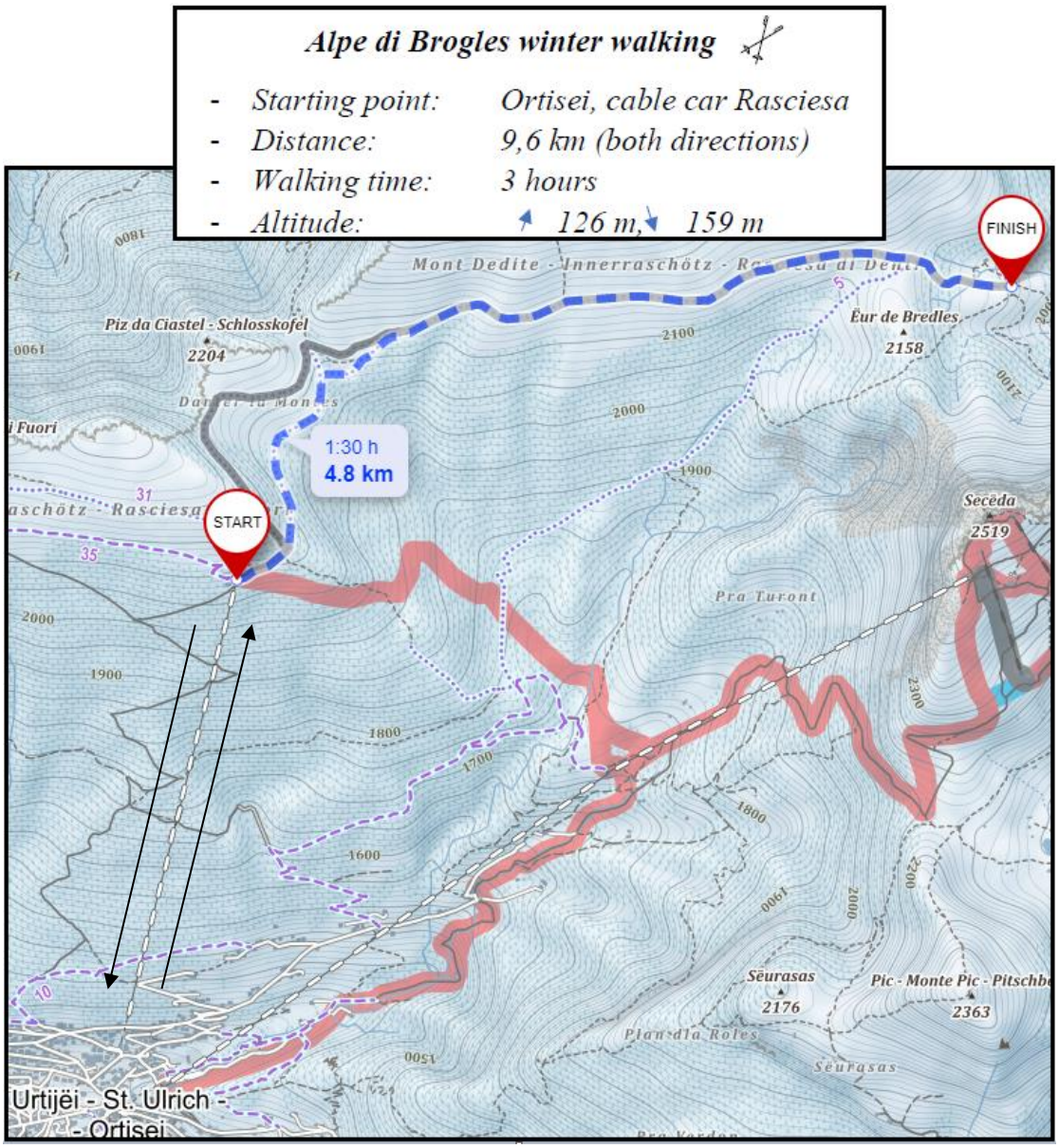
Source: Output from SPSS, 2021.

