MOVING
MOuntain Valorisation through INterconnectedness and Green growth

D4.3: Participatory value chain analysis

Report on the structure and valorisation of 23 mountain value chains across Europe, including evaluation of tele-coupling, assemblage, and enabling institutions and infrastructure

Authors: lackstock, K., Flanigan, S., Creaney,R., Matthews K., Hopkins, J., Miller, D., Ahmed, A., Chabdu, A., Bacigalupo, A., Thompson, C., (The James Hutton Institute)

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Authors	lackstock, K., Flanigan, S., Creaney, R., Matthews K., Hopkins, J., Miller, D., Ahmed, A., Chabdu, A., Bacigalupo, A., Thompson, C., (The James Hutton Institute)
Work Package Leader	WP4 – James Hutton Institute
Project Coordinator	University of Cordoba

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Acronyms

AB	Agricultural Business
A-E	Agro-Ecological
AVC	Additional Value Chain
CAF	Conceptual Analytical Framework
CAO	Council of Agricultural Organisations
CoP	Community of Practice
COVAP	Cooperativa Ganadera del Valle de los Pedroches
DoA	Description of the Action
DOC	Denominazione di Origine Controllata
EVOO	Extra Virgin Olive Oil
FD	Food and Drink
FVC	Focal Value Chain
GDP	Gross Domestic Product
GHG	Green House Gases
GVA	Gross Value Added
HACCP	Hazard Analysis and Critical Control Points
HNV	High Nature Value
HORECA	Hotel, Restaurant, Café sector
ICT	Information and Communications Technology
IFAPA	Instituto Andaluz de Investigación y Formación Agraria y Pesquera
IFOAM	International Federation of Organic Agriculture Movements
IGT	Indicazione Geografica Tipica (like PGI)
ISO	International Organisation for Standardisation
LAG	Local Action Groups
LEADER	Liaison Entre Actions de Développement de l'Économie Rurale
LFA	Less Favoured Area
LUS	Land Use System
MAP	Multi-Actor Platform
MRL	Mountain Reference Landscape

MRR	Mountain Reference Region
MS	Member State
MVA	Market Value Added
MVC	Market Value Change
NDP	No Data Provided
NGO	Non-Governmental Organization
PDO	Protected Designation of Origin
PGI	Protected Geographical Indication
SC	Socio-Cultural
SES	Social Ecological Systems
SME	Small to Medium-sized Enterprise
STEEP	Social, Technology, Economy, Environment, Politics & government
UAA	Utilisable Agricultural Area
UNESCO	United Nations Educational, Scientific and Cultural Organization
VC(s)	Value Chain(s)
VRE	Virtual Research Environment
WP	Work Package

Executive summary

This deliverable summarises our findings regarding the participatory analysis of 23 diverse mountain value chains. Data were collected across the 23 value chain (VC) examples, representing traditional agro-food (meat, cheese, plant-based, alcohol) value chains and value chains based on tourism, public goods and knowledge. Some VCs are emergent, small scale niche products seeking to grow their markets whereas others are more economically dominant and are currently seeking ways to become more sustainable. Both were important to assess in terms of lessons for future mountain policy.

The findings report on the structure across four stages of the value chain – Production, Processing, Distribution/Marketing and Consumption. The analysis assessed the practices performed by the wide range of actors that valorise mountain territorial capital and generate the values associated with the final product. As part of this analysis, the role of infrastructure and institutions were considered to understand to what extent there is an enabling environment supporting these mountain VCs.

Most cases felt the VC did improve economic, social, and environmental outcomes and therefore values were added to mountain territorial capital. Economic valorisation was most positive; but there were also many socio-cultural benefits identified from the VC practices. The environmental valorisation is slightly less positive – although many cases believe that the environmental capital assets were improved, some cases were more neutral, and some felt natural resources had been damaged by the VC. However, in these latter cases, there were mitigation practices underway to protect the resources, such as water, soils, or habitats.

Most of our VCs are tele-coupled to spaces outside the mountain reference landscape (MRL) and the wider mountain reference region (MRR). Although some valorisation takes place at the Production stage within the MRL, much of the economic valorisation occurs at the Distribution/Marketing and Consumption stages outside the MRL or MRR. This may explain why there are many agro-food VCs working with tourism to generate a wider mountain VC assemblage with Consumption taking place in the mountains.

The analysis was extended to consider how the VCs are interdependent with other VCs in the MRL. In general, the assemblage amplified positive valorisation effects in the focal VC or counteracted any problems – however there were some examples of conflicts as well as synergies. These conflicts were often regarding competition for scarce resources, such as water, or skilled staff. Whilst the assemblage emerges from shared MRL territorial assets and actors, the assemblages are also tele-coupled across space.

Many of the issues highlighted above are common to rural VC analyses, highlighting the need to protect the territorial assets; retain value in the rural areas; and use tele-coupling to become the receiving system (e.g., tourism). The mountain location amplifies these concerns as their remoteness make it more difficult to improve both access and primary industry production activities have additional natural constraints. However, mountains also have important assets for their value chains that can become opportunities for development.

1 Introduction

This deliverable is part of WP4's overall objective to analyse the current diversity of mountain Value Chains (VCs) (as assemblages of practices within nested socio-ecological systems) in Europe. The analysis will be used in later tasks to assess their potential contribution to the different regions' sustainability and resilience. The focus is to consider how different social practices are assembled within VCs that are embedded in the local mountain socio-ecological systems. Assemblage theory is an approach to understanding complex systems that emphasizes fluidity and relationships between entities (Moretti et al., 2021a). The project Conceptual and Analytical Framework (CAF) also explains socio-ecological systems as the organization of social and ecological interactions across different scales that generate the systems in which we live.

Mountains cover a significant proportion of Europe (Drexler et al., 2016) and are important sources of public goods for both local communities and the wider lowland populations (Price, 2015). Mountains face particular challenges such as low population density, remoteness and restricted land capability that can inhibit the opportunities for development (European Environment Agency, 2010) as well as being affected by non-mountain specific institutions (Tucker et al., 2021). The purpose of this deliverable is to understand, in a qualitative way, the way in which VCs harness these local mountain assets and work within the challenges faced by mountain communities. These mountain socio-ecological systems correspond with the initial stage(s) of the VCs (Production and sometimes Processing stages).

The deliverable reports on T4.3 (MOVING project team, 2022a) and T4.4 (MOVING project team, 2022b), which includes joint findings of the participatory analysis of how the selected VCs function within the socio-ecological systems within the Mountain Reference Landscapes (MRL). The MRLs are nested within wider Mountain Reference Regions (MRR) that share the pedo-climatic conditions. As such, it represents the application of the CAF developed in WP2 to the 23 focal value chains in the 23 MRLs in project Deliverable 4.2 (Blackstock and Flanigan, 2021). The choice of VCs had to balance a range of considerations: potential or current innovation; ability to enact participatory methodology; a new perspective on value chains, given the advanced scholarship on existing commodity value chain economic performance; and a range that reflected the economic structure of mountain regions (often dominated by the service sector). These were the same cases used to develop the understanding of mountain land use and natural resource systems in T3.3 (Participatory Vulnerability Analysis of Land Systems) and T3.4 (Mapping of Mountain Areas Vulnerabilities).

The approach is an 'extended' value chain analysis that takes a holistic view on how the social practices are assembled within sectoral or sub-sectoral value chains as part of wider rural development processes (Fabre et al., 2021). As such, the unit of analysis is not an individual firm but the combination of firms and other actors that add value to the territorial capital at each stage allowing the final market value to be realised when the product is sold and consumed. In light of MOVING's overall objectives, the research was not focused on a conventional analysis of economic value added, but a broader and more sociological approach to consider the ways in which particular configurations of practices undertaken by actors added value to the full range of

mountain territorial capitals[1] and how these flowed across the VC stages (Deans et al., 2018). Furthermore, to understand mountain rural development, these configurations need to be located in space and understood in terms of how wider institutions can help or hinder the VC and their outcomes. The concept of assemblage is extended beyond how practices and actors are intertwined within their local mountain landscapes and across wider spatial scales; to understanding how the focal VCs interact with other VCs in these mountain landscapes. This territorial approach is important in understanding how VCs can support sustainability and resilience for mountain communities.

