MOVING
MOuntain VAlorisation through INterconnectedness and GREEN growth

D5.1 Comparative cross-case report on Mountain Value Chains

Value Chain contribution to the sustainability and resilience of the Mountain socio-ecological systems?

WP5 Benchmarking and Cross-case comparisons

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Acronyms

AIC	Akaike Information Criterion
AKIS	Agricultural Knowledge and Innovation System
BIC	Bayesian Information Criterion
BWS	Best-Worst Scaling
CL	Conditional Logit
CoP	Community of Practice
CSA	Community Supported Agriculture
D	Deliverable
DESI	Digital Economy and Society Index
EC	European Commission
EU	European Union
G (cluster)	Governance, Cooperation and Territoriality cluster
GA	Grant Agreement
GHG	Greenhouse Gas
GI	Geographical Indication
I (cluster)	Innovation and Infrastructure cluster
LAG	Local Action Group
LCM	Latent Class Model
MRL	Mountain Reference Landscape
N (cluster)	Nature and Ecosystem Services cluster
NA	Not available
NGO	Non-Governmental Organisation
OQT	Optional Quality Term
PDO	Protected Designation of Origin
PGI	Protected Geographical Indication
PGS	Participatory Guarantee Systems
S (cluster)	Social and demographic aspects cluster
SES	Social-Ecological System
TSG	Traditional Speciality Guaranteed
V (cluster)	Value and Quality Products cluster
VC	Value Chain
VC-A	Value Chain Assemblage
WP	Work Package

Executive summary

This deliverable assembles the outcomes of a critical benchmarking process involving the cross-regional analysis of five clusters of mountain value chains. The analysis focused on assessing the contributions of these value chains to the sustainability and resilience of European mountain areas. The examination also delved into the trade-offs between the provision of public and private goods by value chains. This work is part of the *WP5-Cross-case Comparison and Benchmarking* of the MOVING project.

MOVING, a four-year Horizon 2020 funded project, aims to build capacities and co-develop policy frameworks across Europe for establishing new or enhancing/upscaling value chains that contribute to the resilience and sustainability of mountain areas, using a bottom-up participatory process involving value chain actors, stakeholders, and policymakers. The project analyses 23 European mountain regions.

Prior to this deliverable, MOVING undertook an analysis of the vulnerability and resilience of land use systems supporting mountain value chains and an in-depth analysis of a value chain contributing to the viability of each mountain area. The objective of WP5 was to critically benchmark cross-regional clusters of value chains, focusing on vulnerability, sustainability and resilience criteria and analysing the trade-offs between the provision of public and private goods in mountain areas.

To achieve this objective, the 23 value chains were classified into five clusters addressing key challenges faced by mountain areas: Social and Demographic aspects (Cluster S), Value and Quality Products (Cluster V), Innovation and Infrastructures (Cluster I), Nature and Ecosystem Services (Cluster N), and Governance, Cooperation, and Territoriality (Cluster G). Each cluster grouped five to seven value chains.

Within each cluster, a comparative participatory analysis was conducted, evaluating the contribution of value chains to the sustainability and resilience of mountain areas. This analysis focused on identifying how the value chains within each cluster impacted seven objectives, previously defined as crucial to enhance both aspects: Human Capital, Cooperation, Sustainable Use of Local Assets, Inclusiveness, Adaptive Capacity, Ecological Resilience, and Attractiveness and Wellbeing. Additionally, each cluster identified trade-offs, challenges and solutions, and the provision of public goods by value chains.

A cross-cluster analysis was performed through a Cluster workshop, “Unlocking the power of mountain VC”, hosted in Hungary in November 2023 with more than 100 representatives of the 23 mountain regions; and through an online questionnaire where more than 100 experts from these areas assessed and weighed the contribution of the seven objectives to the sustainability and resilience of mountain areas.

Even though each cluster was organised around some specific topics, the cross-comparison analysis underscored the interdependence of factors and challenges across the five clusters. In all the clusters, the participants underlined the intricacy of factors influencing the performance of value chains and their contribution to mountain areas. This highlighted the imperative need for an integrated and collaborative approach to address the multifaceted issues impacting the contribution of the examined value chains to the sustainability and resilience of mountains.

Confirming our hypothesis that ‘*Mountain value chain can create value while enhancing the sustainability and resilience of mountain value chains*”, results showed that VCs provide

essential public goods. They are crucial for the vitality and attractiveness of rural areas thanks to the generation of employment opportunities and incomes. They connect the mountain areas with other areas and the lowlands, creating networks, attracting attention to the producing areas, and creating assemblages and synergies with other value chains and territories. Land and resource management provides ecosystem services and preserves the high value of these areas for future generations. Value chains enhance the human and financial capital of these territories, offering education and training opportunities, but also opportunities for innovation and multi-level governance.

However, these value chains also face important challenges and trade-offs. Among them, mention should be made of the lack of recognition of the public goods provided. Most of the ecosystem services delivered (water harvesting, clean air, energy, sceneries…) do not have a price, and the providers are not compensated for them. Neither policies nor consumers often recognise this extraordinary contribution. Policy incentives or premium prices for the products should recognise the intrinsic value of mountain value chain products.

Furthermore, mountain value chains face unfair competition from non-traditional or non-certified products and big companies that being attracted by the quality and demand of mountain products imitate them using industrial methods and non-mountain resources. Small-scale farms and processing firms have limited bargaining power, and mountain value chains face power imbalances to address these challenges. Non-adapted technologies and difficulties in boosting innovation are also common problems of these value chains. An additional burden is the limited capacity to process products, which means that most of the added value is captured in the lowlands.

Collective action is also limited in mountain VCs due to the multi-tasks performed by their limited number of workers. Attending meetings or participating in initiatives is more complicated due to the constraints of mountain areas. These areas are among the most remote and isolated on the continent, with poor transport and connectivity infrastructures, limited offers of essential services, and difficulties retaining and attracting young people.

The cross-comparison also highlighted different solutions and opportunities envisaged by mountain value chains. Policies might play an important role in recognising the value of the goods and services provided and compensating those making possible; creating communication and awareness-raising campaigns to inform society about the role of mountains as the ecological backbone of Europe and increasing the willingness to pay premium prices for these products. Innovative ways to provide infrastructures and essential services need to be explored. Research and innovation should be fostered to provide low-cost, adapted technologies and services.

Finally, the prioritisation of the 7 objectives proposed to enhance the resilience and sustainability of rural areas showed a marked preference for those objectives linked to human and social capital, followed by the environmental objectives. For the participants, it was clear that the most important thing is to retain people in mountain areas and enhance their skills to manage the territory sustainably.

In addition to this document, each cluster has elaborated a Policy Brief (D5.2). The analysis of D5.1 and D5.2 will flow into WP7 – Policy Analysis and help to inform policy and decision-making at both the local and European levels.

1. Introduction

MOVING is a 4-years Horizon 2020 funded project whose main objective is to build capacities and co-develop relevant policy frameworks across Europe for the establishment of new or upgraded/upscaled value chains (VCs) that contribute to the resilience and sustainability of mountain areas, using a bottom-up participatory process that engages VC actors, stakeholders, and policymakers. The project is developed in 23 European mountain regions (see Figure 1).

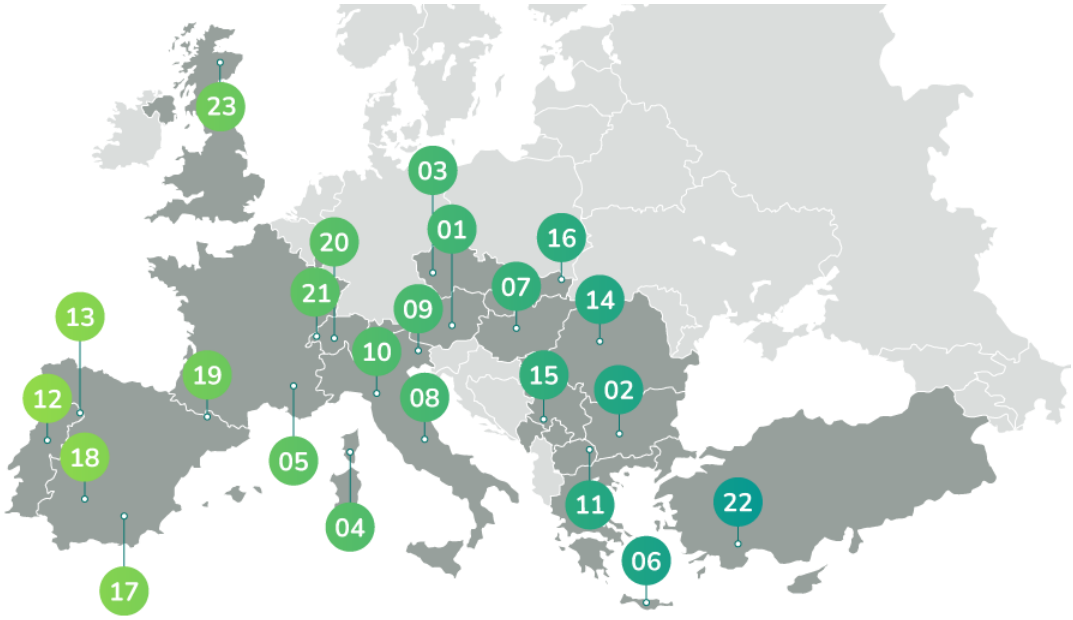


Figure 1 MOVING 23 Reference Regions

MOVING specific objectives are:

1. Establish a European-wide Community of Practice (cop) on Mountain vcs, including actors from the Agricultural Knowledge and Innovation System (AKIS), VC and policy-making stakeholders and society (WP1).
2. Develop a conceptual and analytical framework based on the understanding of mountains as Social-Ecological Systems, describing and interpreting the diversity of mountain vcs, and assessing their contribution to the sustainability and resilience of mountain areas and population (WP2).
3. Provide visual tools to raise awareness of the Agricultural Knowledge and Innovation System (AKIS), vcs actors, civil society, and policymakers on the diversity of land use and production systems of mountain areas, the threats they face, the bio-physical assets they can mobilise, their sustainability, and their resilience to climate change (WP3).
4. Study the configurations, strategies, dynamics, and value distribution of different vcs in the main European mountainous areas to assess their contribution to sustainability and resilience (WP4).
5. Develop in-depth, participatory, critical benchmarking of clusters of mountain vcs to identify enablers and blocking factors affecting sustainability and resilience (WP5).
6. Carry out foresight exercises to capture and anticipate the long-term trends affecting mountain areas, co-constructing shared visions and strategies for a balanced mix of public and private goods (WP6).

7. Elaborate an evidence-based and performance-focused policy roadmap and policy design toolkit for the next generation of policy interventions to enhance the connectivity, sustainability, and resilience of mountain regions (WP7).

The project has worked on 2 different scales: the mountain reference region (MRR), that is, each of our 23 range mountains, and the mountain reference landscape (MRL), a smaller area where our selected VCs operate and where the connections with stakeholders are easier. The WP5 analysis was based on the MRR scale due to its overall objective.

During the project development, an in-depth analysis of a VC in each MRL was conducted, including a meticulous exploration of how each of the four different steps in each VC (production, processing, marketing and distribution, and consumption) contributed to the sustainability and resilience of mountain areas (see Blackstock et al., 2022). However, as VCs normally do not operate isolated in the territory but in close interaction with other VCs, we have also worked with the so-called value change assemblage (VC-A). Additionally, WP3 has identified the main vulnerabilities and opportunities for resilience and sustainability of the land use systems in MOVING mountain regions (see Gonzalez-Moreno et al. 2022).

The results of both WPs have been essential in the development of WP5 – *Cross-case comparison and benchmarking*. This report presents the work undertaken, focused on the cross-comparison of the VCs investigated in our 23 mountain regions. The aim of the work package is shown below.

Objectives of WP5

The main objective is to develop critical benchmarking of cross-regional groups of VCs against vulnerability, sustainability and resilience criteria, with a focus on the trade-offs between the provision of public and private goods in the mountain areas.

Specific objectives:

- *To perform a critical assessment of the VCs identified in WP4 based on the benchmarking indicators aligned with SDGs developed in WP2;*
- *To identify relevant (5) clusters allowing to group typologies of VCs sharing characteristics;*
- *To perform comparative analysis of the vulnerability, resilience and sustainability of VCs for each cluster;*
- *To identify main success and failure factors against specific vulnerability*

To achieve this goal, the project team established five distinct clusters in Task 5.1, highlighting the main challenges faced by mountain areas:

- Social and Demographic aspects (Cluster S)
- Value and quality products (Cluster V)
- Innovation and infrastructures (Cluster I)
- Nature and ecosystem services (Cluster N)
- Governance, Cooperation and Territoriality (Cluster G).

Each cluster has been attributed five to seven MOVING VCs. These clusters serve as a grouping for the benchmarking and cross-comparison of the case studies. Our hypothesis has been that "*Mountain VCs can create value while enhancing the SES sustainability and resilience".* The analysis has followed common guidelines to conduct the cross-comparison of the case studies. All the clusters follow a similar approach to collect and analyse the data, as well as for presenting and interpreting the results, in order to allow comparison across the different clusters and deliver insights into the characteristics of the mountain VCs, the values they create in mountain regions, their contribution to the enhancement of sustainability and resilience of the socio-ecological systems (SES), and the trade-offs between clusters' topics and provision of private and public goods. A Cluster Workshop, *"Unlocking the Power of Mountain Value Chains,"* attended by representatives of all the VCs, provided an opportunity to share and discuss the results among relevant stakeholders and experts. In addition to this document, each cluster has elaborated a Policy Brief (D5.2). The analysis of D5.1 and D5.2 will flow into WP7 and help to inform policy and decision-making at both the local and European levels.

2. Clusters' definitions

To delineate the key aspects characterising each cluster, we employed an iterative method involving the different partners in the MOVING project. In September 2022, the UCO team initiated a series of interviews with each MOVING partner to gain a nuanced understanding of the challenges and opportunities perceived in their respective value chains (VCs). This initial insight was used to extract a preliminary identification of failure and success factors, crafting the basis for a thematic grouping of these challenges. The cluster leaders actively participated in refining the basis of this initial grouping. Additionally, we explored similar initiatives, discovering that our sister project POLIRURAL had developed a cluster categorisation tool that computes a rural attractiveness index using indicators across social, natural environment, human-made environment, economic, institutional and cultural categories. This approach inspired and reinforced our definition of MOVING clusters, aligning them with the challenges we had identified. Given our specific approach on the role of VC to enhance sustainability and resilience we finally decided to work with these five clusters: Social and Demographic aspects (S), Innovation and infrastructures (I), Governance, Cooperation, and Territoriality (G), Nature and ecosystem services (N), and Value and quality products (V). Table 1 provides an overview of some challenges included in the analysis of each cluster. A description of each cluster follows, including the research questions addressed by each of them.

Table 1 Clusters definition and key challenges addressed

Social and demographic aspects	**V**alue and quality products	**I**nnovation and infrastructure	**N**ature and ecosystem services	**G**overnance, Cooperation and Territoriality
S	**V**	**I**	**N**	**G**
• Demographic challenges • Women	• PDO or geographical indications	• Infrastructures (digital, Processing,	• Landscapes • Land use changes	• Collective action • Alliances and

employment • Youth employment • Non local workers • Territorial networks • Collaboration among actors • Wellbeing • Social inclusion • Trade-offs between economic and social aspects	• Production method, certification schemes • Certification schemes based on Traditional production methods (PGI) • Food quality • Market value, added value • Consumers attitude • Local knowledge and cultural heritage • Specific breeding/variety • Unformality	transportation, social) • Digitalisation • Small-scale technologies • Education and trainings for innovation • Capital (social, financial) • Accessibility / Connectivity • Skilled labour	• High Nature Value Farming • Climate change threats • Climate change adaptation strategies • Environmental Protection • Public and private goods trade offs • Diverse interests • Natural capital management • Over/under exploitation of resources	partnerships • Institutional development • Leadership • Telecoupling /Assemblage • Territorial integration • Competition/Collaboration among VCs • Link to tourism • Fragility of the VC • Dependence on subsidies/policies

2.1. Cluster S: Social and Demographic aspects

Lead by: UNIPI - Michele Moretti & Stefano Grando

Beyond direct income generation, but also through it, mountain VCs can have a positive impact on social and demographic aspects and on local communities' wellbeing in an era marked by deep changes and hazards such as global climate trends, technological advancements, and economic shifts that can have significant impacts on individuals and society turbulences, which challenge mountain areas, providing at the same time risks and opportunities.

The general trend towards depopulation of rural and mountain areas has already spread its effects and is still ongoing in some regions. The younger generations are often looking at mountain areas as places hardly capable of being attractive and providing adequate employment opportunities for them. Conversely, some of these areas have the potential to become attractive for people coming to the area pursuing a new way of life (economic migrants, former urban dwellers, retired people, etc.).

In this context, the presence of mountain VCs, based on the local resource systems but also connected to other regions at the different steps of the chain, represents an opportunity for employment, both directly (local people working in the VC) and indirectly through the connections and synergies they can establish with other regions and with other VCs or different activities in the same region.

Besides, these VCs, through the relational practices they rely upon, and the knowledge exchange they trigger, can contribute to the deepening and widening of the social fabric in areas that are often sparsely populated, both internally and externally to the region. This is even truer when we look at the VCs as assemblages of individual and collective actors that evolve over time, with a flexible configuration of the social and economic linkages which influence the relational space of the actors involved.

Potentially, the different groups of local dwellers and newcomers, including the youngsters and with an attention to gender issues - can all find, in the VCs, opportunities for employment, for making a living and improving their wellbeing, as individuals engaged in the VC but also as people living in an area with a vivid civil society strengthened by the presence of active VCs. Obviously, the actual impact of each VC depends on its size, but even small chains can be impactful as components of wider networks, as triggers or catalyst for other initiates, and so on.

Regions and VCs included in Cluster S analysis are:

Nº	Mountain Region	Value Chain	Country
01	Austrian Alps	Lamb from the Weiz region	Austria
04	Corsica	Chestnut Flour	France
06	Crete	Central Rethymno Carob	Greece
07	Transdanubian Mountains	Agroecological Knowledge	Hungary
10	Northern Apennines	Chestnut Flour	Italy
12	Cordilheira Central	Serra da Estrela PDO Cheese	Portugal

The selected VCs for this cluster, set in regions marked by different socio-economic characteristics, provide insights into the issues described, with attention paid to the gender issues whenever they emerge as a relevant aspect of the VCs' relation with the local communities. These issues are analysed for the selected VCs in the light of the MOVING conceptual framework (Moretti et al., 2023) and based on the research findings, with the aim of addressing the following research questions.

1. To what extent do the selected mountain VCs contribute to employment opportunities in their area?
2. How do the VCs strengthen the local networks and the social wellbeing at the local/regional level?
3. Under which conditions are these employment opportunities and/or these social benefits provided?
4. How do the selected VCs involve - or influence the condition of - youngsters and women, and/or the other specific social groups/communities, in the identified areas?

2.2. Cluster V: Value and Quality Products

Lead by: VINIDEA - Cristina Micheloni, Ekaterina Keshcheva & Francesca Alampi (AREPO)

Europe has a long-standing tradition in the definition and protection of quality agro-food products, with the main aim to protect the knowledge, the traditions, the natural resources and support the local economy. The range of quality schemes regulated by the EU includes: a) schemes that highlight the geographic origin, highlighting the value of the areas where the products originate and/or are processed and the related local knowledge. In PDOs (Protected Designation of Origin), every part of the production, processing and preparation process must take place in the specific region. For wines, this means that the grapes have to come exclusively from the geographical area where the wine is made. Besides, some production limitations and quality features are defined. In the case of PGI (Protected Geographical Indication), the emphasis is on the relationship between the specific geographic region and

the name of the product, where a particular quality, reputation or other characteristic is essentially attributable to its geographical origin. For most products, at least one of the stages of production, processing or preparation takes place in the region but often the origin of the ingredients is not strictly from the area and no limitation in the production methods are set; b) schemes that focus on the processing method, without linking it to a specific area, Traditional Speciality Guaranteed (TSG); c) quality schemes that affect the production method (plant production, animal husbandry, processing etc), like organic products, that is the only EU certification method applied along the whole production chain; or product specific terms, like hey milk for dairy products obtained from milk produced by cows fed on fodder and pasture; and d) other schemes that highlight specific aspects, for example Mountain products or products from EU's outermost regions.

In all cases, the purpose is to contribute to the sustainability of the areas in economic, ecological, and social terms, as well as to enhance the competitiveness of EU food and drinks in the local and global markets. Often, quality products also enhance the touristic value of the areas they come from and contribute to their promotion.

Another key aspect of EU quality products is their certification (based on a defined standard and a third-party certification scheme), intended to guarantee the authenticity of the product and production process and prevent misuse and fraud. The implementation of quality schemes requires traceability and a certain effort in terms of bureaucracy to be fulfilled, often perceived by producers (especially the small ones) as a burden.

Regions and VCs included in Cluster V analysis are:

Nº	Mountain Region	Value Chain	Country
09	Eastern Alps	Trento DOC wine	Italy
13	Maciço Noroeste	Douro wine	Portugal
16	Slovak Carpathian Mountains	Bio Honey	Slovakia
17	Betic Systems	Organic Mountain Olive Oil	Spain
18	Sierra Morena	Iberico ham PDO - Los Pedroches	Spain
19	Spanish Pyrenees	Mountain wine	Spain
21	Swiss Jura	Tête de Moine PDO cheese	Switzerland

Several “certified quality products” come from mountain areas value chains, where they are linked to local resources and site-specific conditions, production systems, traditions, and knowledge. Nevertheless, several factors and new events may conflict with the primary scopes of certified quality products value chains and their identification, and the search for potential solutions is the scope of the cluster analysis. In this regard, it is important to explore the following questions:

1. How much of the VC is really “local” or “based on local resources”, and how much is it enhancing/protecting local resources?
2. Are quality products also leading to quality job offers, or how do they impact the local community?
3. How does climate change impact the quality features of the product and its market potential?
4. How can innovation impact the VC features and its acknowledged qualities and, at the same time, its potential for development and increase?
5. Is the bureaucracy implied in quality certification schemes affordable for small farmers/processors, or are some diversified patterns for certification needed?

2.3. Cluster I: Innovation & Infrastructure

Lead by: ZHAW – Gianna Lazzarini & Carmen Forrer

Mountain regions in Europe face particular challenges, including remoteness, difficult terrain, and low population density. Despite these obstacles, the local communities often demonstrate resilience and adaptability, driven by innovation. Innovation manifests, for example, in locally tailored business structures within the VCs, promoting the protection and enhancement of local resources (landscape, biodiversity, nature reserves, traditions, etc.). This cluster will discuss the role of innovation in terms of adaptation, as well as the role of the accompanying infrastructures.

Infrastructures encompassing roads, technology, processing facilities, and storage rooms serve as the backbone of a functioning and supportive environment for economic activities. This is especially important along food and tourism value chains: to add value, raw materials must be processed and transported to the consumers. Production and transformation facilities are needed to produce and process products efficiently, and consumers need to know and have access to the products or the regions. Mountain regions face specific challenges in this regard. The remoteness and difficult terrain have always been a challenge for the transport of goods and people and for efficient and competitive production. These challenges remain, and many rural regions struggle with high infrastructure costs, low investments, and centralisation of services.

In terms of innovation, although mountain communities show strength in adapting to difficult living conditions, the rate of innovation is generally lower than in more urban areas. This is related to other problems, such as an ageing population, the lack of skilled labour and the dominance of the primary sector. Adding to this, sectors that are important for the economy in mountain areas, such as the food industry and tourism, are subject to constant change. For example, a trend towards "ecologisation" or "greening" of the economy is taking hold based on increasing environmental awareness among consumers. At the same time, unstoppable digitalisation is making its way into even the most remote areas. Not least, the Covid 19 pandemic has shown that the internet - access to it and knowing how to use it - is an increasingly important factor for economic survival. Generally, household internet access is lower in mountain regions than in urban areas, although here, too, there are major differences between regions. However, the digitalisation of mountain communities and VCs can create innovative and novel opportunities. For example, by selling traditional products to consumers or tourists through digital platforms or through new tourism "remote work" opportunities. Mountain areas are also places where social innovations and new forms of collaborations (cooperatives, informal settings, etc) emerge and can be observed in many MOVING VCs.

Regions and VCs included in Cluster I analysis are:

Nº	Mountain Region	Value Chain	Country
07	Transdanubian Mountains	Agroecological Knowledge	Hungary
08	Central Apennines	Alto-Molise dairy	Italy
13	Maciço Noroeste	Douro wine	Portugal
20	Swiss Alps	Mountain grain	Switzerland
22	Beydaglari	Greenhouse tomato	Turkey

All MOVING VCs have steps or actors that are positively or negatively influenced by the state of the infrastructure and the need for investment and innovation. Major challenges have been identified in relation to roads, greenhouses, milking robots, processing and transformation facilities, storage facilities for grain, etc. In summary, this cluster is focused on the role of innovation and related infrastructure in mountain areas, highlighting the social, environmental, and economic conditions and challenges they face. The central research questions are:

1. How does innovation (not) take place in the VC?
2. How does the availability and quality of infrastructure influence the ability to innovate?
3. What are the structural characteristics of mountain VC that pose challenges for innovation, upgrading, efficiency, new technologies and investment in the VC?
4. What are essential skills and tools for a resilient VC now and in the future? How can they best be supported by innovation and infrastructure?

2.4. Cluster N: Nature and Ecosystem Services

Lead by: CZU - Lukas Zagata, Jakub Husak & Tomas Uhnak

Mountain regions are characterised by significant territorial capital stemming from natural resources and unique ecosystems. This capital is actively utilised by farmers and other rural stakeholders in diverse ways. Within this cluster, there are instances where regions intentionally strengthen the connection between extensive farming systems and the conservation of high biodiversity in agricultural landscapes, exemplified by the concept of High Nature Value Farming.

Regions and VCs included in Cluster N analysis are:

Nº	Mountain Region	Value Chain	Country
01	Austrian Alps	Lamb from Weiz region	Austria
02	Stara Planina	Public Goods for High Nature Value Farming	Bulgaria
03	Sumava – Cesky Les	Beef production	Czechia
05	Drome Valley	Sheep meat	France
15	Dinaric Mountains	Sjenica lamb PDO	Serbia
20	Swiss Alps	Mountain grain	Switzerland

In this context, agriculture assumes a distinctive role in providing ecosystem services. Farmers often adopt highly extensive agricultural methods to contribute to public goods, relying on financial support from the State. But other actors, like tourists or tourism businesses also use these resources. Despite the focus on ecosystem services, farms in these regions also play a crucial role as producers. Abundant natural assets enable farmers to enhance the value of their production, often through specific certification schemes such as organic farming or mountain products certification.

