
D.1.1.1 State of art of drivers of change

Work package 1 Stakeholder-driven Transition Method (STM)

A.1.1 Setting the scene: identifying drivers of change

Project acronym:	TranStat
Project name:	Transitions to Sustainable Ski Tourism in the Alps of Tomorrow
Programme priority:	Priority 1 - Climate Resilient and Green Alpine Region SO 1.1: Promoting climate change adaptation and disaster risk prevention, resilience, taking into account eco-system based approaches
Programme specific objective:	

Responsible partner: IGF/ÖAW (subcontracted to Environment Agency
Austria)
Involved partners: IGF/ÖAW (concept and review), INRAE (review), UGA
(review), UMIL (review), ZRC SAZU (review), RAGOR (review),
UAS Grisons (review)
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**Report will be part of Output 1.1. Stakeholder-Driven
Transition Method**

**This project is co-funded by the European Union through the
Interreg Alpine Space programme**

TABLE OF CONTENTS

1. INTRODUCTION	5
1.1 Report objectives and methodology	5
1.2 Report structure	6
1.3 Driving forces and megatrends	6
1.4 Strategies to guide the transition process	8
2 CLIMATE AND ECOLOGICAL DRIVING FORCES	11
2.1 Changing snowfall and temperature patterns considering specific topographical features.	11
2.2 Changing water availability	12
2.3 Conservation awareness of natural habitats and biodiversity	12
2.4 Increasing frequency and severity of extreme weather events and extreme wind	13
2.5 Impact of land use changes	13
3 SOCIETAL AND ECONOMIC DRIVING FORCES	14
3.1 Demand for diverse leisure activities	14
3.2 Demand for quality landscapes	14
3.3 Demand for differentiated quality products	14
3.4 Economic globalisation, mass tourism and economy of scale	15
3.5 Changing demographics	15
3.6 Changing dynamics of communities (increased diversity)	15
3.7 Increasing gap (existence and investment on) between services for tourists and locals	16
3.8 Economic regionalisation	16
3.9 Labour force	16
3.10 Competition	16

3.11 Impact of economic conditions	17
3.12 Demand for sustainable waste management	17
3.13 Energy transition	17
3.14 Technological progress	17
3.15 Sustainable transportation infrastructure	18
4 GOVERNANCE AND PARTICIPATION DRIVING FORCES	19
4.1 Governance policies	19
4.2 Political leadership	20
4.3 Real estate development	20
4.4 Monitoring and evaluation	21
4.5 Demand for participation in the decision making process	22
4.6 Demand for knowledge and information exchange	22
5 ANALYSIS OF SELECTED DRIVING FORCES (WORKSHOP RESULTS)	23
5.1 Driving force: Changing snowfall and temperature patterns	23
Introduction	23
Certainty analysis	23
Interlinkages to other drivers	23
Strategies to counter driving forces	23
5.2 Driving force: Changing water availability	24
Strategies to counter driving forces	24
5.3 Driving force: Governance policies	24
Introduction	24
Certainty analysis	25
Interlinkages to other drivers	25
Strategies to counter driving forces	25
5.4 Driving force: Political Leadership	25
Introduction	25
Certainty analysis	26
Interlinkages to other drivers	26
Strategies to counter driving forces	27
5.5 Driving force: Demand for differentiated quality products	27
Introduction	27
Interlinkages to other drivers	28
Strategies to counter driving forces	28

5.6 Driving force: Increasing gap (existence and investment on) between services for tourists and locals	29
Introduction	29
Certainty analysis	29
Interlinkages to other drivers	29
Strategies to counter driving forces	30
5.7 Driving force: Lack of labour force (quantity and quality)	30
Introduction	30
Strategies to counter driving forces	31
6 CONCLUSION	32
7 REFERENCES	33
7.1 General	33
7.2 Climate and ecological driving forces	33
7.3 Societal and economic driving forces	34
7.4 Governance and participation driving forces	35
8 GLOSSARY	35

1. Introduction

1.1 Report objectives and methodology

The report is written in the framework of the Interreg Alpine Space project TranStat - Transitions to Sustainable Ski Tourism in the Alps of Tomorrow - and is part of activity A.1.1 Setting the scene: identifying drivers of transition within the first work package “Stakeholder-driven Transition Method (STM)”. The TranStat project aims to help implement jointly developed approaches for the transition to sustainable mountain resorts (MR) - ski resorts and their settlement area - in practice. Based on a participatory and inclusive approach, TranStat aims to elaborate scenarios and jointly developed approaches to respond to the identified challenges in mountain destinations. The challenge is to promote new models of economic, social and environmental development to ensure a liveable and sustainable future in the Alpine Space. TranStat addresses this cross-cutting issue by creating a physical and digital network of mountain destinations in transition to share knowledge and experiences for the future.

The objective of activity 1.1 is to identify driving forces of transition, in terms of governance structures, physical-environmental and socio-economic conditions across spatial and temporal scales in the Alpine Space to support WP2/WP3 in their work with stakeholders in the Living Labs. The associated report presents driving forces in examined transition processes in the Alpine Space, including a list of driving forces impacting on transition, a glossary of key terms, and an accessible visual summary to build a common understanding.

The information for this report was gathered through a literature review using the snowball method. This involved starting with a selection of relevant articles or books, checking the reference lists or bibliographies of these initial sources, finding and evaluating the sources mentioned in these references. This iterative process continued until a saturation point was reached where no further relevant sources were found.

In addition to the snowball method, Google Scholar and Google Search was used with selected keywords in the context of ski resorts, such as “driving forces, factor of change, megatrends, climate change, etc.”, which included both academic and grey sources. Furthermore related projects of the AlpineSpace program (SmartAltitude, AlpES, ClimAlpTour, The Future of Alpine Ski Resorts: the Example of Métabief) have been reviewed.

Additionally, input was obtained from an international stakeholder workshop, where the preliminary list of driving forces was discussed and modified. Feedback from the project partners was also collected and incorporated into the report.

This report was developed through a series of steps, each aimed at providing a comprehensive understanding of the driving forces impacting ski resorts.

Step 1: Compilation of the draft list of driving forces

The author of this report initiated the process by compiling a draft list of driving forces through an in-depth literature review. This initial list served as a basis for further analysis and discussion.

Step 2: Presentation and stakeholder workshop

The list of driving forces was presented and thoroughly examined during a project and stakeholder workshop, which took place in Megève, France on May 4th, 2023. Invited to the stakeholder were the representatives of nine mountain resorts that function as Living Labs in the project; from France Saint-Pierre-de-Chartreuse and Megève, from Slovenia Kranjska Gora and Rogla, from Italy Valmalenco and Maniva Ski, from Switzerland Surselva and from Austria Sankt Corona and Großes Walsertal. The workshop had two primary objectives: to ensure that all participants developed a shared understanding of the driving forces and to collaboratively

refine the list by identifying the most significant driving forces. The workshop placed great importance on engaging stakeholders from diverse backgrounds, including representatives from both large and small ski resorts, as well as stakeholders from different countries. During the workshop the participants were divided up in three groups that each discussed driving forces related to one of three categories (climate and ecological drivers, social and economic drivers, governance and participation).

Step 3: In-depth analysis of the most important driving forces

Subsequent to the workshop, a detailed analysis was conducted on the two to three driving forces deemed the most significant. This analysis involved addressing key questions, such as the level of certainty and predictability associated with each driver, the influence of uncertainty on its impact, and appropriate strategies for responding to this uncertainty. Furthermore, the analysis explored the interconnectedness between the driving forces, while assessing the current strategies employed to address them, considering their sustainability and effectiveness

The target audience of the report are the project partners that will use the report as a basis for stakeholder activities in the livings to determine the locally specific drivers of change. The visual summary included in the report is intended to give the stakeholders an easy to understand and quick overview of the possible driving forces affecting ski resorts and communities. The report itself may be used for reference purposes by the stakeholders and is therefore written in a non-scientific way. If needed, scientific background information on the transition drivers can be found by using the listed references in the report.

1.2 Report structure

The second half of Chapter 1 provides an overview of the impact of driving forces and megatrends on ski resorts and general strategies for managing the transition process. Chapters 2 to 4 contain a comprehensive list of drivers that form the core content of the report.

The 29 identified driving forces fall into three main groups:

- Climate and ecological driving forces
- Social and economic driving forces
- Governance and participation driving forces

Each category is equally important for a successful transition and contains a varying number of driving forces, with the societal and economic category being the largest in terms of the number of driving forces identified. For a thorough understanding of the challenges facing ski resorts and communities on their sustainability journey, each driving force is accompanied by a brief description and references to relevant literature in its respective focus area.

Chapter 5 provides a summary of the in-depth analysis carried out by the stakeholders during the workshop, exploring the drivers identified.

A brief conclusion is given in Chapter 6.

Chapter 7 refers to the literature used to prepare the first draft of the driving forces. The literature is divided into two sections: general literature and literature specific to each of the three categorised groups of drivers. This division allows for a comprehensive examination of the sources used to inform the report's findings.

Chapter 8 provides the reader with a glossary of key terms used throughout the report.

1.3 Driving forces and megatrends

Ski resorts are under increasing pressure to move towards a more sustainable future due to a number of driving forces and long-term megatrends. These include the urgency to address the impacts of climate change and to balance economic growth with, among others,

environmental protection and liveability of mountain resorts for residents. It is important to recognise and assess megatrends and driving forces that are shaping the transition process in ski resorts and their communities.

Driving forces are factors and uncertainties that create changes in society, the economy, technology and the environment. These driving forces are often clear, relevant and immediate to various stakeholders and may change from year to year. The driving forces impact various stakeholders directly and can be influenced and modified as well by certain stakeholders. These drivers can arise from a range of factors, including alterations in consumer behaviour, shifts in government policy, developments in technology, and global economic conditions (Saritas and Smith, 2011).

External driving forces may originate from outside an industry, organisation, or community, such as changes in the political or legal environment, the growth of a new market or industry, or the emergence of new technologies. These factors can create significant shifts that can have a ripple effect throughout an entire industry or community.

Internal driving forces may be specific to an industry or organisation and may include factors such as changes in management, shifts in organisational culture, or the implementation of new policies or procedures. These may also have a significant impact on an organisation or community, as they can change the way people work, interact, and make decisions.