Therefore, the findings are presented in response to some main research questions:

- What is the rural development context within the relevant Mountain Reference Landscape (MRL) for the focal value chains (FVC)?
- How can the value chains (VC) be characterised in terms of longevity, trends, competition, governance and market conditions?
- What is the structure of the FVCs?
- What are the valorisation processes and what final outcomes are generated?
- What are the main enabling infrastructures and institutions utilised by the VCs?
- How are the VCs and their assemblage structured across space? To what extent do the outcomes identified accrue to the MRL or Mountain Reference Region (MRR)?
- How do the FVCs assemble with other VCs in the MRL? How does the assemblage generate outcomes (positive or negative)?

2 Methodology

Each regional partner worked with one or more focal value chain (FVC) within their MRL to collect and analyse data in response to the research questions highlighted above. In order to work constructively with the Multi-Actor Platforms (MAPs), we took the decision to work within MRLs and not at the MRR scale (see Table 1). For most partners, this was more practical when convening face to face discussions as it avoided asking participants to travel long distances; and even if the meetings were subsequently organised online, it was easier to build a constructive ethos when participants had a shared understanding and connection to the same area. Furthermore, many of the VC and mountain development issues were locally specific. However, working at the MRL scale generated challenges when it came to using secondary data. For example, the Serra da Estrela Cheese focal product is a Protected Denomination of Origin (PDO) product from an area of 4,200km^2 that crosses 18 municipalities and three NUTS III districts. The Serra da Estrela MRL consists of nine parishes from three municipalities. Most statistics are at the municipal or NUTS III level and it is difficult to generate MRL statistics.

[1] Defined in the CAF

In some cases, initial selections had to be changed. There were two reasons for this – when partners reflected that the VC was not sufficiently engaged with territorial capital to be a useful lens to understand sustainable mountain development, or the VC was so emergent that there were not enough potential participants for the methodology to be applied. However, these were generally changes of focus within the same overall VC cluster (e.g., sheep meat or cheese rather than sheep wool) rather than radical shifts.

As highlighted in Table 1, not all the VCs were traditional food and drink-based VCs. There were four unconventional VCs that were slightly different to the others. These included a biodiversity VC (Stara Planina HNV), a knowledge VC (Transdanubian A-E Knowledge) and two different types of tourism VC (Maleshevski Tourism, Brasov Certified Ecotourism). The Speyside Whisky VC was also slightly unconventional in that a major part of the Production practices take place outside the MRL, and the raw materials (barley and yeast) are imported to the mountain settings for Processing.

Information on the specific regional MAP participants is included in Appendix 7.2 for the composition of T4.3 participants, and Appendix 7.3 for T4.4 participants.

As set out in the guidance (see Appendix 1.1) the data collection had the following logic:

1. **Focus on a holistic understanding in support of MOVING's overall objectives.** The CAF and data needs for WP5 (MOVING project team, 2024a) and WP6 (MOVING project team, 2024b) require a huge range of data to be collected. A structured diagram (see Appendix 7.1) was used to highlight the main aspects of the FVC analysis. These diagrams were supplemented by a detailed Word template asking for structured data and three additional diagrams to visualise different elements of the analysis (see Appendix 1.1). The main elements analysed were the four practice stages (Production, Processing, Distribution/Marketing, Consumption) that draw on territorial capital from the MRL and are practiced by sets of actors. These practice stages generate flows of materials, money and information and are supported by infrastructure and institutions that are not particular to the VC themselves. Through the VC practices and the factors that influence them in the wider environment (policies, formal and informal rules and norms), the values generated at each stage can increase or decrease the territorial capital, allowing an evaluation of the overall outcomes that relate to the sustainable mountain development situation.
2. **Collect as much data from secondary sources as possible**. We knew that farmers and other private sector actors were very busy and dealing with the additional burden of the Covid-19 pandemic, so we wanted to ensure primary data collection focussed on collecting information not otherwise available – this signals respect for their time and recognises their specific local or tacit knowledge. Desk based reviews were carried out between November 2021 and March 2022 to fill in the Word template and generate the diagrams (Appendix 1.1). This approach considered a range of secondary sources, such as data published in Eurostat and Member State/local authority data sets; scientific publications; grey literature; and organisational webpages. Most of these data were not available at the precise MRL scale but provided important context and allows particular

MRL aspects of the VC to be benchmarked against the national or EU context. Partners were explicitly encouraged to review and reuse data collected as part of T3.3 (Participatory Vulnerability Analysis of Land Systems) regarding the natural resource systems and actors' concerns about the resilience of their VCs.

3. **Fill the gaps in the review with primary data from interviews**. For each case study between 15-20 interviews were conducted in Spring 2022 with a sample that ensured we captured multiple perspectives on the different stages of the VC (see Appendix 7.2), valorisation processes, and enabling environment (governance and infrastructure issues). These interviews covered all aspects of the VC. In total, across the 23 VCs, 355 interviews were carried out. These data were synthesised and used to update the diagrams and Word templates.
4. **Validate our understanding of the performance of the VCs with workshop(s)**. Each partner (except two) held some form of collective validation discussion with their regional MAP regarding the research findings based on the review of secondary data and the interviews (Task 4.4 Participatory Workshops). In total, across the 23 VCs, 278 participants were involved in the 21 workshops (see Appendix 7.3). In some cases, particularly where the VC is tele-coupled[2] across space, online discussions were held to enable actors that were not based in the MRL to contribute. The outcomes of these workshops were used to update the document and diagrams again, so the analysis was based on an overall synthesis of the three stages (desk-based review, interviews, workshops).
5. **Structured data synthesis within cases**. The range of information collected in T4.3 (MOVING project team, 2022a) is large and complex – four diagrams and a Word document ranging from 80 – 120 pages per partner. The use of a standardised Word document and diagram templates for each case to record their data allowed a comparative analysis process. Each document and diagram represented an analysis of primary and secondary data by the individual partners presented in a consistent format. Some of the unconventional VCs adapted the structure of the templates (Word and diagrams) to better represent the assemblage of practices for their VC stages. The Western Stara Planina HNV VC and Speyside Whisky VC retained the same stages. The Transdanubian A-E Knowledge adapted the later stages, removing 'Marketing' from Distribution and adding it to Consumption stage. Finally, the tourism VCs removed one or more stages but added more nuance to the 'Consumption stage'. The Maleshevski Tourism VC retained Production, had an intermediate stage of 'Processing, Distribution/Marketing' and then Consumption. The Brasov Certified Ecotourism VC focussed on two stages – 'Production

[2] As described in the CAF – tele-coupling means making visible the connections and flows of materials, information or money between apparently distant or disconnected socio-ecological systems.

and Marketing' and 'Consumption' that was broken down into transport, hospitality, and leisure activities.

6. **Comparative data analysis of the synthesised VC data**. The final versions of the diagrams and Word document were provided for comparative analysis in July 2022. The data in the Word documents and diagrams were thematically coded in the QSR NVIVO 12 software using the structure of the diagrams and document. This database approach allows data to be searched by theme, clusters of products, or regions. However, most weight was put on the comparative analysis of these qualitative data. We adapted Qualitative Comparative Analysis techniques to generate an Excel spreadsheet with the 23 cases as rows, and the components of the document/diagram as columns. Data entry was a combination of free text summaries where the data were heterogenous and drop-down menu choices. If a partner had no data or provided an answer that did not fit with the typologies used in the Word document or diagrams, this was recorded as 'no data provided' (NDP). Where unconventional VCs did not use a VC practice stage, their row recorded no data in the Processing and/or Distribution/Marketing stages. The Excel sheet provided a clearer set of data to analyse descriptively, and the richer original data in NVIVO was used to add more description of the patterns.