The strong interdependence between territorial assets and farming makes farmers in mountain regions potentially vulnerable to the impacts of global climate change, which can adversely affect ecosystems. To address this, the following questions need exploration:

1. What are the impacts of global climate change on the territorial capital of mountain areas, and how do these affect value chains?
2. How does global climate change influence the role of high nature value farms?

3. How do local actors in mountain regions balance various interests in land use, including conservation, production, and consumption of natural assets?
4. To what extent are actors vulnerable in their role as providers of public goods, and how might changes in public policy impact them?

2.5. Cluster G: Governance, Cooperation and Territoriality

Lead by: JHI – Liz Dinnie & Chloe Thompson

The governance of mountain landscapes involves many actors and institutions, bringing challenges and opportunities for cooperation to achieve goals and ensure resilience. The priorities of different communities and markets within the region may bring tensions between different actors. Mountain areas often have special qualities that are attractive to those from outside the region for different reasons. These include recreation, second-home ownership, economic opportunities or wildlife/ecological interests, for example. These special qualities mean that the landscapes, heritage and traditions, food and drink and biodiversity, alone or in combination, need to be managed and, in some cases, protected to ensure they are maintained. Hence, the governance of mountain regions can be especially challenging in managing the priorities and wishes of different groups.

The governance of mountain regions may also face challenges in terms of physical and demographic features that characterise mountain regions. Participation in physical meetings may be challenging due to long distances and sparse populations. Online meetings may also be challenging due to poor digital connectivity in the mountains. Populations in mountain regions tend to be more sparsely located and older- characteristics which are difficult to involve in multi-level, multi-actor governance.

Territorial designations, such as national or natural parks, may be adopted to protect the special qualities and values of mountain areas. Such designations bring extra complexity to governance arrangements. They can offer opportunities for greater participation and engagement of different actors; they may also create additional layers of decision-making, depending on how they are managed. Lastly, governance in mountain regions can be challenging because of the remoteness of mountain regions from urban centres and the top-down nature of rural and agricultural EU policy-making.

Regions and VCs included in Cluster G analysis are:

Nº	Mountain Region	Value Chain	Country
03	Sumava – Cesky Les	Cesky Les cattle	Czechia
05	Drome Valley	Drôme Valley lamb	France
09	Eastern Alps	Trento DOC wine	Italy
11	Maleshevski Mountains	Rural tourism	North Macedonia
14	Southern Romanian Carpathian Mountains	Certified ecotourism	Romania
23	Highlands and Islands	Speyside Malt Whisky	Scotland (UK)

This cluster examined how different actors and institutions govern and cooperate to manage opportunities and tensions in the MRL (and tele-coupled territories). Questions included:

1. What does the VC tell us about levels of trust and cooperation between actors in the mountain region?
2. How inclusive and accessible is the VC to other actors in the region?
3. How do sectoral and strategic plans influence the participation of different actors in governing the territory?
4. What are the challenges to multi-level governance in mountain regions?

3. Methodology

A comprehensive internal work plan was developed to outline the various tasks necessary for cross-case comparison and benchmarking based on the following sequential tasks:

1. Characterising the mountain SESs and the VCs
2. Assessing the contribution of the VC-A to the sustainability and resilience of the SES
   2.1. Definition of objectives for sustainability and resilience
   2.2. Definition of relevant indicators per cluster
   2.3. Interviews and discussions with experts (optional)
   2.4. Benchmarking and comparative analysis
3. Clusters workshop
4. Questionnaire to weigh the objectives

An identical flow of tasks has been implemented across all clusters to ensure results are comparable. The work previously performed in WP3 and WP4 has been an important source of information and data. The working method has been collaboratively designed between the cluster leaders and the coordinating partner (UCO). Some of the tasks have been independently conducted by each cluster leader, while other steps have been led by UCO, utilising inputs from cluster leaders. The different steps are described in the following sections.

3.1. Characterising the mountain SESs and the VCs

Each cluster initiated its work with a thorough literature review, which served multiple purposes. It provided valuable insights to refine research questions and formulate hypotheses, identified characteristics influencing or influenced by the cluster topic across the SES, and shaped the objectives and indicators defining the contribution of VCs to SES sustainability and resilience. The literature review also informed the discussion of the cluster topic during reporting. Special attention was placed on consulting publications and work from MOVING's sister projects, namely SHERPA, RURALIZATION, DESIRA, and POLIRURAL.

Particularly important sources of data have been D4.3 Report on participatory value chain analysis (including also regional reports), D4.5 Report on Vulnerability and Resilience Performance of 23 Reference Region Value Chains, D4.6 Global Upgrading Strategy, D3.3 Tools for science-society-policy interfaces (incl. also regional reports) and D4.1 Inventory of Mountain value chains (https://www.moving-h2020.eu/work-packages-and-deliverables/). Clusters were encouraged to broaden their characterisation beyond focal value chains to encompass the entire assemblage of value chains (VC-As) analysed in each mountain region, ensuring a comprehensive analysis. Attention is dedicated to incorporating information about the provision of public goods, value creation, and the policy environment in all clusters. Any gaps in the value chain analysis from WP3 & WP4 are addressed by filling in missing data using secondary sources or by requesting the information from project partners.

3.2. Assessing VC contribution to sustainability and resilience of mountain SES

In the second step of the analysis, each cluster leader has deepened the analysis and comparison of VCs, based on the characteristics and description of the cases, to identify evidence to support the general hypothesis that "*Mountain VCs can create value while enhancing the SES sustainability and resilience"* which is articulated through the cluster's research questions. Using objectives and indicators to assess this assumption allowed us to compare the situation in different mountain areas, identify and analyse trade-offs between the creation of value(s) and the contribution to sustainability and resilience, to consider the provision of private and public goods, and to explore the policy environment. This step has been divided into 4 stages as follows.

3.2.1. Definition of objectives for sustainability and resilience

The initial phase involved defining a set of objectives that effectively capture the contribution of the VC-A to the sustainability and resilience of the SESs. These objectives represent the anticipated outcomes when practices within VC-A enhance resilience and address sustainability. The objectives were formulated to be easily understandable as they are being assessed through the questionnaire in the fourth step of the methodology.

The collaborative development of objectives involved inputs from cluster leaders and the WP5 leader. The objectives were defined with a normative approach (Cialdine et al., 1991)., since they were framed by considering what VC-A should deliver and achieve to enhance the sustainability and resilience of the SES. The aim was to limit the number of objectives to ensure relevance across multiple clusters. Each objective was assigned to one or more clusters, with cluster leaders taking responsibility for analysing these objectives through the designated case studies. Seven objectives were agreed upon to align with the questionnaire and benchmarking exercise objectives.

Figure 2 MOVING's 7 objectives towards sustainability and resilience

3.2.2. Definition of relevant indicators per clusters

For each objective, a set of approximately five indicators was identified to provide metrics, evaluation criteria, or signals indicating how a specific VC is performing with respect to the defined objective. The criteria considered during the formulation of objectives and indicators included:

1. VC-A practices that enhance sustainability and resilience of the SES, as outlined in D4.3 and respective regional reports.
2. Crucial vulnerabilities related to the cluster, and actions undertaken or potentially taken by VCs to mitigate vulnerabilities and enhance adaptive capacity, as highlighted in D4.5 and respective regional reports.
3. Aspects identified by stakeholders and youth, which currently or in the future could contribute to SES sustainability and resilience, as derived from regional foresight workshops (regional reports in WP1 and WP6).
4. Upgrading strategies outlined in D4.6, both within and across clusters.
5. Insights from interviews and discussion groups on defining objectives and indicators for the cluster, marking the next step in the process.
6. The refinement of these objectives' descriptions took place through collaborative working sessions in WP5, complemented by inputs and feedback collected from cluster leaders through interviews and discussions. The selected list of indicators (Table 2) was designed to encompass elements necessary for addressing the research questions formulated for each cluster.

Table 2 Objectives and indicators selected by each cluster

Objectives	Clusters	Indicators
Human capital	**V**	Qualitative and traditional practices Education programmes and professional trainings
	I	Skills and training Knowledge advisors
Cooperation	**S**	Number of civil society groups and NGOs Number of brokers and advisors Number of public actors Number of research entities
	V	Bargain power distribution Collective organisations Collaborative & dynamic engagement Eno-gastronomic touristic initiatives Interactions with other VC Diversification in the use of products and by-products
	I	Digital Infrastructure Collective action institutions
	G	Trust Sharing Local ownership Local decision making Collective action institutions
Sustainable use of local assets	**V**	Quality of natural resource exploitation Respect of eco-system biodiversity Genetic biodiversity (varieties and breeds) Soil fertility preservation Mitigate/reduce water and air pollution
	N	Sharing between actors (e.g. information, material, machinery, labour) at production stage Sharing between actors (e.g. information, material, machinery, labour) at processing stage Contribution of VC practices to existing cultural landscapes (production stage) Sustainability of resource use (at production stage)
	G	Contribution of VC practices to existing cultural landscapes Contribution of symbolic capital Sustainability of resource use Presence of protected areas
Inclusiveness	**S**	Percentage of women in VC Percentage of young actors (<40 years) Non-local actors
	G	Non-local actors Age Gendering Accessibility of the resource system to local entrepreneurs Knowledge, advice, and skills
Adaptive Capacity	**I**	Use of digital technologies New products
	G	Sectoral plans Territorial plans Legal obligations
Ecological Resilience	**I**	Accessibility of natural resources Ecological innovations
	N	Pollution, erosion, and waste (whether practices at production stage influence soil erosion and pollution, air pollution, water pollution, waste.) Biodiversity and habitat quality (whether practices at production stage have negative, positive or mixed outcomes for biodiversity) GHG emissions (consider the contribution that practices at production stage)

		GHG emissions (consider the contribution that practices at processing stage)
Attractiveness & wellbeing	**V**	Touristic initiatives Protection of landscape Economic spill-over Price premium Reduction of abuses and imitations Feeling of identity/belonging
	I	Access to capital Average Wage
	N	Participation of young people (farmers and employed). Average percentage at all stages. Is the resource system accessible to local entrepreneurs? Local participation in decision making in VC (average at all stages)

3.2.3. Interviews and discussions

For the cases where additional information was necessary, cluster leaders were advised to conduct some expert interviews to discuss, elaborate, select, and consolidate the objectives and indicators, but this was an optional step.

3.2.4. Benchmarking and comparative analysis

In this step, each individual cluster conducted a comparative analysis of the selected indicators' performance across the different VCs within the cluster. Cluster leaders collected data from MOVING deliverables, such as D.4.3, D4.5, D4.6, and compared the data for each indicator. A judgment scale (benchmark) was proposed for each indicator to assess and benchmark the VC-As' performance regarding their contribution to the sustainability and resilience of SES. Some indicators were quantitative, while others were assessed qualitatively using categories, such as Likert scales. Binomial scales with two categories (e.g., "yes" or "no") were used for certain indicators, and when possible, three categories were employed, translating to 1 to 3 points for easier comparisons between cases.

The benchmarking approach utilised grids for each indicator, defining whether the indicator contributed to the sustainability and resilience of the SES or not. Scales were presented in categories, the top category corresponding to 3 points. Once the benchmarking was defined, and data for assessing the cases were collected, the information was interpreted to generate an overview. This allowed for the analysis of trends and trade-offs, with particular attention given to identify policy issues and the provision of public goods. Although statistical significance cannot be achieved with 5 to 7 cases, emerging trends or hypotheses could be discussed. The interpretation of results occurred within each cluster, and the results were presented at the Cluster workshop described in the next step.

In preparation for discussing the results at the workshop, the analysis and weighting results were made available. Each VC-A was assessed on each indicator within the cluster, and the results were color-coded for easy visualisation on maps and/or tables. Discussions and comparisons occurred within and between clusters to identify trade-offs and provide evidence on cross-cutting issues like policies and the provision of public goods. The inter-cluster analysis was more qualitative but grounded in the indicators' results from each cluster.

3.3. Cluster workshop

From November 6th to 10th, 2023, a combined workshop entitled '[Unlocking the Power of Mountain Value Chains'](), was hosted in Budapest, encompassing all five clusters and WP6 cross-case foresight analysis. Initially, the GA description of WP5 and WP6 proposed five distinct cluster meetings. However, adapting to the evolving nature of WP5 and the challenges of precisely categorising each VC into a single cluster, a strategic decision was made to organise a joint workshop. This approach not only provided opportunities for individual cluster analyses but also fostered interaction among participants from different clusters, facilitating the exchange of experiences and insights.

Each cluster leader extended invitations to participants from the respective value chains (VCs) and recruited experts, including researchers, policymakers, VC stakeholders, and advisors. MOVING partners played an active role in collaborating with cluster leaders to identify and invite relevant stakeholders. A notable achievement was the gathering of 102 participants, exceeding our target of 100.

Figure 3 Artwork containing the main messages from MOVING workshop "Unlocking the power of Mountain value chains" (Budapest, Nov. 2023) (by Szilárd, grafacity.eu)

The primary objective of the workshop was to deliberate on the significance of various variables in vulnerability, sustainability, and resilience analyses within the context of each cluster's theme, however interactions, participatory discussions, visits and exchanges were prioritised. Participants also engaged in assessing the contribution of the 7 objectives to sustainability and resilience. Beyond the structured discussions, the workshop created a space for informal exchanges, thereby contributing to the consolidation of the MOVING community of practice and advancing our overarching goal of capacity building. An overview of the activity can be seen in [the video]().

3.4. Questionnaire to weigh the objectives

To assess the relative importance of these seven objectives, a comprehensive questionnaire (see Appendix - Questionnaire to Weigh the Objectives) was deployed using the EC survey tool available in multiple languages and was widely distributed via the VRE and through MOVING partners in their MAP. The survey targeted stakeholders living or working in European mountain regions who are engaged in various activities such as farming, food processing, forestry, tourism, administration and policy, nature conservation, etc. The panel of contacts resulted largely from MOVING partners who were asked to contact 5-7 experts

from MOVING multi-actor platforms with a comprehensive understanding of the VCs and their influence on the sustainability and resilience of their mountain areas. By intentionally including a wide range of stakeholders with different backgrounds, a comparison between differing expertise, priorities, and opinions was possible, as demonstrated, for example, by Galli et al. (2016). From 133 contacted stakeholders, valid data from 108 respondents from different mountain regions and clusters in 14 countries could be gathered, thereby achieving the target of receiving at least 100 responses.[1] The survey was available online from 18th October 2023 until 20th December 2023, and the tool allowed the participants to choose their preferred language. There was neither a time limit for answering the questions nor a set order in which the questions were to be answered. Surveys were also admitted when not every question was answered and, in some cases, multiple answers were possible. To avoid participation fatigue, the questionnaire was combined with the WP6 questionnaire, which sought to evaluate strategic options.

3.4.1. Best-Worst Scaling Application

The questionnaire, designed by UCO, used a “best-worst scaling” (BWS) method. This approach involves respondents selecting the best and worst items from lists of options. The frequency of these choices indicates the relative importance individuals assign to each item concerning an underlying dimension of interest (Flynn and Marley 2012). BWS offers notable advantages over other methods for capturing preferences (Marley and Louviere 2005; Lusk and Briggeman 2009; Lagerkvist et al. 2012), such as ease of comprehension for respondents; enhanced assessment of trade-offs; minimisation of rating biases and suitability for handling numerous items simultaneously.

BWS has seen extensive use across diverse valuation contexts, including healthcare (Lancsar et al., 2007), environmental policy (Villanueva and Glenk, 2021), and particularly in studying consumer preferences (Lusk and Briggeman, 2009; Lagerkvist et al., 2012). Its application has been documented in various research studies, highlighting its effectiveness and versatility in understanding preferences and priorities in different domains (Villanueva and Granado-Díaz 2022). The present analysis focused on stakeholders' preferences or attributed importance to the seven MOVING objectives.

Besides the BWS scale ratings, the survey design included multiple-choice questions and open-ended questions, allowing respondents to freely word or add answers or comments without predefined options. In terms of content, the survey (Appendix - Questionnaire to Weigh the Objectives) focused on various aspects of agricultural practices and regional economy, both currently and with regard to future visions. Starting, the participants were prompted to state their demographic and professional backgrounds, their country and the corresponding value chains (e.g., VC options for Spain: Organic Mountain Olive Oil, Mountain wine, and Iberico Ham PDO) and to rate the importance of several **impacts** on production as well as the importance of elements to improve regional farmers´ and entrepreneurs´ situations in the future. The next part of the survey focused on the **objectives** asking if they contribute or not to improve the sustainability and resilience of mountains. The stakeholders were presented with a sequence of seven **choice cards** (see Figure 4), each including three objectives. Respondents were asked to indicate the most important and least important objective from their point of view, considering the efforts of implementation and/or co-benefits for actors in their current situation. So that, eventually, a ranking of the relative importance of the seven objectives could be created.

7 Choice Card 1

7.1 In the table below, between the three objectives proposed select the most important and the least important.

	Cooperation Actors engage in formal and informal relationships in the value chain, fostering fruitful collaboration. This collaboration also leads to sharing benefits fairly among all involved parties throughout the production, processing, and distribution phases.	**Human capital** Actors and enterprises in the value chain are concerned about the importance of education and upskilling to respond to the evolutions of mountain value chains. They are aware of their role in educating the next generations and providing them with appropriate skills.	**Inclusiveness** The structure of the value chain is open to new entrantes and it promotes the participation of all in the management and decision-making. Formal and informal rules are designed for the inclusion of different groups of population (migrants, women, LGTBIQ+, disabled persons).
The most important	○	○	○
The least important	○	○	○

Figure 4 Example choice card

In the next phase of the survey, participants had the option to rank the seven objectives simultaneously. This involved assessing the current contributions of each objective and evaluating the perceived ease or difficulty of improvement in the specific region. Additionally, participants could choose one or two objectives to answer three open-ended questions. These questions covered established practices, solutions, or relationships to achieve the chosen objectives, the necessary supports (such as policies, programs, or people) required, and the obstacles hindering stakeholders from performing better on these objectives. The survey concluded by offering several links for additional information.

3.4.2. Econometric Specification and Impact Score Calculation

BWS was first discussed in 1987 by Jordan Louviere (Flynn and Marley, 2012). Adapting from the framework of random utility theory, the importance U that the expert n derives from choosing an objective i from list t with $j = 1,2,\ldots J$ objectives can be described with an observed or deterministic component, $V_{ni,t}$, and an unobserved random error term $\varepsilon_{ni,t}$ that is typically assumed to be identically and independently distributed (iid) across the sample population and related to the choice probability with a type I extreme-value distribution implying constant error variance $\pi^2/6$.

$$U_{ni,t} = V_{ni,t} + \varepsilon_{ni,t} \quad (1)$$

The deterministic part considers the contribution that an objective makes to the latent utility scale (in our case mountain sustainability and resilience):

$$V_{ni,t} = \alpha_{ni} I_{ni,t} \quad (2)$$

where α is a parameter to be estimated, $I_{ni,t}$ is an indicator variable for objective i if it is available in best-worst task t evaluated by expert n, and α_{ni} represents the utility that the objective i provides to expert n.

The probability that expert n chooses objective i from best-worst choice task t with $j=1,2,\ldots J$ objectives can be described by a conditional logit (CL) model, which has a closed form:

$$P_n(y_{best} = i|\alpha_n, t) = \frac{\exp(\mu V_{n_i,t})}{\sum_{j=1}^{J} \exp(\mu V_{n_j,t})} \quad (3)$$

where μ is a scale term inversely proportional to error variance and normalised to one. Equation (3) describes a model to appraise the likelihood of 'best' choices given the utility contributions of the objectives. Different approaches are available for jointly modelling 'best' and 'worst' choices. This study uses an approach that assumes that the decision process is sequential, meaning that the 'best' choice is assumed to be followed by the 'worst' choice (Lancsar 2009). In the sequential CL model, the product of logit probabilities is taken. Each factor of the product consists of a CL model of the 'best' or 'worst' choice in the sequence of choice tasks.

Let *b* be the objective chosen as 'best' with respect to the contribution of the VC to mountain sustainability and resilience ($y_{best} = b$) from the choice set t_1 with $j = 1,2,\ldots J$ practices, and *w* be the objective subsequently chosen as 'worst' ($y_{worst} = w$) from the choice set t_2 containing the remaining *J*-1 elements. The logit probability of observing this sequence can be expressed as:

$$P_n([y_{best} = b, y_{worst} = w]|\alpha_n, t_1, t_2) = \frac{\exp(V_{n_b,t_1})}{\sum_{j=1}^{J} \exp(V_{n_j,t_1})} \times \frac{\exp(-V_{n_w,t_2})}{\sum_{j=1}^{J-1} \exp(-V_{n_j,t_2})}. \quad (4)$$

The above model assumes preference homogeneity among experts. We employ a latent class approach (Boxall and Adamowicz 2002) to investigate preference heterogeneity, particularly because of the relative ease of interpreting heterogeneity. Furthermore, latent class models (LCMs) are particularly convenient for assessing potential sources of heterogeneity.

In the LCM, preference heterogeneity is captured by simultaneously assigning individuals into behavioural groups or latent segments while estimating a choice model. The core of the model is still a conditional logit model. Yet, the probability of expert *n* choosing the 'best' object and subsequently the 'worst' object from a list of objectives (Eq. 4) is now conditional on membership to class *s* with $s = 1,2,\ldots,S$. In addition, a classification model is used to determine the allocation of individuals to the *S* classes. Given the expert's choices over the best-worst choice tasks, the membership probability of individual *n* to class *s* is given by multinomial logit process:

$$h_{ns} = \frac{\exp(\lambda \gamma_s Z_n)}{\sum_{s=1}^{S} \exp(\lambda \gamma_s Z_n)}. \quad (5)$$

where λ is a scale term inversely proportional to error variance and normalised to one. Z_n are explanatory variables, in this case value chain and regional specific characteristics, and γ_s are parameters to be estimated. One of the *S* parameter vectors is normalised to zero to ensure the identification of the model. Given the best-worst choice probability conditional on class membership $P_{n|s}$ and the class probability h_{ns}, the joint unconditional probability of expert *n* observing a sequence of best-worst choices is given by:

$$P_n(y_{best} = b, y_{worst} = w) = \sum_{s=1}^{S} h_{ns} P_{n|s}. \quad (6)$$

Equation (6) can be estimated using maximum likelihood techniques. The researcher imposes the number of latent segments or classes exogenously. There is no rigorous procedure to determine the number of classes. Information criteria based on the value of the log-likelihood

function such as the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) may be used. The number of classes that minimise each of these criteria suggests the preferred model. However, generally applicable rules for selecting the preferred model do not exist (Swait 1994), and analyst judgment and model parsimony play a significant role in the final selection. For the purpose of this work, a 3-class solution was chosen based on joint evaluation of BIC, which showed continued but relatively low decrease beyond 3 classes, and parsimony and ability to interpret findings for policy recommendations.

The parameters α indicate the relative importance of objectives to be chosen as best or worst in a best-worst choice task. Parameters can have a positive or negative sign, indicating the importance of objectives on best-worst choice relative to the objective omitted for identification purposes. To allow for an intuitive interpretation, parameters can be converted to reflect ratio-scaled probabilities or "impact scores" following the procedure described in Sawtooth (2013). These scores can be interpreted as the predicted percentage of times that an objective is chosen as best with respect to the contribution of the VCs to the sustainability and resilience of the mountain area. Impact scores are calculated as follows:

$$Ratio - scaled\ impact\ score_{is} = \frac{\exp(\theta_{is})}{(\exp(\theta_{is}) + J - 1)} \quad (7)$$

where θ_i is the zero-centred utility weight for objective *i* in class *s*, and *J* is the number of objectives shown on each best-worst choice task. The scores can then be scaled on a 0-100 point scale.Reporting

The final step has been the elaboration of this deliverable D5.1 as a synthesis work of the UCO team, as WP5 leader, and the 5 cluster leaders and the drafting of a policy brief per cluster that conforms D5.2. The content and key messages of these policy briefs are based on the discussions with the participants, and the main focus reflects the influence of the policy environment in the cluster cases, and its contribution to the sustainability and resilience of the SES.

4. Results & Discussion per cluster

4.1. Cluster S

Cluster S analysis has been conducted on the following VCs:

Nº	Mountain Region	Value Chain	Country
01	Austrian Alps	Lamb from the Weiz region	Austria
04	Corsica	Chestnut Flour	France
06	Crete	Central Rethymno Carob	Greece
07	Transdanubian Mountains	Agroecological Knowledge	Hungary
10	Northern Apennines	Chestnut Flour	Italy
12	Cordilheira Central	Serra da Estrela PDO Cheese	Portugal

However additional elements suggested by other VCs and/or other mountain areas among the ones analysed in MOVING were considered. These additional elements have been harvested from MOVING reports and from the in-depth analysis conducted at the Cluster Workshop, as described in the following.

The work has been developed in line with the common methodological pathway, based on the results of the work carried out throughout the project. Indicators were identified and quantified through the observation of quantitative and qualitative data collected for each case-study and refined through personal contacts when needed.

An in-depth analysis was developed at the Cluster Workshop in Budapest, with a debate involving experts and stakeholders from the selected VCs. Participants were asked to share a broad storytelling of their experiences provided most of the input for the interpretation of these indicators and was a key source of inspiration. The participation of an extra-cluster case study (Swiss Jura - Tête de Moine PDO cheese) further enriched the discussion. Additional literature sources provided additional clues for interpreting and framing the research and debate outcomes through the lens of the cluster.

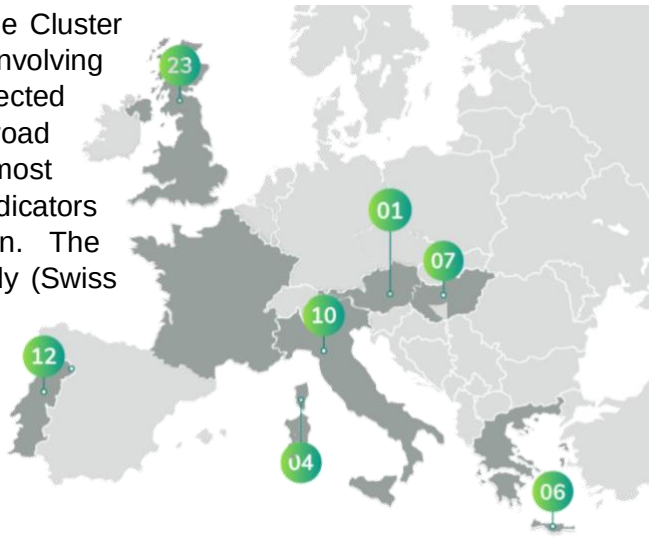


Figure 5 Cluster S - Reference Regions and Value Chains

4.1.1. Indicators and Benchmarking

Table 3 shows the indicators quantified for those objectives on which Cluster S focused: **Cooperation** (here basically deployed through indicators accounting for networking) and **Inclusiveness**. The networking indicators do not represent the result of detailed quantitative analyses, but they have been quantified in general terms by the research groups, and they are reported in the table as such. Therefore, given the complexity and the highly qualitative components of the phenomena under observation, the indicators should be regarded as a proxy for the real forms and effects of the interaction between VCs and their territories and as a source for reflection rather than as self-explanatory numbers.