In the ski resort industry, driving forces can be seen in changes for example in customer behaviour, such as a shift towards eco-friendliness and sustainability, or a decrease in demand for traditional skiing activities. Advances in technology, such as snowmaking systems or the development of alternative winter sports, can also act as driving forces in the industry. Changes in government policies related to tourism, environment, or land use can also influence ski resort operations and development.

Megatrends, on the other hand, are long-term, transformative changes in society that have a broad and lasting impact on many aspects of life and are usually felt by all stakeholders, although to different degrees. These trends are typically driven by a combination of social, economic, technological, environmental and political drivers. Examples of megatrends include demographic change, globalisation, urbanisation, climate change and advances in digital technology. Stakeholders groups alone do often not have the power to modify the direction or intensity of a trend or megatrend- Some megatrend cannot even be modified by (groups of) national states (Saritas and Smith, 2011).

Megatrends and drivers are linked in that megatrends are often the result of several drivers working together over a long period of time. Driving forces can accelerate, amplify, or disrupt megatrends, leading to changes in the way people live, work, and interact with each other and the environment. For example, the megatrend of urbanisation is driven by a number of combined forces including industrialization, changing job markets, mechanization of agriculture, lifestyle changes and changing consumer preferences. These drivers have led to the rapid expansion of cities and the development of new forms of urban infrastructure and services.

Authors such as Bilas et al. 2022, Buckley et al. 2015, Dwyer et al. 2008, and Elmahdy et al. (2017), have compiled thorough lists of trends affecting the tourism industry in general after conducting research and literature reviews. Although the list of megatrends compiled by the authors refers to both summer and winter tourism, it is clear that all of these megatrends and their associated drivers have their specific impacts on winter tourism in the Alps. The driving forces are described in detail in chapters 2, 3, 4 and 5. The authors have grouped the trends as follows:

Social megatrends: Megatrends in society that are expected to have a long-term impact on the way people live and work are referred to as social megatrends. They consist of changes in consumer behaviour, urbanisation, demographics and lifestyles. Examples of important social megatrends that are expected to have a major impact in the future include ageing

populations, increasing urbanisation, societal challenges due to climate change, and changing family patterns.

Technological megatrends: These changes in technology are described as having the potential to change the way people live and go about their daily lives. They include developments in biotechnology, robotics, automation and renewable energy. Some of the major technology trends that are expected to have a significant impact on the future include the proliferation of smart devices, the artificial intelligence and the increasing use of renewable energy sources.

Economic megatrends: These changes in the global economy that are expected to affect the way people live and work are described as megatrends. They include globalisation, the rise of the digital economy, mitigation and adaptation to climate change, and changes in the balance of economic power. The impact of international trade policy, the rise of emerging economies and the growing importance of the digital economy are just some of the major economic trends expected to affect the future.

Environmental megatrends: These megatrends describe the environmental changes that are likely to affect the way people live and work. They consist of resource scarcity and climate change, which result in a growing interest in sustainable solutions. Some of the major environmental trends that are expected to have an impact in the future include the impact of climate change on weather patterns, the increasing need for renewable energy sources and the need to protect natural resources.

Political megatrends: These megatrends outline the political and governmental changes that are most likely to have an impact on how people live and work. Changes in political ideology, changes in power structures, and the effect of new technologies on politics are among them. Some of the major political trends that are anticipated to have an impact on the future include the growth of populist groups, the polarization of politics, and the expanding role of social media in political discourse.

1.4 Strategies to guide the transition process

Today, mountain resorts stakeholders are faced with a common challenge: coping with the effects of climate change without having a robust reference framework for action. To help them move towards a desirable and sustainable future, ski resorts need to understand and assess the megatrends and driving forces affecting the ski industry. Since each ski resort is experiencing the effects of megatrends and driving forces differently, addressing the transitional processes calls for a diverse approach. As a result, each resort needs to be assessed individually, taking into accounts its unique characteristics, such as geographic location, infrastructure and amenities, equipment condition, debt load on the operator, employee and business skills, customer structure, the state of tourist accommodations, the region's economic and cultural importance, the natural environment, and the availability of water, governance structures, the attitudes of the local population on the future development of ski areas, etc.

Although each ski resort with its own characteristics interacts differently with megatrends and drivers, the ski resort of Métabief in the French Jura provides an interesting example of a step-by-step ~~general~~ approach on how communities can manage the transition process towards a sustainable future (Alpy and Erard 2021).

The recommended steps in the Métabief example to manage the transition process toward a more sustainable ski tourism destinations are:

- (1) **Initial research:** In order to help ski resorts transition to a sustainable future, it's crucial to investigate the economic viability of alpine skiing, the potential for new

tourism activities that do not depend on snow, and possible solutions to offset the financial loss that would result from the end of alpine skiing.

- (2) **Invest in knowledge:** Ski resort operators can understand the issues and take control of the climate adaptation strategy by investing in knowledge, collecting data on ski slopes, water resources and infrastructure, and seeking external expertise to address uncertainties.
- (3) **Innovation:** Innovation is crucial for adaptation and change in resort equipment and organisation. It encourages experimentation and creativity to find new technological solutions and establish new habits that counteract the pick-list effect.
- (4) **Using skills and training:** To drive change, resorts must rely on the skills of their employees, including lift operators, maintenance technicians and snowmakers. By strengthening skills in each core area and encouraging ongoing training, employees can improve their skills and create new opportunities.
- (5) **Tell a new story:** Ski resorts need to tell a new story that is in line with the culture and shared values of local people. Identifying these values is essential to the success of a future model and involves all stakeholders, including elected officials, tourism professionals and local voluntary organisations.
- (6) **Imagine the future through foresight, design concrete projects and take action by bringing stakeholders together:** Ski resorts need to imagine a future that is less or not dependent on snow and that corresponds the interests, needs and values of all relevant stakeholders by proposing scenarios whose feasibility has not yet been demonstrated, encouraging collaboration, being agile in constructing the future model and seizing opportunities as they arise. Regional coordination, project engineering and the involvement of local elected representatives are essential for successful change.
- (7) **Mobilize:** bring all relevant stakeholders together to work collaborative to drive change and realize the future

There are many examples in the literature of ski resorts responding to changing trends. The following two examples from Lower Austria are intended to show that on the one hand some drivers come unexpectedly and require a quick response. On the other hand, other drivers, such as those links to the megatrend climate change, are so massive that the response of ski resorts sometimes requires a fundamental reorientation.

As the example of the rapidly implemented COVID-19 measures in the ski resorts of Lower Austria shows, drivers of change can sometimes be quite unexpected. According to Steiger et al. (2021), the COVID-19 pandemic has unexpectedly serve as a catalyst for innovation in the travel and tourism sector. In the case study, new digitalisation approaches in tourism management, customer loyalty and pricing have been tested in ski resorts in Lower Austria. The COVID-19 crisis has led to a re-evaluation of visitor management and consumer data analysis. The report claims that the crisis has led to technological advances, increased cooperation between business actors and improved communication with customers. The lessons learned from the case study could help the tourism industry become more resilient to external shocks in the future.

Another case from Lower Austria illustrates how driving forces linked to global warming can lead a ski resort to make significant changes to achieve a sustainable future. An article in the newspaper "Presse am Sonntag" (12.12.2021) highlights the financial challenges faced by small to medium-sized ski resorts in Lower Austria due to the high costs of maintaining lifts and slopes and providing modern amenities for visitors. According to the article, ski resorts could

rebrand themselves by offering year-round activities to attract visitors. It cites the examples of St. Corona am Wechsel and Annaberg, where unprofitable lifts were removed and family-friendly summer activities were prioritized. The article's conclusion is that skiing's future lies in year-round activities rather than its reliance on (artificial) snow, which is becoming more and more expensive due to global warming.

The following example shows how contradictory the idea of ski resort transition can be. The Navacerrada ski resort in the Guadarrama mountain range near Madrid, Spain, faces a dispute over its future. The Spanish government plans to dismantle the resort and turn it into a national park due to rising temperatures and climate change. The resort's reliance on artificial snowmaking is deemed unsustainable, but its owners and local communities view it as a significant source of income. The decision has environmental and economic implications, with the government arguing that converting the slopes into a national park would benefit the environment and provide a cost-effective recreational area. The resort's supporters argue that closure would negatively impact the local economy and tourism, and that technological solutions can compensate for the changing climate and enable the resort to continue operating (Millan Lombrana 2013).

2 Climate and ecological driving forces

According to the IPCC report, climate change and its interlinked drivers, including declining snow cover (partly due to winter precipitation falling as rain instead of snow), glacier and permafrost have negative impacts on skiing, mountaineering and glacier tourism. Especially variability and declining snow cover in lower lying ski resorts have impacted the operability of these ski resorts negatively (Hock et al. 2019, pp 134, 168). Ski resorts are undergoing significant change as they navigate multiple drivers. Changing snowfall and temperature patterns have forced resorts to adapt their operations to accommodate shorter ski seasons and fluctuating snow conditions. In addition, the availability of water, a critical resource for snowmaking, has become a concern due to climate change and increasing water demands. The exposure of ski slopes to the sun has become another element influencing ski resort change, as different temperatures and precipitation patterns have very different effects on snow conditions depending on the exposure of the slopes. Compared to slopes facing away from the sun, slopes exposed to the sun are more sensitive to variations in temperature and precipitation. The awareness and need to preserve natural habitats and biodiversity has become a priority for ski resorts in this transition.

The stakeholder workshop revealed that the increasing frequency and severity of extreme winds poses a challenge to ski resorts, and resorts are exploring ways to manage and mitigate the impacts of extreme winds through infrastructure improvements and advanced wind monitoring systems.