Our comparative analysis did consider if there were patterns by geography or VC clusters (see Table 2) but unless stated there were no clear patterns. This suggests the findings emerge from the particular context and are not simply a result of the type of commodity produced.

However, due to the heterogeneity of data sources and cases themselves, we did not undertake quantitative analysis or attempt to generalise based on numbers. Therefore, the numbers provided are to give an indication of how the cases were distributed between categories but do not signify significance beyond our set of 23 focal VCs. As described above, some of the overall numbers will be less than 23, as the unconventional VCs did not record information for all four VC stages. The generalisability of our findings will be developed on the basis of the CAF (Moretti et al., 2021a) and resonance with the existing literature on VCs and mountain rural development. Finally, not all the data collected in T4.3 (MOVING project team, 2022a) has been presented in this deliverable, to focus on the main findings regarding the performance of the VCs. However, these additional data will be further developed in T4.5 (vulnerability, sustainability assessment and resilience appraisal) and T4.6 (Upgrading Strategies For The Value Chains) (MOVING project team, 2022c, MOVING project team, 2023) as well as in the potential clusters for WP5 (Cross-case Comparison and Benchmarking) (MOVING project team, 2024a). An example is the detailed information on innovation (technical and social) across the VC stages or the information about collaboration and governance mechanisms. Furthermore, the summary of the enabling institutions in section 4.6 can be further developed as part of WP7 Policy Analysis and Roadmap (MOVING project team, 2024c).

3 Overview of the 23 value chains analysed

This section gives an overview of the 23 value chains investigated in MOVING. These are fully described in Deliverable 4.2 (Blackstock and Flanigan, 2021) and in the publicly accessible

information on the MOVING Website, but we present them here to provide context for the reader of this deliverable. There is also a summary of the specific VC findings presented in the Appendix (see Section 7.1) where the nuanced findings are presented in the voices of the MOVING regional partners. Table ***1*** presents a summary of these chains, including the adopted abbreviations used throughout this document which represents the focal value chain product in the context of the MRL being studied. The table also includes information on the spatial context for all 23 chains in terms of MRL, MRR, country, and international context.

Table 1: Overview of value chains and spatial context (In order by country name)

	VC abbreviation[3]	VC focal Product	MRL name (and area km²)	MRR name (and area km²)	Country name	International context
1	Weiz Lamb	Lamb	Weiz Bergland (836)	Styria (56,521)	Austria	EU
2	Western Stara Planina HNV	HNV Farming	Western Stara Planina (1,660)	Stara Planina (26,869)	Bulgaria	EU
3	Sumava Beef	Beef	Strazny, Lenora, Horni Vltavice (125)	Sumava (13,044)	Czech Republic	EU
4	Corsican Chestnut Flour	Chestnut flour	Bucugnà, Ghisoni and Nuceta (358)	Corsica (8,725)	France	EU
5	Drome Lamb	Lamb	Drome Valley (378)	Pre-Alps (54,305)	France	EU
6	Rethymno Carob Flour	Carob flour	Central Rethymno (394)	Crete (8,284)	Greece	EU
7	Transdanubian A-E Knowledge	Agro-ecological knowledge	Barnag, Pecsely (32)	Transdanubian Mountains (6,564)	Hungary	EU
8	Alto Molise Cheese	Spun paste cheese	Alto Molise (276)	Central Apennines (39,824)	Italy	EU
9	Trento Wine	DOC Wine	Trento (158)	Eastern Alps (39,929)	Italy	EU
10	Tuscan Chestnut Flour	Chestnut flour	Stazzema, Seravezza (120)	Tuscany (22,007)	Italy	EU

[3] VC abbreviations used in this document refer to the FVC in the case study MRL; in some cases, where the MRL includes multiple municipalities, or the MRL name is particularly long, the MRR name is used instead, but still represents the VC in the context of the local MRL area

11	Maleshevski Tourism	Rural tourism	Berovo, Pehchevo (806)	Maleshevski Mountains (6,899)	North Macedonia	Non-EU
12	Serra da Estrela Cheese	PDO Cheese	Serra da Estrela (305)	Cordilheira Central (29,328)	Portugal	EU
13	Alto Douro Wine	Wine	Vila Nova de Foz Coa (90)	Alto Douro (15,917)	Portugal	EU
14	Brasov Certified Ecotourism	Certified Ecotourism	Brasov county: Zărnești, Bran, Moieciu and Fundata Argeș county: Rucăr, Dragoslavele and Dâmbovicioara (846)	Southern Romanian Carpathians (30,224)	Romania	EU
15	Sjenica Lamb	Lamb	Sjenica (2,541)	Dinaric Mountains (92,967)	Serbia	EU
16	Carpathian Bio-Honey	Bio-honey	Polomka, Bacuch, Bravacovo (161)	Slovak Carpathian Mountains (29,287)	Slovakia	EU
17	Betic Organic Olive Oil	Organic Olive Oil	Carcabuey, Priego de Cordoba, Zuheros (410)	Betic Systems (57,021)	Spain	EU
18	Huesca Wine	Wine	Ayerbe and Loarre (138)	Huesca (36,805)	Spain	EU
19	Sierra Morena Ham	Iberian ham (PDO)	Villanueva de Cordoba, Pozoblanco, Cardeña (1,273)	Sierra Morena (18,416)	Spain	EU
20	Grisons Grain	Grain	Grisons (7,104)	Swiss Alps (25,735)	Switzerland	Non-EU
21	Tête de Moine PDO[4] Cheese	Cheese	Jura, Berne (753)	Swiss Jura (2,826)	Switzerland	Non-EU
22	Elmali Tomatoes	Tomatoes	Elmali (1,433)	Beydaglari (not available)	Turkey	Non-EU

[4] Please note, other FVCs are also based on PDO products (see Section 4.6.4). In the case of Tête de Moine PDO Cheese the regional partner believed it was important to include PDO in the VC abbreviation.

23	Speyside Whisky	Scotch Whisky	West Moray, Badenoch & Strathspey (3,414)	Highlands and Islands (33,417)	UK (Scotland)	Non-EU

In previous deliverables (Moretti et al., 2021b, Blackstock and Flanigan, 2021) these VCs have been summarised in terms of clusters representing the product resulting from different types of mountain land-based production in each MRL. These clusters are illustrated in Table 2 and described in more detail in sub-sections below.

Table 2: Value chain clusters

Cluster	Value chain (and country)
Meat-based	• Weiz Lamb (Austria) • Sumava Beef (Czech Republic) • Drome Lamb (France) • Sjenica Lamb (Serbia) • Sierra Morena Ham (Spain)
Crops	• Corsican Chestnut Flour (France) • Rethymno Carob Flour (Greece) • Tuscan Chestnut Flour (Italy) • Betic Organic Olive Oil (Spain) • Grisons Grain (Switzerland) • Elmali Tomatoes (Turkey)
Cheese	• Alto Molise Cheese (Italy) • Serra da Estrela Cheese (Portugal) • Tête de Moine PDO Cheese (Switzerland)
Bio-honey	• Carpathians Bio-Honey (Slovakia)
Alcohol	• Trento Wine (Italy) • Alto Douro Wine (Portugal) • Huesca Wine (Spain) • Speyside Whisky (Scotland, UK)
Tourism	• Maleshevski Tourism (North Macedonia) • Brasov Certified Ecotourism (Romania)
Public goods	• Western Stara Planina HNV (Bulgaria) • Transdanubian A-E Knowledge (Hungary)

In nearly all cases, the commodity (e.g., milk, olives, grapes) produced in the mountains is further processed as meat, cheese, flour, oils, or alcohol. The most contentious cluster was the 'crop' cluster. Here most of the products are processed - the exception is the Elmali Tomatoes, which

is sold without requiring further processing into different products. Furthermore, the alcohol VCs could be part of a crop cluster, as these are sub-type of processed products dependent on the crops from plants (grapes or barley). Potentially, bio-honey could also be a part of the 'crop' cluster as it also derives from plants. However, we keep these separated to provide continuity with the clusters used in D4.1: Inventory of Value Chains (Moretti et al., 2021b).