Appendix 31 Leaders in climate change mitigation in Val Gardena



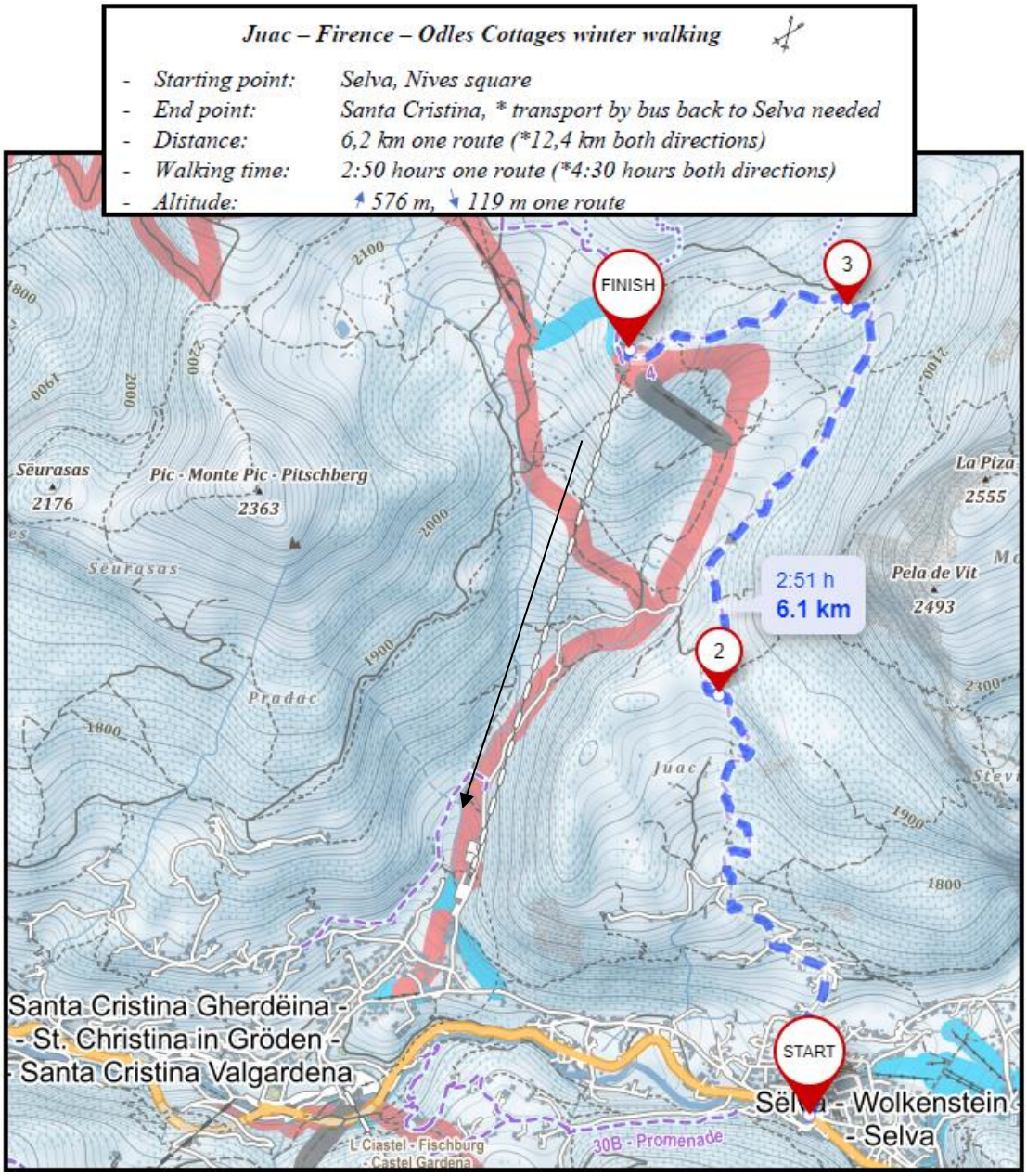
Source: Output from ATLAS.ti, 2021.

Appendix 32 Alpe di Brogles winter walking map



Source: Own processing from www.mapy.cz, 2021.

Appendix 33 Juac – Firence – Odles Cottages winter walking map



Source: Own processing from www.mapy.cz, 2021.