The stakeholder workshop identified the following drivers as the most important:

1. Changing snowfall and temperature patterns
2. Changing Water availability
3. Slope exposure to sun
4. Awareness and societal pressure to preserve natural habitats and biodiversity
5. Increasing frequency and severity of extreme wind

2.1 Changing snowfall and temperature patterns considering specific topographical features.

Changing snowfall, humidity and temperature patterns can have a significant impact on ski resorts and surrounding communities. Snowfall and temperature patterns play a critical role in determining the length and quality of the ski season, as well as the success of snowmaking operations. Temperatures in the Alps have risen by 2.5°C over the past century, with new record highs since the 21st century. Snowfall patterns are changing, with glacier retreat and reduced snow cover. A 2017 study suggests that the Alps could lose up to 70% of their snow cover by 2100 if global warming continues (Stretton, J., 2019; CREA 2023),

Adequate snowfall is essential for a ski resort to open and operate during the season. Changes in snowfall patterns, such as a reduction in total snowfall or shifts in the timing of snowfall, can have a significant impact on the ski season. The timing of snowfall is critical for ski resorts, as snowfall earlier in the season can help establish a base layer of snow that will last throughout the winter. A lack of snowfall or delayed snowfall can result in a shorter ski season, reduced revenues for ski resorts and negative impacts on the local economy and tourism industry.

Temperature patterns also play an important role in snowmaking operations. Snowmaking is used to supplement natural snowfall and requires specific temperature conditions for optimal snow production. Changes in temperature patterns, such as warmer temperatures or

temperature fluctuations, can affect the ability of ski resorts to produce snow, resulting in a shorter ski season and reduced revenues for ski resorts.

Topographical features, such as the slope's orientation to the sun, should not be underestimated, as they can exacerbate the negative effects of changing snowfall, humidity and temperature patterns on ski resorts. This aspect was highlighted during the stakeholder workshop in Megève. If a ski slope is exposed to direct sunlight for most of the day, this can cause the snow to melt more quickly, reducing the amount of snow cover and shortening the ski season. On the other hand, slopes that are not exposed to the sun can retain snow for longer periods of time, allowing for a longer ski season.

Changes in snowfall, humidity and temperature patterns can also affect tourist behaviour, causing skiers and snowboarders to change their holiday plans or choose different resorts. Such changes can affect the revenue and profitability of ski resorts and other businesses in surrounding areas that rely on tourism.

2.2 Changing water availability

Changes in water availability can have a significant impact on ski resorts and surrounding communities. Ski resorts rely heavily on water for snowmaking and other operations, and climate change and increasing water demand can lead to water scarcity, which can affect the ability of ski resorts to operate and attract visitors.

Snowmaking, which is used to supplement natural snowfall, requires significant amounts of water, which is typically drawn from nearby rivers, lakes or reservoirs. Reduced water availability due to factors such as drought, increased water demand from other sources, water-saving regulations by the municipality or changes in precipitation patterns can make it difficult for ski resorts to obtain the water they need for snowmaking and other operations. This can result in a shorter ski season, reduced revenues for ski resorts, and negative impacts on the local economy and tourism industry.

Ski resorts and surrounding communities can take steps to mitigate the effects of changing water availability. One approach is to reduce water use and improve water efficiency through measures such as installing low-flow fixtures, using recycled water, and implementing water conservation practices. In addition, resorts and communities can work to promote sustainable water management practices, such as rainwater harvesting and water conservation education programmes.

2.3 Conservation awareness of natural habitats and biodiversity

The rising awareness of preserving natural habitats and biodiversity is an important driver that can impact on ski resorts and surrounding communities. Ski resorts are often located in wilderness areas or adjacent to protected areas, which can lead to habitat fragmentation and displacement of wildlife. Displacement of wildlife can lead to increased competition for resources and further habitat fragmentation, resulting in long-term ecological impacts.

The creation of ski slopes often requires the removal of trees and other vegetation, which can have negative impacts on the local ecosystem, including a reduction in biodiversity and overall ecosystem health. However, the creation of ski slopes can also lead to reforestation, which can have positive effects on the local ecosystem, such as providing wind protection.

Conflicts between conservation and tourism development can arise as ski resorts need to balance the needs of visitors with the protection of natural habitats and biodiversity. To manage these conflicts, visitor guidance and education is needed to ensure that visitors are aware of the potential impacts of their activities and can make informed choices that minimise their impact on the local ecosystem.

2.4 Increasing frequency and severity of extreme weather events and extreme wind

Extreme weather events have become more frequent and severe in the Alps as a result of climate change. Extreme weather events, changing precipitation patterns, glacier retreat and rising temperatures have all been caused by climate change (Dokulil, M. T., 2022). Other extreme events such as heavy rainfall, storms, heatwaves, and rapid temperature fluctuations, can have a profound impact on various aspects of ski resort operations and overall sustainability.

One of the primary concerns is the impact of extreme weather events on snowfall patterns. Ski resorts rely heavily on consistent and sufficient snowfall to provide optimal skiing conditions throughout the season. However, extreme weather events can disrupt the regular snowfall patterns by bringing rain instead of snow or causing unpredictable shifts in precipitation timing. This leads to a shorter ski season, reduced snow cover, and less reliable snow conditions, which can negatively affect visitor numbers and revenue.

Extreme weather events also impact the stability of slopes and the safety of ski resort infrastructure. Heavy rainfall can lead to soil erosion, landslides, and increased avalanche risk, posing significant dangers to skiers and resort facilities. Additionally, storms and strong winds can damage ski lifts, buildings, and other infrastructure, resulting in costly repairs and temporary closures. These disruptions not only affect the immediate operation of ski resorts but also damage their reputation and ability to attract visitors in the long run.

Moreover, extreme weather events can cause disruptions to transportation systems, making it difficult for tourists to access the ski resorts. Road closures, flight cancellations, and hazardous travel conditions due to heavy snowfall or severe weather conditions can deter visitors from reaching their desired destinations.

Stakeholders and representatives from ski resort pointed out at workshop in Megève that snowmaking machines may not function properly in high winds, and existing snow can be blown away or drift into unpredictable patterns, making it difficult to groom or maintain ski runs. This can further impact the visitor experience and revenue for ski resorts.

The effects of extreme weather conditions can also extend beyond the ski resort itself and impact the surrounding community. Many ski resort towns rely heavily on tourism as a source of income, and a decrease in visitors to the ski resort can have a ripple effect on local businesses such as restaurants, hotels, and shops. Additionally, extreme events can cause damage to buildings and infrastructure in the surrounding area, leading to costly repairs and potentially putting residents at risk.

2.5 Impact of land use changes

The impact of land use regulations and changes is a significant driver that can affect ski resorts and surrounding communities. Changes in land use policies, zoning regulations and development pressures can (1) affect the availability of land for ski resorts and surrounding communities and (2) have serious ecological impacts on surrounding areas.

Deforestation, for instance, can lead to soil erosion, reduced soil fertility and loss of wildlife habitat. Soil erosion can also lead to sedimentation of nearby water bodies, affecting aquatic ecosystems and water quality. These changes can have long-term ecological impacts on surrounding areas, leading to conflicts with local communities that depend on the environment for their livelihoods.

To address these conflicts, ski resorts and surrounding communities can work together to promote sustainable land use practices that minimise the impact on the local environment. This includes using renewable energy sources, reducing carbon footprints, and promoting environmental education and conservation efforts. In addition, policy makers can promote sustainable land use practices and zoning regulations that balance the needs of ski resorts and surrounding communities with the protection of the local environment.

3 Societal and economic driving forces

The tourism industry is undergoing several changes due to shifting lifestyles, interests, and demographics of tourists. Tourists and locals are seeking diverse leisure activities, resulting in a trend towards outdoor and adventure-based activities. Quality landscapes and clean air are also becoming increasingly important to tourists, leading to a shift towards sustainable tourism practices and nature-based solutions. Ski resorts are facing competition, and tourists are willing to pay a premium for differentiated quality products and services, leading to the development of new and innovative offerings. Finally, the demographic profile of tourists is changing, with more families and older adults participating in leisure activities, requiring ski resorts and communities to adapt their facilities and services to cater to their changing needs and preferences.

The stakeholder workshop identified the following drivers as the most important:

1. Demand for differentiated quality products
2. Increasing gap (existence and investment on) between services for tourists and locals
3. Labour force

3.1 Demand for diverse leisure activities

The changing lifestyles and interests of people have resulted in an increasing demand for varied leisure activities, leading to a shift towards outdoor and adventure-based pursuits like hiking, cycling, paragliding, and ski touring. In the past few years, the tourism industry has observed a growing trend towards "experience-based" travel, where tourists seek unique and authentic experiences instead of conventional tourist activities. The COVID pandemic has furthermore accelerated the need for alternative incentives to visit ski resorts via different activities to increase visitor numbers in the quieter times (Hudson, L., 2023). Witting and Schmude (2019) are projecting in their research in Germany and Austria that climate change will have a negative impact on skier demand for the 2030s and 2040s as a result of decreasing number of operating days and optimal ski days.

Ski resorts can leverage this trend by offering a diverse range of activities beyond skiing and snowboarding, such as snowshoeing, ice skating, and snowmobiling.

In general, dependence on a single industry, such as skiing, can make a community vulnerable to economic changes. Diversifying the local economy can help ensure stability and growth. If the industry experiences a downturn or other challenges, the community's economy can suffer significant setbacks. For example, if a ski resort experiences a mild winter season, the number of visitors and revenue generated by the ski industry is likely to decline, which can have a ripple effect throughout the community's economy. Businesses that depend on the ski industry, such as hotels, restaurants and retail shops, will also experience a drop in revenue.

3.2 Demand for quality landscapes

Tourists and locals are increasingly looking for holiday destinations with quality landscapes and clean air. In the Alps, it is necessary to preserve the natural environment and maintain the visual beauty of the region in order to meet this demand. This driver is pushing for a change towards sustainable tourism practices and nature-based solutions, as well as a transition towards clean energy and sustainable transport to address the issue of air pollution.

3.3 Demand for differentiated quality products

The driving force behind consumer demand for differentiated quality products in ski resorts and communities is the desire for unique and memorable experiences. Skiers, snowboarders and other winter sports enthusiasts are looking for high-quality facilities, personalized

services, and a diverse range of activities and experiences that go beyond skiing. Additionally, consumers are increasingly concerned with sustainability and eco-friendliness, and are more likely to choose ski resorts and communities that demonstrate a commitment to environmentally responsible practices.