3.1 Meat value chains

Five of the focal value chains being studied in the MOVING project are types of meat: three lamb (Weiz, Drome, Sjenica), one beef (Sumava), and one ham (Sierra Morena). The main sustainable development challenges for the meat VCs include climate change, an aging and scarce population in the territories, and the remote nature of the locations. Demand patterns are mixed.

In the Austrian region of Weiz, sheep are herded at high altitudes and 150 active farms produce and sell lamb meat of premium quality, both on national and international markets. By-products from the production and processing of lamb includes wool, dairy products, cosmetics and furs (Karner et al., 2022b, Karner et al., 2022a).

Sheep meat is also produced in the French Drôme Valley. The lambs are reared on grass and are mainly sold directly or in a short circuit. The informal marketing context allows for a mainly localised sale of lamb produced (Trentin et al., 2022, Trentin and Chevalier, 2022).

In the Dinaric mountains of Serbia, namely the Pester plateau, PDO lamb production is famous, as is PDO cheese, smoked sheep meat and beef sausages. The sheep co-produce valuable agri-environmental landscapes and therefore the products are recognised and protected by designation of origin. However, these values are not yet fully valorised through the certification process and market positioning (Tar et al., 2022, Zivadinovic et al., 2022).

Sumav is a region of Czech Republic that is well-known for its beef (especially organic) produced by extensive cattle breeding and locally processed and distributed. The final products also include discount varieties such as beef tripe, beef tongues, ribs and beef sausage products (Zagata and Husak, 2022a, Zagata and Husak, 2022b).

Finally, the Spanish Sierra Morena region produces premium top quality Iberian ham (PDO), produced in an extensive system by 19 firm in the Southern Cordoba region that follow a strict regulation system to ensure resilience and sustainability of the territory and value chain (Maestre-Díaz et al., 2022a, Maestre-Díaz et al., 2022b).

3.2 Crop value chains

Six of the value chains in MOVING have focal products derived from the harvesting of plants or trees: two chestnut flour (Corsica, Tuscany), carob flour (Rethynmo), olive oil (Betic), grain (Grisons), and tomatoes (Elmali). In general, the VCs of these unique products is at risk because of consistent labour migration from mountainous and rural areas to more urban ones as well as the limitations that come with cultivation at high altitudes.

In the mountainous Corsica region of France, the production of “farina castagnina” results from the 50 varieties of chestnut groves present in the territory (Sorba, 2022a, Sorba, 2022b). Unfortunately, because of the arrival of the gall wasp disease, production has been halved in the last eight years. Production and processing of chestnuts are still conducted in an artisanal manner. In Tuscany, Italy, high-quality chestnut flour is also a crucial product, still produced in small stone houses, “metati”. This short chestnut flour VC is linked to other VCs, such as chestnut honey (Allali et al., 2022a, Allali et al., 2022b).

Carob flour is produced in the semi-mountainous Central Rethymno region of Crete, Greece, and it is used primarily as an ingredient of bakery and pasta products. Carob flour and other carob products are sold both nationally and internationally. The lengthening of the carob value chain during the last decade has allowed for carob flour to be used as a food ingredient in a range of food products such as baked goods, pasta, dairy drinks, health bars, and dietary supplements and seeds to be exported abroad. The seeds are processed into “locus bean gum” which yields the highest contributor to the carob market due to its exploitation in the food, pharmaceutical and other industries. (Vavvos et al., 2022, Triliva et al., 2022).

Extra virgin olive oil (EVOO) is an important product of the Betic Cordilleras in Spain. The demand for EVOO is increasing internationally, thus different business models (e.g., small family business, national company, medium-sized mills, etc.) intervene in the various steps of the EVOO VC. (Zafra, 2022a, Zafra, 2022b, Geiser et al., 2022, Geiser and Schmitt, 2022).

The grain value chain in the Grisons mountains is often carried out at up to 1600 meters above sea level. The products are organic and considered premium in terms of price but are benefiting from increasing demand given companies’ positive marketing efforts (Geiser et al., 2022, Geiser and Schmitt, 2022).

Finally, the tomatoes of the Beydaglar Mountains (Turkey) are a result of greenhouse tomato cultivation and their market is dependent on international regulation of importer countries, such as Russia and Ukraine (Yercan et al., 2022a, Yercan et al., 2022b).

3.3 Cheese value chains

Three of the value chains in MOVING are types of cheese, from MRLs in Alto Molise (Italy), Serra da Estrela (Portugal), and Jura/Berne (Switzerland)

In Alto Molise, Italy, the traditional Apennine “caciocavallo” cheese is produced using mainly local raw milk. An increasing demand for the final product, spun paste cheese, has been observed, with potential for more growth in international markets (Belliggiano et al., 2022, Ievoli et al., 2022).

In the Portuguese Cordilheira, Sierra de Estrela PDO cheese is made locally by 29 small-to-medium manufacturers with milk from two autochthonous sheep breeds. However, consumers are often unwilling to pay the premium price for the PDO cheese since they do not clearly differentiate between PDO and non-PDO cheese (Esgalhado et al., 2022, Esgalhado, 2022).

The Tête de Moine PDO cheese is an emblematic product of the Swiss Jura region, whose VC is an inter-profession responsible for managing quality control and promoting sales. Moreover, The Tête de Moine production is strongly linked (assemblage) to Gruyère, another major Swiss cheese PDO (Piccin and Serra, 2022, Piccin, 2022).

3.4 Bio-honey value chains

The Slovak Mountains of Slovakia offer bio-honey mostly consumed by beekeepers and their families, local and national inhabitants, and generally people who visit the territory and buy directly from beekeepers and are willing to pay a higher price for this honey, compared to cheaper and lower quality honey sold in supermarkets (Surová, 2022, Surová 2022).

3.5 Alcohol value chains

Four of the value chain case studies in MOVING are alcohol products: three wine (Trento, Alto Douro, Huesca), and one Scotch Whisky (Speyside).

In the Eastern Alps of Alto Trentino, Italy, white, rose and red wines are produced. The largest area is used to produce Pinot Grigio, comprising 34% of overall grape production but the flagship product is the Trento DOC sparkling wine. Products range from the cheaper IGT (indicazione geografica tipica) wines to the more expensive DOC (denominazione di origine controllata) wines. Universities and research centres provide input for the wine production VC which, with tradition, shape wine-making practises (Micheloni et al., 2022, Pezzi and Kleshcheva, 2022).

The Higher area of Maçico Noroeste, Portugal, is characterised by ideal conditions for wine production, especially in the Alto Douro Valley. Despite production being expensive in mountain viticulture, as more and more producers invested in the MRL, consumers can buy a wine from this sub-region at any price (Carvalho and Santos, 2022, Pezzi, 2022).

Wines from vines resilient to climate change are produced in the Spanish Huesca Pyrenees. The wine is a response to the increasing demand for “0km” products, which also offers a great oenological experience for those who visit the winery and the territory (Conte and Ascaso, 2022, Palacios et al., 2022).

Speyside Single Malt Whisky produced in the Scottish Highlands is sold internationally at a premium price, which reflect the importance of the location of production and processing to product branding. The whisky from this VC benefits from the peatlands and grassland of the territory as well as the presence of water for processing the liquor (Creaney et al., 2022, Flanigan et al., 2022).

3.6 Tourism value chains

In the Maleshevski Mountains of North Macedonia, rural tourism is thriving as a result of targeted social and recreational activities, traditional product offerings, and the employing of young people.

The territory also provides accommodation, restaurants, agricultural products, tourist guides and other support services.