Indicators have been organised into a three-level Likert scale, as visible below. In brackets are the quantifications (in absolute numbers, in percentage or in qualitative assessment) derived from available data and information for each case study.

Table 3 Cluster S Indicator Results**

Objective	Indicators	Weiz Lamb	Chestnut Flour - France	Central Rethymno Carob	Agroecol. Knowledge	Chestnut Flour - Italy	S. da Estrela PDO Cheese	Whisky	⌀ *
Cooperation	**N° civil society groups & NGOs**	2 (6)	2 (3)	1 (1)	2 (5)	2 (4)	2 (4)	3 (14)	**5.3**
	N° brokers & advisors	3 (5)	3 (5)	1 (1)	1 (2)	2 (3)	1 (2)	3 (7)	**3.6**

	N° public actors	3 (Many)	2 (6)	3 (Many)	2 (6)	2 (6)	3 (23)	3 (Many)	**10.3**
	N° research entities	2 (3)	3 (7)	1 (2)	3 (Many)	1 (1)	2 (4)	1 (2)	**3.0**
Inclusiveness	**% Women in VC**	3 (47.2%)	2 (25.0%)	1 (12.7%)	2 (25.0%)	3 (44.2%)	2 (<40%)	2 (<40%)	
	% Young (< 40)	3 (46.9%)	1 (11.0%)	2 (25.0%)	3 (67.0%)	1 (<10%)	2 (<40%)	2 (<40%)	
	Non-local	2 (Low)	2 (Low)	2 (Some)	1 (No)	1 (No)	2 (Low)	2 (Low)	

** Calculated only on quantified indicators*
*** First figure indicate the Likert scale (1-3). In brackets, the number or % of each indicator.*

Besides, VCs and regions are different from each other in many regards, so even well-constructed and similar numbers could highlight diverse evidence and vice versa. For example, when analysing the **Cooperation** objective, if we look at the number of actors engaged in each VC, we see relevant size differences (Table 4). Obviously, these differences influence the weight and the meaning of the number of networks established or joined in each region as well as, more generally, the VC's capability to have a relevant *direct* impact on the territory. The same can be said regarding the weight that the percentages of women, young people and non-local people assume in each case.

Table 4 People engaged in each VC (production and processing)

Country	Austria	France	Greece	Hungary	Italy	Portugal	UK
Nº engaged Stakeholders	324	17	542	12	52	155	100

It is worth underlying that, both in Table 3 and Table 4, data refer only to the production and processing phases. This choice is due to two considerations: the willingness to focus on the VC's phases more directly rooted in the territory (excluding products/services retailing and final consumption/utilisation) and the data availability and reliability on the other.

Another element of characterisation of the case study VCs is the perceived "remoteness" of each mountain region and the connectivity with urban centres and lowlands. As also witnessed during the discussions with VCs' actors, the operational context for farmers and processors in Crete (a remote mountain area on an island in the middle of the Mediterranean) is quite different from that on an Alpine or a Central Italian Apennines valley.

Looking at the indicators on the cooperation and "networking" dimension, the differences between actors' categories can be attributed to the complexity of the VC, which might require a lower or higher degree of connection with local or external actors. This complexity makes the internal comparison of Cluster S VCs quite difficult. Local communities' habits can also influence the number of relations established. This means numbers should not be used to "rank" different VCs' performances but rather as a base for reflection on their similarities and differences.

The diverse set of networks established by the different chains witnesses that different contexts may lead to different choices (assuming networking patterns can be seen as the result of a choice rather than the "forced" outcomes of local conditions). Some similarities emerge

for similar chains, as in the case of the relations with research groups established by chestnut producers both in Corsica and in the Northern Apennines.

Even considering all these contextual factors, the indicators offer some important hints. Some relations with brokers and business sector were expected, being linked to the "core business" of each VC. Besides the obvious relations with the various actors along the chain, it is interesting to see the variety of networks established by all the VCs with NGOs and civil society organisations, witnessing VCs actors' capability to connect with a variety of experiences and grassroots initiatives from solidarity purchasing groups to environmental organisations, from activists for rewilding to community-based initiatives. In the brokerage and business realm, links with Local Action Groups and Chambers of Commerce represent different, also complementary, relational practices followed by the selected VCs.

The links with research entities are quite widespread across the cases. They range from universities (also non-local) to public research centres, both general and specialised (like for instance for the research on whisky production in Scotland). This, as for the links with the public sector, is an interesting element to be weighted considering the potential "positive" bias in the case-studies selection and related to the request for connections with entities having "an influence" on the VC rather than necessarily having "a link" to them.

Looking at the **Inclusiveness** dimension, the percentage of women and youngsters varies from one VC to another, around levels that do not signal a specific attitude of the mountain chains, whether positive or negative. Some VCs witness higher inclusiveness: this is the case, not surprisingly given the nature of the initiative, for young people in the Hungarian case and, maybe less predictably, for the Austrian sheep farming case, both for women and young groups.

For both women and youngsters, the data on their involvement is interesting in the light of the assumption that survey focusing on farms' owners/managers tend to underestimate their presence (Sutherland, 2023). As argued by Shortall and Marangudakis (2022), "*Although women contribute significantly to the farm labour force and farming activity, they are under-represented when it comes to being the farm manager. Farm managers are those responsible for running a farm."* It is worth reminding that these data should be read carefully also in the light of the limits of the sample, which is a selection chosen for deeper analysis in the wider landscape of case-studies VCs. In this regard, it is worth reminding what argued in Blackstock et al. 2022 (p.28) on the inclusion of women, youngsters and extra-locals, in relation to the whole set of VCs, and with explicit reference to extra-Cluster S examples: *"At the Production stage, actors tended to be mainly male and mostly aged over 40, however in the non-agriculture-based VCs there was a greater prevalence of younger people (e.g., 25–40- year-olds). Production actors tended to be locals with some small numbers of non-local immigrant workers (e.g., Trento Wine). At the Processing stage, again actors tended to be mainly men, with some exceptions in the cases of the Serra da Estrela Cheese and Carpathian Bio-Honey in which women played a larger role. In almost all cases, most of the actors were aged over 40, with a few exceptions with larger numbers aged 25-40 (Brasov Certified Ecotourism, Transdanubian A-E Knowledge and Weiz Lamb). Actors were again here mainly of local origin".*

Two last reflections on the relevance of these mountain VCs for social issues are inspired by the outcomes of the long questionnaires, focusing on those given by experts and stakeholders referable to the VCs included in Cluster S. When asked to assess the impact of their VC on local economy, close to two third of them replied "weak" or "none" (17 on 27, plus 3 "don't

know"), whereas the impact on culture and social relations was ranked "very strong or "quite strong" by 21 respondents out of 29 (1 did not know). This is an overall confirmation that the selected VCs are likely to have an impact on the core dimensions of this Cluster, and at the same time the low perceived impact on local economy confirms a moderate quantitative importance of the indicators expressing inclusiveness in terms of number of people engaged. The same respondents were asked to rank Cluster S objectives and "Human capital" (17 votes) and "Cooperation" (13 votes) were recognised as the most relevant, whereas none mentioned "Inclusiveness", which was maybe perceived as a "not-core" aspect in the evaluation of mountain VCs' impact.

Further interpretation of these indicators and data and broader analyses have been developed at the Cluster Workshop, as accounted for in the following.

4.1.2. Cluster workshop analysis

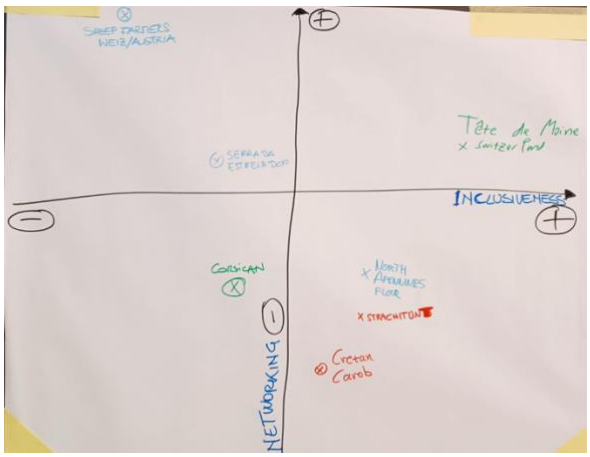
The in-depth analysis for Cluster S at the Cluster Workshop has been structured on the base of a narrative description of the main characters and evolution of each represented VC, through the lenses of the Cluster. Representatives of the seven VCs in the cluster attended the workshop.

Special focus was given to the VC actors' attitudes towards networking at the regional and extra-regional levels and towards the VC's capability to include social groups like women, youngsters, migrants and extra-local people, aiming to critically reflect on the suggestions offered by the indicators and to address the questions characterising the Cluster.

Participants were asked to display the VC they represented into a four-quadrant diagram structured along two axes: networking and inclusiveness (Figure 6). This display was meant to be qualitative and based on actors' perception, with the aim of benchmarking the selected indicators. It was clearly explained that the display in the quadrants was not aimed at giving a positive or negative assessment of the VC performance (given the diversity of contexts, sectors, etc.) and indeed all the four quadrants were populated.

The participatory identification and prioritisation of challenges and possible related solutions, again in the Cluster S perspective was also developed during the talks. They will be described in section 3.1.5.

A



B

Figure 6 Visual outputs of Cluster S Workshop (A: perceived level of inclusiveness and networking; B: main challenges (green) and solutions (yellow))

The debate highlighted that VCs contribute to the networking at the territorial and extra-territorial level, both joining or strengthening existing networks and/or promoting new ones centred on their business (as for example in the case-study in Austria).

However, farms' capacity to engage in cooperation and networks can be limited by their small size, which limits the (at least perceived) time available for networking, and by the farms' multi-activity, which makes it difficult to identify common interests to cooperate. This was witnessed in the Corsican case, where land fragmentation, with most farmers having only small pieces of land dedicated to chestnut production, pushed them to multi-activity farming, hindering their motivation to join into cooperation. An additional hindering factor is a mistrust of cooperation due to negative past experiences (for example, blamed for their perceived political bias, as in the Greek case). The mere heritage of individualist rather than cooperative habits has also been mentioned in the Austrian case.

The Austrian case reported an important interaction with the LEADER program. The LEADER Local Action Group (LAG) has been mentioned also for the Hungarian case. Of course, these are examples of networks in support of the VCs rather than networks established or strengthened by them, confirming the role of LAGs as an important component of a supportive policy environment.

Networking can be a resource for the whole mountain territory but can also remain confined at the sector level. Although in the Portuguese case, the network is large in numbers (it is a large PDO area), it is centred around two certification bodies which are not engaged in the development of the area. The lack of networking with local authorities, though potentially perceived as a catalyst of networking around the VC, was highlighted in the Italian case. The role of particularly proactive actors, sometimes coming back to the area after working elsewhere (as for the case study in Greece), was also underlined as a possible enabling factor for the development of the initiatives and for the establishment of connections.

According to the participant representing the chestnut production in Northern Apennines, cooperation does exist in the selected area and VC, but only among farmers in the very early stages of production (harvesting and chestnut drying phase). Networking is very relevant to match demand and supply. However, this only happens through personal contact and friendship. Thus, it is worth wondering, not only in relation to this case study, to which extent the practices within the VC strengthen the social ties or, vice versa, a VC develops based on an existing fabric of interpersonal relations. It is likely that that two directions can both be at work in a virtuous circle.

The discussion highlighted that the sense of remoteness varies significantly from one mountain area to another (possible extremes being the Greek and the Swiss case: in the first case the participants argued: "*we are twice remote: as mountain area and as an island in the middle of the Mediterranean*", whereas the Swiss participants did not perceive their area as remote or disadvantaged). VCs' contribution to the social fabric and extended connections must also be assessed in consideration of these differences, being potentially more crucial in areas with weak social networking.

Looking at the inclusiveness dimension, no common characters were identified. As already argued in relation to the indicators, in general it is difficult to argue that mountain VCs have specific performances in this regard. However, both the indicators and the discussion at the

Cluster Workshop highlighted a clear role of women in the VCs. This is relevant considering that mountain regions are often seen "*as a gendered space, which means that the living conditions, resources, power relations and perspectives for a good livelihood are unequally distributed between men and women*" (Oedl-Wieser 2017). The presence of women can be explained in the light of the character of the selected VCs, mostly based on traditional productions, multifunctionality, territorial embeddedness: as argued by Ball (2020), women tend to be highly present in these types of chains because they are able to perform the diversified activities and duties associated with these models of production also in traditional farming. In this regard, it is worth mentioning the Austrian case, where an important side-product of the lamb VC (the wool) is marketed almost exclusively by a female farmer, who is also the vice-head of the lamb farmers' cooperative (see also Deliverable 4.2 p.6).

Focussing on the evidence harvested at the Cluster Workshop, some differences in gender engagement are rooted in the tradition: in Portugal, herding was mainly a male duty, whereas cheese-making was rather female, and this is still the dominant pattern. In Austria and Italy, the higher presence of women (but also young people) in part-time activities, to preserve some time for family duties, is still witnessed. In the Corsican case (France) women are said to be highly present, although only in the processing phase (flour production), which makes them key actors in the diversification of the produce, but they are often "hidden" behind their husbands or male family members. This aspect is not a heritage on the past: on the contrary, sometimes the "professionalisation" of a VC indirectly led to the substitution of a woman with a man as VC manager, as mentioned by participants from Portugal and France.

Still in Portugal, herding is described as attractive for newcomers (after being considered a poor job in the last decades), whereas in Italy and Austria migrants are not involved in the production within the selected VCs but are often customers final products.

The involvement of young people seems to depend on context-specific factors, like the remoteness of the area, the difficult access to land, the high workload (France), which have a negative effect. Whereas, the strong identity and reputation of the VC, the commitment of the local cooperative in training and knowledge transfer (Austria), or the possibility of income integration (Italy) are key factors for youngster generation engagement in the VC and attractiveness of mountain areas.

4.1.3. Public goods delivered

Networking and Inclusiveness, and related consequences on wellbeing and attractiveness of the mountain areas, are the two main dimensions addressed in this cluster. Beyond specificities and limitations, the analysed VCs provide specific contributions to these two dimensions, as they contribute to strengthen the social fabric in their territories, both vertically (along the VC) and horizontally (links with civil society, local authorities, etc.), and as they offer job and engagement opportunities to women and youngsters. The direct impact depends on the size of each VC, but the potential impact increases if we consider the possibility that these initiatives are enlarged and potentially replicated.

Networking and inclusiveness represent the most cluster-specific public goods delivered by the VCs. A certain level of inclusiveness, as well as territorial networking, have been accounted for in the description of the Cluster Workshop. With regard to the second issue, it is just worth highlighting here that these networks can increase the vitality of local communities even when rooted in the VC business, as in the Greek case *(Blackstock et al. 2021, p.24*) in

which *"the use of the carob gum in both pharmaceutical and biomedical industries can add to the vitality of the value chain and the semi-mountainous villages in the region".*

However, other public goods have been mentioned, namely the contributions given to the safeguard or harmonic evolution of local landscapes and biodiversity, as witnessed in the Swiss case. Educational programs open to locals and visitors, on farming and cuisine-related issues are organised by the cooperative managing the VC in Austria.

Another type of public good characterises explicitly the Hungarian case study on agroecological knowledge. In this VC, trainings and physical events on "sustainable livelihoods" are organised with the aim of spreading knowledge about sustainability and resilience, but also wellbeing. These activities represent a direct contribution to awareness, knowledge and social cohesion around the needs for an agroecological transition, which are in themselves public goods, and that are, in this case, at the very core of the initiative. In the words of Blackstock et al., 2021 p.28), this VC is described as "*relevant for land use, saving and creating environmental and community values, it is an excellent example of how a conscious and powerful community can create and spread knowledge about resilience and sustainability" (see also Blackstock et al., 2022, p.125)*

4.1.4. Trade-offs, challenges and solutions

Trade-offs and challenges

The last elements of Cluster S analysis regard trade-offs and challenges emerging in relation to the capability of the VCs to provide these public goods as well as to fully display their performance potential.

As anticipated in a previous section, during the in-depth analysis at the Cluster workshop, participants were asked to contribute to a participatory prioritisation of the main challenges for the future of the VCs, as resulted from an analysis carried out with the involvement of all clusters' representatives the day before, and to the identification and prioritisation of the related possible solutions. Results are visible in part B of Figure 6, where depopulation, with consequent loss of human capital and skilled labour force, and low inclusiveness were confirmed as relevant challenges.

The debate also highlighted two other key challenges for the VCs in relation to the Cluster S objectives: i) the fact that links and networks are often based on personal relations and/or business interest rather than collective endeavours and commitments, and ii) a general difficulty to collaborate due to lack of time, different interests, mistrust, cultural habits.

Solutions

Some possible solutions for addressing the set of challenges have been identified.in strengthening the collaboration among VCs actors, which entails working for a change in both individual and collective attitude, thought, for example, promoting an active role for local innovation brokers who can act as facilitators of collective action. The development of personal leadership capacities was also indicated (although marked with low priority). This element can be very relevant in some contexts but can hardly lead to a general recommendation.

Though not displayed in the sheet, a last important element was identified and discussed, which looks like a pre-condition for inclusive territorial development. Territorial actors with a role on planning, managing, representing local issues should be capable of – and committed to - listening to local communities, to identify socially agreed and territory-tailored solutions.

The discussion also pointed out two interesting trade-offs that do not emerge only from the observation to the specific Cluster S objectives (to recall them shortly: collaboration-networking and inclusiveness), but rather considering the broader relations between those objectives and the need/aim for economic sustainability and profitability.

First, a possible tension between VCs profitability and local control on the VCs development and reliance of local resources has been identified. Agri-food centred networks can connect with other sectors and networks (for instance tourism) offering opportunities for higher profitability but potentially unrespectful of cultural specificity and long-term sustainability of the chain. This is for example the case in Scotland, where the whisky VC is interlinked with local tourism, in a context where distillery visitor centres are the third most visited attraction in the country (D2.4 p.81). In the Cretan case, carob processors and traders are in other areas outside the island, as it is not possible to perform this activity locally. In the Portuguese VC, the option to rely upon Spanish milk for cheese production can get into conflict with the PDO protocol, but also with the reliance on local milk.

Another possible trade-off between profitability and production of public goods has been mentioned in the Cretan case, regarding the choice between moving to publicly supported production and land uses (e.g., olive oil but also reforestation in the specific case) and safeguarding minor traditional products (carobs) and the consequent diversification of produce and practices and protection of biodiversity.

Finally, the capability of mountain VCs to contribute to the social fabric of the area, strengthening the web of networks at the territorial level is certainly regarded as a key aspect of these VC's performances, and it is generally confirmed by the analysis. Traditional individualistic habits, low trust in cooperation and lack of time and resources hamper, in some but not all the cases, the development of strong local networks that could strengthen the development of the VCs themselves. Possible solutions look at the role of the brokers, and at the capability of key actors to listen to the VCs actors, and more generally to local communities. Mountain VCs would benefit of such solutions, but can also be part of them, through their participation to collective initiatives.

Less clear, but potentially important, is the impact of selected VCs on inclusiveness of specific social groups. The loss of young people, seen both as workforce and consumers, but also as the key for the survival of local communities are challenges that VCs face for their survival. Again, at the same time, VCs can be part of the solutions to those challenges by providing job opportunities, reinforce connections around common value, strengthening territorial identities, and thus contribute to improving the living conditions of local communities.

4.2. Cluster V

Cluster V deals with Value and quality production chains. Value Chains (VC) considered within this cluster focus on quality schemes, encompassing geographical indications (GIs), organic production and other specific certification schemes or standards (e.g. OQT Mountain product or products from Protected areas, National standards on ecological tourism). Quality schemes, defined by EU regulatory frameworks or by National/private standards should always be certified by third parties. They are considered crucial tools contributing to the development and the economic, environmental and social sustainability of mountain areas, as well as to the competitiveness of EU food and drinks on local and global markets. Nevertheless, the scope of each quality certification scheme focuses either on the area of production, on traditional recipes or, in a broader sense, on production method. Therefore, their contribution to sustainability and resilience varies.

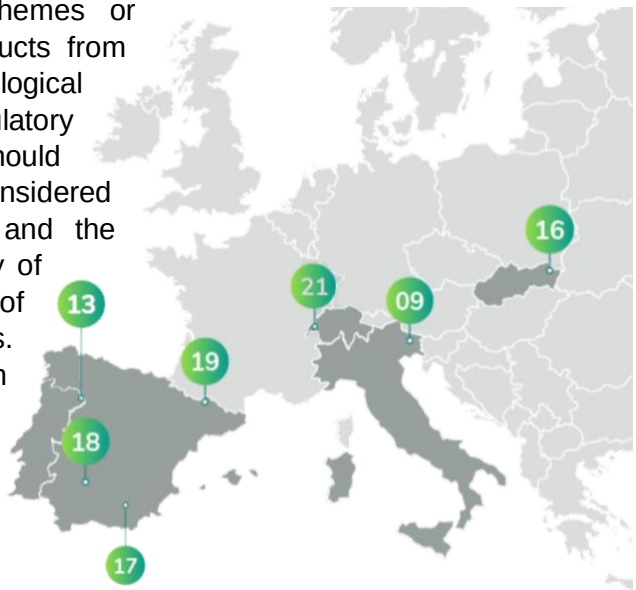


Figure 7 Cluster V - Reference Regions and Value Chains

The value chains directly involved in the cluster are the following:

Nº	Mountain Region	Value Chain	Country
09	Eastern Alps	Trento DOC wine	Italy
13	Maciço Noroeste	Douro wine	Portugal
16	Slovak Carpathian Mountains	Bio Honey	Slovakia
17	Betic Systems	Organic Mountain Olive Oil	Spain
18	Sierra Morena	Iberico ham PDO - Los Pedroches	Spain
19	Spanish Pyrenees	Mountain wine	Spain
21	Swiss Jura	Tête de Moine PDO cheese	Switzerland

The analysis of the VCs included in Cluster V was based on the findings collected and elaborated in the deliverable D4.3 (Blackstock et al., 2022). These were also interpreted through inputs provided by existing literature sources. For each of these VCs, Cluster V analysed their performances in terms of contribution to the sustainability and resilience of their regions through the fulfilment of the set of common objectives developed for all clusters included in WP5 (see MOVING's 7 specific objectives page 7). Specifically, each of these objectives was assessed through indicators (further detailed in the next paragraph) tailored to the cluster and to the specificity of the VCs.

Moreover, the conclusions drawn from the study of the above-listed VCs were further tested and discussed with other VCs based on quality products (Taleggio PDO cheese and other derived dairy products) and belonging to other clusters (e.g. PDO Queijo Serra da Estrela, Portugal; PDO Sjenica lamb, Serbia; Speyside malt whisky, Scotland; PDO Tête de Moine cheese, Switzerland) participating in the cluster workshop.

4.2.1. Indicators and Benchmarking

The indicators identified for the Cluster V relevant objectives and the performance for each VC studied are displayed in Table 5.

Despite the efforts to look for quantitative data, the aspects under observation were interpreted mainly through qualitative data analysis.

Each indicator has been measured through a Likert scale with numerical rating options from 1 to 3. Here, 3 represents a high or positive performance of the indicator, and 1 illustrates a low or negative evaluation.

Two indicators present a different interpretation of the numerical ratings:

1. The indicator "Bargain power distribution", used to measure the contribution of the VC to the "cooperation" objective, where 1 stands for low, 2 for medium and 3 for high.
2. The indicator "Interactions with other VCs", used to measure the contribution to the "cooperation" objective, where 1 stands for competition with other VCs, 2 for coexistence and 3 for strengthening.

Where no data were available, it has been indicated as "NA" (not available).

Table 5 Cluster V Indicators

Objectives	Indicators	Organic Mountain Olive Oil	Iberico Ham PDO	Tête de Moine PDO Cheese	Mountain Wine	Douro Wine	Bio-Honey	Trento Doc Wine
Cooper-ation	Bargain power distribution	2	2	2	3	1	3	3
	Collective organisations	2	3	2	3	1	2	3
	Collaborative engagement	2	3	3	3	3	3	3

	Enogastro-nomic initiatives	2	3	3	2	2	1	3
	Interactions with other VCs	3	3	1	3	2	2	3
	Product diversification	3	1	NA	3	3	3	2
Human capital	**Qualitative & traditional practices**	2	3	3	2	2	3	2
	Education & training	3	3	2	2	2	3	3
Sustain-able use of local assets	**Resource exploitation quality**	3	3	3	2	2	3	2
	Ecosystem biodiversity	2	2	2	3	2	3	2
	Genetic biodiversity	2	2	3	3	3	3	2
	Soil fertility preservation	3	2	2	2	2	NA	2
	Mitigate/reduce water and air pollution	2	2	1	1	2	3	2
Attractive-ness & Wellbeing	**Touristic initiatives**	3	3	3	3	3	1	3
	Protection of landscape	3	3	3	3	3	3	3
	Economic spill-over	3	3	3	2	2	3	3
	Price premium	2	3	3	2	2	2	3
	Reduction abuse & imitation	3	2	3	2	2	2	2
	Identification	3	3	3	3	1	3	3

VCs from Cluster V showed that thanks to their multidimensional link to the territory, quality products may have positive effects on rural development dynamics, creating spillover effects on the local economy and contributing to the protection of landscapes, natural resources and cultural heritage, as reported in literature (Arfini, 2005).

The recognition of origin or quality products or specific production methods through a quality scheme allows the market to remunerate producers, through the price mechanism generating an added value that is redistributed along the value chain and fixed and linked to the territory, keeping local production systems alive, especially those based on small and medium enterprises, and located in marginal areas (Bérard and Marchenay 2004; Barham and Sylvander 2011), where the farming sector accounts for a significant part of the economy and production costs are high.

In this way, quality schemes can contribute to safeguarding employment and SMEs, ensuring attractiveness of rural areas as places to live and work.

VCs from Cluster V also confirmed that quality schemes may contribute to biodiversity conservation either directly, for example using a specific genetic resource, e.g. the planting of new varieties or the recovery of native varieties for wines, or indirectly, through production and management practices that include landscape and ecosystem services, like extensive pastures or the ecological infrastructures within organic farms.

Besides, the VCs give evidence of how quality schemes are an important tool of territorial marketing, since product's reputation is reflected on the territories of origin with an evident gain in terms of visibility and cultural and touristic attractiveness for regions, thus generating important opportunities to other rural sectors and activities contributing to the diversification of the rural economy.