3.4 Economic globalisation, mass tourism and economy of scale

In ski resorts and communities in the Alps, the trends of globalisation, conventional products and mass tourism are evident. Conventional products, which are part of the globalised market, tend to be mass-produced and have long supply chains, making it difficult for local businesses to compete. In addition, this approach can lead to the exploitation of workers and the environment. Despite these concerns, globalisation can bring investment and opportunities for international trade that benefit local economies.

In the pursuit of economic efficiency and profit maximisation, ski resorts often adopt mass tourism as a strategy. This approach allows them to benefit from economies of scale, resulting in lower costs per visitor. By attracting large numbers of tourists, resorts can spread their operating costs over a wider customer base, offer competitive prices and potentially increase profits. Mass tourism also generates additional revenue for local businesses, including restaurants, hotels and retail shops, contributing to a stronger local economy. However, it is important to recognise that mass tourism can also bring challenges such as overcrowding, traffic congestion, environmental degradation and negative impacts on local communities and ecosystems.

3.5 Changing demographics

The demographic profile of tourists is changing, with more families and older adults participating in leisure activities. This shift requires ski resorts and communities to modify their facilities and services to accommodate these groups. Ski resorts may introduce beginner-friendly slopes, ski lessons for seniors, or age-appropriate child-care services, while communities also face changing demographics, they may add more family-friendly amenities such as playgrounds, picnic areas or cultural activities, or appropriate healthcare, personal assistance and retirement housing.

3.6 Changing dynamics of communities (increased diversity)

Changing community dynamics, including increased diversity, can have a significant impact on ski resorts and their surrounding areas. Changing community dynamics refers to shifts in the composition and characteristics of the local community living in and around the ski resort areas. Traditionally, these communities have been small and homogenous, with a primarily local population consisting of individuals who have lived in the area for generations. However, in recent years, ski resorts in the Alps have seen an increase in diversity within their communities. This diversity includes age, ethnicity, nationality and cultural background. Economic diversity is also increasing, with residents from a range of socio-economic backgrounds, including professionals, entrepreneurs and those seeking employment in the tourism industry. This economic diversity can lead to variations in income levels, occupation types and lifestyle choices within the community. Lifestyle diversity also reflects different recreational preferences and interests, with some individuals being outdoor enthusiasts, while others are attracted to the cultural and social aspects of the resort.

Other impacts such as rising numbers of second-home owners, influx of seasonal labour and external investment may influence the dynamics of communities.

As ski resorts often experience gentrification they tend to become more expensive to live in, the cost of living can become a significant barrier to entry for many people, leading to

depopulation and the disappearance of a social class and eventually mean the sense of community will be lost. This can create a vicious circle, particularly in the low season where the local economy may be heavily dependent on tourism and ski resort operations (Weinberg 2020)

3.7 Increasing gap (existence and investment on) between services for tourists and locals

The widening gap between services for tourists and locals can have a significant impact on ski resorts and surrounding communities. One potential impact is the marginalisation of local people as resources are directed towards meeting the needs of tourists rather than the needs of the local community. This can lead to tensions between locals and tourists, as well as a sense of disconnection from the wider community.

A lack of investment in local infrastructure and services such as public transport, schools and health facilities can result from a focus on catering for tourists. Additionally, many tourist services often have a seasonal pattern (e.g., ski lifts, catering facilities) and are closed during off-peak periods. As a result, local people may find it difficult to access essential services, which could exacerbate existing inequalities.

3.8 Economic regionalisation

The trend towards short circuits and quality products is growing, as consumers increasingly prefer locally and sustainably produced goods. As a result, there is a growing demand for organic products, locally sourced food and handicrafts. To boost local economies and create jobs, ski resorts and communities in the Alps need to support sustainable agriculture and local businesses.

3.9 Labour force

Ski resort communities often rely on seasonal workers to operate during the winter months when tourism and skiing are at their peak. Attracting and retaining skilled workers can be a challenge for ski resorts, as many seasonal workers are students or young adults who may be looking for a new adventure each winter season. Ski resorts may have difficulty finding skilled workers for specific roles, such as ski instructors or maintenance personnel, as these roles require specific certifications and experience. Since the COVID pandemic, it has become even more difficult for ski areas to find labour, skilled or unskilled (e.g. in gastronomy, hotels).

The availability of affordable and convenient accommodation for seasonal workers plays a vital role in attracting and retaining skilled employees. Ski resorts often face difficulties in finding suitable housing for their workforce, especially in popular resort areas where the demand for accommodations is high. Limited housing options can lead to increased competition and rising costs, making it challenging for resorts to provide affordable accommodations for their seasonal staff.

In order to balance the need for seasonal workers with the desire to maintain a skilled and experienced workforce, ski resorts need to implement effective recruitment strategies, offer competitive wages and benefits, and invest in training and development programmes. Therefore, the goal is to create workers' loyalty in order to ensure they would come also in the following seasons.

3.10 Competition

The competitive landscape of the ski industry is a complex system that can affect the ability of individual resorts to attract skiers and generate revenue. One of the most important drivers in this landscape is the number and quality of ski resorts in a given region. In a highly competitive region, resorts may need to invest in marketing, customer service and infrastructure to attract and retain skiers. Government support and investment in the ski industry can help improve infrastructure, expand resorts and promote the region.

3.11 Impact of economic conditions

Economic drivers such as inflation, interest rates, and global economic conditions can have a significant impact on ski resort operations and the local economy. Inflation can lead to a decrease in demand for ski resorts, leading to lower revenue and profits. Interest rates can make it more expensive for ski resorts to finance capital projects, leading to reduced capacity and a less competitive offering. Global economic conditions can also have an impact on ski resort operations and the local community.

3.12 Demand for sustainable waste management

Ski resorts and communities as well as winter sport companies implement sustainable waste management practices to reduce their environmental impact, including recycling, composting, waste reduction, and donation and reuse. They also use environmentally friendly packaging materials such as compostable plates and utensils.

3.13 Energy transition

The driving force of "energy transition" is motivated by the need to reduce energy costs in ski resorts and communities in the Alps, while also addressing the growing recognition of the impact of energy consumption on the environment and climate change. The most important measure to achieve this transition is through energy saving, which can be achieved through the implementation of various energy-saving measures, such as the use of renewable energy sources, energy-efficient building designs, and promoting public transportation.

By switching to renewable energy sources such as solar, wind and hydroelectric power, resorts and communities can reduce their carbon footprint and mitigate the negative impact of greenhouse gas emissions on the environment and climate change. This transition to renewable energy can also result in cost savings, energy efficiency and energy security, which can improve the long-term economic viability of ski resorts and communities.

In addition, the transition to renewable energy sources can have a positive impact on the local economy by creating new jobs in the renewable energy sector and promoting sustainable tourism practices.

3.14 Technological progress

Technological advances are driving improvements in ski resorts, not only enhancing the skiing experience but also changing the way people live and work in mountain communities. Remote working has become more feasible, allowing people to enjoy the amenities of mountain life while maintaining their careers, thanks to the advent of digital technology. Ski resorts can take advantage of this trend by promoting themselves as attractive locations for remote workers, thereby increasing their year-round population and stimulating the local economy. At the same time, upgrades to lifts, snowmaking and grooming equipment can improve the quality of life in the area by making skiing more efficient and enjoyable. Modern lifts can transport skiers more quickly, comfortably and safely than older lifts, reducing waiting times and increasing the number of runs skiers can enjoy. Improved snowmaking technology aims to ensure consistent snow cover throughout the ski season, while grooming machines can improve the quality and consistency of the snow surface, making skiing smoother and more enjoyable. However, the question is whether investments in technologies support the transition process in ski resorts. It will be interesting to see if the revenues from extending the ski season and improving snow quality are invested in the overall transformation process of ski resorts. If not, the use of technologies might rather delay the necessary transformation process.

3.15 Sustainable transportation infrastructure

Sustainable transport infrastructure is a critical factor that can affect both ski resorts and their surrounding communities. An efficient and sustainable transport infrastructure can make a significant contribution to the success of a ski resort. Accessibility, capacity, safety and sustainability are important aspects to consider when developing transport infrastructure for a ski resort.

During the stakeholder workshop in Megève the case of ski resort Saint-Pierre-de-Chartreuse has been raised, that the lack of public transport can have a negative impact on the village and the resort. Without efficient and affordable public transport, visitors may be deterred from travelling to the resort.

Similarly, in ski resort Valmalenco, the lack of public transport could have a negative impact on both the resort and the surrounding community. The inclusion of ski passes could help to reduce transport costs for skiers, but this may not be enough to ensure that the transport system is efficient, safe and sustainable.

4 Governance and participation driving forces

Governance policies are crucial to the growth and sustainability of ski resorts, ensuring safety standards, reducing environmental impact and enhancing the resort's reputation through the implementation of tax incentives and regulations. Political leadership can provide direction, resources, and collaboration to inspire stakeholders and community members to shape the future of the ski resort or community. Effective monitoring and evaluation mechanisms can track progress and identify areas for improvement. Local, regional, and national governments play a critical role in the governance of ski resorts and tourism facilities in the Alps. Participatory democracy can increase commitment, investment, collaboration, accountability, and sustainable outcomes by involving all stakeholders in decision-making processes.

The stakeholder workshop identified the following drivers as the most important:

1. Governance policies
2. Political leadership

4.1 Governance policies

Governance can play a critical role in the development and sustainability of ski resorts and surrounding communities. Fiscal incentives, safety standards and regulations to limit environmental impacts can have a major impact on the reputation of the ski area and the protection of the local ecosystem. Measures to promote tourism and education can also attract visitors and retain businesses in the ski industry. Education and training programmes can support the transition to sustainability. However, many of these possible governance measures are not implemented because they are not enforceable in the political process with different interests.

During the workshop in Megève stakeholder pointed out that in Rogla Ski Resort, government policies can make a difference, especially in the long term. Tax incentives can push the resort in a certain direction, but the diverse governance of the municipal regions and the separation between the mayor and the ski company can pose challenges in terms of consistency and longterm perspective.

In the Valmalenco ski resort, government policies are essential to reduce energy costs for residents and government agencies to stay in the valley. Policies such as the promotion of organic waste, the renovation of buildings and public transport can also contribute to sustainable development. Funds can also help move a municipal region in a particular direction.