On the same note, the Piatra Craiului National Park in Southern Romania is a high-quality tourist destination that is regrettably threatened by inappropriate development in the area. Twenty per cent of the park's tourists are foreigners and many tourists participate in hiking or wildlife tourism. The focus for this VC is the certified eco-tourism services.

3.7 Public goods value chains

Farmland biodiversity is considered a product of the Western Stara Planina territory of Bulgaria, characterized by small-scale extensive grazing and low input cropping. In the EU, there is a high societal demand for products from biodiverse and 'high nature value' (HNV) farmlands.

In the Transdanubian Mountains of Hungary, 8-10 families live in the area and produce food through permaculture, forest agriculture, contour farming, extensive animal husbandry. Their knowledge about sustainable (off-grid) living is a potentially valuable product used to share and create awareness of resilience and sustainability.

4 Findings from the participatory value chain analysis

The findings in this section are presented in terms of introducing the VC context (rural development issues and the VC products) (Section 4.1), followed by the VC structure (Section 4.2); processes of valorisation and outcomes from the VCs (Section 4.3); the spatial distribution of VC structures and processes (Section 4.4); and the assemblage between each focal VC and additional VC(s) from the same MRL (Section 4.7). The role of enabling infrastructure and institutions are also briefly presented to remind us that the VC is embedded in multi-level technical and governance networks that are not primarily focussed on the VCs themselves (Section 4.5 and 4.6).

4.1 Context of the 23 value chains:

This section highlights the wider context of the 23 value chains. It firstly situates the 23 MRLs within their wider sustainable rural development issues. Secondly it highlights the overall context of the 23 VCs in terms of their longevity, trends, level of competition and underlying governance and market structure. The first section (4.1.1) explores the wider territorial issues and the second section (4.1.2) explores the more specific context of the value chains.

4.1.1 What is the rural development context of the focal value chains?

Development of mountain areas is a key underpinning focus of the MOVING project. It is also a key focus of the EU and wider European areas. Recently, the European Commission adopted a 'long term vision for rural areas' which aims to make rural Europe 'stronger, connected, resilient

and prosperous' by 2040[5]. Many of the most deprived and underdeveloped rural areas are also mountain areas, hence our focus on mountain value chains. There is a lot of overlap with existing European rural development issues within our 23 mountain reference landscapes.

Most of these mountainous areas are faced with ageing populations, due in part to youth depopulation and migration from these rural areas (e.g., Maleshevski tourism, Serra da Estrela Cheese and Sjenica Lamb (to name a few examples). Given the often-poor opportunities for long term and year-round employment young people often move away from the MRLs, and as a result the VCs can struggle to fill positions (which can often be more seasonal). Such a trend is often supplemented further by poor access to affordable housing (e.g., Transdanubian A-E Knowledge and Speyside Whisky) and opportunities for non-tourism focussed jobs compared to urban areas. Digital and physical infrastructure such as roads and public transport options (e.g., Rethymno Carob Flour) and access to services (e.g., healthcare, education) can also be of a lower standard or at least lower frequency, which is especially apparent given the often-poor accessibility to mountain areas (i.e., for transporting building materials and creating new roads). Given the increased initial costs to provide such housing and infrastructure there can also be poor political/financial opportunities and desire to fund services in these mountainous areas.

Given their mountainous terrain, many of the MRLs are environmentally fragile areas facing biodiversity loss and the more acute impacts of the climate emergency (e.g., droughts, fires, lack of available water). For instance, Carpathian Bio-Honey and Sierra Morena Ham (amongst others) are facing droughts and pests and diseases, leading to poorer outcomes for businesses and land-based practices in the area. Given moves to diversify farming into other land uses there is also agricultural and land abandonment in favour of more prosperous industries, or in favour of more prosperous locations less inhibited by altitude or steep terrains. More positively though, some MRLs are focussing on meeting net zero carbon targets in their mountain areas (e.g., Speyside Whisky).

In terms of deprivation figures, just under half the cases identify their MRL as an area subject to deprivation or a poverty hotspot: Alto Molise Cheese, Corsican Chestnut Flour, Sumava Beef, Maleshevski Tourism, Serra da Estrela Cheese, Alto Douro Wine, Sjenica Lamb, Betic Organic Olive Oil, and Grisons Grain[6]. This makes the socio-economic valorisation processes even more important for these mountain areas.

More positively, there are examples of successful co-habitation and multifunctionality of land in some of the MRLs (e.g., for agriculture, breeding, tourism, hunting, leisure, habitat), as well as adding value in the context of rural mountainous areas (e.g., through upscaling and improving the sustainability of some of the VCs). Examples include the Brasov, Sumava, Speyside, and Western Stara Planina MRLs. New road infrastructure (often instigated by tourism provision) is also improving the accessibility of some of these mountain areas (e.g., Transdanubian A-E

[5] A long-term vision for the EU's rural areas | European Commission (europa.eu)
[6] The MRL is a large area however there are hotspots of deprivation within it.

Knowledge). Finally, having geographical and production designations on some of the focal products of the VCs (e.g., PDO, PGI) is helping to improve the sustainability of the MRLs more generally. The following VCs involve some form of PDO certification: Alto Molise Cheese, Betic Organic Olive Oil, Corsican Chestnut Flour, Alto Douro Wine, Tête de Moine PDO Cheese, Rethymno Carob Flour, Sjenica Lamb, Sierra Morena Ham (Iberian Ham), Serra da Estrela Cheese and Trento Wine; whilst Huesca Wine, Rethymno Carob Flour and Speyside Whisky have PGI certification. For many of these VCs, the PDOs and PGIs may cover territory much larger than the MRLs. VCs are often located in areas associated with environmental designations such as National Parks, which are present in many MRLs.

4.1.2 How might the focal value chains be characterised?

Most value chains selected have been in operation for some time, with 12 in operation for more than 50 years; nine for 10-50 years and only two VCs (Carpathian Bio-Honey and Transdanubian A-E Knowledge) for less than 10 years.

In total, 65 products were mentioned in total across the 23 VCs. The comparative analysis grouped them into 'premium' (e.g., higher priced, often restricted supply) products; 'commodity' (e.g., mass produced to ensure competitive price) products and other category (including non-market products). The vast majority of these were premium products (n=45). Twelve were discount/commodity products and eight products were denoted as 'other'. The discount/ commodity products included kebab meat, curd cheese, sparkling wine, blended whisky, and wool – highlighting that these more commodified products were often by-products of the premium focal products. In general, additional products associated with each VC were similar in terms of their characteristics. For example, in the Serra da Estrela Cheese VC, the products in addition to PDO (sheep) cheese were an additional PDO curd cheese, wool and lamb.

Some of these VCs might be considered niche or small in terms of their economic activity. However, they are useful to consider due to potential for growth and their contribution to wider sustainability outcomes. For example, the global chestnut flour market is expected to grow at a compound annual growth rate of 2.5% in the forecasting period of 2022-2027. The demand for the product is also witnessing a significant rise in Europe and North America owing to the growing bakery industry and the rising population of consumers suffering from gluten intolerance, so it is interesting to see how chestnut flour VCs in Tuscany and Corsica can take account of these opportunities. In other cases, the VC represent nationally important commodities. For example, in Portugal, the Alto Douro Wine has a revenue double the national average for wine production; and the olive oil produced within the PDO Priego de Córdoba was worth 16.53 million € in 2020; providing global visibility for the final products produced by the Betic Organic Olive Oil VC. In several cases, the combination of being a mountain product, with other aspects such as being organic, could lead to much higher prices being paid, covering the higher production costs (e.g., Grisons Grain from the Swiss Alps).

In terms of competition, for 12 of the VCs there were alternative suppliers of the focal products. For four of the VCs there was not considered to be any alternative suppliers in their regions (Weiz

Lamb, Corsican Chestnut Flour, Tuscan Chestnut Flour, and Grisons Grain). However, this does not mean no competition since there are other suppliers of lamb, chestnut flour and organic grains that are not based in the MRLs. In terms of alternative products, 12 VCs denoted that some alternative products were available in their region, whilst a few VCs highlighted that no such alternative products were available. In the cases of alternative suppliers (n=6) and alternative products (n=7) there were several instances in which no data was provided (NDP[7]).