A feeling of identity and belonging is often inherent in quality products, contributing to the valorisation of rural identity. This applies for producers as well as for consumers who establish solidarity links with the cultural identity of the territories where these products originate, as well as experiential connections after visiting and enjoying the area.

However, despite the positive impact outlined so far, these VCs highlight that some quality systems still underperform when it comes to environmental and socio-economic resilience and sustainability. Even if GI quality schemes cannot be considered environmental tools per se, they can potentially play a positive role in environmental conservation, providing the opportunity for territorialisation of environmentally friendly production rules, considering the multiplicity of local specific resources (Belletti et al. 2015).

Nevertheless, the cost/benefit ratio can be very different depending on the type of product and the sectors and to enter a quality scheme already implies additional efforts and costs that are acceptable for the producers only if the economic value of the product is paying them back, making a difference compared to non-certified products.

This especially depends on the society's (consumers, citizens, public institutions, etc.) ability to recognise the values connected to the product and the reasons for its differentiated quality, which is still an issue (Special Eurobarometer 473).

The analysis of the indicators, particularly, drew the attention on some failure and success factors in each VC allowing to identify some challenges and trade-offs:

- **Challenge to balance bargaining power distribution and enhance the inclusion of the actors in the VC**. As a matter of fact, all the VCs examined **showed a very good level of cooperation** among the actors participating in the VC, some better than others. This happens thanks to several forms of organisation, for example being part of a producer group, or a cooperative or an interprofessional body and also thanks to the cooperation and coordination with other actors of the territory that are involved to some extent in the VC, contributing to it and its development, such as consultancies or research bodies helping developing new practices, or other types of public and private actors (municipalities, local/regional governments or associations). However**, asymmetrical relations between actors may develop,** creating power imbalances and mistrust that may affect the possibility of VC development and evolution.
  The Jamón ibérico Los Pedroches PDO VC, for example, showed an imbalance of power between COVAP cooperative (one of the biggest cooperatives in Spain) and

little firms not associated. COVAP owns the only slaughterhouse in Los Pedroches territory. Iberian pig slaughter is a non-profitable service, as it only works 9 weeks a year and can't be used for other animals. Nevertheless, it gives the cooperative the power to control the production line in the territory by limiting the offer of Iberian hams (PDO Los Pedroches) and controlling prices. Therefore, little firms that are not members of the cooperative have more difficulties completing the process and obtaining proper revenues, and as a consequence, limiting the PDO from evolving and growing as a common brand.

On the same note, in the Douro Wine VC, cooperativism, which has a long tradition in the region, has been losing importance, often because of poor management. As grape production is characterised by many small-scale producers with no own processing facilities, they have no alternative other than selling the grapes to cooperatives or to private wine-making companies. In such process, apart from some cooperatives, small producers have a very limited power on the definition of grape price, leading to an increasing asymmetry between large and small producers.

Tête de Moine VC offered a different example, as well as a good governance model able to mediate conflicts and improve cooperation. These VC is made up of nine cheese dairies and two refiners, which are part of the two largest cheese dairies. Refining requires significant infrastructure and investment which implies an imbalance of power between the two large cheese dairies and the smaller producers depending on them. In fact, the two largest facilities gather most of the cheese for the ripening, and are the two only official ripeners, being then the bottleneck of the supply chain. In an industry where every processor knows and monitors the others and where the introduction of competition between them by the downstream distribution is a gateway to the personalisation of conflict, this VC emphasised the importance of having a structure like the *Interprofession* soothing the tension. A PDO structure having a single final voice for production and processing and being responsible for the volume allocation seems essential to prevent worsening of the balance of power.

- **Challenge to avoid the competition for resources with other** VCs at farm or landscape level **transforming it into cooperation** towards the **strengthening of the VC**. The first is the case of Jamón ibérico Los Pedroches PDO. The PDO Los Pedroches is the most recent quality certification for Iberian ham. This means that the territory of Los Pedroches region was used for producing the pigs for previously established PDOs. This is still the case since many hams leave the territory to be cured under the certifications of other PDOs, meaning that all the natural resources, infrastructures and traditional knowledge associated with the production stage of Iberico ham PDO Los Pedroches are also used for pigs that are processed outside. This represents a challenge for the PDO to grow in the territory and gain affiliations. Additionally, this leads to competition with "Iberico ham" a non-differentiated brand, taking advantage of PDO's reputation.

  A different situation takes place with Tête de Moine, where a co-presence with other VCs leads to their mutual strengthening, also thanks to the **solid interprofessional system**. As a matter of fact, the Tête de Moine and the Gruyère PDO value chains are **complementary productions** and collaboration between the two often happens. Tête de Moine production area is included in the larger Gruyère PDO production area. This is an advantage for the local producers as they can sell the milk for one cheese making or the other, in function of market trends. Indeed, Gruyère is produced with summer and spring milk, which does not fit well with Tête de Moine, a "winter cheese" that is

not very mature (2.5 to 4 months vs. at least 5 months for Gruyère). Thus, Gruyère PDO is a very complementary production to the Tête de Moine, with selling prices for milk close to those of the Tête de Moine (between 0.75 and 1 euro per litre), a similar if slightly stricter specification, and a maturing period that is compatible with the production of summer milk.

- **Challenge to obtain a premium price and avoid dependence from subsidies.** Some VCs showed that the price premium for certified products does not often compensate for the higher production costs, leading to question the actual viability of these certified productions. Since the participation in quality schemes allows to benefit from some Regional/National subsidies, for example in the Rural Development Programmes, in certain cases the availability of subsidies leads to over relay on them rather than exploring alternatives to obtain a fair price or to improve the production method efficiency. In the long term it puts the VC at risk and does not contribute to its improvement.
- **Trade-off between typical landscape protection and pollution**. Viticulture provided an example. The extension of viticulture, including in higher areas, is considered positive for the production of the "typical landscape" that can enhance touristic appeal. But at the same time, depending also on the management system, it risks polluting (due to the use of plant protection products, fertilisers, tractors) areas that were previously preserved and, often, quite fragile. Focusing on soil, for instance, in higher mountain regions it is relatively delicate and unable of retaining substantial quantities of water.
- **Trade-off in the product specification between protecting tradition and standardisation.** If a VC faces market success there is an understandable effort to boost production, with the aim to increase profits. The growth can have place either enlarging the number of producers involved or augmenting the production of the existing ones. But it can also take place through an enlargement of the designation area or loosening the production rules. Both scenarios can jeopardise the long-term sustainability of the VC and undermine the preservation and advancement of the values it started from (and for). The last case may lead to the irrational industrialisation of the VC, impacting small-scale producers, the environment, and the quality of the final products. Vigilance against these risks should not hamper the proper growth potential of the VC.

Further assessment and validation of some of the indicators and the related challenges and trade-offs, have been developed at the Cluster workshop held in Hungary as accounted for in the following.

4.2.2. Cluster workshop analysis

The Cluster workshop allowed to test and validate some of the outcomes of the analysis of the VCs belonging to cluster V and to identify some challenges and perhaps solutions to address them. The conclusions drawn from the analysis of the above-mentioned VCs were further assessed and discussed with the VCs belonging to Cluster V as well as with others based on quality products (e.g. Queijo Serra da Estrela PDO, Sjenica lamb PDO, Speyside malt whisky from Scotland, Taleggio PDO cheese and other derived dairy products), starting from the discussion of the same list of indicators. Particularly, the group discussions held in Budapest,

focused on two objectives and on specific trade-offs and challenges identified during the first part of the research.

The objectives selected for the discussion were **Cooperation** and **Attractiveness and Wellbeing**:

- The cooperation objective was approached from two perspectives. On the one hand, **cooperation inside the value chain** among the different actors that make up the VC and the level of networking and collaboration among them. On the other hand, **cooperation with other economic activities outside the VC, but linked with it**, for example, because they use the same land and the same resources from the territory.
- Attractiveness and Wellbeing was approached as how the VC contributes to the well-being of inhabitants by creating jobs, quality jobs and incomes.

For each of these, the following indicators and the related challenges and trade-offs were discussed:

1. **Cooperation:** the group discussion focused on the **challenge of balancing bargaining power distribution and enhancing the inclusion of the actors in the VC.** Furthermore, attention was drawn to the level of **interactions** with other VCs at farm or landscape levels to understand whether this allows for a **strengthening of the VC, some sort of coexistence or rather a competition for the use of resources**.
2. **Wellbeing:** the group discussion focused on whether the added value of the product remains within the production territory. The debate was centred around the identified challenge of how to avoid dependence on **subsidies.**

Workshop participants confirmed the challenges and trade-offs resulted from the cluster case studies and add on their own experiences and perceptions, further detailing and adding examples in some cases.

The potential of quality schemes for the sustainability and resilience of mountain value chains clearly emerged. Nevertheless, it was made clear how geographic indication-based quality schemes often do not set any restriction or limitation in the production methods that preserve or enhance environmental sustainability. Also, the soon-to-be-approved revision of the regulation of EU Geographical Indications does not directly address the issue of environmental sustainability, allowing only for the inclusion of sustainability requirements on a voluntary basis. Method-based quality schemes, such as organic production, on the contrary, do improve the environmental performance of the value chain, but they do not always cover all the aspects needed (i.e. some aspects of animal welfare and landscape preservation).

Complicating the context of the contribution of quality systems to environmental sustainability, according to workshop participants, are the multiple labels with green claims, rarely based on agreed and defined standards and certification patterns. This very likely results in greenwashing misleading the average consumers, induced to buy such products attracted by lower prices.

The group exchanges during the workshop reflected on the combination of different quality schemes and other regulatory tools as possible solutions to enhance the global sustainability of the VCs. A good example was reported by Tête de Moine, where the PDO may be combined

with national protected areas labels. Specifically, in order for the cheese to also obtain a “Natural Park brand" label, it is required that:

- the raw material comes from the Regional Park (Parc du Doubs or Parc du Chasseral),
- the processing is carried out on its territory,
- the producer commits to fulfilling at least three sustainable development measures from a predefined catalogue (including becoming a member of the Regional Park).

The labelling of a Regional Park product is organised jointly with the regional brands (Doubs, Jura and Jura Bernois).

The combination of organic and PDO quality schemes is also quite common, particularly in wine and olive oil. This happens in areas where productivity is limited by environmental constrains that also contribute to sensorial quality, such as the mountain areas. The three cluster V’s case studies related to wine and the one related to olive oil, include several farmers with both labels.

Furthermore, participants were asked to answer 2 questions:

1. *Which environmental risks are hampering the VC in terms of relevant features of the quality product? Is the production method of the VC hampering the environment? How to mitigate them?*

The answers emphasised the importance of having ecological infrastructures and the support of local administrations and cooperation among actors for the management of specific resources as well as flexibility in the implementation of some rules of the quality scheme.

They also laid stress on the interdependence of certain productions from the environment where they are taking place, such as the importance of oaks for breeding the pigs for the Iberico ham. Old oaks are dying due to age and pathogens and in 2050 it is foreseen to have a reduction of trees that will result in a decrease in the number of pigs. Since oaks grow slowly, there’s the urgency to start planting new trees now.

Water availability is a shared concern, that impacts all VCs, as well as soil fertility maintenance. High temperatures may as well change sensorial features of products like wine or olive oil.

A horizontal concern is the building up and passage on knowledge from one generation to another. Only a community deciding to keep living in the mountains can grant such an essential element. Technological transformation can support the knowledge preservation and also its evolution and implementation, but in any case, also digital tools need humans to be used.

2. *How is the quality scheme supporting the resilience of the region?*

Tête de Moine PDO cheese laid stress on the pivotal role of cultural and historical heritage connected to the product. The Swiss Alps' economy and society revolve around cheese production, which is strongly linked to the management of the territory and the landscape. Events to commemorate the history of the production and its territory not only attract tourists but also make farmers and all inhabitants of the area proud of their contribution to this VC.

PDO Olive oil from the Betic system recalled the good level of cooperation among associations and municipalities in the area, which contributes to *ecotourism* activities connected with olive oil production, thus allowing for the creation of new jobs and synergies with other VCs in the area.

The rediscovering and revalorisation of an ancient traditional product might also represent a strategy to contribute to the resilience of the mountain area. This is the case of the Taleggio valley, an Alpine valley in the Italian region of Lombardy (IT) well renowned for the PDO cheese Taleggio. This PDO cheese progressively got a positive reputation that led to a high market request. Such a high demand and the good price offered attracted big companies that started to produce the cheese in the PDO area but on another scale and with different techniques (producing much less positive environmental and social effects). The economic competition became impossible for small-scale farmers until a group of small farmers and processors started the production of an ancient type of cheese, typical in the area as well, the "*strachitunt*". The retro-innovative cheese obtained through much more restrictive standards, linked to the mountain territory, is recognised as PDO (Strachitunt PDO), which not only distinguishes it from Taleggio (it is a different type of cheese) but also acknowledges the whole values, including its placement in an Alpine valley. Ecotourism developed as well in the valley linked to this production thanks to the creation of a museum of the nomadic shepherds. This attracted young people coming from big cities of the regions who also decided to start work in the mountains.

As a common feature for the resilience of the VC and the proactivity on the territory, it was acknowledged as key to the level of governance of the quality schemes and the participation and commitment of the actors involved in it. Good governance and broad commitment are essential not only at the starting phase of the quality scheme implementation but should be actively maintained along its development and when it is established and working.

4.2.3. Public goods delivered

The **public goods** that quality value chains can offer include the preservation of landscape (for example through pasture and fodder growing for the production of cheese, or steep vineyards), the safeguard of soil fertility, biodiversity (both in terms of grown varieties/ecotypes, breeds and environmental biodiversity, like soil microbial species), water and air quality, rural vitality and, what was identified as most important, the vitality of the community. Successful quality VCs have a positive economic impact on the territory and the diversification of rural activities, translating in the possibility of better living conditions for local population and the consequent possibility to invest in the VC itself but also in related activities, such as tourism.

4.2.4. Trade-offs, challenges and solutions

Challenges:

1. Communication and valorisation of the whole values underpinned by the quality schemes

Communicating the "whole" value**,** material and immaterial, underpinned by the quality schemes clearly emerged as a challenge. "Quality" should not be perceived solely as a

sensorial attribute of a product or a singular quality feature, such as its origin or the specific breed involved. It extends to encompass a range of public goods delivered by these productions (biodiversity, clean water and air, landscape preservation...) and it involves their production method, the associated know-how and traditions, as well as the additional efforts and costs borne by producers to meet quality scheme requirements.

However, some management choices (e.g. pasture based rearing systems versus conventional husbandry, wines produced from hand picking grapes versus machine harvested productions...) and their impact on the sustainability and authenticity of the production process, or how they impact local communities and environment, are not simple to communicate to consumers and, consequently, hard to be adequately valorised and translated into fair prices paying producers back for the commitment to quality.

At the same time, it is difficult to explain to producers what benefits they can gain from participating in a quality system if their efforts are not recognised by consumers, resulting in costs higher than possible gains. Consequently, many producers decide not to certify the product, even if it complies with the criteria for certification, thus bearing less production costs and selling the product at lower prices to guarantee a minimum economic return. This leads to a situation of unfair competition for the protected productions because similar non-certified products originating in the same area exploit their reputation, causing product devaluation.

The reason is linked to the weak communication and understanding of the benefits of the quality scheme to the VC, both on producers' side (those who decided to stay out of the scheme and certification process but taking advantage of it) and consumers'.

The bureaucratic burden of certification, for some VCs is also to be considered.

2. Governance and power distribution along the VC

Bargaining power distribution refers to the capacity of one party to influence another, to exert some kind of pressure on the other, or the ability in our specific case to derive greater benefits that are not redistributed equally across the territory and the actors. It is a strategic point for the success of VCs and, at the same time, inclusion.

The form of organisation that provides the governance of the VC broadly vary from producers' group to cooperatives or interprofessional bodies. Whatever the governing body, a key feature should be the capacity to continuously interact with other actors of the territory that are involved to some extent in the VC, contributing to it and its development, such as universities or innovation brokers, or other types of public and private actors (municipalities, local/regional governments, or associations).

Large cooperatives of producers, often of small-scale producers, can be an excellent governing body but there are cases where this structure may lead to imbalance bargaining power and non-inclusive relationships. For example, cooperatives may have more power over little firms not associated, even if belonging to the same VC or quality production (i.e. Los Pedroches PDO Iberico Ham). Other cases report a lack of trust in the collective organisation due to low level of organisation and coordination and poor management, thus creating power imbalances and mistrust that may affect or limit the possibility of VC development and evolution. More frequent are the cases of power imbalances along the production chain with a clear major power towards the final steps actors (i.e. Portuguese wine case).

The mentioned challenge can be tackled with a robust structure of the producer group that often is very active in the early stages of quality scheme definition but progressively loses interaction and internal dynamics after the recognition or when generational renewal takes place. This social development is also affecting the innovation process, often based on individual initiatives, and the standards update and development, needed as climate change is impacting production but also because positive new techniques and tools become available. A broad continuous involvement of actors in standards/specifications definition would also have a positive impact on trust and community identification.

At the same time a fair and transparent profit sharing would be an essential element for long term cooperation within the VC.

The main trade-off identified is that the success of the VC attracts industrial firms and lead to the risk of losing traditional production methods and create a distance from the initial values of the product**.**

VCs that obtain a good success in terms of reputation of the products and of the area, resulting in good prices and market opportunities for the products, are pushed to enhance the quantity produced and to intensify the production methods. If not properly managed, this risks to lead to a negative industrialisation of the processes that hampers the sustainable use of local resources and, in the long term, may put at risk the reputation of the product and of the area, with negative impact also on tourism, for example.

A similar development path, negative for the sustainability and resilience of the VC and the local community, takes place when the push to increase the amount produced and decrease production costs leads to importing the main ingredients (i.e. milk) from other areas, where also the production methods are different.

It does not mean that quality products should not innovate or aim at higher efficiency, but a proper balance between economic gains and values of the product and its production impacts on the environment and the local community should be thoroughly considered. To safeguard the authenticity of VC should not be interpreted as “no changes” and only “small scale operations” but all the values and impacts should be weighted and considered.

It can be interesting to compare the different development of small-scale vine-growing in Trentino (IT) and in Higher Douro (PT). In the Italian case small producers are considered key for quality management and their cooperation or collective effort is supported by local policies and paid by the premium products. Therefore, small scale farming often with mixed productions, also including touristic services, manages to be economically sustainable, attracting young farmers and maintaining a demographic balance. In the Portuguese VC small producers seldom manage to have a cooperative structure, while in the majority of cases large companies took over and became the main actor in grape and wine production. This development negatively impacted local population dynamics.

On the other hand, also a rigid, too strict and not dynamic interpretation of original values and traditional practices risks losing economic sustainability and hamper the whole sustainability of the VC.

Solutions

"Behind a quality value chain there is a quality community".

The sentence above, captured during the Cluster workshop, effectively synthetises the core (and probably only) solution to several of the challenges identified. It means that **a** robust and continuous commitment of the producers' group, supported by the involvement of other actors of the community, like local authorities, advisers, researchers and civil society, is needed for the management and continuous development of the value chain. A continuous, participatory and dynamic development of quality schemes standards, for example through skilled facilitators and a strong governing body of the quality scheme (i.e. GI consortia) have shown to be essential (i.e. Tête de Moine or Trentino cases).

In order to enhance the delivery of ecosystem services and to protect local natural resources, while at the same time putting them at value, a combination of quality schemes (i.e. PDO/PGI + organic + mountain product) and interaction with other territorial regulatory tools (i.e. Natural protected areas regulation) could be experimented (i.e. example of several PDO and organic wines).

The Optional Quality Term (OQT) Mountain Product can be an additional element of qualification, providing it does not require extra efforts in terms of work and costs and its use is properly restricted to products completely linked to mountain areas.

Reducing the bureaucratic burden and costs for small scale producers and a revision of the requirements into force is mandatory. Besides, more innovative methodologies can be tuned, such as collective, participatory or group certification. Specifically for organic schemes, the implementation of group certification (as from EC Reg. 2018/848) should be adapted (as economic limitation and in the required collective trading) to mountain small scale farms and communities. Some experiences with Participatory Guarantee Systems (PGS) suggest it can be an excellent tool for guaranteeing (not certifying) new or small-scale VCs, with multiple benefits also on the community and communication. PGS can also be a starting point for VCs that can further evolve and reach a stage in which they can implement a certification scheme.

The need for more information about the multiple values behind a quality product can be tackled only with continuous information campaigns, starting at local level and reaching distant markets where the products' value may be of interest. Nevertheless, the local dimension is crucial, also to foster the acknowledgement of the identity of the community with the value chain and the product. A long-term communication campaign would also contribute to solve the unfair competition of non- certified products from the same area and from fraudulent products.

4.3. Cluster I

Regions and VCs included in Cluster I analysis are:

Nº	Mountain Region	Value Chain	Country
07	Transdanubian Mountains	Agroecological Knowledge	Hungary
08	Central Apennines	Alto-Molise dairy	Italy
13	Maciço Noroeste	Douro wine	Portugal

20	Swiss Alps	Mountain grain	Switzerland
22	Beydaglari	Greenhouse tomato	Turkey

Figure 8 Cluster I - Reference Regions and Value Chains

Innovation and infrastructure are two very broad topics overlapping with other clusters and being part of over five of the seven defined objectives: Human Capital, Attractiveness & wellbeing, Cooperation & synergies, Ecological resilience and Adaptive capacity. Within Cluster I indicators of innovation, infrastructure and other enabling factors were developed based on literature and from data of previous Work packages. The indicators of innovation, infrastructure and other enabling factors were based on data from previous work packages. The data were transformed from their original form into interval data on a scale of 1 to 3 to facilitate interpretation and comparison. This was done by assessing the fulfilment of an indicator along the different stages (production, processing, distribution & marketing, consumption) of the value chain, resulting in a scale from 1 (not fulfilled at any stage of the VC) to 3 (fulfilled at all stages of the VC). For example, if knowledge advisors were available at three of the four stages of the supply chain, the VC would receive a score of 2.5 for this indicator. In the analysis, we divided infrastructure and innovation and provided indicators for both groups.

Furthermore, we conducted interviews with two experts to gain more information on digital innovation and social innovation. The case study, indicator, and interview analysis served as preparation for the cluster workshop, where we aimed to collect challenges and success examples from stakeholders and partners.

4.3.1. Indicators and Benchmarking

Indicators and enabling factors for infrastructure and innovation are shown in the following sections.

Indicators of infrastructure and enabling factors for innovation

We identified seven indicators for infrastructure and enabling factors for innovation. We chose two indicators of infrastructure that were available in the database and that are particularly relevant in the context of innovation. Based on the interview about the DESIRA project and literature (Ievoli et al., 2019) we defined digital infrastructure as a key infrastructure characteristic.

Innovation in rural areas might be promoted by increasing knowledge and the availability of training and skills in the region (Bosworth et al., 2020; Esparcia, 2014; Singh & Bhowmick, 2015). As availability of financial resources is a major promoting factor for innovation (Esparcia, 2014; Ludvig et al., 2018), we included access to capital and average wage as enabling factors. Although there are mixed findings on to the impact of natural resources on innovation (Chen et al., 2020; Gamito et al., 2021), we assumed that the access to natural resources is a key requirement for innovations. Furthermore, we included the availability of

collective action institutions as a relevant indicator for structures that promote collaboration and networks.

Table 6 Cluster I indicators results

Objectives	Indicators	Agroeco. Knowledge	Alto-Molise dairy	Douro Wine	Mountain Grain	Green-house Tomato
Human Capital	Skills & training	1.5	1.5	2	2	2
	Knowledge	1.5	2.5	2	2.5	1.5
Attractivenes s & wellbeing	Access to capital	1.5	1	2.5	1.5	3
	Average Wage	NA	2	2.5	2.5	3
Ecological resilience	Accessibility natural resources	1	2.5	1.5	2.5	2.5
Cooperation & synergies	Digital infrastructure	1.5	3	3	2	3
	Collective action institutions	1.5	2.5	1.5	1.5	2
Ecological resilience	Ecological innovations	1.5	1.5	2	1	1
Adaptive capacity	Use of digital technologies	3	2	3	3	1
	New products	3	3	3	2.5	3

Most VCs scored medium to high on the enabling factor indicators (Table 6). Only one case study scored an average of less than two points, indicating that the enabling factors in that VC were rather poor. The remaining VCs achieved medium average scores between three and four points. These VCs therefore seem to already have a rather innovation-friendly environment. Across the different VCs the indicators skills and trainings and collective action institutions had mostly low values. Average wage and digital infrastructure were generally high. The scores varied widely between the different objectives and value chains. The Central Apennines Dairy case achieved particularly high scores for the cooperation and synergies objective. Similarly, the Portuguese Douro Wine and the Turkish Tomatoes chains achieved high scores for the financial indicators in the objective of Attractiveness & wellbeing. The Hungarian Agroecological knowledge scored low on all indicators covering the objectives of human capital, attractiveness & well-being, ecological resilience and cooperation & synergies.

We identified **three indicators for innovation**. As indicators of innovation, we selected the number ecological innovations, the use of digital technologies and the number of new products along the value chains. All VCs reached high values for new products indicating that innovations took place along the whole value chains (Table 6). Also, digital technologies were widely used in most cases. Less innovation took place in the field of developing new processes, markets and distribution systems for ecological innovations. Almost all VC scored

medium to high on the innovation indicators. In terms of objectives, scores were very high for the objective of adaptive capacity and rather low for ecological resilience.

If we compare the average values of the enabling factors and infrastructure with the indicators of innovation, we might see some cases where a highly enabling environment and high innovation rate is found, e.g. the Portuguese Douro Wine. In other cases, innovation was low even with a good enabling environment, e.g. Turkish Tomatoes. In contrast, the Hungarian case study had a low value for promoting factors and a high score for innovations. Only in two cases the innovation seems to reflect the quality of enabling factors. This comparison shows that each case study is unique, and the few promoting factors included here are not sufficient to explain differences in innovation rates. Interestingly the VC with very low accessibility of natural resources scored best in terms of innovations, which would go in line with the negative correlation between natural resources and innovation capabilities found by Chen et al. (2020).

4.3.2. Interviews

Cluster I decided to conduct two expert interviews, one with María Alonso Roldán, Project Researcher Specialist at the University of Córdoba, focused on digital innovation and digitalisation in rural areas from the Project DESIRA. The other interviewed partner, Lukáš Zagata, Associate Professor at the Czech University of Life Sciences Prague, did research on social innovation and retro-innovation, e.g. in Zagata et al. (2020).