In the Saint-Pierre-de-Chartreuse ski resort, local governance policies are not very important due to the application of the Mountain Law. The safety standards and regulations laid down in the Mountain Law can be costly, especially if the ski season is short. It would be better if the equipment could be used for more than just skiing to cover the costs. A positive example in French law is the use of the "Evaluation of the Existing Valorisation (EVE)", which allows the evaluation of ski lifts in operation, rather than the replacement of ski lifts every 25 years.

In the ski resort of Megève, the public-private governance structure depends on the history of the municipal region before the implementation of the mountain law. A productive relationship between the municipality and the ski operators is crucial. Multi-positioning with different mandates and missions is generally useful as it provides better access to more skills and opportunities, but there is a risk of conflicts of interest.

4.2 Political leadership

Political leadership can have a significant impact on the resort and the community. Clear vision and direction from political leaders can inspire stakeholders and community members to work towards a sustainable and resilient future. They can allocate resources, advocate for policies and regulations, and encourage collaboration and partnerships between different stakeholders and community members. However, the extent of the impact of political leadership depends on the governance structure and management constellation of the resort and community.

In the case of Rogla, political leadership is very important as different mayors may have different views. Tourism funding can have a huge impact on the resort and the community, and the political leader needs to communicate and balance the economic interests of businesses and resort operators with the needs of residents. In the Saint-Pierre-de-Chartreuse resort, political leadership is an important driving force in creating a link between stakeholders and representatives so that they can work for the benefit of the commune. However, the availability of funding can be a weak point. The ski resort of Megève also faces the challenge of conflicting boundaries and legal procedures between municipalities. In the ski resort of Valmalenco, the mayor has no say in the operation of the ski lifts. However, the ski resort does have an impact on the community.

Public funding has to benefit the area/municipality and not just the ski operators, so the ski operators have to work with the municipality to benefit from public funding. Tensions can arise between public and private entities, as the economic value added goes to the private entity, but the debt remains with the public entity.

4.3 Real estate development

Real estate development in ski resort communities can bring economic benefits such as increased tourism, employment opportunities and tax revenues, but it can also lead to negative impacts such as changes in local demographics, gentrification, affordable housing issues for residents and strain on local infrastructure and resources. A significant challenge related to real estate development is the issue of "cold beds". Cold beds purchased as property investment or holiday homes remain unoccupied for a significant part of the year, particularly in the low season. This raises issues for resort communities such as changing demographics, gentrification and affordability. As more properties are purchased for investment or second homes, demand for available housing increases, leading to higher prices and limited availability. This scarcity of affordable housing options makes it difficult for local residents, particularly those with seasonal or low-wage jobs, to find suitable accommodation.

Another key issue facing ski resorts is rising energy prices, which can affect the affordability of housing in ski resorts. As construction and operating costs increase, developers may pass these additional costs on to homebuyers or tenants, resulting in higher house prices or rental rates. This can make it more difficult for residents, particularly seasonal workers or members of the local community, to find affordable housing within the resort area.

Energy-saving measures are a logical consequence of rising energy prices. However, the necessary investments are a burden on the already tense situation of many real estate owners and developers.

In general, developers, policy makers and community leaders need to consider the potential impacts and benefits of real estate development in order to minimise negative impacts and maximise benefits for all stakeholders. This could be achieved with a fair management and regulations

4.4 Monitoring and evaluation

The driving force of monitoring and evaluation plays a crucial role in the transition of ski resorts and communities towards sustainability. By tracking environmental, social and economic indicators, resorts and communities can identify areas for improvement and take targeted action to address these issues.

In the ski resort of Rogla, the national database called Slovenia Green was created to track the satisfaction of residents and businesses with tourism development in the area. However, accessing data from other authorities can sometimes be a challenge. At the municipal level, there is no legislation to determine which indicators should be monitored, and monitoring is not done in real time. This highlights the need for standardised and consistent monitoring mechanisms.

Similarly, in the ski resort of Saint-Pierre-de-Chartreuse, while the data collected through monitoring is crucial for communicating with residents and setting the direction of the transition, there are challenges in collecting the necessary data due to a lack of tools and expertise.

In the ski resort of Megève, the classification as a Plus Plus municipality, with a larger budget to support tourism infrastructure, makes monitoring and evaluation essential to demonstrate the impact of tourists on the municipality to the national government. However, not all municipalities have data collection systems in place.

In the Valmalenco ski resort, monitoring ski pass sales, hotel bookings, second home rentals, traffic in restricted areas and waste disposal helps to track progress and identify areas for improvement in the transition to sustainability.

4.5 Demand for participation in the decision making process

Participatory Democracy is a mode of governance that involves active participation and engagement of the community in decision-making processes. It is driven by the increasing demands from local stakeholders for more inclusive and democratic decision-making processes and the recognition of the importance of local knowledge and expertise. Stakeholder participation in decision-making processes is essential to promote a sense of ownership, cooperation and accountability. It can lead to increased participation, commitment and investment, collaboration between different groups, accountability for the transition, and sustainable and long-lasting outcomes.

4.6 Demand for knowledge and information exchange

Knowledge and information exchange among stakeholders and across ski resorts and communities can facilitate the sharing of best practices and innovative solutions for sustainable and resilient transitions. It can help identify best practices and successful strategies that have worked in other ski resorts and communities, learn from failures, collaborate between stakeholders, raise awareness of sustainability and resilience challenges, and improve decision-making. By sharing knowledge and information, stakeholders can make more informed decisions about sustainability and resilience, leading to more effective and efficient use of resources and better outcomes.

5 Analysis of selected driving forces (workshop results)

5.1 Driving force: Changing snowfall and temperature patterns

Introduction

The ski season is heavily influenced by snowfall and temperature patterns, which can have a significant impact on overall resort operations, snowmaking processes and snowpack stability. Without sufficient snowfall, it would be impossible for a ski resort to open and operate during the season. In addition, the timing of snowfall is critical for ski resorts as it can affect their ability to attract tourists and generate revenue. Temperature patterns also play a critical role in snowmaking operations, as they determine the conditions necessary to produce snow. Changes in snowfall and temperature patterns can affect tourist behaviour, causing skiers and snowboarders to choose different holiday plans or ski resorts. This change in behaviour can have a negative impact on the revenue and profitability of ski resorts and other businesses in surrounding areas that depend on tourism. Therefore, understanding the impact of snowfall and temperature patterns on the ski season is essential for resorts and businesses alike to prepare for and adapt to changing weather conditions.

Certainty analysis

Climate change poses significant challenges to high mountain areas. Decline in glaciers, snow, and permafrost has changed the frequency, size, and location of the majority of connected natural hazards. Due to rising population, tourism, and socioeconomic growth, individuals and infrastructure are now more exposed to natural disasters. Snow and glacier changes have altered the quantity and timing of runoff in snow-dominated and glacier-fed river basins, with local effects on agriculture and water resources. The loss of glaciers, snow cover, and permafrost has had a significant influence on tourism and recreational pursuits like skiing, glacier travel, and mountaineering. (Hock et al., IPCC 2019). Ski resorts continue to undergo changes as a result of the long-term climatological trend of altering snowfall and temperature patterns in ski resorts and communities. The window of opportunity for producing technical snow is definitely narrowing. Due to the increasing variety of meteorological conditions, such as small variations in temperature that can have significant effects, it is often fairly difficult to anticipate the level of uncertainty. Regional climate models are available to help forecast and prepare for anticipated changes in temperature and snowfall patterns, which can help reduce this uncertainty.

Interlinkages to other drivers

There are linkages with other driving forces, such as water availability and extreme winds, which can affect not only snow production but also domestic and industrial water supplies and hydropower generation in winter and summer. It is important to consider these interrelationships when assessing and addressing the impacts of changing snowfall and temperature patterns on ski resorts and surrounding communities.

Strategies to counter driving forces

To counter the driving forces of changing snowfall and temperature patterns, several strategies can be implemented. These strategies are:

Stopping large ski events that would require huge amounts of technical snow: This is a very effective measure that can help reduce the demand for artificial snow and limit the ecological impact of winter sports.

Limiting the operation of ski slopes to the higher altitudinal zones (if possible): This measure can be very effective as higher altitudes are less affected by temperature rise and are more likely to have natural snowfall.

Snow storage, especially for cross-country skiing: This measure can be a minor effective measure, but it can help maintain cross-country skiing trails during periods with little or no snowfall.

Being flexible to react to higher temperatures: This can be achieved by opening summer tourism infrastructure, such as mountain bike trails and coasters, even during the winter season. This is a very effective measure as it provides alternative activities for tourists.

Diversifying the touristic offer: this is another effective measure. This measure can help reduce the dependence on snow-based activities and attract visitors throughout the year.

Finding a niche less dependent on snow, such as families: This measure can be very effective, as some families are less focused on winter sports and may be more interested in other activities such as sightseeing, cultural events, and indoor activities.

5.2 Driving force: Changing water availability

Ski resorts rely on water for snowmaking operations and other uses. Climate change and increasing water demand can lead to water scarcity, affecting ski resort operations and the surrounding communities. Snowmaking requires large amounts of water, which is sourced from nearby rivers, lakes, or reservoirs. To address these challenges, ski resorts and surrounding communities can take a variety of measures to reduce water use, increase water efficiency, and promote sustainable water management practices.

Strategies to counter driving forces

Water availability is a critical issue for ski resorts, as changing weather patterns can affect the amount and timing of snowfall, which in turn affects the ski season. To address the drivers of changing water availability, ski resorts can adopt several strategies, including

Retaining water in reservoirs / artificial lakes at higher altitudes: This is a moderately effective measure that involves storing water at higher elevations where it can be used for snowmaking and other purposes during the ski season. In addition, this water can be used for energy production and other uses, such as irrigation, in the summer months. However, these measures can be significant interventions in natural environment and therefore need to be well balanced between benefits and harms.

Conserve water at the start of the season: This is a highly effective measure and can be achieved through water-saving technologies and promoting water-efficient practices among resort visitors.

Use water efficiently: This is also a highly effective measure and involves using water in the most efficient water saving way or by shared use (e.g. through the use of hydroelectric power generation).