Looking to the governance structure of the focal VCs, partners were asked to distinguish their focal VCs according to the following governance classification (Gereffi, 2005):

- **Market** (low complexity of transactions[8], high ability to codify transactions, high supply base capability, low power asymmetry)
- **Modular** (high complexity of transactions, high ability to codify transactions, high supply base capability, medium power asymmetry)
- **Relational** (high complexity of transactions, low ability to codify transactions, high supply base capability, medium power asymmetry)
- **Captive** (high complexity of transactions, high ability to codify transactions, low supply base capability, medium to high power asymmetry)
- **Hierarchy** (high complexity of transactions, low ability to codify transactions, low supply base capability, high power asymmetry)

Approximately one third of cases (n=8) considered their value chains to be governed through a market structure. For example, the Carpathian Bio-Honey VC, was categorised as market structure due to the 'low complexity of transactions between a buyer and seller'. Whilst in the cased of Huesca Wine in the Spanish Pyrenees, there is symmetry of power, with recognition that 'without grapes there is no wine, without the distributor this wine is not sold, and of course, if there is no consumer of this product, the VC ceases to make sense'. Five VCs considered their governance structure to be relational. For instance, in the case of Speyside Whisky, the VC was defined as relational as 'each distillery or parent company will have to negotiate supplies of malted barley, yeast and water'. Another five felt it was a captive structure. For Rethymno Carob Flour, the captive structure was identified because of 'its low supply base'. Only the Sjenica Lamb VC was reported as having a hierarchal governance structure. The remaining VCs (n=4) did not classify their governance structure (NDP). This means that most VCs had a high complexity of transactions, a high ability to codify transactions and a medium-high power asymmetry across the chain. In terms of how these governance structures are affecting the performance of the VCs the responses were mainly positive, citing the potential to enable greater innovation, better

[7] Please note that NDP can refer to either an absence of data or to non-standard data being recorded
[8] Transactions are the exchange practices (monetary or otherwise) involved in a trade between a buyer and seller.

performance, collaboration, and maintaining stable prices. However, in a few cases a lack of cooperation was mentioned as a reason for poor VC performance.

For most value chains (n=20) the demand for their focal products is increasing. The focal products of one value chain (Sierra Morena Ham) are level (i.e., not increasing or decreasing). Meanwhile, the two lamb VCs (Drome Lamb and Weiz Lamb) are decreasing in demand. For five of the VCs these trends in demand were associated with mainly regional markets, for six demand was mainly national, and for just over half of the VCs (n=12), their main source of changes in demand was through mainly international markets.

The focal VCs presented are generally typical of the wider regions/countries within which they are based (n=19), with three of the unconventional value chains representing atypical products (Brasov Certified Ecotourism, Transdanubian A-E Knowledge and Western Stara Planina HNV). Only one VC offered no response on its wider typicality (Maleshevski Tourism).

Overall, although there are some similarities in the rural development issues of the areas under study, exploring a range of different value chains, we can clearly identify some specific difference in terms of their governance structure and level of competition.

4.2 Structure of the 23 value chains:

This section describes and highlights the structure of the 23 focal Value Chains. By this we mean highlights the territorial capitals (i.e., the economic, environmental, and social conditions that exist to support the creation of products within the VCs), the practices that occur along the four stages (i.e., Production, Processing, Distribution/Marketing and Consumption), the range of actors involved in the VCs and the flows and by-products that are produced along the chain.

4.2.1 Territorial capital

Firstly, looking to the range of territorial capitals that exist to support the functioning and successful creation of products within the 23 VCs. These are presented in Table 3 according to their economic, social, and environmental capitals; note the capitals under each heading are those identified by regional partners and are presented in no particular order.

Table 3: Territorial capitals across the 23 Value Chains

Territorial capitals	***Specific capitals present in the VCs***
Economic capitals	LEADER presence; Economies based on agriculture, forestry and tourism; Banking services; Animal management; Orchards; Product processing; Roads; Village buildings; GDP; GVA; Shrinking primary sector; Growing tertiary sector; Meat processing facilities, e.g., slaughterhouses; Farm machinery; CAO support under LFA scheme; Supportive co-operatives; Land terraces; Mixed family farms; Vineyards and associated equipment; Co-operatives for support; Land availability (increasing prices); Focused on economic growth; Local varieties of fodder; Ham curing establishments; Direct and indirect jobs/labour; Market

	competitiveness from PDO and PGI status; Adventure and winter sports; Gastronomy & tourism boom; Marketing; Technologies and traceability; Water production; Greenhouse cultivation; Local consumers; Hotels; Restaurants; Storage; Infrastructure; Shops; Accommodation; Transportation; Changing rooms; Packaging rooms.
Social capitals	Peasant culture; Communal pastures; College students, young and urban migrants; Education; Local material culture; Voluntary organisations; Farmer knowledge; Original buildings; Increasing older populations; Support for community action; Social institutions; Specialized knowledge and skills; Good relationships and cooperation; Heritage interests; Interest in preservation; Innovation; Traditional knowledge for various VC stages; Archaeology; Cultural landscape and imagery; Local rituals; Preservation/improvement of breed/genetic pool; Long term farming families; Multifunctional farming tradition; Small and traditional villages; Business networks; Creative capital; Food products and regional reputation; Large and diverse settlements; Multiple languages spoken; Historical settlements; Reputation & brand.
Environmental capitals	Alpine pasture; Mountainous areas; Good (mountain) climates; Biodiversity; clean water and good hydrological network; Mosaic landscape; Lakes; Pristine scenery; High quality farmland and high-altitude pastures; Habitats for rare and native plants and animals; Local fodder; Lakes; Meadows; Forests and woodland pastures with recovering soils; National parks and other designations; Archaeology and geology; Organic farming methods; Focus on nature conservation; Barley; Peat; Breeds adapted to production; Extensive semi-natural grassland and land management; Winter tourism; Endemic flora; Native breeds; Olive groves; Milk and local cheese.

Among the 100 economic capitals were mentioned, tourism and tourist activities were referred to in relation to eight VCs – not only in relation to the tourism-focussed VCs, but also in relation to some of the agriculture-based VCs. In addition, hotels, restaurants and shops were frequently mentioned as key economic/built capitals in the context of Consumption practices. Many of these capitals map well onto the issues described in Section 4.1, but they often take a more positive turn, for example highlighting the importance of traditional knowledge or the specific elements required to produce the specific value chain (e.g., peat for Speyside Whisky). Interestingly, although many of the VCs mentioned the importance of the physical mountain location for their VC, 15 made no mention of the territorial capital derived from mountains. This ranged from tourism-based VCs through to agriculture VCs.

For the social capitals, 101 capitals were mentioned. Fifteen VCs mentioned the importance of ‘traditions’ or ‘traditional knowledge’, whilst 10 VCs mentioned good relationships, community, or cooperation as key social capitals.

Finally, 98 examples of environmental capital were recorded across the 23 VCs. The importance of the mountain environment was underlined in eight VCs and there is also frequent mention of the importance of climate, biodiversity, and rare breeds. Rarer, however, were some

environmental capitals which were only directly important for that specific VC, for example, peat and barley (Speyside Whisky) or vines for wine production (Alto Douro, Trento, and Huesca Wine). Forests were also important for a range of VCs which mainly represented more Eastern European geographies (i.e., Corsican Chestnut Flour, Transdanubian A-E Knowledge, Brasov Certified Ecotourism and Carpathian Bio-Honey).

This section has highlighted the sheer volume and range of territorial capitals required to create the focal VC products. It has illustrated some interesting trends in terms of the importance of climate, biodiversity, traditions, and strong relationships along with the importance of more VC specific capitals which may only be found in those MRLs.