Summary of the interview on digital innovation and digitalisation

The DESIRA project focused on digitalisation in agriculture, forestry, and rural areas in general. In these three areas challenges and benefits of digitalisation were identified, with a focus on digital innovation. They identified three parts for digitalisation: infrastructure, skills and training, and digital trust. Innovation policies and fundings must include rural areas with strategies adapted and specifically address rural areas. There is a need for enablers that support innovation, e.g. digital brokers, digital enablers, innovation enablers, as well as people who can support these processes. Technology and digitalisation shouldn't be promoted just because the tools are there but should really solve a problem and help society. The first step, however, is to improve the digital infrastructure in rural areas: Improve and provide high-quality infrastructure for connectivity, also to support Agriculture 4.0, and to share data.

Many factors need to be in place for digital innovation: good infrastructure, good skills, good education, education for digital skills, tailored programmes for rural areas. Digitalisation in Europe is measured by the DESI-Index (Digital economy and society index). It considers four dimensions: human capital, connectivity, integration of digital technologies, and digital public services. This index should be adapted for rural areas, which can be challenging, e.g. rural areas have specific types of businesses that need to be considered, e.g. farms run by a single person. These businesses have a strong need for digitalisation and shouldn't be left out.

Enabling innovation should be public and private, both sides. It is also important to form groups, communities or cooperatives to make it more affordable, e.g. buying new machinery is cheaper for a group of people.

The DESIRA project developed policy roadmaps, with pathways towards inclusive and sustainable rural digitalisation, with one specific pathway to promote innovation and digital ecosystems in rural areas.

Summary of the interview on social innovation and retro-innovation:
In his research, Lukáš identified various types of innovation, with a particular focus on social and technological innovations. Retro-innovations, which are primarily identified as social innovations that involve rethinking and revitalising ideas, processes, or technologies from the past and use them in a new way. These innovations require specific definitions and the identification of innovative processes, according to Lukáš. Criteria for retro-innovation include reflexivity, reminiscence, revival, and integration and learning. Social movements, such as the organic movement in the Czech Republic, where social issues are addressed, are integral to retro-innovation. Digitalisation is also linked to retro-innovation, emphasising the importance of learning from historical experiences and learn how to use digital technologies in this context.

Furthermore, regime and niches play a crucial role in enabling innovation. The government plays a vital role in protecting niches and fostering innovation, as market forces alone may not be sufficient. Nevertheless, crises and disruptions can sometimes facilitate innovation. For instance, the war in Ukraine, which was a major crisis and disruption, forced the EU to foster renewable energies. However, market demand is still important for innovations to last long, focusing on both farm level and consumer acceptance. Innovation can occur at all stages of the value chain. Infrastructure, including internet access and roads, is essential.
However, the high costs for infrastructure require innovative thinking. Therefore, innovation and the indicators are dependent on their context, with sustainability as key for all innovations. Lukáš mentioned that overall barriers to innovation can be the high costs, resistance from regimes, and lack of interaction and collaboration.

4.3.3. Cluster workshop analysis

Not all VCs from cluster I were represented at the Cluster workshop. The following VCs were represented at the Cluster workshop: 07. Transdanubian Mountains (Hungary)– Agroecological Knowledge; 08. Central Apennines (Italy) – Alto-Molise Dairy; 20. Swiaa Alps (Switzerland) – Mountain grain and 22. Beydaglari (Turkey) – Greenhouse Tomato

The objective was for the participants to share experiences and ideas, identify challenges and be inspired by the opportunities and examples of others. Additionally, the cluster leader aimed to identify innovation and infrastructure promoters and explore the contribution of local VC to sustainable development within innovation and infrastructure. The workshop format included an introductory session, followed by a flipchart exercise to collect initial thoughts on infrastructure and a brief presentation on infrastructure. The main part of the workshop involved group discussions on infrastructure and innovation guided by questions and examples along the VC steps (production, processing, transport, distribution & retail, and consumption). In the following sections, the analysis done by the cluster leader with key messages, starting with infrastructure and followed by innovation, are described.

The discussion focused on the importance of infrastructure as a key enabling factor, with the internet, transportation, and facilities being identified as the most important aspects. The access to internet as communication tool has become indispensable in European society, particularly in mountainous and rural areas where connectivity is crucial. Efficient and uncomplicated transportation of goods and people require well-working roads and railways. Facilities such as processing plants, shops, and housing or social facilities are also important. When examining infrastructure with the local stakeholders and partners, connectivity emerged as the primary topic for infrastructure.

The discussion on innovation could not be entirely separated from infrastructure. Therefore, some key messages from innovation are linked to infrastructure. For instance, the need for digitalisation in mountain areas was underscored by the demand for small-scale technologies, including sensors for plant health and animal control. However, concerns were raised about the high cost of certain digital tools, such as drones, which act as a barrier for farmers to use them. The participants acknowledged that digitalisation is an important tool for innovation in mountain areas, but not the main driver for it.

Education and knowledge sharing played a crucial role in the discussion. Participants agreed on the need for farmer training programs that focus on regenerative, sustainable, and extensive agriculture practices specifically for mountain areas. To raise awareness among all actors, education emerged as key factor. Participants highlighted the need for consumer education to enhance awareness about the origin and qualities of the products they consume. One significant challenge identified was the lack of networks and knowledge sharing, which contributes to a low level of interconnectedness in mountain areas. The missing integration of actors in retail was recognised as a problem. To address these challenges, participants discussed the importance of establishing direct contact between producers and consumers, promoting direct marketing, and encouraging non-cooperative marketing initiatives. The importance of increased awareness and knowledge about local producers and farmers, was emphasised, along with the need to foster relationships between them and consumers. This can be achieved through initiatives such as Community Supported Agriculture (CSA). Additionally, the role of restaurants in purchasing local food was recognised as a positive step in supporting local producers. To better connect producers and consumers, that new marketing technologies, including internet marketing, be embraced.

Knowledge sharing has been identified as a powerful mechanism for bridging the gap between producers and consumers, fostering a deeper understanding of the value chain. To achieve effective knowledge sharing, it was proposed to either re-use or develop new innovative approaches for mountain areas, using traditional techniques or infrastructure. For example, in Italy excursions with a focus on historical and cultural elements were promoted combined with visits to local producers, to offer consumers a holistic experience and a well-established storytelling.

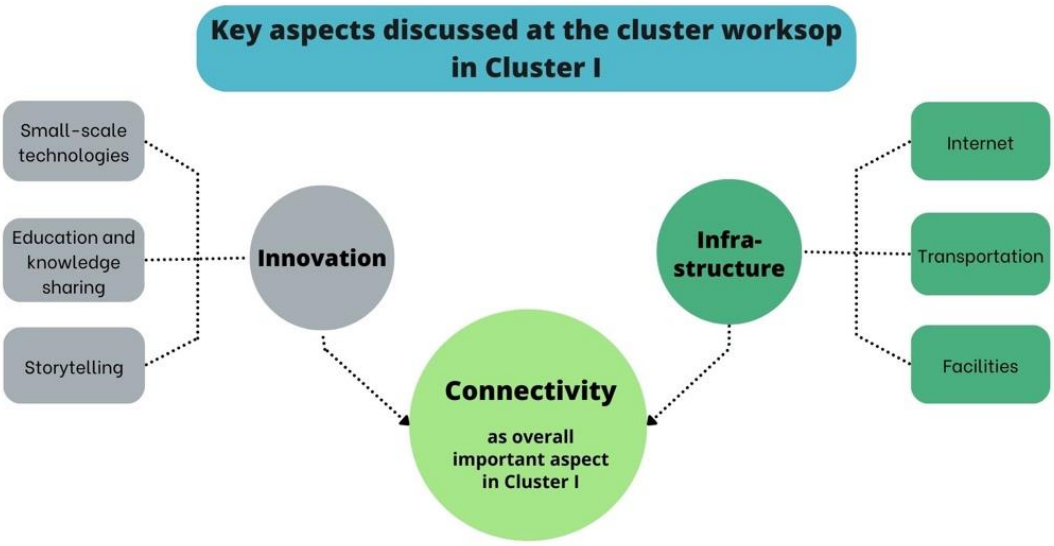


Figure 9 Overall key aspects identified and discussed at the cluster workshop for Cluster I.

4.3.4. Public goods delivered

By analysing all the results from Cluster I, we identified three public goods delivered by the VCs for infrastructure and innovation: Financial and Human Capital, Education, and Connectivity.

Capital refers to both financial and human resources. Access to financial capital and support is fundamental to creating an enabling environment for start-ups and businesses. Economic stability and good income levels also contribute to the attractiveness of a region for investment and entrepreneurship. Human capital is important, not only in terms of having enough skilled workers, but also in terms of sharing knowledge, ideas, and motivation.

This leads directly to Education: Education and training play a key role in knowledge sharing and access to advice. These aspects contribute to continuous learning and out-of-the-box thinking, which are crucial for innovation. In this respect, mountain areas are particularly rich in historical and traditional knowledge, and learning from it and incorporating it into new processes is seen as specificity of mountain areas. In this respect, encouraging young people to change, try new things, and embrace innovation sets the stage for the development of a forward-looking community.

This in turn leads to Connectivity: mountain communities need to be able to connect within the community and with the outside world, where building a robust digital infrastructure is important for connectivity and collaboration. Access to the internet and advanced communication networks not only facilitates the efficient exchange of information, but also create a platform for innovation. But it is not only digital infrastructure that is needed, also well-functioning roads, logistics processes, and social facilities are important aspects of connectivity in remote areas. At the same time, creating an attractive living environment is

essential to retain and attract a skilled workforce. Therefore, it is also important to ensure a professional and locally adapted infrastructure, such as processing or storage facilities.

4.3.5. Trade-offs, challenges and solutions

Trade-offs

A critical trade-off arises due to limited financial resources between infrastructure and innovation, requiring a well-founded calculation of investments. Additionally, there appears to be a trade-off between enabling factors and innovation. Innovations often arise in response to challenges, and since mountain areas already face numerous challenges, the potential for innovative solutions is high. This potential should be nurtured by fostering an environment inherently attractive to innovative individuals and conducive to creative approaches.

Challenges

The main challenges identified in Cluster I are social, financial, and infrastructural resources. In terms of social resources, mountain areas lack skilled labour in general and of specific education and training opportunities, especially trainings for mountain farmers. The main financial challenges are related to resource constraints often faced by mountain regions due to the low population densities and limited economic activities. This severely restricts the availability of financial capital to invest in innovative projects and technologies. Infrastructure deficits relate to the lack of digital infrastructure such as poor internet access, physical infrastructure, such as poor transportation systems, and social infrastructure such as limited access to markets, health systems, or other social services.

Solutions

Tailored training programs for farmers, emphasizing mountain-adapted technologies and modern applications of traditional farming practices, will contribute to a future-oriented, digitally literate workforce. Exploiting historical and traditional knowledge not only addresses production challenges but also serves as a powerful tool for attracting tourism and marketing mountain products. Financial support is essential to stimulate innovation and enhance infrastructure. Encouraging projects through subsidies for start-ups and collaborative groups promotes the exploration of mountain-specific practices. Direct financial support for machinery and technologies adapted to mountain conditions increases production and resilience. In addition, improving infrastructure, such as internet access, roads, or schools and education centres, is seen as part of the solution to the infrastructure deficit and helps to make mountain areas more attractive for living and business.

4.4. Cluster N

The analysis of data for Cluster N based on benchmarking of data gathered within WP4 and especially Task T4.3. This approach was used to avoid of repeated questioning of stakeholders and reuse of data already gathered within the MOVING project. However, a limitation was low data availability in two of the Cluster N regions (Stara Planina – Bulgaria and Drome Valley -. France) in previous WPs and especially WP4. Both VCs have not delivered as extended analysis as expected. These data were supplemented by interviews with experts on farming in high nature value areas and ecosystem services providing.

Figure 10 Cluster N - Reference Regions and Value Chains

The following value chains were included in Cluster N analysis:

Nº	Mountain Region	Value Chain	Country
01	Austrian Alps	Lamb from Weiz region	Austria
02	Stara Planina	Public Goods for High Nature Value Farming	Bulgaria
03	Sumava – Cesky Les	Beef production	Czechia
05	Drome Valley	Sheep meat	France
15	Dinaric Mountains	Sjenica lamb PDO	Serbia
20	Swiss Alps	Mountain grain	Switzerland

4.4.1. Indicators and Benchmarking

Selected indicators for the respective objectives of Cluster N are listed in Table 7 including categories and scale used.

Table 7 Results of Cluster N indicators

Objectives	Indicators	Weiz Lamb	HNV Public goods	Beef Production	Sheep Meat	Sjenica Lamb PDO	Mountain Grain
Sustainable use of local assets	Sharing - production	3	NA	1	NA	2	3
	Sharing - processing	3	NA	1	NA	1	1

	Contribution to cultural landscape - production	3	NA	3	NA	3	3
	Contribution to cultural landscape - processing	3	NA	3	NA	1	3
Ecological resilience	Pollution, erosion, waste	1	NA	2	NA	1 to 2*	1 to 2*
	Biodiversity & habitat quality	3	NA	3	NA	3	3
	GHG emissions - production	2	NA	1	NA	2	NA
	GHG emissions - processing	1	NA	2	NA	1	1
Attractiveness & wellbeing	Young people	2	NA	1	1	2	1
	Access resource system	2 to 3*	2 to 3*	1	NA	2 to 3*	2
	Local participation	1 to 2*	NA	1	NA	1	NA

Note: * - “average” from different stages (production, processing, distribution and marketing) of the VC

The first objective for Cluster N is focused on the sustainable use of local assets and particularly on synergies of activities of VC with ecosystem services. For this objective, indicators focused on the sustainable use of local resources, the contribution of VC to the existing cultural landscape and also indicators measuring cooperation among actors were used. Considering the mountain areas with high nature value (e.g. National Parks, protected sites), the interests of different actors (farmers, protected sites, tourists, locals) clash. So, for long-term sustainable utilisation of local assets is, cooperation among actors is necessary. The data show mainly differences between the old EU member or associated states and post-communist states. The higher level of cooperation and sustainable use of local assets in general is within the first mentioned group of states. This result from higher level of trust among actors in these states as is confirmed also by cluster workshop results. On the other hand, sharing between farmers (production stage) is better than at processing stage regardless the regions. The specificity of high nature value mountain areas is in the requirement for providing ecosystem services and also maintaining cultural landscape. These requirements are fulfilled at very good level across the Cluster N regions.

The second objective for Cluster N is focused on ecological resilience of high nature value mountain areas. For this objective were used indicators focused on the influence of VC practices on biodiversity, soil erosion and pollution, air pollution, water pollution and waste and also indicators focused on contribution of these practices to GHG emission both at production and processing stage. The data show that VC practices at the production stage positively influence biodiversity within the areas. However, the production could potentially (in case of improper farming practices) negatively or partly negatively influences GHG emissions, erosion, pollution and waste within the areas. The provided data from regions (see Blackstock et al., 2022) explain this fact by potential overgrazing, adverse effects on air pollution and erosion in case of not suitable farming practices, which sometimes appear. Considering the GHG emission the higher level of negative effects appears at the processing stage compared to production stage. This is also the reason for restrictions on the localisation of processing

stage within the areas of National Parks or protected sites from the side of their representatives.

The third objective for Cluster N is focused on attractiveness and wellbeing to make mountain areas more attractive for inhabitants and visitors. For this objective were used indicators focused on VC employment rate, participation of young people in VC practices, accessibility for local entrepreneurs and local participation in decision making. The data show that the attractiveness and wellbeing of the localities in the cluster are threatened mainly by weak involvement of young people in VC practices at all stages and lack of participation of actors in local decision making. This is valid for all examined high nature value mountain areas. On the other hand, the accessibility for local entrepreneurs is rather high (with exception of one region). It could be evaluated as opportunity for development of these mountain regions.

The complex analysis of data available shows that there is a trade-off between sustainable use of local assets, biodiversity and high nature value of the areas in general at one side and attractivity of the areas for young people and ability or willingness of locals to participation in decisions making on the other hand. This could be result of restriction for production function of agriculture within the high nature value of mountain regions and support of ecosystem services provision. This is also acknowledged by discussion of these issues among local actors at cluster workshops. The data and information gathered at cluster workshops show that provision of public goods in form of maintaining of cultural landscape and ecosystem services could threaten production function of agriculture and thus also attractivity of these areas for young people.

4.4.2. Cluster workshop analysis

The in-depth analysis for Cluster N at the Cluster workshop has been structured based on Guidelines for WP5, indicators analysis results and findings from previous research within MOVING project. Three tasks were discussed during the Cluster workshop:

1. **Climate change:** What are the impacts of global climate change on territorial capital of the MRLs and implications for the VCs? How does global climate change impact the role of High Nature Value farms?
2. **Diverse interests:** How do local actors balance diverse interests in land use (landscape) in mountain regions with respect to conservation - production - consumption of natural assets? What are the barriers and opportunities for the four groups (farmers, protected sites, tourists and locals) to cooperate to achieve their goals?
3. **Vulnerability of actors:** How vulnerable are actors with respect to their role as public good provisioners, and eventual changes in public policy?

The discussion was focused mainly on challenges of sustainable development of the localities with respect to proposed tasks. On the other hand, also possible solutions and examples of good practice were discussed. The emphasis was put especially on common characteristics of regions grouped within Cluster N rather than individual cases from different regions.

1. **Climate change:**

Water scarcity was identified as the most important issue with regard to climate change. Lack of water lead to decrease of yield, shortage of fodder and lower quality of feed and final products and also to water shortage for local inhabitants. This situation results often to conflict of interests about water use among local actors. The increasing temperature was also discussed. The increasing temperature leads to possibility to grow crops in higher altitudes,

what could threaten high nature value areas within Cluster N regions. This also leads to conflicts of farmers with locals and tourists, who afraid of using of chemicals and agriculture intensification in general. The Cluster N workshop participants agree that these challenges are more urgent in regions in South Europe and in lower altitudes. However, these challenges move also to northern regions and higher altitudes.

The possible **solutions** based on examples of good practices were identified during Cluster N workshop. The main focus was on knowledge sharing and advisory services. Particularly was proposed transfer of knowledge from countries and regions, where the problem is for a long time. Higher investments in training of farmers (the best advisors are experienced farmers) and in tools for knowledge dissemination. Create network of experts, environment for sharing knowledge and link together farmers, researchers and advisors were also recommended by local stakeholders. Besides that also circular farm management, more diversity, adapted varieties cultivation and holistic and interdisciplinary approach were also mentioned.

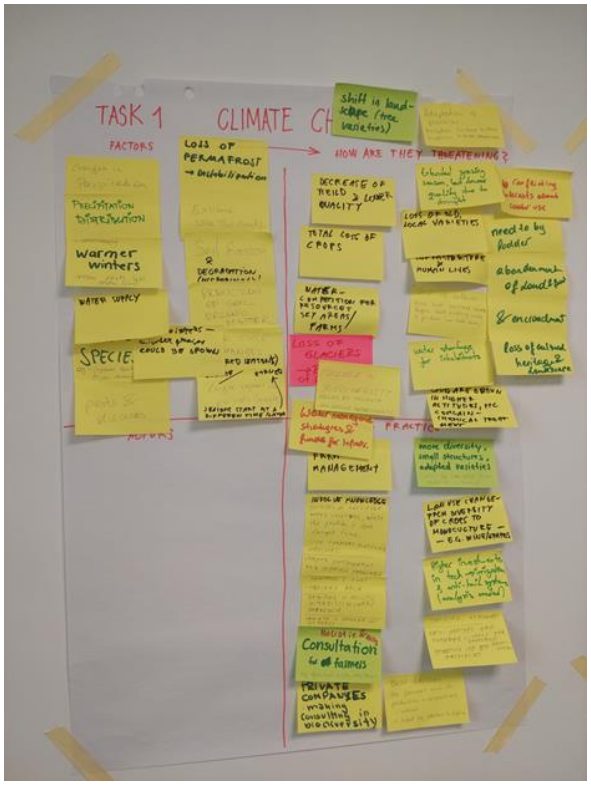


Figure 11 Visual output of Cluster N workshop – Climate change

2. Diverse interests:

The discussion was focused mainly on barriers and opportunities for cooperation among actors and problems balancing the diverse interest of local actors. Generally, four main groups of actors were identified within the regions belonging to Cluster N. These groups are *farmers* using the land for agricultural production, *National Parks or protected sites authorities* using the land mainly for conservation and protection of biodiversity, *tourists* using the land for recreational purpose and *locals* using the land for housing and everyday living. It is possible to identify following conflict of interest based on discussion at Cluster N workshop:

- protection of biodiversity vs. agriculture´s interests;

- cultural heritage vs. economic profit;
- both tourists and cattle using the pastures.
- governance structure vs. farmers vs. tourism (resulting from underrepresentation of these groups within governance structures)

The main barriers for cooperation among the actors are lack of willingness to cooperate, subsidies aimed at individuals and not for collective action, sometimes different production methods, which is difficult to align and generally lack of systematic support of cooperation.

The possible **solutions** based on examples of good practices were identified during Cluster N workshop. Generally, the main focus was on building trust among the actors, support sharing among the actors and bringing different actors together. It particularly means to include farmers to decision-making about protected sites (e.g. participation in board of national Park) or "working holidays" where tourists help farmers to maintain quality of protected sites. Also, availability of small agricultural areas as commons were mentioned. According to stakeholders, the use of agricultural land as commons would "force" local actors to cooperate effectively. The important proposed solution is also renumeration of ecosystem services provision from tourism industry, which also uses the land maintained by farmers.

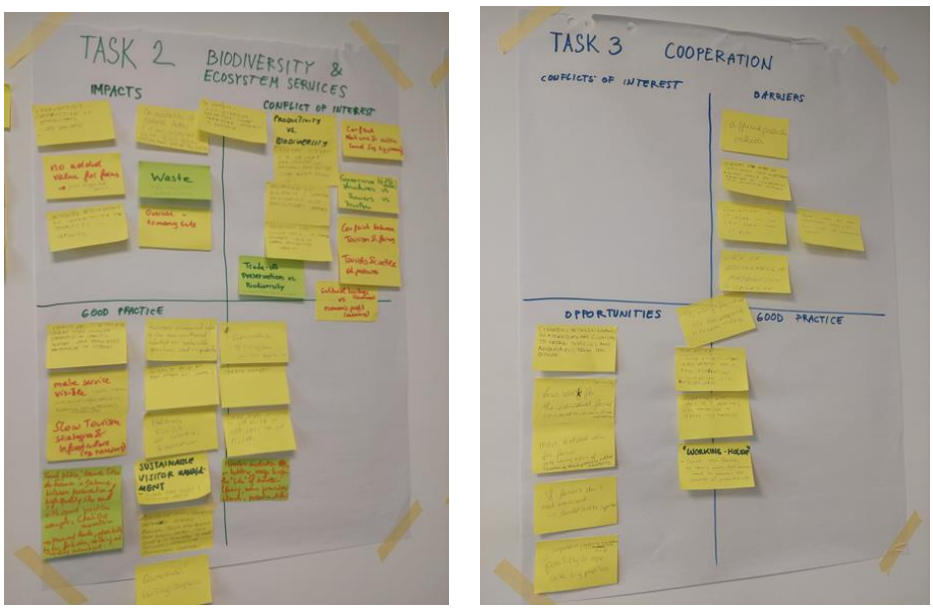


Figure 12 Visual outputs of Cluster N workshop – Diverse interests and biodiversity

3. **Vulnerability of actors:**

The issue of vulnerability of actors with respect to their role of public good provisioners was discussed during the Cluster workshop. The discussion was focused mainly on sources of this type of vulnerability. The main issue is changeable agricultural policy both at national and EU level. There is missing trust in stability of the "rules of the game" among farmers and other local actors. Some partners mainly from Eastern European countries mentioned also low transparency of policies in general. Farmers are also less involved in formulating of agricultural policy and there is often missing agriculture in municipal development strategies. There is also discussion among farmers about shift to more productive (intensive) agriculture within high

nature value mountain areas to be less dependent on subsidies for ecosystem services providing.

The possible **solutions** based on examples of good practices were identified during Cluster N workshop. The solutions are especially focused on stable and long-term funding, inclusion of agriculture in municipal development strategies and diversification of farmers activities. The diversification includes community supported agriculture, farmgate sale, niche products, higher valorisation of products, involvement farmers to tourism industry and generally activities decreasing the dependence of farmers on subsidies for public good provisioning. Also, advisory services provided by successful and innovative farmers were proposed due to the higher trust among the farmers.

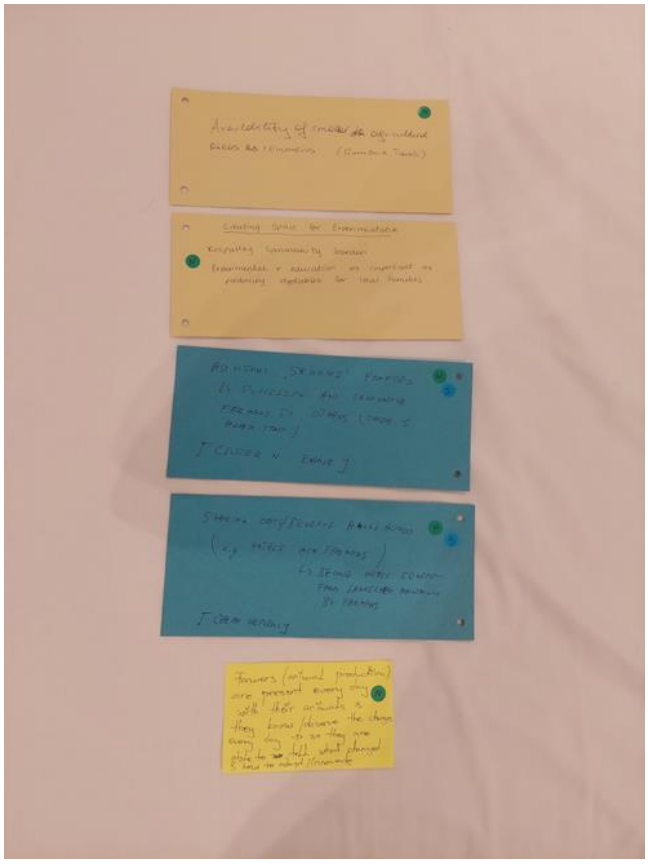


Figure 13 Key proposed solutions for Cluster N at Cluster workshop

4.4.3. Public goods delivered

By analysing all the results from Cluster N, we identified ensuing public goods delivered by the VCs. The main public good delivered within the mountain areas with high nature value is maintaining of cultural landscape and ecosystem services provision. Maintaining the cultural landscape is important, especially for tourists and visitors who use the landscape for leisure activities. However, also local inhabitants benefit from maintained landscape, which could increase quality of life. On the other hand, the provision of this kind of public good should not restrict the economic valorisation of local production as it is a factor of low job availability. Providing ecosystem services is important especially for National Parks, or protected sites and

generally for society as a whole. It also helps preserve the high nature value of these areas for future generations.