Sharing water resources at an inter-municipal level: This is another highly effective measure that involves working with neighbouring communities to share water resources. By sharing water resources and networks, resorts can reduce their overall water consumption and ensure that water is used as efficiently as possible.

5.3 Driving force: Governance policies

Introduction

Effective governance policies can significantly impact the growth of ski resorts, the local economy, and workforce. Tax incentives can lower construction and equipment purchase

costs, while regulations that ensure safety standards and limit environmental impact can enhance the resort's reputation and protect the local ecosystem. Policies that foster tourism and education can attract more visitors and retain businesses in the ski industry. Regulations, policies, and legal frameworks are critical components of ski resort and community transition, providing guidance, incentives, and accountability to drive positive change and ensure long-term sustainability. Training and education programs can be provided to support the transition to sustainability.

Certainty analysis

The predictability of the driving force "Governance Policies" varies depending on election results and changes in governance at different levels. However, governance policies at the local level generally follow directions from the regional and national level. It takes time for governance policies to make an impact, and stability is crucial for achieving the intended impacts, especially during a time of transition. In some cases, local decision-makers organise themselves into interest groups to influence regional and national levels (ANMSM in France, for example). To react to uncertainty, it is important to implement long-term projects and develop strategic documents for long-term planning.

Interlinkages to other drivers

The driving force of governance policies is interrelated with other driving forces, such as energy and transport, property development and more. Governance policies can have a significant impact on these other drivers through regulations and policies related to zoning, land use, environmental protection and more. For example, governance policies can dictate the types of energy sources allowed in ski resorts, such as renewable energy sources or fossil fuels. It can also regulate transport options, such as promoting public transport or electric vehicles. In addition, government policies can affect the types of real estate developments that are allowed, such as affordable housing or luxury holiday homes. In addition, political leadership can influence governance policies, which in turn influence the interrelated drivers. Political leaders can set priorities and goals that shape governance policies and can be influenced by different stakeholders and interests within the community.

Strategies to counter driving forces

Current strategies to address the driving force of governance policies affecting ski resorts and communities involve various trade unions, professional associations and chambers of commerce working to influence regulations and change policies. However, these associations can only represent the interests of their members and their strategies may not be sustainable in the long term.

To ensure long-term sustainability, it may be necessary to adopt a more collaborative and inclusive approach that takes into account the needs and interests of all stakeholders, including local residents, businesses and environmental groups. This may involve more transparent and participatory decision-making processes, as well as efforts to build consensus and cooperation among different stakeholders.

5.4 Driving force: Political Leadership

Introduction

Political leadership is an important driver for ski resorts and communities as it can provide the necessary guidance and direction to ensure a sustainable and resilient future. The role of political leadership is not just about setting policies and regulations, but also about inspiring stakeholders and community members to work together towards a common goal. Effective

political leadership can help foster a collaborative and inclusive environment where everyone has a voice and feels invested in the future of the resort or community.

One of the key roles of political leadership is to establish a clear vision and set goals and objectives for the resort or community. This can help create a sense of direction and purpose and ensure that all stakeholders are working towards a common goal. However, the creation of visions and goals is a time-consuming affair that often does not fit in with the short-term planning at the political level.

Political leaders can also allocate resources and advocate for policies and regulations that support the long-term sustainability of the resort or community. This may include promoting sustainable tourism practices, investing in infrastructure and protecting natural resources.

In addition, political leadership can play an important role in fostering collaboration and partnerships between different stakeholders and community members. By bringing together different perspectives and ideas, political leaders can help create a more cohesive and integrated community that is better able to adapt to changing circumstances.

Certainty analysis

The certainty and predictability of political leadership as a driving force for sustainable transition in ski resorts and communities can vary significantly from region to region and country to country.

In Slovenia, for example, political leadership is more predictable at the local level than at the national level. This is because many mayors are re-elected several times as long as they keep their promises. However, funding for sustainable initiatives can be unpredictable in Slovenia, which can create uncertainty about the impact of political leadership on sustainable transition.

Similarly, French stakeholders highlighted that in France, the predictability of political leadership and its impact on sustainable transition may depend on funding from regional or national levels. This can create uncertainty as to whether sustainable initiatives will be consistently supported and funded.

In Italy and in France, political leadership is generally more unpredictable, with mayors having a mandate of only five years. This can make it more difficult to implement long-term sustainable plans and initiatives, as there may be changes in leadership and priorities.

The degree of uncertainty in political leadership can affect the impact of the driver for sustainable transition in resorts and communities. Where political leadership is more predictable, there may be greater stability and continuity in the implementation of sustainable policies and initiatives. Conversely, when political leadership is less predictable, it may be more difficult to maintain a long-term vision and plan for sustainable development. To respond to uncertainty in political leadership, resorts and communities can focus on building strong partnerships and collaborations with other stakeholders, such as local businesses and community members. They can also prioritise building resilience and flexibility into their sustainability plans to adapt to changes in political leadership or other external factors. In addition, efforts can be made to engage with political leaders and advocate for sustainable policies and initiatives, regardless of changes in leadership.

Interlinkages to other drivers

The driving force of political leadership is interrelated with other forces that can influence sustainable transition in ski resorts and communities.

One important interrelated force is participation in decision-making. Political leaders who prioritise participatory decision-making processes can promote more sustainable and inclusive development. However, participation can be time-consuming and may not always be feasible due to limited resources or time constraints.

In addition, political leadership is closely linked to governance policies. The policies that political leaders implement can have a significant impact on the sustainability of ski resorts and communities. It is therefore essential that political leaders prioritise sustainability and incorporate sustainable policies into their governance framework.

At the local level, political leadership and governance policies are often closely intertwined. Local mayors tend to be more responsive to the needs of their constituents and can be more effective in implementing sustainable policies. This may be because they are less beholden to the policies and interests of a particular political party.

Strategies to counter driving forces

Fostering the driving force of political leadership can be challenging, as political leaders are often under considerable pressure to secure funding and manage competing priorities. However, there are several strategies that can help support and encourage political leadership in the context of sustainable transition in ski resorts and communities.

One approach is to prioritise community engagement and participation in decision-making processes. While it may not be possible to involve the public in every decision, seeking input and feedback from local stakeholders can help build trust and support for sustainable initiatives. This can also help to ensure that political leaders are accountable to the needs and priorities of their constituents.

Another approach is to provide political leaders with access to funding and resources that can support sustainable initiatives. This may involve seeking partnerships with other organisations or government agencies, as well as seeking grants or other sources of funding that can support sustainable development.

In France, where power often lies in Paris, it might be challenging to be a good local leader, it may be particularly important to build strong partnerships and networks that can help amplify the voice of local leaders and communities.

In Italy, fostering political leadership can mean giving the local community ownership of the leadership process. This can help to build a strong sense of commitment and investment in sustainable development efforts, and can also help to ensure that political leaders are accountable to the needs and priorities of the community.

Ultimately, fostering political leadership requires a collaborative and proactive approach that prioritises community engagement, access to resources and a commitment to sustainability. By working together to support political leadership, communities and stakeholders can help drive sustainable change in ski resorts and beyond.

5.5 Driving force: Demand for differentiated quality products

Introduction

The driving force of "demand for differentiated quality products" is a crucial factor in the tourism industry. Quality has always been an essential aspect of the tourism experience, but there has been a renewed emphasis on it, particularly in the context of differentiated and authentic products.

Authenticity is a key element of differentiated quality products, and it is increasingly important for tourists to feel that they are experiencing something unique and genuine. Locals also play a crucial role in creating this authenticity, as they can provide insights and knowledge that tourists cannot find in guidebooks or online. By involving locals in the tourism experience, destinations can create a compelling story that resonates with visitors and makes them feel more connected to the place they are visiting.

The tipping point for this driving force is now, and it is imperative that destinations adapt and evolve in response to this demand for differentiated quality products. Destinations that fail

to do so risk becoming commoditised and losing out on the high-spending tourists who are looking for authentic and differentiated experiences.

Interlinkages to other drivers

The driver of "demand for differentiated quality products" is linked to other forces in the tourism industry. The economic situation plays an important role, as tourists are increasingly willing to spend money on quality products and experiences. However, destinations also need to be aware of the widening gap between the services provided to tourists and locals. As tourism grows, it can create tensions between visitors and locals, and destinations must work to ensure that the benefits of tourism are shared equitably.

Landscape quality is another critical factor, as tourists are often attracted to destinations for their natural beauty. Preserving local habitats and biodiversity is essential to ensure that these landscapes remain attractive and continue to attract tourists.

Stakeholders from ski resorts pointed out that the workforce is also an important factor, as destinations that invest in their workforce are more likely to provide quality experiences for tourists. Technological advances and transport and infrastructure are also important, as they can enhance the tourist experience and make destinations more accessible to tourists.

Finally, competition is an important factor, as destinations need to differentiate themselves from other destinations offering similar products and experiences. By focusing on differentiated quality products, destinations can stand out in a crowded market and attract tourists who are looking for authentic and unique experiences and also new target visitors.

Strategies to counter driving forces

The demand for differentiated quality products in the tourism industry has led to the development of various strategies to meet the needs and expectations of tourists. One of the most prominent strategies is the labelling of sustainability, such as the Flocon Vert sustainable development label. This label is awarded to tourist accommodation and other tourist services that meet specific criteria relating to environmental and social responsibility. Only labelled accommodation is displayed on the booking platform, increasing the visibility of sustainable tourism options for tourists.

Another strategy is to create higher value-added 5-star experiences. This involves training tourism suppliers to provide high-quality services and products that are tailored to the needs and preferences of tourists. In this way, tourism providers can differentiate themselves from their competitors and attract more discerning customers who are willing to pay a premium for a unique and high-quality experience.

The provision of high-quality local agricultural products in gastronomy or local handicraft products as merchandising are further strategies in ski resort and communities.

The establishment of training centres for tourism and hospitality professionals is another important strategy to meet the demand for differentiated quality products. These centres provide vocational training and continuing education programmes for tourism professionals, ensuring that they are equipped with the necessary skills and knowledge to deliver quality services and products to tourists. This strategy helps to improve the overall quality of the tourism offer and also supports the development of a skilled and competent tourism workforce.