4.2.2 Practices

Now the key practices of the 23 VCs are introduced according to the four practice stages. Each practice represents a stage in the VC, moving through the following typology, remembering that three unconventional VCs slightly deviated from these stages (see Section 2):

Production >> Processing >> Distribution/Marketing >> Consumption

- The Production stage includes practices involved in production of commodities on which the final product(s) are based.
- The Processing stage includes practices which involve transformation of commodities into the final product(s).
- The Distribution/Marketing stage includes practices relevant to how the product is provided to the consumer.
- The Consumption stage includes practices relevant to the consumption of the product(s).

Ninety-four practices in total were mentioned at the Production stage across the 23 VCs. For the livestock focussed VCs (e.g., beef, lamb, ham, dairy), practices at the Production stage include farm and pasture management, production of milk, breeding and raising livestock, and slaughtering. For the crop and beekeeping-based VCs, the practices include organising (of seeds, grains, and location of beehives), experimental research and monitoring, harvesting, and packing. For the tourism-based and agro-ecological VCs, practices at this stage include ecosystem management, knowledge exchange and obtaining certifications. For alcohol-based VCs, practices include planting and growing practices, water management, and extraction of key inputs from outside the MRLs.

Moving to the Processing stage. Here, 120 practices were identified across the 23 VCs. For the livestock focussed VCs, practices at the Processing stage include more slaughtering, cutting and processing of meat/cheese/milk, application of tacit knowledge, and quality controlling. For the crop and beekeeping-based VCs, the practices include transportation of grains and crops, grinding, roasting and baking. For the tourism-based and agro-ecological VCs, practices at this stage include extensive grazing and moving of cattle for pasture management, maintaining and transferring knowledge, development of training courses, and maintaining certification

achievements. For alcohol-based VCs, practices include fermentation, bottling and packaging, storage, and knowledge exchange.

Looking now to the Distribution/Marketing stage, where 89 practices have been recorded across all the VCs. For the livestock focussed VCs, the main practices include packaging and labelling, running farm shops, maintaining contractual relationships, marketing, transportation, certification, and storage. For the crop and beekeeping VCs, the practices here include marketing, bulk distribution to points of sale, packaging, and labelling. Tourism and agro-ecological VCs have practices which include provision of farmer payments, social media updating, marketing, and training and certification processes. Finally, for the alcohol-based VCs the practices include transport, branding, tasting, and labelling.

Turning to the Consumption practices. Seventy-one practices were highlighted at this stage. For the livestock focussed VCs the main practices include meat preparation, sales on the farms, consumption at various locations including private residences, restaurants, and festivals. For the crop and beekeeping VCs, the practices here include purchase at farm/retail/hospitality venues, and cooking. Tourism and agro-ecological VCs have practices which include pursuit of RDP Pillar II objectives, knowledge transfer events, and certification upholding. Meanwhile, for the alcohol-based VCs the practices include sales, events, reaching a wide range of tourists, tours and visitor experiences, auctions, and exports.

Finally, adaptation of these four stages were required in the cases of Transdanubian A-E Knowledge, Maleshevski Tourism, and Brasov Certified Ecotourism. Here, practices were sometimes recorded at different stages than expected as they explored their VCs across a reduced number of practice stages. For example, Brasov Certified Ecotourism case explored their VC across two practice stages: Production and Consumption. The 'Production' part of the tourism VC includes activities associated with selecting and booking the destination, and Consumption was subdivided into to transport, hospitality, leisure practices.

Overall, there are many practices recorded across the VCs to deliver the final products. In general, a wider range of practices are undertaken in the initial two stages, when the VCs differ significantly in terms of their production requirements and outputs. At the later stages, although still significant, the number of practices reduces slightly as virtually all VCs focus a smaller set of distribution and sales-related practices, and greater similarity exists in terms of the types of practices undertaken in the context of the product clusters (e.g., alcohol, livestock, crops etc.)

4.2.3 Actors

Actors across the value chains were categorised according to the following typology:

- Land-use system managers
- NGOs
- Civil society
- Broker/advisors
- Agricultural businesses

- Non-agricultural businesses
- Public sector representatives
- Research
- 'Other'.

A wide range of actors were identified across the 23 value chains, which are first discussed in terms of these types, then in terms of key characteristics across the four practice stages.

4.2.3.1 Types of actors

Land-use system (LUS) managers are the actors that manage land that generates inputs or is used for producing commodities for processing in the focal VC. These included farmers of various types, forest owners, national park managers, and shepherds, but also public and private landowning organisations including municipalities, fishery bodies, and ministries of defence. For the majority of VCs (n=17) LUS manager numbers were small in size (i.e., fewer than 50 employees) headed by either sole proprietors (n=9) or a mix of business ownership types (mixed response: n=10). Almost all LUS managers were 'for profit' companies. The level of technological innovation/uptake was, however, very mixed ranging from low to high.

NGOs are the actors that work in Non-Governmental Organisations that are involved in the focal VC. These NGOs may own land, implement projects, or provide training. These included breeding associations, tourism associations; Local Actions Groups (LAGs), collectives and co-operatives and growers' associations (amongst others). Again, the NGOs across the 23 VCs tended to be 'small' in size (n=14). Responses on the business ownership structure was either mixed or not provided (n=16) highlighting uncertainty here. Most NGOs here were 'not for profit (n=18), and technological uptake amongst them was generally considered average (n=10).

Members of civil society are the non-organised actors that may be involved in the focal VC as citizens or activists. Across the 23 VCs these included local consumers (participating in co-operatives), tourists, volunteers, youth groups, residents, emigrants, community councils and 'hobby' beekeepers. Numbers of civil society actors within the 23 VCs, were either considered small (n=10) or data was not provided (n=10). There was again little data provided on the business structure of the civil society actors as this category is not well suited for unorganised citizens (n=17). All responses to market orientation here were either 'not for profit' (n=12) or 'not provided' (n=11). Of those that provided a response around technology (n=13), seven VCs characterised their civil society technological uptake as 'low'.

Actors such as innovation brokers, extension officers, and business advisors that engage directly in the focal VC are identified as brokers/advisors. Across the VCs, these included chambers of agriculture, trade unions, private advisors, national parks, education establishments and wholesale brokers. Most VCs contained brokers/advisors that were 'small' in size (n=12). The business structure of the brokers/ advisors was generally unclear (no pattern), whilst the market orientation was generally 'for profit' (n=12). Technological innovation tended to be either average or advanced (n=11).

Agricultural businesses are the actors in businesses either on-farm or beyond the farmgate (but still agricultural) that are involved in the focal VCs. These include agricultural producers, millers, livestock dealers, cellars, winemakers, co-operatives, factories, estates, slaughterhouses, and exporter associations. Agricultural businesses tended to be small or medium in size (n=17) and 'for profit' (n=18), however there was no clear pattern of their business structure. Technological innovation/uptake levels were often low to average (n=13).

Meanwhile, non-agricultural businesses are the actors that are either non-agricultural businesses or diversified (non-agricultural) on-farm enterprises within the focal VCs. In our 23 VCs these include technology firms, fuel suppliers, tourism providers, accommodation providers, supermarkets, restaurants, bakeries, breweries, distilleries, and warehouses. Non-agricultural businesses tended to be small or medium (fewer than 250 employees) in size (n=16) and 'for profit' (n=17), however there was no clear pattern of their business structure either. Technological innovation/uptake levels were often average to advanced (n=13).

Public sector actors are those that exist as public authorities or have policy-making responsibilities affecting the focal VCs. For illustration, ministries of agriculture, tourism organisations, administration, local authorities, political groups, and national parks. Public sector actors across the 23 VCs tended to be small to medium in size. There is no clear pattern over business structure, but market orientation tends to be 'not for profit' (n=17). The level of technological innovation/uptake was quite mixed, but eight VCs reported average levels.