4.4.4. Trade-offs, challenges and solutions

Trade-offs

The complex analysis of data available shows that there is a trade-off between sustainable use of local assets, biodiversity and high nature value of the areas in general at one side and attractivity of the areas for young people and ability or willingness of locals to participation in decisions making on the other hand. This could be result of restriction for production function of agriculture within the high nature value of mountain regions and support of ecosystem services provision. This is also acknowledged by discussion of these issues among local actors at cluster workshops. The data and information gathered at cluster workshops show that provision of public goods in form of maintaining of cultural landscape and ecosystem services could threaten production function of agriculture and thus also attractivity of these areas for young people.

Challenges

The main challenges include not only climate change, but also, in the case of Cluster N, the diverse interests of the different land-use actors in the Cluster N regions and the lack of cooperation among themselves. The main challenges regarding climate change are changes in precipitation and changes in distribution of precipitation, warmer winters, more pests and diseases, lack of water supply for irrigation, introduction of invasive species. The main challenges regarding diverse interests are conflicts between farmers, representatives of protected sites, tourists and local inhabitants. The main challenge regarding lack of cooperation is missing willingness to cooperate among all local actors. These challenges should be addressed by development policies.

Solutions

Considering the most important solutions, these are mainly connected to more targeted funds for farmers and pastoralists in mountain areas; subsidies directed as an incentive to increase cooperation and collective action among farmers, and among farmers and other local actors; subsidies supporting crop diversity and generally stable and long-term funding. Beside the subsides also support of knowledge sharing among local actors, using examples of good practices and advisory services provided.

4.5. Cluster G

Cluster G, Governance, Cooperation, and Territoriality looks at the following case studies:

Nº	Mountain Region	Value Chain	Country
03	Sumava – Cesky Les	Cesky Les cattle	Czechia
05	Drome Valley	Drôme Valley lamb	France
09	Eastern Alps	Trento DOC wine	Italy
11	Maleshevski Mountains	Rural tourism	North Macedonia
14	Southern Romanian Carpathian Mountains	Certified ecotourism	Romania

23	Highlands and Islands	Speyside Malt Whisky	Scotland (UK)

Cluster G analysis has been conducted using existing data from previous Work Packages to address four objectives: Cooperation and Synergies, Utilisation of Assets, Inclusiveness, and Adaptive Capacity. The research team reviewed Work Package 4, selecting data that appropriately fitted as indicators for one each of the objectives. In some cases, data was transformed from its original form into interval data (for example, a scale of 1 to 3), allowing for easier comparison between regions in the Cluster. To do this, means of the scores across the processing, production, marketing, and consumption stages were calculated to leave an average score for each value chain. Because scores across the stages of the value chains varied, this sometimes resulted in numbers that are not whole for each VC.

During the working sessions at the Budapest Meeting further discussions were had, and both partners and local stakeholders shared their views and experiences which has helped to enrich the data. Information from further literature sources has also added to the work below.

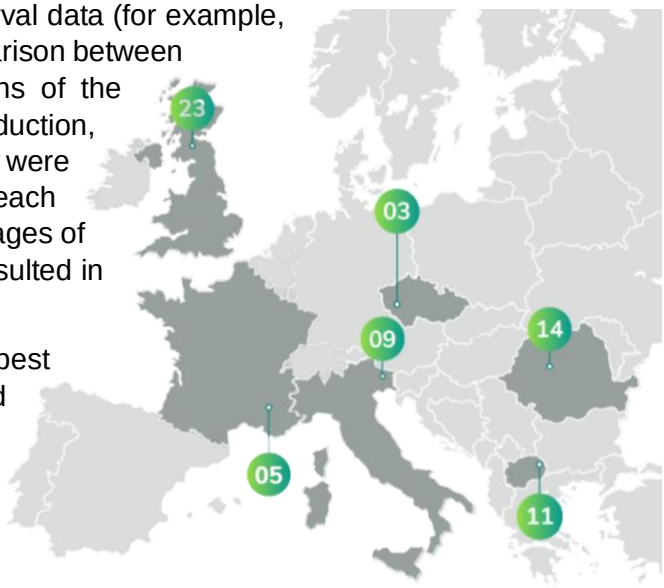


Figure 14 Cluster G - Reference Regions and Value Chains

4.5.1. Indicators and Benchmarking

The following tables show the indicators selected for the Cluster G objectives.

Table 8 Cluster G Objective Indicators

Objective	Indicator	Beef Production	Sheep Meat	Trento Doc Wine	Rural Tourism	Certified Ecotourism	Whisky
Cooperation	Trust	1	NA	2.25	3	1.5	2.25
	Sharing	1	NA	3	3	1.5	2.25
	Local ownership	2.25	NA	2.25	2	1.5	1.75
	Local decision making	1	NA	2.5	2	1.5	1.5
	Collective action institution	Yes	Yes	Yes	Yes	Yes	Yes

Sustainable use of local assets	**Contribution to cultural landscape**	2.25	NA	2	3	3	3
	Contribution symbolic capital	2.75	NA	2.5	3	3	2.75
	Sustainability of resource use	3	NA	1.5	NA	1.5	1.5
	Prescence of protected areas	National Park	Natural Park 2000	Three National Parks & UNESCO protected Dolomites	Yes	Piatra Craiului National Park	Cairngorms National Park
Inclusiveness	**Non-locals***	1.25	NA	1.25	1.3	1	1.5
	Age**	2.5	NA	2	2	1	2.25
	Gendering	Mostly male	NA	Male or mixed	Mostly male	Male or mixed	Male or mixed
	Accessibility local entre-preneurs***	1.5	NA	1.5	3	3	1.5
	Knowledge, Advice, & Skills******	3	3	1	1.5	2	3.5
Adaptive Capacity	**Sectoral plans**	National & EU levels	MRL, VC, & National levels	MRL level	MRL & VC levels	National & EU levels	VC, National, & International levels
	Territorial plans	MRL & VC levels	VC & EU levels	VC level	MRL, VC, & National levels	NA	MRL, VC, National, & International levels
	Legal obligations	National & EU levels	VC, National, & EU levels	National & EU levels	MRL, VC, & National levels	MRL & National levels	National & International levels

1 = low, 2 = medium, 3 = high

**(Mostly local = 1, mixed = 2, mostly immigrants = 3)*

***(Majority <40=1; majority <60=2; majority > 60 =3)*

****(High inaccessibility = 1; Medium accessibility = 2; high accessibility = 3)*

*****(MRL = 1, MRR = 2, National = 3, International = 4)*

North Macedonian Rural Tourism, Italy's Trento Doc, and Scotland's Speyside Malt Whisky all have relatively high levels of trust. These are evidenced through partnership and collaboration work by landowners and distillers in the Speyside case. In the other regions levels of trust are lower. In Czechia enterprises in the MRL are large, and as they do not need cooperation with others to secure their businesses levels of trust stay low.

Sharing (of, for example, machinery or labour) is highest in Trento, Italy and North Macedonia, followed by Scotland. This form of local cooperation is high despite competition between

actors. In Scotland stakeholders spoke of a need to protect the uniqueness of their product, but still share knowledge and at times promotional activities. In Czechia, a lack of need for cooperation impacts sharing, with the value chain scoring low.

Local Ownership is highest in Trento and Czechia, with land being owned either by local municipalities or by local farmers. Scotland sees some local ownership, but also a number of absentees, non-local owners, with production and marketing stages often taking place outside of the region.

Local Decision Making is highest in Trento and North Macedonia, with the remainder of the regions at medium and low levels. In Czechia, few farmers, processors, distributors, or consumers form part of municipal councils. In Scotland, there is opportunity for local decision making at the processing stage through community input in the Cairngorms National Park, but little opportunity for local involvement in private business decisions undertaken at the production, marketing, and consumption stages.

All regions have formal collective action institutions, including examples of National Parks, Trade Unions, formal cooperatives, and charitable organisations. These support the production stage of VCs. They vary between the MRL level and national level, and demonstrate the existence of multi-actor governance.

Across the indicators for Cooperation and Synergies, Romania and Czechia both score relatively low (with the exception of local ownership in Czechia). Scotland scores quite high for Trust and Sharing, but lower for Local Ownership and Local Decision Making – presumably due to the international nature of the Whisky value chain. Italy and North Macedonia score either highly or medium across all Cooperation and Synergies indicators, suggesting that within the Cluster G they have the highest levels of Cooperation and Synergies. This would suggest cooperative governance at a local level. Both regions have institutions supporting innovative ideas within the value chains.

Contribution of VC practices to existing cultural landscapes is high for three regions, and medium high for two. In Trento and Speyside land management practices associated with the processing stage of the VCs maintain the landscape in a traditional way. Traditional imagery is used to sell products associated with the VCs.

Contribution of symbolic capital is also high for the VCs, with production, processing, and marketing practices contribution to the positive perception of the mountain region in Trento. In Scotland, there are links to other local products or raw materials and the mountain region scenery. Rules relating to the labelling of products reinforce contribution of symbolic capital, with Speyside Whisky.

Sustainability varies for the VCs. Czechia has high sustainability of resource use. Romania, Scotland, and Italy have partly sustainable resource use with issues of either water scarcity or packaging causing problems.

All VCs are in regions with protected areas, including examples of national parks and UNESCO protected sites.

Combined, these indicators suggest that assets are utilised by VCs in ways that are contributing to cultural landscapes and symbolic capital, that wider governance has given natural assets some protection, but that some VCs do face issues of sustainability.

All VCs in Cluster G have a low proportion of immigrants involved. For example, in Scotland, workers are often multi-generational. In Italy, some immigrants work in the VC when harvesting or in one of the cooperatives.

Most VCs have populations with average ages between 40 and 60. However, Czechia and Scotland are both slightly higher with more actors over 60. In Scotland this is due to the number of retired workers who become tour guides, and in Czechia due to difficulties for young farmers due to costs of starting a farm business. Romania is lower with most actors being less than 40 years old due to the active nature of the hiking tours.

Czechia and North Macedonia are both value chains with mostly male actors due to historical male domination of the industries in these areas. The Trento, Romanian, and Scottish value chains have male or mixed actors, suggesting slightly higher levels of female actors though not high enough to be a majority. Effort is being made in the Scottish VC to make the gender balance more equal.

Levels of accessibility vary among the value chains, with North Macedonian Rural Tourism and Romanian Ecotourism both scoring highly. In other areas local entrepreneurs face a combination of high land prices or high costs of machinery to start production, which make value chains less accessible.

The Scottish value chain has skills and training opportunities on all levels – from MRL to international. Other Cluster G value chains have lower levels of skills and training available, and Trento and Romania were only based on one available data point.

Overall, a combination of high land prices and historically male dominated industries mean that Inclusiveness is fairly low in Cluster G VCs.

All value chains in Cluster G have some Sectoral Plans, varying across MRL, MRR, National, EU, and international levels. Some examples of the Sectoral Plans include plans for organic agriculture, biodiversity enhancement, development of green economies and tourism, and water management.

Most value chains have data for Territorial Plans. Examples of these plans include development programmes for green tourism and a green economy, biodiversity plans, and national park management plans.

All value chains have Legal Obligations up to the National level, with Scotland, Trento, and Czechia also having international and EU legal obligations. Examples of these include regulations around animal cruelty, organic agriculture, biodiversity, safety, tax, employment, and land and water usage.

Overall, the Adaptive Capacity indicators across Cluster G suggest governance coming from numerous different levels.

4.5.2. Cluster workshop analysis

During the November Workshop in Budapest, the Cluster G leaders met with researchers and stakeholders from Romania, Macedonia, Trento, and Scotland. Representatives from Drome Valley did not attend since they are present in two other clusters. A presentation was given on the methodology used to develop the above indicators, and the results so far, for Cluster G. People were then asked to choose two axes based on cluster objectives from either *Local Participation in Decision Making, Inclusiveness*, or *Adaptive Capacity* to think about in relation

to their region. Participants chose the axes Local Participation in Decision Making and Adaptive Capacity. Participants then had some time to discuss in their regional groups where they felt their regions sat on the axes. After this, we went around the group and discussed the results.

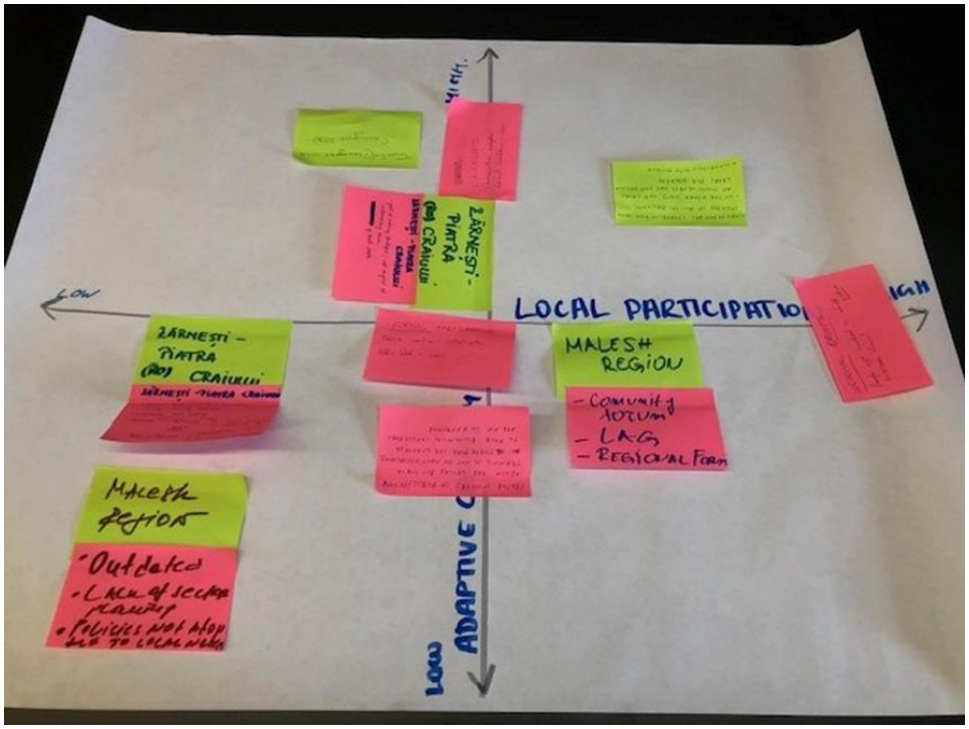


Figure 15 Axes and positioning of the regions

Romanian representatives felt that their region faced low levels of participation in Local Governance, but high Adaptive Capacity. They suggested that people needed to contact policy makers more, and that whilst the facilities for good government exist, they do not work properly. Romania is a relatively young democracy, which may be one reason for more limited governance functioning at present (Pascaru & Ana Buţiu, 2010). Participants also commented on bias in governance, particularly during consultations at a local level. This is supported by the literature, where interview data suggests strong perceptions of corruption in Romanian governance and a lack of trust (Mikulcak, Newig, Milcu, Hartel, & Fischer, 2013; Pascaru & Ana Buţiu, 2010). Poor infrastructure and weaker local administration may leave it more vulnerable to corruption (Marquardt, Möllers, & Buchenrieder, 2012). Despite these challenges, Adaptive Capacity was rated highly. The representatives felt that local people are very resilient and gave examples of ski resorts being turned into mountain biking parks to allow for continuation of sports tourism as the snow season becomes shorter with increased climate warming in the area.

Macedonian representatives felt that their region faced similar problems to Romania, with high levels of corruption in governance. This is supported by data from the Corruption Perception Index, which ranks Macedonia relatively high in corruption (Corruption Perception Index, 2023). Literature suggests a lack of accountability for Macedonian governance, which increases risk of corruption, as well as post-Communist decentralisation not being driven by

local governments as it should have been (Xheka & Xhaga, 2021). Despite this, representatives from the region felt that local participation was high, due to the existence of community forums. In this context, community forums are local groups which meet to decide where the given budget is allocated. As well as these local community forums North Macedonia makes use of regional forums, which function in a similar way, enhancing participation in governance.

Italian representatives felt that there was generally low enthusiasm for participation in local governance, particularly among growers working in the Trento DOC value chain. Within governance there are skilled actors in public decision making, but they are not very interdisciplinary and stay in their roles for a long time. This leads to a feeling that younger people are not well represented, and that the environment is not considered in the way the economy is. There was concern among participants that there is no authority looking at the long view. However, growers in the Trento DOC value chain are often part of local cooperatives. Research conducted in another rural Italian region demonstrated that community-based cooperatives offer valuable economic and social benefits to their areas (Mastronardi, Giagnacovo, & Romagnoli, 2020). When looking at Adaptive Capacity, there was suggestion that it is not at a good enough level, with predictions of changing climate being ignored. Participants gave an example of recent funding (EU and national) being given for development of a ski resort at an altitude of 800m, lower than any current ski facilities. Participants felt this was inappropriate given trends in snow cover and want regulation against development that does not take future projections into account.

Scottish representatives felt that there were high levels of participation in Local Governance, and high Adaptive Capacity. Participants said that local people do get involved in the things that interest them at a local governance level. Communities are recognised in the National Park manifesto, and there has been development of the Cairngorm National Park National Partnership Plan in conjunction with the five local councils whose areas are covered. This allows an opportunity for local engagement. However, there is room for improvement, with participants suggesting that Community Councils are unfit for purpose and as such remain unutilised, and that rural communities don't have their voices heard at the governmental level. They suggested that high Adaptive Capacity is characterised by informal local groups reacting quickly to new situations. The example was given of community development companies, which function as not-for-profits and social enterprises, owning local businesses. This gives back to the communities. They stressed that people would like the opportunities to be able to experiment and make mistakes, and for organisations to think outside the box with the ways they are engaging communities.

4.5.3. Public goods delivered

Public goods delivered through multi-level governance vary between different regions in Cluster G. In Scotland delivery of the Cairngorms National Park Plan, which includes the natural environment and public services, was felt to be inclusive. The Park Authorities had put further effort into reaching 'hard-to-reach' groups by going through local gatekeepers who had access to minority groups within the Park's boundaries. The actual process of consultation had also been adapted to include local communities by visiting them in person and holding open sessions, rather than just expecting people to respond online. These are all signs of multi-actor, multi-level governance to deliver and enhance public goods.

4.5.4. Trade-offs, challenges and solutions

Trade offs:

Perhaps not strictly a trade-off but a substitution. EU programmes such as LEADER and the Rural Development Fund are often seen as key mechanisms for delivering multi-level governance. With the UK's exit from the EU access to these programmes was curtailed. In Scotland this created a 'space for experimentation' which encouraged communities and the National Park to look elsewhere for funding to support initiatives.

Challenges:

As expanded on above when reflecting on the discussions had with Romania and North Macedonia at the Budapest Workshop, perception of corruption in government/state actors can lead to low levels of trust and unwillingness to engage in multi-actor processes. This creates a challenge for governance, as people are less likely to engage. The challenge of overcoming attitudes of apathy to governance is one that needs to be addressed, particularly in these regions.

Adaptive capacity was not thought to be high enough in some areas, with examples of decisions being made that may not be suitable for the future, given changing climate patterns.

Solutions:

When discussing the challenge of the perception of corruption in governance, measures to reduce corruption and increase public trust included suggestions to strengthen civil society so that it is more active. Going forwards, the value chains may have roles to play in this. It is hoped that by addressing the perception of corruption, apathy towards governance would be reduced as a consequence. If people felt that they had impact on governance in their areas, they may be more likely to want to get involved.

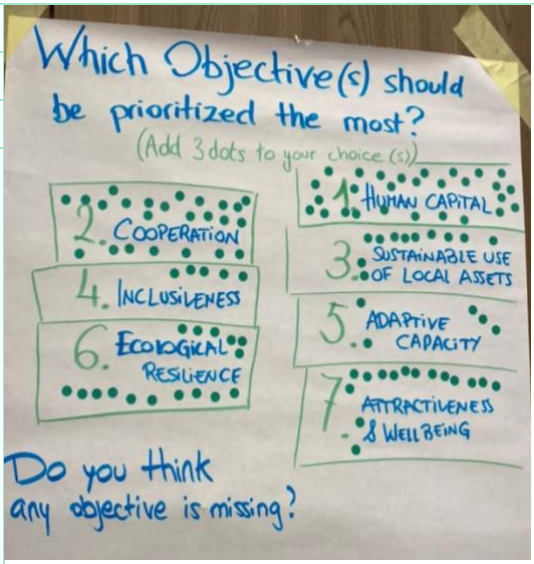
Problems with low levels of adaptive capacity could be addressed in part through increased knowledge sharing. In particular, Italian stakeholders felt that knowledge sharing between experts and members of local and national government would increase the adaptive capacity of their region.

4.6. Cross-clusters analysis of objectives

All the stakeholders in the Cluster workshop, in a plenary session, were asked to weigh the 7 objectives (3 dots per person) according to their capacity to contribute to the sustainability and resilience of MOVING mountain areas and to propose additional objectives if they miss any. Results show the high importance they give to human capital and cooperation objectives, reinforcing the results obtained in the questionnaire and in the cluster analysis.

Table 9 Weighing of objectives by stakeholders

Objective	Number of dots
1 Human capital	28
2 Cooperation	24
3 Sustainable use of local assets	11

4 Inclusiveness	5	
5 Adaptive Capacity	5	
6 Ecological Resilience	16	
7 Attractiveness & Wellbeing	15	

Stakeholders also participated actively in identifying factors that either support or hinder progress towards achieving the 7 objectives. Key insights from these discussions aligned with previous deliberations. Noteworthy themes included the urgency to enhance social awareness regarding the crucial role mountains play in delivering both private and public goods and services. Additionally, stakeholders emphasised the need to promote local food consumption, underscored the significance of networking and the role of third-sector organisations, advocated for decentralisation processes, and stressed the necessity of enhancing the lobbying capacity of mountain areas to influence policies. Education and strategies for attracting and retaining young people were also highlighted as crucial elements.

Conversely, the discussions also brought to light blocking factors impeding progress. These included social challenges such as a lack of trust among VC stakeholders, the geographical remoteness and isolation of mountain territories, the small scale and fragmentation of farms and processing firms, inadequate infrastructures, and broader global trends such as globalisation and the tendency toward industrial concentration that highly affects small mountain VCs. Policy-related concerns were also raised, encompassing issues like political instability in various European countries and the absence of specific policies tailored to address the unique challenges faced by mountain areas.

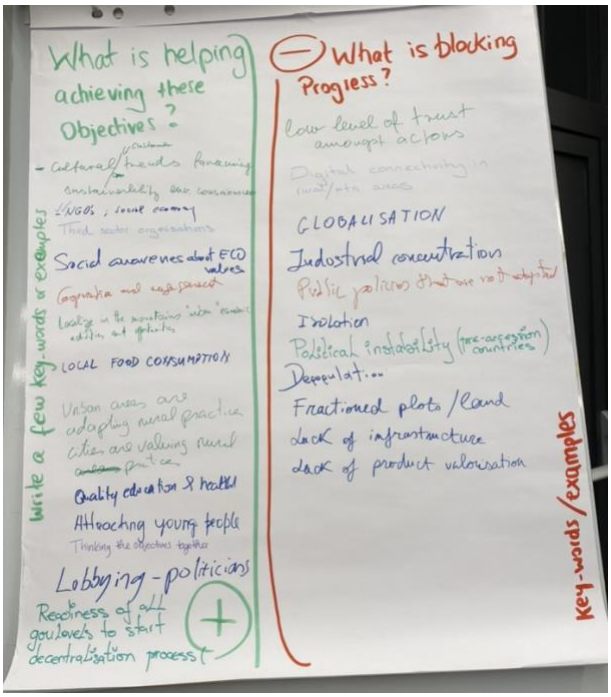


Figure 16 What is helping achieving the objectives ? vs. What is blocking progress ?

4.7. Questionnaire results

Figure 17 shows the distribution per country of the 108 valid responses. On average 5-6 responses per VC were obtained, as anticipated. The higher figures in some countries are attributable to the fact that several VCs were analysed in different mountain regions.

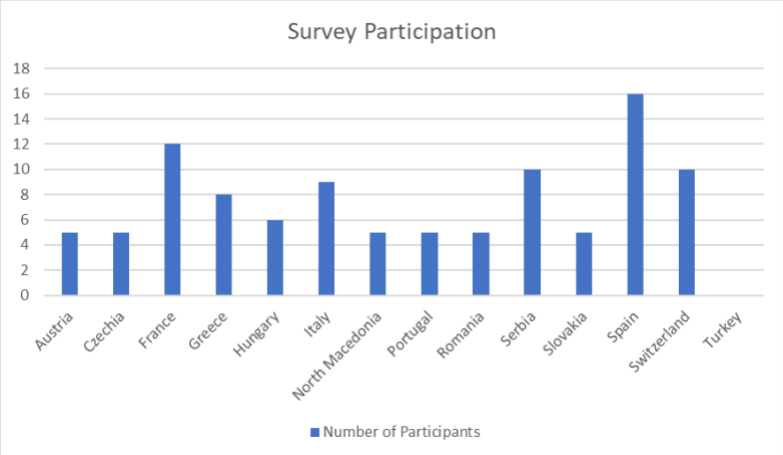


Figure 17 Respondent distribution by country

In terms of value chains, 21 of the 23 MOVING value chains were represented by the survey participants (see Table 10), providing a diverse range of input. Scottish participants could not

answer due to the long periods needed to get the ethical approval that did not match MOVING time, nor Bulgaria VC stakeholders due to their disengagement from the project.

Table 10 Respondent Distribution by Value Chains

Value Chains	Country	Number of Participants
Weiz Lamb	Austria	5
Beef production	Czechia	3
Chestnut Flour	France	9
Sheep meat	France	3
Central Rethymno Carob	Greece	7
Agroecological Knowledge	Hungary	6
Alto-Molise dairy	Italy	3
Trento Doc Wine	Italy	4
Chestnut flour	Italy	1
Rural Tourism	North Macedonia	4
Serra da Estrela PDO Cheese	Portugal	2
Douro wine	Portugal	2
Certified ecotourism	Romania	5
Sjenica lamb PDO	Serbia	10
Bio-honey	Slovakia	5
Organic Mountain Olive Oil	Spain	7
Iberico Ham PDO – Los Pedroches	Spain	6
Mountain wine	Spain	3
Mountain Grain	Switzerland	2
Tête de Moine PDO cheese	Switzerland	7
Greenhouse Tomato	Turkey	8

The survey participants were engaged in various sectors such as tourism, agriculture, natural parks and nature conservation, administration and policymaking, forestry, processing and manufacturing, consulting services, research, education, and development, energy, gastronomy, sport and leisure activities, and other categories. A majority (69.44%) of respondents were between 40-65 years old, while 26.85% fell within the 25-40 age range. A smaller percentage of 3.7% stated to be over 60 years old at the time. The gender distribution showed that the proportion of women was 37.96%. Concerning the participants´ level of education, 88.89 % stated having a university degree or even further education. The representation of different company sizes in which the participants were employed (Figure 18) at the time of the survey was diverse as well as their personal role in these companies (Figure 19). Most people (28 respondents) were part of large companies that rely on more than 50 employees. The company-role that was most represented in the survey (50 respondents) were permanent long-term employees.