Stakeholders of the Megève Workshop regard snowmaking is another strategy used to meet the demand for differentiated quality products, although this strategy might be contradictory to a sustainable transition. Ski resorts are investing in state-of-the-art snowmaking equipment to ensure that they can offer tourists a consistent and high-quality skiing experience, regardless of weather conditions. This strategy helps ensure that resorts remain attractive and competitive in the face of climate change and other environmental challenges.

5.6 Driving force: Increasing gap (existence and investment on) between services for tourists and locals

Introduction

The driving force of "increasing gap (existence and investment on) between services for tourists and locals" can have a significant impact on ski resorts and communities. As tourism continues to grow and become a major source of income for these areas, there is often a shift in focus towards providing services and amenities primarily for tourists. This can lead to a widening gap between the services and investments provided to tourists and those provided to local people, which can have negative social, economic and environmental consequences. On the one hand, tourists may have access to high quality services and facilities that local people do not, which can lead to feelings of resentment and inequality within the local community. On the other hand, the prioritisation of tourism-related services and infrastructure can also lead to the neglect of local needs, such as affordable housing, public transport and health services. In addition, the environmental impacts of tourism, such as increased energy consumption, waste generation and congestion, can fall disproportionately on the local community.

Certainty analysis

The driver of "increasing gap (existence and investment on) between services for tourists and locals" is already an existing trend in many ski resorts and communities. However, the degree of uncertainty regarding its impact can vary depending on several factors such as the specific context, the strategies implemented to address the issue, and the level of involvement of stakeholders.

The uncertainty surrounding this driving force can make it challenging for ski resorts and communities to develop effective strategies to mitigate its impact. For example, it may be difficult to predict the extent to which the gap will widen over time or how the local community will respond to the increasing disparity between services for tourists and locals.

Interlinkages to other drivers

The driving force "increasing gap (existence and investment) between services for tourists and locals" is interrelated with several other forces, including

Real estate development: Real estate development in ski resort communities can contribute to the widening gap between services for tourists and locals by driving up property values and making it more difficult for locals to afford to live in the area.

Labour force: The availability and quality of local labour can affect the gap between services for tourists and locals. For example, if there is a shortage of skilled workers in the area, businesses may prioritise services for tourists over those for locals.

Quality products: The demand for high quality products and services in ski resort communities can also contribute to a widening gap between the services provided to tourists and locals. Companies may focus on providing luxury experiences for tourists while neglecting the needs and preferences of local residents.

Governance/participation: The role of governance and participation in ski resort communities can also affect the gap between services for tourists and locals. For example, if local people are not adequately represented in decision-making processes, this can result in policies and investments that prioritise tourism over local needs.

Investment in services: The level of investment in services for both tourists and locals can also contribute to the gap between the two groups. For example, a lack of investment in local infrastructure and services can result in a lack of resources for local people.

Impact of economic conditions: Economic conditions can also play a role in the gap between services for tourists and local people. For example, if the local economy is dependent on tourism, this may lead to tourism services being prioritised over local needs.

Demand for economic diversification: The desire for economic diversification in ski resort communities can also affect the gap between services for tourists and locals. For example, if efforts to diversify the local economy prioritise tourism development over other industries, this can lead to a lack of investment in local services and infrastructure for residents.

Strategies to counter driving forces

Strategies to address the driving force behind the widening gap between services for tourists and locals vary from resort to resort and community to community. However, some common strategies are:

Local-focused investment strategies: This approach involves investing in local businesses, infrastructure and services to improve the quality of life for locals and make the community more attractive to tourists. Examples include developing affordable housing, investing in local schools and supporting local health services.

Participatory strategy/action plan (public/private): This approach involves the creation of a joint public/private action plan aimed at reducing the gap between tourists and locals. The action plan may include measures such as promoting sustainable tourism practices, supporting local businesses and improving the overall quality of life for both tourists and locals.

Identifying locally engaged economic actors for participatory processes: This approach involves identifying key economic actors in the community who have an interest in reducing the gap between tourists and locals. These actors may include local business owners, community leaders and government officials. By engaging these stakeholders in a participatory process, the community can develop a shared vision and plan for the future.

Diverse events for different stakeholders: This approach involves creating events that appeal to both tourists and locals. By diversifying events, resorts can attract a wider range of visitors and create a more inclusive community.

Public-private investment (linked to planning consent) for public services: This approach involves using public-private partnerships to invest in public services that benefit both tourists and locals. Examples include improving public transport, enhancing public spaces and supporting local cultural events.

5.7 Driving force: Lack of labour force (quantity and quality)

Introduction

Labour shortages are a critical factor affecting the sustainability and resilience of ski resort communities. Ski resorts rely heavily on seasonal workers and the inability to attract and retain skilled workers can have significant economic, social and environmental impacts. Skilled and experienced workers are essential for the smooth operation and maintenance of ski resort facilities, ensuring guest safety and providing quality services. If resorts cannot attract enough workers, they may have to reduce operating hours, limit services, or even close facilities, affecting the local economy, employment, and community well-being.

Competition for workers is fierce, and resorts must offer competitive wages, benefits and working conditions to attract and retain a skilled workforce. This can be a challenge, especially for smaller resorts or those located in remote areas where access to services and amenities may be limited. To address this, resorts can work with other businesses and community stakeholders to create attractive packages that offer a range of services and benefits to employees.

Investing in training and development programmes is also essential to maintain a skilled and experienced workforce. Ski resorts need to provide opportunities for employees to gain new skills and certifications, and to develop their careers within the ski resort industry. This can help to increase staff motivation and job satisfaction, reduce staff turnover and improve the quality of service provided to guests.

Strategies to counter driving forces

Strategies to address the driving force of labour shortages (quantity and quality) in ski resorts can be divided into several categories:

Training and development: Ski resorts can establish training centres for tourism and hospitality professionals to improve the quality of the workforce. Training programmes can be designed to up-skill and re-skill workers, providing them with the necessary knowledge and skills to deliver quality services.

Employer branding: Ski resorts can promote their destination and community as an attractive place to work, highlighting the benefits of living and working in the area. This can be achieved through employer branding campaigns, using ambassadors and social media to reach potential employees.

Incentives: To attract and retain staff, resorts can offer financial incentives such as discounts on services or staff accommodation. Municipalities can also offer financial incentives to renovate accommodation to make it more attractive to staff.

Staff accommodation: Resorts can provide staff accommodation to address the issue of affordable housing. Municipalities can help by finding accommodation, negotiating with owners and acting as guarantors for tenants. In addition, new hotel developments can include staff accommodation at the planning stage.

6 Conclusion

Ski resorts are facing increasing pressure to undergo a transition process towards sustainability, driven by a complex interplay of various driving forces. However, there are encouraging examples of ski resorts that have already successfully implemented sustainable changes, serving as positive models for others to follow. The transition process requires a series of well-sequenced steps, starting from raising awareness and acquiring knowledge, followed by identifying the relevant stakeholders and actors and ultimately implementing the necessary changes.

An essential initial step is the analysis of driving forces, which helps in understanding the altered conditions affecting ski areas. Within the TranStat project, extensive research and workshops were conducted to compile a comprehensive list of the most significant driving forces. Furthermore, an in-depth analysis of these forces was undertaken, providing valuable insights for the transition process. Utilizing the identified driving forces, the TranStat project aims to develop potential scenarios specifically tailored to ski areas. These scenarios serve as a basis for deriving tangible and actionable steps that can be taken in later stages of the transition process. By following this systematic approach and drawing from the insights gained, ski resorts can effectively navigate the transition towards sustainability, ensuring a resilient and prosperous future for themselves and their stakeholders.

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8 Glossary

Air quality

Air quality: the impact of ski resorts on air pollution due to increased vehicle traffic, snowmaking operations, lift operations, and other activities. The potential health impacts on skiers, employees, and surrounding communities.

Biodiversity loss

Biodiversity loss in the Alps is caused by the construction and operation of ski resorts and often by the increase in tourism, leading to fragmentation, degradation, and loss of habitats, ecosystems, and species. The loss of biodiversity not only threatens the ecological balance and resilience of the Alpine ecosystem but also undermines the economic, social, and cultural sustainability of the region in the long term.

Centralized governance

Centralized governance: This is a governance model in which decision-making authority is concentrated in a single entity or group. In the context of ski resorts and communities, centralized governance may involve a single management team or board of directors with significant decision-making power.

Climate adaptation measures

Ski resorts and communities in the Alps are facing significant challenges related to climate change, including decreased snowfall, higher temperatures, and increased risk of natural disasters such as floods and landslides. Ski resorts in the Alps are diversifying their offerings to become less dependent on snow-based activities, implementing risk management strategies to mitigate natural disasters, adopting sustainable practices to reduce their environmental impact, and working together to develop coordinated adaptation strategies. Snowmaking, diversification, risk management, sustainable practices, and collaboration are all common adaptation measures for ski resorts.

Climate change

Climate change has had a significant impact on ski resorts and communities in the Alps. The rising temperatures and changing precipitation patterns have led to shorter ski seasons and less reliable snow cover, which has affected the local economy and culture. The effects of climate change on ski resorts and communities in the Alps are complex and multifaceted.

Competition

Competition: Ski resorts and communities operate in a highly competitive industry, with many resorts vying for visitors and revenue. Competition drives innovation and investment, as resorts seek to differentiate themselves and offer unique experiences to visitors. However, competition can also lead to price wars and other negative outcomes if not managed carefully.

Demographic change

Changing demographics: The demographic profile of tourists is changing, with more families and older adults participating in leisure activities. Ski resorts and communities need to modify their facilities and services to accommodate these groups, such as by introducing beginner-friendly slopes, ski lessons for seniors, or age-appropriate child-care services.

Diversification of local economies

Diversification of local economies in the Alps is a process of creating alternative sources of income and employment for communities that rely heavily on winter sports. It can have numerous benefits, such as creating new job opportunities, reducing seasonal fluctuations, and attracting a wider range of visitors. Many ski resort communities are exploring ways to diversify their economies by promoting summer tourism, developing other industries such as agriculture, manufacturing, or high-tech businesses, and creating year-round recreational opportunities, such as hiking or biking trails, golf courses, and cultural events.