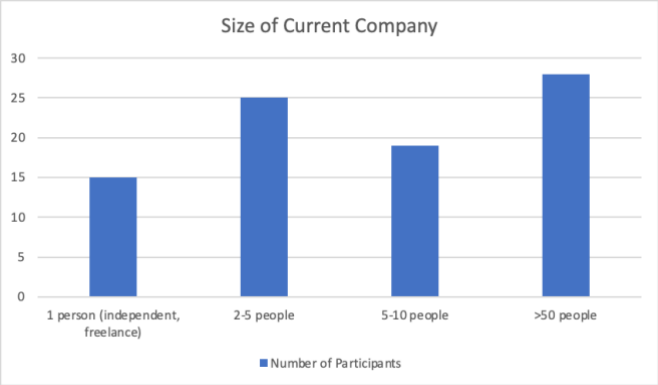


Figure 18 Size of different companies

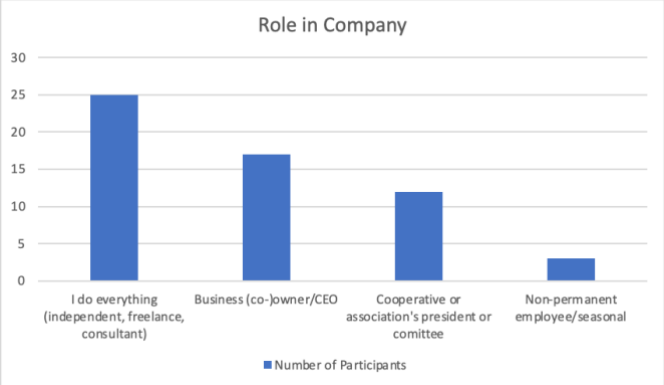


Figure 19 Role in the company

Stakeholders' Preferences for the Objectives

In the present study, for the statistical analysis, a **latent class model** aiming to identify distinct groups in the data based on response patterns was used. The three-class solution was selected due to a high goodness of fit (pseudo R^2 of 0.297), with solutions with greater number of classes showing meagre improvements in model fit as compared to this.

With the **latent class model (LC3)** (Table 11) three latent classes could be identified, each characterised by mean responses to the survey´s key objectives, using the objective O4-Inclusiveness as reference. All attribute coefficients show statistical significance at the 1% level (**), emphasising the robustness of the model considering the statistical power. The fact that all coefficients are positive implies a significant preference for any of the objectives considered as compared to the O4-Inclusiveness. The probabilities of belonging to each latent class provide information about the distribution of the survey respondents across Class 1 (32.6%), Class 2 (47.8%), and Class 3 (19.6%).

Table 11 Results Latent Class Model identifying 3 classes (LC3)

Latent Class Model. 3 classes (LC3)									
	Class 1			Class 2			Class 3		
	Coef.		*SE*	*Coef.*		*SE*	*Coef.*		*SE*
Mean parameters									
O1-Cooperation	2.702	***	0.656	2.442	***	0.387	5.796	***	1.014
O2-Human capital	3.690	***	0.730	1.655	***	0.380	4.246	***	0.976
O3-Sustainable use of local assets	4.075	***	0.767	2.067	***	0.375	4.795	***	0.934
O5-Adaptive capacity	2.691	***	0.712	2.194	***	0.402	3.858	***	0.929
O6-Ecological resilience	4.920	***	0.826	1.890	***	0.385	3.452	***	0.952
O7-Attractiveness & wellbeing	3.055	***	0.754	3.193	***	0.404	2.528	**	0.873

Class specific constant	0.041		0.208	0.425	*	0.185	-0.466	*	0.223
Scale factor Worst responses	-0.464	**	0.151						
Membership probability	0.326			0.478			0.196		
LL	-1122.03								
Pseudo R2	0.297								
AIC/N	1.008								
Observations (individuals)	2268 (108)								
******, **, * denote significance level at 5%, 1%, and 0.1%***									

The findings unveil the diversity in responses within the surveyed panel, offer an understanding of the different classes and with which attitudes they can be associated with. The model's robustness, as evidenced by the high significance levels and fit metrics, underlines its efficacy in revealing latent structures within the dataset. Using the model coefficients, the importance of each objective as observed by the expert judgments can be converted into a utility scale, using normalised impact scores. These are depicted in **Error! Reference source not found.**. As can be seen in this figure, the three identified classes exhibit diverse preference patterns for the objectives. Class 1 appears to prioritise O6-Ecological resilience (highest mean for O6-Ecological resilience), O3-Sustainable use of local

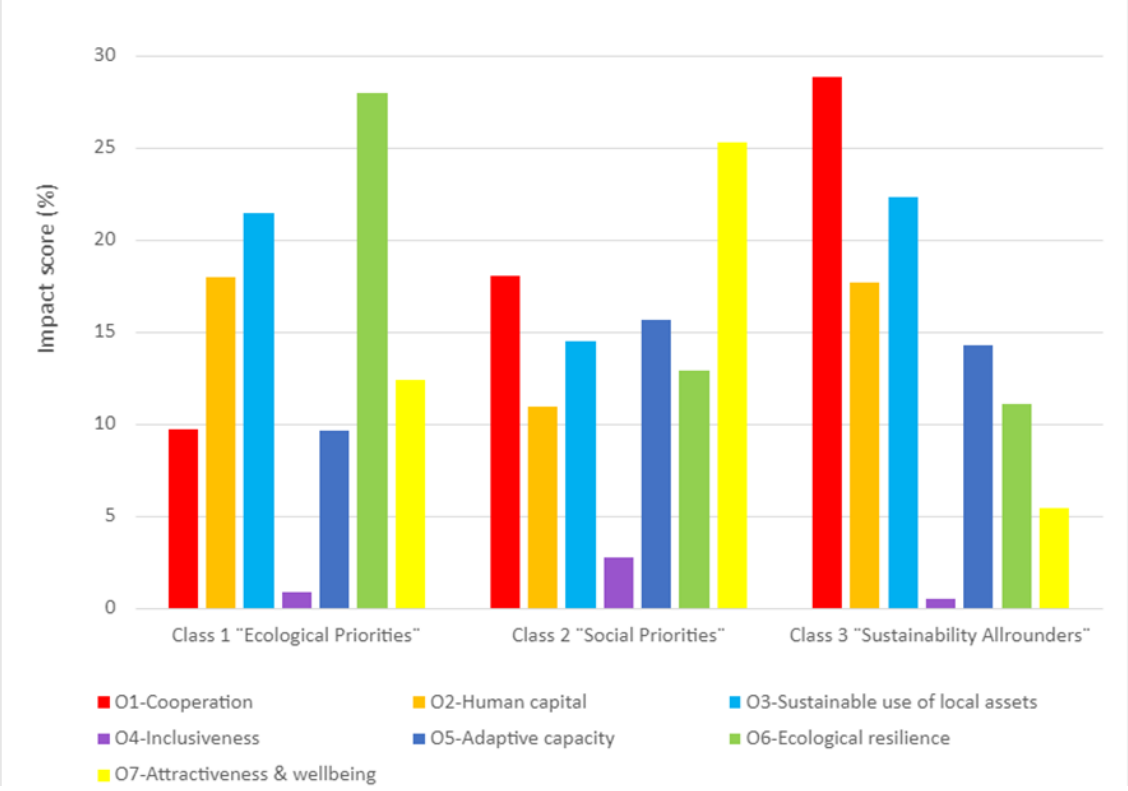


Figure 20 Impact score (%) of the modelled classes 1-3 considering the objectives O1-O7

assets, and a moderate emphasis on O7-Attractiveness & wellbeing. Therefore, it could be stated that Class 1 is framing a ¨**green**¨ set of priorities. Class 2 shows a more balanced preference for the set of objectives considered, placing emphasis on O7-Attractiveness & wellbeing, O2-Human capital, and O5-Adaptive capacity as main objectives, indicating a focus on **social and human aspects**. The highest means of Class 3 reveal a strong emphasis on the O3-Sustainable use of local assets, O1-Cooperation, and O6-Ecological resilience, suggesting a stronger commitment to **environmental sustainability and cooperative practices** in comparison to the Classes 1 and 2. As expected from the model results, in all three classes O4-Inclusiveness is rated the least important objective.

5. Discussion

5.1. Comparative analysis of the value chain contribution to sustainability and resilience

Each cluster has identified key issues that validate our hypothesis that *Mountain VCs can create value while enhancing the sustainability and resilience of the Socio-Ecological Systems* based on the analysis of the 7 objectives. These focal points are emphasised for each cluster. However, the preliminary findings from cross-comparison of these clusters underscore the interconnected nature of central issues across clusters in the analysed value chains and emphasise the need for a comprehensive and collaborative approach to address them effectively without restricting the analysis within the boundaries of individual cluster topics.

The analysis conducted in **Cluster S** emphasises the better performance of VCs with a variety of networks and how interconnected VCs and those with more capacity to cooperate create more value and are more sustainable and resilient. However, in most of the cases analysed are networks external to the VCs (Local Action Groups, research centres, certification bodies…) rather than internal networks to the VC. They also found that when an internal network exists, it is based more on interpersonal relations than on institutional ones. Strengthening the networking capacity and cooperation will reduce vulnerabilities and make mountain areas more sustainable and resilient. However, other challenges that undermine resilience and sustainability are demographic issues, such as gender imbalances or lack of attractiveness for women and youngsters, remoteness or difficult access to land and resources for young people or newcomers. Limited education and training opportunities and lack of skilled labour for the management of the first steps of the VCs (production and processing) are also limiting factors that underscore the difficulties associated with maintaining a workforce and engaging the younger generations in mountain areas.

Among the links with the topics analysed in the other clusters, the need to establish connections with innovation and research centres resonates with the challenges identified in Cluster I. The issues surrounding inadequate infrastructure, difficult access to innovation for small farms or processing firms, and the absence of innovation brokers or technologies adapted to the small scale of mountain Value Chains (VCs) are clear links to the discussions in this cluster.

Furthermore, Cluster S identified topics addressed by Cluster G, emphasising the role of governance structures, such as Local Action Groups, in addressing social and demographic challenges in mountain areas. The recognition of the collective action and networking aspects aligns with the governance considerations explored in Cluster G. The challenges in attracting

and retaining young people due to land fragmentations and the small size of many farms relate directly to the topics analysed in Cluster N.

In **Cluster V**, all the VCs are under PDO or organic production systems, and these schemes positively contributed to the resilience and sustainability of the mountain regions. These increased their cooperation opportunities, as it was also found that most of these VCs interact with other VCs (mainly tourism ones), creating synergies that facilitate the direct sale of the products, the join care for the landscape or the sustainable natural resource exploitation. This diversification of activities ensures the attractiveness of the areas to live and work. Among the negative impacts on sustainability and resilience can be mentioned the small scale of these productions and the limited bargaining power of these VCs when competing at the national or international level (except for the whisky VC), the difficulties of competing with big companies when the products become attractive for broader markets, and the demand increase. These companies 'grab' the image of these VCs, providing cheaper and more industrialised products produced with non-sustainable methods and competing with the traditional ones. Other points mentioned are the burden and cost of certification schemes that often do not compensate for the premium price obtained by the products or the lack of awareness of consumers of all the added value and public good provisions incorporated in these certified products that ensure the sustainability and resilience of the territory.

The interrelation of topics with those analysed by other clusters emerged, for instance, in the negative impact of climate change on the natural resources and land use systems that contribute to the unique character of certification schemes or management practices within the VCs. This aligns with the discussions in Cluster N, which specifically focuses on the effects of climate change, natural resource protection, and ecosystem services.

Moreover, the role of young people in VC management and the opportunities they present, along with the barriers they face in accessing resources, emerged as significant themes, linking to discussions within Cluster S. Additionally, concerns were raised about the lack of technologies aligned with Protected Designation of Origin (PDO) requirements, higher infrastructure costs, and the reluctance of certification schemes to adapt to new situations, particularly those associated with climate change. These aspects are thoroughly examined in Cluster I.

Lastly, governance-related challenges (Cluster G) were also referenced in the analysis, particularly the difficulties faced by young people in accessing decision-making positions within the governing boards of certification schemes. This demonstrates the broader impact of governance structures on the sustainable and resilient functioning of VCs, tying back to the themes explored in Cluster G.

The primary findings from **Cluster I** highlight the best performance in resilience and sustainability of the VCs with skilled human capital, with good access to advisors and human and financial capital or good digital infrastructures. The VCs in this cluster also offer new products, but in general, they have limitations in adopting innovations. The analysis shows the importance but also the difficulties associated with creating an enabling environment for innovation in remote and isolated areas, with limited availability of financial and human capital. These challenges align with those discussed in Cluster S, where there is a recognised need for young people, education, and training to not only enhance knowledge but also to facilitate knowledge-sharing aspects that can drive innovation.

The connection with Cluster N is evident in the acknowledgement of the potential effects of climate change and how innovation can play a crucial role in promoting High Nature-Value

Farming and ecosystem service provision. The need for innovative solutions to adapt to changing environmental conditions underscores the interconnected nature of innovation and sustainability and resilience.

Moreover, Cluster I delves into the influence of adopting innovations and retro-innovation, such as organic farming practices, in certified products. This connection aligns with the topics typically addressed in Cluster V, emphasizing the importance of innovations in the certification and production of organic or other certified products.

Lastly, the relevance of collective action and the need to join forces to promote innovations tailored to the specific needs of mountain VCs, as well as the governance of these innovations, are characteristic issues addressed by Cluster G. The collaborative and governance aspects highlighted in Cluster G resonate with the emphasis on collective efforts and cooperation required for successful innovation adoption within the context of Cluster I.

The analysis conducted in **Cluster N** for the sustainable management of natural resources identified a different performance between the VCs of central countries such as Austria or Switzerland and Eastern countries with a lower tradition of cooperation, widespread corruption, and difficulties in balancing the interests of different actors. In any case, they found that farming in these protected areas highly contributes to ecosystem services and public good provision. These VCs care about natural resources, have reduced GHG emissions, and create cultural landscapes (often due to the regulations introduced by natural parks or other protection figures). However, these limitations made the work in these areas less attractive for young people, and also, there are difficulties in aligning the interests of farmers, tourism and conservationists in the use of natural resources.

The cluster comparison highlighted challenges linked to governance (Cluster G), such as the low representativeness and bargaining power of farmers in Natural Parks decision boards and the limited tradition of collective action and cooperative work (especially in Eastern countries). It also overlaps with the findings in Cluster S, such as the difficulties in attracting young people to engage in activities related to natural resource management, as well as the need for education and training to address these challenges.

Moreover, aspects related to Cluster I have been emphasised, such as the adoption of practices like circular farm management and the collaborations with experts and innovation advisors to explore more sustainable management methods. The integration of innovative approaches and the involvement of knowledgeable advisors emerge as critical components for addressing challenges and promoting sustainable and resilient practices within the context of the value chains under consideration.

The analysis conducted in **Cluster G** identified key topics to enhance sustainability and resilience, the trust among the actors in the VC, the sharing of information, machinery or practices, and the existence of collective action institutions. As in the previous case, the VCs in Central countries perform better than those from Eastern countries, where these values are more incipient. Other factors analysed were the local ownership of the resources and the decentralisation of decision-making at the local level. In this cluster, the size and the consolidation of the VC are quite dissimilar (whisky in Scotland vs ecotourism in Romania or North Macedonia), which might have influenced the results.

The results exhibit significant intersections with themes explored in Clusters S, N, I and V. One common concern shared across Clusters G and S is the demographic composition within the analysed VCs. The ageing population and the lack of attraction for non-locals within these

VCs pose challenges, echoing the difficulties faced by young people and women in accessing resources. Additionally, the shortage of skills and training opportunities reflects the broader need for capacity building and skill development within the context of sustainable and resilient value chains.

The links Cluster N particularly concern the governance challenges identified in Natural Parks or Protected Sites. The effectiveness of governance structures in these areas varies across countries, with some regions demonstrating successful practices (e.g., Scotland or Switzerland) and others grappling with difficulties.

Within the context of social innovations, Cluster G draws a connection with Cluster I by highlighting traditions such as machine sharing in some VCs, such as those in the wine industry. This showcases the social and collaborative aspects that contribute to sustainable practices within these value chains.

Lastly, the governance considerations in Cluster V relate to the cultural landscape produced by some of the VCs and the governance of value-adding practices, traceability, and the certification of organic or other certified products.

In essence, the cross-comparison analysis reveals the interdependence of factors and challenges across our five clusters, emphasising the necessity of an integrated and collaborative approach to address the multifaceted issues impacting the contribution to the sustainability and resilience of mountain areas of the examined value chains.

5.2. Provision of public goods

Value chains, although primarily oriented towards the provision of private goods, play a crucial role in contributing to public goods. A consistent finding across all clusters is that VCs have a substantial impact on mountain areas, significantly contributing to the provision of public goods. Notably, value chains generate employment opportunities and income, thereby bolstering the vitality of mountain regions.

Moreover, VCs play a pivotal role in enhancing human and financial capital within these areas. They offer educational and training opportunities, facilitating knowledge transfer to their workforce. Consequently, VCs contribute to the social fabric of mountain regions, both internally—by bringing together diverse producers and processors, fostering the creation of networks, and attracting the attention of policymakers and consumers to the territory—and externally, strengthening connections between mountain areas and other regions. The analysis reveals that VC assemblages create positive externalities and synergies. Additionally, VCs and their associated activities enhance the attractiveness of mountain areas, creating opportunities for young individuals, women, and non-local residents.

Innovation opportunities and connections with other regions are also attributed to VCs, particularly through telecoupling. Often, not all stages of the VCs are developed within the mountain area, offering avenues for innovation and collaboration with external areas.

Value chains also contribute significantly to the provision of ecosystem services, especially in cases where certification schemes, tourism, or activities in high nature value and protected areas are involved. Protocols and regulations governing these VCs tend to preserve and manage natural resources (pastures, water, forests, soil fertility, traditional breeding or plant varieties, etc.), contributing to the conservation of cultural and natural landscapes. Preserved landscapes play a vital role in enhancing the quality of life, well-being, and attractiveness of

the areas, benefitting both local inhabitants and tourists who stimulate the local economy. But VCs also preserve the high nature value of these areas for future generations.

Another significant public good delivered by VCs is the opportunity for participation in multi-level governance actions. Value chains often engage in various multi-actor, consultation, and participation processes, fostering inclusiveness and creating spaces for new ideas and experimentation.

5.3. Trade-offs, challenges and solutions

The cluster analysis has brought to light several trade-offs and challenges, along with potential solutions. A significant issue revolves around the distinction between the provision of public and private goods by VCs. While VCs contribute to public goods, such contributions are often unrecognised and unpaid. This situation can negatively impact the attractiveness of mountain areas or VCs, leading to restrictions on job provision and higher incomes and exacerbating depopulation issues. Raising consumer and citizen awareness about the importance of public goods and crafting policies that ensure fair compensation could revitalise these areas. Additionally, consumers showing a willingness to pay a premium price for private goods can make the VC business more attractive.

Another trade-off arises from the unfair competition between certified products or production methods and conventional ones. Producers may find the burdens and costs associated with certified products challenging, and the extra prices potentially received do not compensate for the efforts. Consumer awareness about the special characteristics of protected products, the goods and services that mountains provide to society and the benefits these products bring to the territory are crucial. Communication and awareness campaigns can play a vital role in changing societal mindsets.

The balance between collaboration and competition within and between VCs is a complex trade-off. How do we combine collaboration and competition among members of one VC or between VCs that compete for the same resources, i.e., farming, tourism, and nature protection? Joint actions among VC members can foster trust and sharing opportunities while competing VCs need protocols for joint resource exploitation that are negotiated and accepted by all stakeholders.

The small scale of farms and processing companies in mountain areas poses a challenge to collective action, with limited human resources making it difficult to attend meetings and participate in joint actions. Poor infrastructure, remoteness, and limited connectivity add to these challenges, emphasising the need for improved services, access to relevant technologies, and connectivity in mountain areas.

Corruption perception and reluctance to cooperate are significant barriers in some Eastern countries' VCs. Strengthening civil society and building public trust could potentially improve this situation.

Unfair competition from larger companies poses another trade-off. Mountain VCs have a limited capacity for production because they are based on limited natural resources or due to labour force availability. However, when mountain products become recognised by their specific quality values and demand increases, external companies often grab the image and imitate mountain products using different products or production methods without preserving their intrinsic values. Limited bargaining power and power imbalances leave mountain areas vulnerable to such competition, emphasising the need for protective laws and regulations.

In the realm of innovation, the small scale of Mountain VCs makes it challenging to access adapted technologies and introduce innovations. Rigid protocols and the difficulty of making changes in certification and protection methods add complexity to the introduction of innovations. Moreover, technological changes can be costly and may require a skilled workforce that is not always available in mountain areas. On a positive note, mountain VCs and areas have significant potential for social and retro innovations. Subsidies and targeted support for these areas could enhance their potential to foster innovation.

5.4. Cross-value chain analysis of the objectives to enhance resilience and sustainability

The outcomes of the questionnaire revealed the preferences of participants in selecting the objectives that contribute more to sustainability and resilience. The diverse demographic and professional backgrounds among the survey participants across 14 different countries ensure a variety of perspectives. The demographic profile of respondents is well-distributed across age ranges, with a significant majority falling between 40-65 years old and a substantial representation from the 25-40 age group. The gender distribution indicates a slight imbalance, with fewer women (37.96%) than men participating. It's noteworthy that the group of participants with a university degree or higher education (88.89%) is overrepresented. Considering professional diversity, participants were engaged in a wide array of sectors.

Previous studies in this subject area provided evidence that differing preferences exist for possible future land-use change scenarios in European mountain regions (Soliva et al., 2008), for ecosystem services in the Italian Alps (Grilli et al, 205), for policy priorities in Scottish hill areas (Morgan-Davies and Waterhouse, 2010), and for sustainable mountain tourism strategies and consumption patterns in Europe (Colasante et al., 2024).

As far as we know, this is the first study incorporating a large number of European countries (14) and stakeholder opinions on a fixed set of sustainability and resilience objectives, providing insight into which nuances of sustainability are considered the most important when designing policies to protect and strengthen mountain regions.

From the results, a certain preference heterogeneity for the examined objectives can be drawn, identifying three distinct streams of preferences. Based on these streams, three stakeholder groups can be outlined:

- **Class 1 - Environmental Advocates**: Stakeholders who particularly value ecological objectives and put a moderate emphasis on wellbeing. The objectives they consider contribute more to sustainability and resilience are: O6-Ecological resilience, O3-Sustainable use of local assets, and O7-Attractiveness & wellbeing.
- **Class 2 - Social Visionaries**: Stakeholders who prioritise social and human aspects. This class shows a more balanced preference for the set of objectives considered, prioritising O7-Attractiveness & wellbeing, O2-Human capital, and O5-Adaptive capacity as main objectives.
- **Class 3 - Sustainability Together**: Stakeholders that promote environmental and cooperative aspects. Their preferred objectives are O3-Sustainable use of local assets, O1-Cooperation, and O6-Ecological resilience.

The group of ¨Social Visionaries¨ represented almost half of the participants in the survey (47,8%) and the “Environmental Advocates” (32.6%), having Class 3 a more reduced number of adherents.

Social visionaries emphasize the contribution to sustainability and resilience by focusing on people. They believe that VCs wield significant power to valorise and revitalise mountain areas, particularly by offering high-quality jobs and stable income. However, a strong emphasis is needed on education and upskilling to address new challenges and adapt to socio-economic and environmental threats (Coopmans et al. 2021).

On the other hand, environmental advocates stress the contribution of VCs to resilience and sustainability based on natural resources. VCs can play a vital role if their practices mitigate environmental threats, address water scarcity, maintain biodiversity, and incorporate activities that consider the cultural, social, environmental, and economic factors of the mountain context. Additionally, the emphasis is on limiting the degradation of natural resources while attracting and retaining people through job opportunities and fair incomes.

Notably, both perspectives underscore the importance of enhancing the attractiveness and well-being opportunities of mountain areas, along with attracting and retaining human capital, recognising that European mountains heavily depend on human involvement for resilience and sustainability.

The last class, “Sustainability Together,” with lower membership, can be considered a mix of environmental and social aspects as they prioritise sustainable use of local assets and ecological resilience, but also cooperation through collaboration and sharing benefits along the different stages of the VC.

A consistent finding across all identified groups is the surprisingly low assigned importance of Inclusiveness as an objective. From the cluster analysis result, this can be interpreted as indicating that in the majority of the VCs analysed, there is a limited presence of women, youngsters, and non-locals. The existing literature suggests that the underrepresentation of women in the survey may contribute to this result. It is expected that women, being a minority in sectors like agriculture and forestry, might be more inclined to advocate for inclusiveness. Also, the significant majority of the respondents representing the age span of 40-65 years could have an influence. Studies have shown that Millennials (born between 1980-2000) tend to value inclusiveness in their work environment (Maier et al., 2015) and the attitude of the Baby-Boomer-Generation (born between 1946–1964 (Coleman et al., 2006) is very different from younger ones focusing on different values (Tulgan, 2003).

The survey results underscore the importance of developing policies at the international, national, regional and even local levels to support European mountain areas. This includes engaging young people and the rural population in general and creating an enabling policy environment for the value chains. Deliverable D5.2 encompasses one policy brief per cluster, offering reflections on the conducive policy environment to enhance the contribution of VCs to the sustainability and resilience of the mountain socio-ecological systems (SES).

6. Conclusions

In conclusion, the critical benchmarking process conducted across the five clusters of value chains in European mountain areas, as part of the MOVING project's WP5, has provided a nuanced understanding of their contributions to sustainability and resilience. The detailed

examination of each cluster's unique challenges and contributions offers a holistic view that can inform targeted and effective strategies for enhancing the sustainability and resilience of mountain value chains in specific aspects.

However, despite the distinct focuses of each cluster, common themes have emerged in the five clusters, highlighting the intricate interplay of factors and challenges between the cluster topics and emphasising the need for collaborative and comprehensive approaches to address them.

The trade-offs identified, such as the lack of recognition and compensation for the public goods provided, the competition between certified and conventional products, the struggle for collective action, and the vulnerability to unfair competition by big companies grabbing the image of mountain products, highlight the nuanced landscape within which mountain value chains operate. Furthermore, constraints related to innovation, limited bargaining power, and limited access to infrastructure, services or digital connectivity due to the remote nature of mountain areas, pose increasing challenges.

Despite these challenges, the analysis has underscored the crucial public goods provided by these value chains. These include not only mountain vitality and economic benefits through job creation and income generation but also the delivery of ecosystem services and the preservation of cultural landscapes. The lack of recognition and fair compensation for these public goods emerges as a key obstacle to the long-term sustainability and attractiveness of mountain areas.

The prioritisation of objectives related to human and social capital in the preferences marked by the participants in the questionnaire signals a clear understanding that retaining and enhancing the skills of individuals in mountain areas is pivotal for sustainable management.

As a final reflection emerged the enthusiasm and commitment demonstrated by the mountain stakeholders and experts who actively participated in the Cluster workshop and contributed to the questionnaire. In both activities, we overpassed our top expectations. This high level of engagement has proven to be instrumental in extracting bottom-up insights and fostering a grassroots approach to address the sustainability and resilience of mountain areas.

MOVING recognises the significance of this input and will integrate it into its Policy Analysis in WP7, shaping the foundation for its final Policy Roadmap. As we look ahead, the culmination of the benchmarking analysis, along with the nuanced perspectives provided in the Policy Briefs elaborated by every cluster (D5.2), will be a cornerstone resource to inform the development of a new generation of policies tailored to the specific needs of mountain areas. By influencing policy discussions at both local and European levels, MOVING aims to contribute meaningfully to the sustainable future of mountain regions.

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Appendix - Questionnaire to Weigh the Objectives

Moving mountains towards a better future

Fields marked with * are mandatory.

Dear valued member of MOVING community and dear other participants,

Thank you for taking the time to participate in our survey! We aim here to gather valuable insights from a diverse community from the mountain regions in Europe, and we truly appreciate your contribution. You are the right person to fill in the questionnaire if you live or work in a mountain region and practice an economic or voluntary activity such as farming, food processing, forestry, tourism, administration and policy, nature conservation, etc. You may forward the link to the survey to colleagues that fulfill this description too.

The survey looks to identify what are mountain actors' priorities in terms of the future in mountain areas, through the perspective of your daily activities around products that we studied in the MOVING project.

The survey should take approximately 15 to 20 minutes to complete. Your responses will remain confidential and anonymous, and the data collected will be used solely for research and analytical purposes. All information collected will be handled in accordance with applicable data protection laws and regulations (see data protection declaration)

You can choose your preferred language from the drop-down menu at the beginning of the survey. You

may pause and come back to the survey later. Your previous responses will be saved, ensuring a seamless experience.

If you have any questions or concerns, please feel free to contact us in any language at moving. coord@uco. es
Consult the Project webpage at www.moving-h2020.eu, subscribe to the newsletter and our social media channels for future updates on the results.

Best regards,
MOVING Consortium

DATA MANAGEMENT

MOVING is responsible for the processing of the personal data provided with your consent when registering and informs you that the data provided will be processed in accordance with the General Data Protection Regulation (EU) 2016/679 of 27 April 2016 (GDPR) and other applicable rules, for the management of the activity and to send other electronic communications of content related to it. Read more in our Privacy Policy

☐ I consent to the use of my data for the purposes stated in the Privacy Statement.

1 LOCATION

* 1.1 In which country do you currently live?

- ○ Austria
- ○ Bulgaria
- ○ Czechia
- ○ France
- ○ Greece
- ○ Hungary
- ○ Italy
- ○ North Macedonia
- ○ Portugal
- ○ Romania
- ○ Serbia
- ○ Slovakia
- ○ Spain
- ○ Switzerland
- ○ Turkey
- ○ Scotland
- ○ Other

1.2 If other, which country?

1.3 In which region do you live (province, canton, administrative unit name, region)?

* 1.4 Select the category that constitutes your main activity

- [ ] Tourism sector
- [ ] Agriculture
- [ ] Nature parks and nature conservation
- [ ] Administration and policies
- [ ] Forestry
- [ ] Processing and manufacturing
- [ ] Transport, distribution and marketing
- [ ] Consulting services
- [ ] Research, education and development
- [ ] Energy
- [ ] Gastronomy & restaurant
- [ ] Sport & leisure activity
- [ ] Other (please, specify below)

1.5 Within agriculture, please specify all types of production that apply to your situation

- [ ] Permanent crops (vinery, olive groves...)
- [ ] Arable crop production (grains, corn)
- [ ] Milk production
- [ ] Pork
- [ ] Greenhouses
- [ ] High nature value farming
- [ ] Beef meat
- [ ] Sheep
- [ ] Agro-forestry (Chestnut, Carob, etc)
- [ ] Apiculture

1.6 Within processing and manufacturing, or distribution, please specify the types of products that apply to your situation

- [ ] Meat products (e.g. beef, lamb, sheep, pork...)
- [ ] Milk and cheese
- [ ] Wine, oil, beer, whisky, beverages
- [ ] Flour, bread, pasta
- [ ] Fresh plant product
- [ ] Animal by-products (e.g. wool)
- [ ] Other

1.7 Is your production or the products you distribute within one or more of these schemes? Select all that apply

- [ ] Protected Designation of Origin (PDO)
- [ ] Protected Geographical Indication (PGI)
- [ ] Organic
- [ ] High nature value farming
- [ ] Product Denomination of mountain origin
- [ ] Local cooperative, own brand, farm shop

1.8 Other: Which is your main activity?

2 ABOUT YOU

2.1 Please indicate what is your age category, with the choice options indicated:

- ( ) <25
- ( ) 25-40
- ( ) 40-65
- ( ) >65

2.2 Please indicate your gender with the choice options indicated:

- ( ) Female
- ( ) Male
- ( ) Non-binary
- ( ) Other

2.3 What is your level of education?

- ( ) Primary and/or secondary school
- ( ) High school
- ( ) Professional school/apprenticeship
- ( ) University degree
- ( ) Further education, PhD, specialists
- ( ) Other

2.4 Please, indicate the size of your current company/institution:

- ( ) 1 person (independant, freelance)
- ( ) 2-5 people
- ( ) 5-10 people
- ( ) 10-50 people
- ( ) >50 people

2.5 What is your personal role in the company/institution?

- ( ) I do everything (independant, freelance, consultant)
- ( ) Business (co-) owner/CEO

- Cooperative or association's president or committee
- Permanent long-term employee
- Non-permanent employee/seasonal

2.6 How old is your company/institution, or how long ago did you take over the farm/business?

- <2 years
- 2-5 years
- 5-10 years
- 10-30 years
- >30 years

3 PRODUCTS

3.1 Please, select from the list which is the product/activity you are related to in your region:

- Lamb from the region of Weiz (Austria)
- Public Goods from High Nature Value Farming (Bulgaria)
- Cattle farms, specifically beef production (Czechia)
- Chestnut Flour (France)
- Sheep meat locally produced and valorised (France)
- Central Rethymno Carob (Greece)
- Agroecological Knowledge (Hungary)
- Alto-Molise dairy (Italy)
- Trento Doc Wine (Italy)
- Chestnut flour (Italy)
- Rural Tourism (North Macedonia)
- Serra da Estrela PDO Cheese (Portugal)
- Douro wine (Portugal)
- Certified ecotourism (Romania)
- Alps: Sjenica lamb PDO (Serbia)
- Bio-honey (Slovakia)
- Organic Mountain Olive Oil (Spain)
- Iberian Ham PDO – Los Pedroches (Spain)
- Mountain wine (Spain)
- Mountain Grain (Switzerland)
- Tête de Moine PDO cheese (Switzerland)
- Greenhouse Tomato (Turkey)
- Speyside Malt Whisky (UK-Scotland)

3.2 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Lamb from the region of Weiz (Austria)

3.3 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Public Goods from High Nature Value Farming (Bulgaria)

3.4 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Cattle farms, specifically beef production (Czechia)

3.5 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Chestnut Flour (France)
- Sheep meat locally produced and valorised (France)

3.6 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Central Rethymno Carob (Greece)

3.7 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Agroecological Knowledge (Hungary)

3.8 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Alto-Molise Dairy (Italy)
- Chestnut flour (Italy)
- Trento Doc Wine (Italy)

3.9 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Rural Tourism (North Macedonia)

3.10 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Serra da Estrela PDO Cheese (Portugal)
- Douro wine (Portugal)

3.11 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Certified ecotourism (Romania)

3.12 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Alps: Sjenica lamb PDO (Serbia)

3.13 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Bio-honey (Slovakia)

3.14 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Organic Mountain Olive Oil (Spain)
- Mountain wine (Spain)
- Iberian Ham PDO – Los Pedroches (Spain)

3.15 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Mountain Grain (Switzerland)
- Tête de Moine PDO cheese (Switzerland)

3.16 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- Greenhouse Tomato (Turkey)

3.17 We have studied these products below, including all productionn, processes, support and consumption. Please select the one you relate the most with based on your country.

- ○ Speyside Malt Whisky (UK-Scotland)

4 REGIONAL IMPACT

We have studied the production of lamb from the region of Weiz, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of public goods from High Nature Value Farming, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of cattle farms, specifically beef production , including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of chestnut flour, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of sheep meat, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of Central Rethymno carob, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of agroecological knowledge, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of Alto-Molise dairy, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of Trento Doc wine, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of chestnut flour, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the sector of rural tourism, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of Serra da Estrela PDO cheese , including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of Douro wine, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the sector of certified ecotourism, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of Sjenica lamb, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of bio-honey, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of organic mountain olive oil, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of Iberian ham PDO – Los Pedroches, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of mountain wine, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of mountain grain, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of Tête de Moine PDO cheese, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of greenhouse tomato, including all companies and organizations, and also the socioeconomic, political and environmental context.

We have studied the production of Speyside malt whisky, including all companies and organizations, and also the socioeconomic, political and environmental context.

4.1 From your point of view and activity, which is the impact of this production on these aspects

	Very strong	Quite strong	Weak	None	Don't know
The economy	○	○	○	○	○
The culture and education, with positive effects on the quality of social relations	○	○	○	○	○
The natural resources	○	○	○	○	○
The diversification of sources of income by providing a balance between economic profit, the quality of social relations and the upkeep of landscapes and nature.	○	○	○	○	○
Other	○	○	○	○	○

4.2 For "other" please specify:

* 4.3 Rank in order of importance (with the most important in the first position) the elements that most influence the production you have selected in your region:

Use drag&drop or the up/down buttons to change the order or accept the initial order.

- Other (specify below)
- Climate change
- Demographic changes (positive & negative)
- Tourism
- The selling prices of the products/services of this activity to consumers

4.4 If you would like to add another element under "other", specify here what it would be:

* 4.5 Sort from the most important (in the first position) to the least important (in the last position) the key elements to improve farmers' situation in your region in the future.

Use drag&drop or the up/down buttons to change the order or accept the initial order.

- Better water management systems and practices
- Better quality of the air
- More biodiversity
- Better soils
- Better fights against pests & diseases
- Better fight against the degradation caused by the predators
- Better access to land
- Improvements of the pastures and access to more animal feed
- Public subsidies

*

4.6 Sort from the most important (in the first position) to the least important (in the last position) the key elements to improve entrepreneurship & entrepreneurs' situation in your region in the future.

Use drag&drop or the up/down buttons to change the order or accept the initial order.

- Digitalization
- Access to more technology
- Progress on quality and reputation of the products
- Decrease of the prices of the energy
- Access to new markets for the local enterprises
- More tourists
- Access to finance
- Increase of population
- Education
- Jobs
- Public subsidies

4.7 Any other idea?

4.8 If you have an idea or recommendation to make to unlock a better future for your region, and more specifically in relation to this production, please tick up to 5 boxes that best match your feeling:

at most 5 choice(s)

- ☐ Land management
- ☐ Support more the forestry
- ☐ Support more the agriculture
- ☐ Fostering better business conditions for the enterprises
- ☐ Protect more the nature
- ☐ Invest in renewable energies
- ☐ Invest in circular economy like recycling, re-using, managing the waste, etc.
- ☐ Giving to municipalities more funds to invest in infrastructures and local projects
- ☐ Invest in primary and permanent education
- ☐ Mobility & infrastructure (roads, trains, airports, public transports)
- ☐ More access to high schools and universities to transfer technology and innovation
- ☐ Access to local products at lower prices
- ☐ Support the tourism
- ☐ Access to health services
- ☐ Support the cooperation between farms and enterprises
- ☐ Invest in the local government

4.9 Optional: give an explanation for your selection or indicate any other idea.

5 INFORMATION ABOUT OBJECTIVES

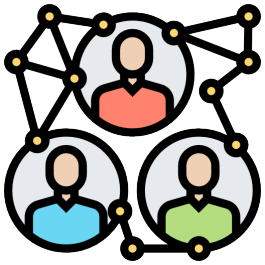
In the next pages, you will be asked about “objectives” for the development in which the activities in mountain areas could be improved (or worsened) for example in food production and tourism. We want to know which are the most important for you. We first show you some sheets explaining the objectives related to possible improvements (or worsenings). Please read carefully to answer the questions on the pages after.

Human capital

Actors and enterprises in the value chain are concerned about the importance of education and upskilling to respond to the evolutions of mountain value chains. They are aware of their role in educating the next generations and providing them with appropriate skills.

Cooperation

Actors engage in formal and informal relationships in the value chain, fostering fruitful collaboration. This collaboration also leads to sharing benefits fairly among all involved parties throughout the production, processing, and distribution phases.



Sustainable use of local assets

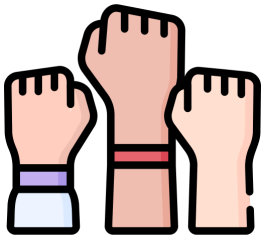
Activities in the value chains are designed so that cultural, social, environmental and economic factors are adapted to the territorial context and availability of resources while limiting damage to them

Inclusiveness

The structure of the value chain is open to new entrantes and it promotes the participation of all in the management and decision-making. Formal and informal rules are designed for the inclusion of different groups of population (migrants, women, LGTBIQ+, disabled persons).

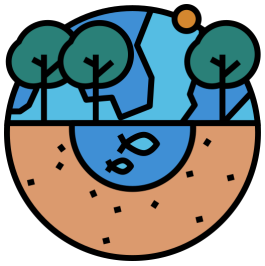
Adaptive capacity

Actors are aware of their role and responsibility to support the adaptation and mitigation of socio-economic threats, such as depopulation, isolation, inflation, etc. They take appropriate action and consideration of these threats in strategic decisions.



Ecological resilience

Actors are aware of their role and responsibility in helping to adapt to and mitigate environmental threats such as climate change, water scarcity, and biodiversity changes. They take appropriate actions and considerations of these threats into account when making strategic decisions.



Attractiveness & wellbeing

The activities along the value chains focuse on revitalising rural areas with aiming to retain youth and attract new inhabitants. This is achieved through several initiatives, strategies and policies such as the creation of high-quality jobs and stable income for workers.

6 PRIORITIES

Following, you are going to be presented a sequence of 7 choice cards including objectives that actors in mountain areas can achieve to contribute to the development of the regions. Please, indicate what objective you think as the **most important and the least important**, considering the efforts of implementation and/or co-benefits for actors **in your current situation**? Please, the choices are independent, so you just have to think in the three alternatives included in the card. Select each time the “most important” and the ”least important” option.

7 Choice Card 1

7.1 In the table below, between the three objectives proposed select the most important and the least important.

	Cooperation Actors engage in formal and informal relationships in the value chain, fostering fruitful collaboration. This collaboration also leads to sharing benefits fairly among all involved parties throughout the production, processing, and distribution phases.	**Human capital** Actors and enterprises in the value chain are concerned about the importance of education and upskilling to respond to the evolutions of mountain value chains. They are aware of their role in educating the next generations and providing them with appropriate skills.	**Inclusiveness** The structure of the value chain is open to new entrantes and it promotes the participation of all in the management and decision-making. Formal and informal rules are designed for the inclusion of different groups of population (migrants, women, LGTBIQ+, disabled persons).
The most important	○	○	○
The least important	○	○	○

8 Choice Card 2

8.1 In the table below, between the three objectives proposed select the most important and the least important.

	Human capital Actors and enterprises in the value chain are concerned about the importance of education and upskilling to respond to the evolutions of mountain value chains. They are aware of their role in educating the next generations and providing them with appropriate skills.	**Sustainable use of local assets** Activities in the value chains are designed so that cultural, social, environmental and economic factors are adapted to the territorial context and availability of resources while limiting damage to them	**Adaptive capacity** Actors are aware of their role and responsibility to support the adaptation and mitigation of socio-economic threats, such as depopulation, isolation, inflation, etc. They take appropriate action and consideration of these threats in strategic decisions.
The most important	○	○	○
The least important	○	○	○

9 Choice Card 3

9.1 In the table below, between the three objectives proposed select the most important and the least important.

	Sustainable use of local assets Activities in the value chains are designed so that cultural, social, environmental and economic factors are adapted to the territorial context and availability of resources while limiting damage to them.	**Inclusiveness** The structure of the value chain is open to new entrantes and it promotes the participation of all in the management and decision-making. Formal and informal rules are designed for the inclusion of different groups of population (migrants, women, LGTBIQ+, disabled persons).	**Ecological resilience** Actors are aware of their role and responsibility in helping to adapt to and mitigate environmental threats such as climate change, water scarcity, and biodiversity changes. They take appropriate actions and considerations of these threats into account when making strategic decisions.
The most important	○	○	○
The least important	○	○	○

10 Choice Card 4

10.1 In the table below, between the three objectives proposed select the most important and the least important.

	Inclusiveness The structure of the value chain is open to new entrantes and it promotes the participation of all in the management and decision-making. Formal and informal rules are designed for the inclusion of different groups of population (migrants, women, LGTBIQ+, disabled persons).	**Adaptive capacity** Actors are aware of their role and responsibility to support the adaptation and mitigation of socio-economic threats, such as depopulation, isolation, inflation, etc. They take appropriate action and consideration of these threats in strategic decisions.	**Attractiveness & wellbeing** The activities along the value chains focuse on revitalising rural areas with aiming to retain youth and attract new inhabitants. This is achieved through several initiatives, strategies and policies such as the creation of high-quality jobs and stable income for workers.
The most important	○	○	○

The least important	○	○	○

11 Choice Card 5

11.1 In the table below, between the three objectives proposed select the most important and the least important.

	Adaptive capacity Actors are aware of their role and responsibility to support the adaptation and mitigation of socio-economic threats, such as depopulation, isolation, inflation, etc. They take appropriate action and consideration of these threats in strategic decisions.	**Ecological resilience** Actors are aware of their role and responsibility in helping to adapt to and mitigate environmental threats such as climate change, water scarcity, and biodiversity changes. They take appropriate actions and considerations of these threats into account when making strategic decisions.	**Cooperation** Actors engage in formal and informal relationships in the value chain, fostering fruitful collaboration. This collaboration also leads to sharing benefits fairly among all involved parties throughout the production, processing, and distribution phases.
The most important	○	○	○
The least important	○	○	○

12 Choice Card 6

12.1 In the table below, between the three objectives proposed select the most important and the least important.

	Ecological resilience Actors are aware of their role and responsibility in helping to adapt to and mitigate environmental threats such as climate change, water scarcity, and biodiversity changes. They take appropriate actions and considerations of these threats into account when making strategic decisions.	**Attractiveness & wellbeing** The activities along the value chains focuse on revitalising rural areas with aiming to retain youth and attract new inhabitants. This is achieved through several initiatives, strategies and policies such as the creation of high-quality jobs and stable income for workers.	**Human capital** Actors and enterprises in the value chain are concerned about the importance of education and upskilling to respond to the evolutions of mountain value chains. They are aware of their role in educating the next generations and providing them with appropriate skills.

The most important	○	○	○
The least important	○	○	○

13 Choice Card 7

13.1 In the table below, between the three objectives proposed select the most important and the least important.

	Attractiveness & wellbeing The activities along the value chains focuse on revitalising rural areas with aiming to retain youth and attract new inhabitants. This is achieved through several initiatives, strategies and policies such as the creation of high-quality jobs and stable income for workers.	**Cooperation** Actors engage in formal and informal relationships in the value chain, fostering fruitful collaboration. This collaboration also leads to sharing benefits fairly among all involved parties throughout the production, processing, and distribution phases.	**Sustainable use of local assets** Activities in the value chains are designed so that cultural, social, environmental and economic factors are adapted to the territorial context and availability of resources while limiting damage to them.
The most important	○	○	○
The least important	○	○	○

14 OPTIONAL SELECTION OF OBJECTIVES

14.1 Rank below the objectives from the one you think the production is making the biggest contribution to, in the current situation (in the first position), to the one you think the production is making the smallest contribution to (in the last position)

Use drag&drop or the up/down buttons to change the order or accept the initial order.

- ⠿ Human capital
- ⠿ Sustainable Use of local assets
- ⠿ Cooperation
- ⠿ Inclusiveness

- Adaptive Capacity
- Ecological Resilience
- Attractiveness & wellbeing

14.2 Rank below the objectives from the one you think will be the easiest to improve in your region within 10 years (in the first position), to the one you think will be the most difficult (in the last position)

Use drag&drop or the up/down buttons to change the order or accept the initial order.

- Sustainable Use of local assets
- Attractiveness & wellbeing
- Adaptive Capacity
- Ecological Resilience
- Inclusiveness
- Human capital
- Cooperation

14.3 Optional: please choose 1 or 2 objectives you would like to tell us more about with three additional questions in the next page

- [ ] Human Capital
- [ ] Cooperation
- [ ] Sustainable use of local assets
- [ ] Adaptive capacity
- [ ] Ecological resilience
- [ ] Attractiveness & wellbeing
- [ ] Inclusiveness
- [ ] No, go directly to end of questionnaire

14.4 Optional question: in your opinion, is there an objective that is missing and if yes how would you formulate it?

15 Human Capital

Human capital

Actors and enterprises in the value chain are concerned about the importance of education and professionalization in the territorial context around the value chains. They are aware of their role in educating the next generations and providing them with appropriate skills

15.1 What are the practices, solutions or relationships that you already have established (or would like to) that help you and the production reach the objective? (list a few in very short sentences)

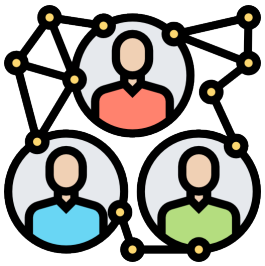
15.2 What are the supports (policies, programs, people), that help you and/or the activity reach this objective (or could help in the near future)?

15.3 What are the obstacles in your activity that block you to perform better in this objective? (list a few in very short sentences)

16 Cooperation

Cooperation

Actors engage in formal and informal relationships in the value chain, fostering fruitful collaboration. This collaboration also leads to sharing benefits fairly among all involved parties throughout the production, processing, and distribution phases.



16.1 What are the practices, solutions or relationships that you already have established (or would like to) that help you and the production reach the objective? (list a few in very short sentences)

16.2 What are the supports (policies, programs, people), that help you and/or the activity reach this objective (or could help in the near future)?

16.3 What are the obstacles in your activity that block you to perform better in this objective? (list a few in very short sentences)

17 Sustainable use of local assets

Sustainable use of local assets

Activities in the value chains are designed so that cultural, social, environmental and economic factors are adapted to the territorial context and availability of resources while limiting damage to them

17.1 What are the practices, solutions or relationships that you already have established (or would like to) that help you and the production reach the objective? (list a few in very short sentences)

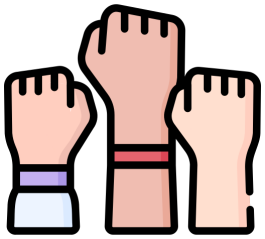
17.2 What are the supports (policies, programs, people), that help you and/or the activity reach this objective (or could help in the near future)?

17.3 What are the obstacles in your activity that block you to perform better in this objective? (list a few in very short sentences)

18 Adaptive Capacity

Adaptive capacity

Stakeholders are aware of their role and responsibility on helping to adapt and mitigate socio-economic threats, such as depopulation, isolation, inflation, etc. They take appropriate action and consideration of these threats in strategic decisions.



18.1 What are the practices, solutions or relationships that you already have established (or would like to) that help you and the production reach the objective? (list a few in very short sentences)

18.2 What are the supports (policies, programs, people), that help you and/or the activity reach this objective (or could help in the near future)?

18.3 What are the obstacles in your activity that block you to perform better in this objective? (list a few in very short sentences)

19 Inclusiveness

Inclusiveness

The structure of the value chain is open to new entrantes and it promotes the participation of all in the management and decision-making. Formal and informal rules are designed for the inclusion of different groups of population (migrants, women, LGTBIQ+, disabled persons).

19.1 What are the practices, solutions or relationships that you already have established (or would like to) that help you and the production reach the objective? (list a few in very short sentences)

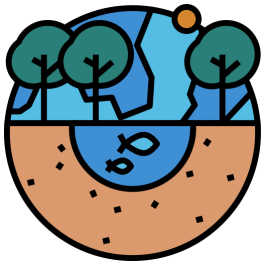
19.2 What are the supports (policies, programs, people), that help you and/or the activity reach this objective (or could help in the near future)?

19.3 What are the obstacles in your activity that block you to perform better in this objective? (list a few in very short sentences)

20 Ecological Resilience

Ecological resilience

Actors are aware of their role and responsibility in helping to adapt to and mitigate environmental threats such as climate change, water scarcity, and biodiversity changes. They take appropriate actions and considerations of these threats into account when making strategic decisions.



20.1 What are the practices, solutions or relationships that you already have established (or would like to) that help you and the production reach the objective? (list a few in very short sentences)

20.2 What are the supports (policies, programs, people), that help you and/or the activity reach this objective (or could help in the near future)?

20.3 What are the obstacles in your activity that block you to perform better in this objective? (list a few in very short sentences)

21 Attractiveness & wellbeing

Attractiveness & wellbeing

The activities along the value chains focuse on revitalising rural areas with aiming to retain youth and attract new inhabitants. This is achieved through several initiatives, strategies and policies such as the creation of high-quality jobs and stable income for workers.

21.1 What are the practices, solutions or relationships that you already have established (or would like to) that help you and the production reach the objective? (list a few in very short sentences)

21.2 What are the supports (policies, programs, people), that help you and/or the activity reach this objective (or could help in the near future)?

21.3 What are the obstacles in your activity that block you to perform better in this objective? (list a few in very short sentences)

22 CLOSING AND THANKS

We warmly thank you for your participation in our survey and for taking the time to answer the questions. To follow and be informed about the results, please subscribe to our newsletter and the project's social media channels:

Website and newsletter: MOVING H2020
LinkedIn: Linkedin MOVING H2020
Twitter: Twitter MOVING H2020
Facebook: Facebook MOVING H2020

22.1 Free space for comments and remarks on the previous answers