Driving forces

Driving forces in relation to ski resorts and communities in the Alps are factors that initiate, influence, and shape the transition of these regions. Some of the key drivers in this context include: climate change, globalization, demographic changes, technological innovation, and social and cultural shifts. All these driving factors can have significant impacts on the local economy, environment, and social fabric of the communities.

Economic conditions

Economic conditions: The economic conditions of the broader economy can have a significant impact on ski resorts and communities. For example, during times of economic downturn, consumers may have less disposable income to spend on vacations, which can lead to decreased revenue for ski resorts. On the other hand, during times of economic prosperity, ski resorts may see increased demand for their services.

Economic diversification

Economic diversification: Ski resorts and communities often seek to diversify their economic activities beyond just skiing and snowboarding. This can include expanding into other winter sports, developing summer tourism initiatives, or promoting cultural events and festivals. Economic diversification can help to mitigate the risks associated with relying too heavily on a single source of revenue.

Economy of scale and mass tourism

Economy of scale and mass tourism: Ski resorts and communities often tend towards mass tourism to maximise profits and minimise costs. This approach allows them to achieve economies of scale, resulting in lower costs per visitor. However, mass tourism can also lead to overcrowding, traffic congestion, environmental degradation and other negative impacts on the local community and ecosystem.

Energy use

Ski resorts and communities in the Alps have a significant energy use due to their high demand for winter sports activities and the need to provide accommodations for visitors. This energy use is mainly for heating, electricity, and snowmaking. Renewable energy sources such as biomass, solar, and geothermal energy are being used to reduce the carbon footprint of these communities. Additionally, the transportation of people and goods to and from ski resorts and communities contributes to energy use, and some resorts are working to reduce the impact of transportation by promoting sustainable travel options.

Globalisation

Globalisation: The ski resort industry is also influenced by globalisation. This trend refers to the interconnectedness of economies and cultures around the world. Globalisation has enabled ski resorts to attract visitors from all over the world, as well as to source goods and services from a wide range of locations. However, globalisation can also lead to homogenization of ski resort experiences and cultures, as resorts strive to cater to a global audience.

Governance policies

Governance policies: These are the rules, regulations, and guidelines that dictate how ski resorts and communities are governed. Governance policies can cover a wide range of topics, from environmental management to tourism development.

Governance structures

Governance structures involve different levels of government and industry associations that shape policies and regulations impacting the tourism sector. In the context of the ski industry in the Alps, national, regional, and local governments, as well as industry associations, play a crucial role in influencing the transition towards sustainable tourism.

Governance structures

Governance structures: These are the systems and processes that are put in place to manage and oversee the operations of ski resorts and communities. Governance structures can include things like management teams, boards of directors, and regulatory bodies.

Human activities

Human activities: Construction and logging can have an impact on the terrain and topography of a ski resort. These activities can alter the natural features of the land, which may affect the difficulty and safety of ski slopes.

Institutional arrangements

Institutional arrangements refer to regulations, policies, and legal frameworks that provide guidance, incentives, and accountability to promote positive change and ensure the long-term viability of the ski industry. These arrangements encourage the adoption of sustainable practices, foster innovation, and ensure compliance with sustainability goals and standards.

Knowledge and information exchange

Knowledge and information exchange: This refers to the level of interest and engagement from stakeholders who wish to share and receive information and expertise related to ski resort and community governance. High demand for knowledge and information exchange can indicate a commitment to informed decision-making and collaborative problem-solving.

Labour

Ski resorts and communities require a significant amount of labour to operate successfully. This includes everything from ski instructors to hotel staff to maintenance workers. Ski resorts often face challenges in attracting and retaining skilled workers, especially during peak seasons. As such, labour is a critical driver in the economic processes of ski resorts and communities

Land use change

Land use change in relation to ski resorts and communities in the Alps has been significant over the past few decades. The growth of the ski industry in the region has led to an increase in tourism, which in turn has driven changes in land use patterns. These changes have been driven by a combination of factors, including the development of new infrastructure, changes in land management practices, and increasing demand for recreational activities.

Local governments

Local governments are responsible for governing a particular locality, such as a town or city, and may play a role in governing ski resorts and communities located within their jurisdiction. They are responsible for providing vital services such as water, sanitation, and waste management, and managing local infrastructure and land-use planning.

Megatrends

Mega trends refer to long-term, global shifts that have a significant impact on society and the economy. In the context of ski resorts and communities, mega trends can include factors such as changing demographics, climate change, technological advancements, and shifts in consumer behavior.

Monitoring and evaluation

Monitoring and evaluation: This refers to the ongoing process of assessing and measuring the performance of governance structures and policies. Monitoring and evaluation can help identify areas for improvement and inform decision-making.

National governments

National governments: These are the elected bodies responsible for governing an entire country. National governments may play a role in setting policies and regulations that impact the operations of ski resorts and communities.

Natural features

Natural features: Trees, rocks, and cliffs that have a significant impact on the difficulty and safety of ski slopes. Slopes with numerous natural obstacles are typically more challenging and may require more advanced skiing techniques.

Natural hazards

Natural hazards: Climate change is increasing the frequency and severity of natural hazards such as avalanches, landslides, and flooding. These hazards can impact the safety of skiers, the infrastructure of ski resorts, and surrounding communities. Measures should be taken to reduce environmental impact and promote sustainable practices

Participation

Participation refers to the level of interest and engagement from stakeholders who wish to participate in governance processes. High demand for participation can be an indicator of strong community engagement. By involving all stakeholders in the decision-making process, including local residents, businesses, and environmental groups, the transition towards sustainable ski resorts and communities can be more inclusive and comprehensive.

Participatory democracy

Participatory Democracy is a form of governance that seeks to actively involve and engage the community in decision-making processes. It responds to the growing demand from local stakeholders for more inclusive and democratic decision-making and the recognition of the importance of local knowledge and expertise. The involvement of stakeholders in decision-making is crucial for promoting ownership, cooperation, and accountability, leading to increased participation, commitment, and investment. Collaborative efforts among various groups can result in greater accountability, and sustainable outcomes that are long-lasting.

Political leadership

Political leadership involves political leaders who create a clear vision, direction, and resources, and advocate for policies and regulations that support the transition towards sustainable tourism. They can also facilitate collaboration between stakeholders and communities.

Real estate development

Real estate development: Ski resorts and communities often rely on real estate development to generate revenue. This can include the construction of ski-in/ski-out accommodations, vacation homes, and other amenities. However, real estate development can also lead to overcrowding, increased traffic, and other negative impacts on the natural environment. As such, ski resorts must balance the economic benefits of real estate development with the need to preserve the natural beauty and resources of the surrounding area.

Regional governments

Regional governments are elected bodies responsible for governing a larger geographic area, such as a province or state, and may have a role in governing ski resorts and communities within their boundaries. They are responsible for managing shared resources like water,

transportation, and energy, as well as ensuring that the development of ski resorts and tourism facilities aligns with regional development goals and strategies.

Regionalisation

Regionalisation: This refers to the process of developing and maintaining strong regional ties and networks within a ski resort or community. Regionalisation can be seen in the promotion of local products, the establishment of partnerships with nearby businesses, and the development of regional tourism initiatives. Ski resorts and communities often rely on regionalisation to maintain a distinct identity and to attract visitors from nearby areas.

Snowfall and temperature patterns

Snowfall and temperature patterns: These factors are critical for ski resorts as they affect the ski season, snow-making operations, and snow cover stability. Changes in snowfall and temperature can impact tourist behavior and revenue, making it essential for ski resorts to adapt to these changes to remain profitable and sustainable.

Societal evolution

Societal evolution: It refers to the changing lifestyle and interests of people, leading to a growing demand for diverse leisure activities, including outdoor and adventure-based activities. Ski resorts can leverage this trend by offering a diverse range of activities beyond skiing and snowboarding, such as snowshoeing, ice skating, and snowmobiling.

Stakeholder participation

Stakeholder participation involves involving local residents, businesses, non-governmental organizations, and other stakeholders in decision-making processes related to the transition towards sustainable tourism. This creates a sense of ownership, collaboration, and accountability towards the outcome of the transition.

Sustainable management of water resources

Sustainable management of water resources in ski resorts and communities involves reducing water consumption, reducing water waste, increasing water recycling and reuse, and protecting the quality of water resources through erosion control and sedimentation management. This is especially important as water is a critical resource for snowmaking, drinking water, and other recreational activities. Implementing sustainable water management practices can help to ensure the long-term availability and quality of water resources for both visitors and residents, as well as protect the local ecosystem.

Sustainable tourism

Sustainable tourism is a type of tourism that considers environmental, social, and economic sustainability. It encompasses practices that conserve natural and cultural resources, promote community involvement, and provide economic benefits to local communities.

Sustainable waste management

Sustainable waste management: Ski resorts and communities generate a significant amount of waste, from food and beverage packaging to ski equipment. Sustainable waste management practices are becoming increasingly important as both consumers and governments become more environmentally conscious. Ski resorts that implement effective waste management practices can reduce their environmental impact and appeal to consumers who prioritize sustainability.

Terrain and topography

Terrain and topography: Critical factors that determine the difficulty and safety of ski slopes. This refers to the physical characteristics of the land, including its shape, elevation, steepness, and natural features such as ridges, valleys, and cliffs.

Transition processes

In the context of ski resorts and communities, the term "transition" refers to the process of adapting to changes in the environment, economy, and society in order to create a more sustainable and resilient future. This can include transitioning to more sustainable practices and technologies, diversifying offerings beyond skiing to attract visitors year-round, and adapting to the impacts of climate change on snowfall patterns and other aspects of the ski resort experience.

Transparency

Transparency: This refers to the openness and clarity with which decisions and actions are communicated to stakeholders. Transparent governance structures prioritize open communication and accountability.

Water availability

Water availability: Ski resorts rely heavily on water for snow-making operations and other uses. Climate change and increasing water demand can lead to water scarcity, affecting ski resort operations and surrounding communities. To address these challenges, ski resorts and communities can take measures to reduce water use, increase efficiency, and promote sustainable water management practices.