Research actors are those that are involved in the research affecting the focal VCs and include universities, colleges, research institutes, and agricultural and specific VC product education centres. These tended to be small or medium in size (n=15) and 'not for profit' (n=15) in terms of market orientation. Patterns of business structure were unclear but technological uptake/innovation was predominantly advanced (n=15).

Finally, other actors (those that do not easily fit in any other category) include farmers unions, investment banks, festivals, and specific marketing organisations. No data was provided from most VCs on the size, ownership, business structure or technological uptake/innovation level for the 'other' actors, highlighting perhaps the sheer range of actors that the category represented.

4.2.3.2 Actors types within practice stages

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.

At the Distribution/Marketing stage, although there was still a slight prevalence of male workers, the gender distribution was much more mixed in general across the 23 VCs here. Actors at this stage also tended to be younger, mostly aged between 25-40, except for Elmali Tomatoes, Grisons Grain and Huesca Wine which still contained mainly actors aged over 40 at this stage. Actors at this stage again tended to be local.

Finally, at the Consumption stage, partners were less sure of the gender and age distributions in general, but when such data were recorded there was an even balance between men and women, and across all ages. Consumers were also much more globally located than at the other practice stages and included tourists visiting the regions on holiday but also distribution of the focal products across the regions, nations and globe.

In summary, a diversity of business models involving the actors across the 23 VCs are reported. Most actors tended to be small-medium sized organisations with average levels of technological uptake. LUS managers, broker/advisors and businesses (agricultural and non-agricultural) tended to be run 'for profit' and other actors tended to be 'not for profit' organisations. Technological uptake/innovation through the VCs was fairly mixed. Looking at the actors in terms of practice stages there was a dominance of men working in the earlier stages of the VCs (i.e., Production and Processing) and a greater balance/dominance of women working in the later stages of the VCs. Actors at the first three stages tended to be local, whilst a more international range was present at the Consumption stage. Actors within the tourism-based VCs tended to be younger than those in the agriculture-based VCs throughout the practice stages.

4.2.4 Flows

In this section we highlight the inputs and outputs which move between the practice stages (flows) and eventually leave at various stages in the form of products, by-products, or externalities. These flows and by-products can be classed as either tangible products such as physical materials and products (e.g., milk, grains, feed) or information and meaning (intangible products) including knowledge transfer and branding. These by-products can become important inputs for other VCs in the MRLs (Section 4.7) Externalities are tackled as part of the environmental valorisation processes (Section 4.3.3).

Flows that pass from the Production stage to the Processing stage include physical materials and products such as livestock, milk, carob pods, cheese, wool, and honeycombs. Information and meaning flows here include culture, landscape, community resources, and traditions. By-products leaving the VCs at this stage include wool, milk, chestnuts, straw, and grains, as well as information and meaning by-products including education and conservation. There was no clear pattern between the types of flows and by-products and the types of VCs with most VCs highlighting both tangible and intangible products.

Between the Processing and Distribution/Marketing stages, tangible flows included meat products, chestnut and carob products, wine, and dairy products. Whilst intangible flows including education, marketing, and traceability standards. For the by-products these included tangible

products such as whey, olive pits, wool, draff, and pot ale. Intangible by-products included wider brand and product image (e.g., Betic Organic Olive Oil) and area reputation (e.g., Tête de Moine PDO cheese).

Moving to flows between the Distribution/Marketing and Consumption stages, these include chestnut flour, cheese, bottled wine, and whisky, and intangible flows such as local food stories. By-products included compost, dairy products, and more intangible by-products such as area reputation and image. Again, little clear pattern could be identified in the types of flows/by-products and characteristics of VCs.

Finally, looking to what flows and by-products emerge out of the VCs after the Consumption stage. Tangible flows here are the 23 focal VC products (highlighted in Table 1) as well as additional products and by-products including packaging, health benefits, waste, and reuse and upcycling of VC materials including wine and whisky bottles into candle holders and other outputs.

Overall, there were a wider range of flows and by-products produced across the 23 VCs with virtually all VCs highlighting a range of both intangible and tangible outputs/products across the practice stages.

4.2.5 Summary

Comparative VC analysis relies on a structured approach. The analysis needs to link territorial capital to VC stages and consider how the actors' practices generate flows across the VC stages. Without such a structured approach, it is very difficult to understand how valorisation occurs and how a VC generates outcomes. However, heterogeneity across the 23 VCs means that even such a structured approach has generated a diversity of findings.

Firstly, there is a large range of economic, socio-cultural and environmental capitals within the MRLs that are drawn on for the mountain VCs – many are similar across the VCs but some are distinctive. Furthermore, some non-territorial capitals are also assembled through practices, so also needs to be considered. There are a large range of practices involved at each VC stage; whilst there are commonalities within similar types of VC (e.g., crop cultivation at the Production stage) it is difficult to generalise beyond the sense that practices become more homogenous at later VC stages. There are many different actors involved in the VCs, and these include both private and public sector organisations as well as citizens. Even taking a meso-level focus for a VC that is produced and sometimes processed within the MRLs indicates the large network of actors that assemble to generate value. Finally, whilst finance, information and materials flow between stages, some flows are diverted into other VCs and others are externalities. These externalities are considered as part of the valorisation analyses presented next.

4.3 Valorisation and outcomes

This section considers the economic, socio-cultural, and environmental valorisation processes at each practice stage leading to the final outcomes generated by the VC for the MRL and beyond. These are not financial or quantified valuations in the economic sense, but the perceptions of how the territorial capitals enrolled in the VC have been increased, protected, or diminished through

VC practices. It is important to assess all types of valorisations to understand the VC contribution to sustainable mountain development. For example, many of the values accruing to their VC are not valued in conventional economic data (e.g., the pollination and maintaining biodiversity ecosystem services within Carpathian Bio-Honey VC). Please note, we use the terminology 'value changed' not the more traditional notion of value added' to allow that cases may report a negative outcome, where the territorial capital is reduced along the VC.

4.3.1 Economic valorisation leading to economic outcomes

Value chain analysis was originally designed to generate competitive advantage for a firm and latterly for an economic sector or region. Therefore, the first set of valorisation processes giving rise to outcomes is focussed on economic development, if not expressed in precise monetary values. The focus is on employment, livelihood viability, and contribution to national economic growth, however, it was often difficult to collect primary or secondary data on economic valorisation processes or the economic outcomes that was explicitly about the VC within the MRL. The spatial distribution of these outcomes is addressed in Section 4.4.

Some cases (e.g., Brasov Certified Ecotourism, Rethymno Carob Flour) referred to the Ukrainian crisis and Covid-19 as having an overall negative effect on the economy and therefore employment in their MRL. Furthermore, the unconventional VCs highlight the importance of how valorisation data are interpreted. In the Transdanubian A-E Knowledge VC, the actors are lifestyle migrants and their standard of living, measured with the normal indicators would be very poor, however, this is based on a conscious choice and their actual, subjectively perceived wellbeing is on a much higher level.

4.3.1.1 Increased employment

In the primary sector (normally related to Production stage), many cases reported that employment rates in their VC industry were higher than the regional average employment rate for the primary sector (n=9). Some reported the rates were the same (n=2) and some that they were lower than average regional employment rate (n=3) (Brasov Certified Ecotourism, Sjenica Lamb Carpathian Bio-honey), with nine cases having no data or non-standard data provided for this question). However, this pattern is reversed for the manufacturing sector (the Processing stage) in the MRL, where the VCs have a lower-than-average employment rate in most of the cases providing data (n=7); level employment in three cases and a higher-than-average employment rate in five cases (Alto Molise Cheese; Rethymno Carob Flour; Trento Wine; Tuscan Chestnut Flour; Speyside Whisky). There were eight cases with no data. Finally, there were 12 cases where the services sector (Distribution/Marketing; Consumption practices) part of the value chain had lower employment rates than average for the MRL; with only two cases where rates were same as the average and none where the service sector part of the VC in the MRL had higher employment rates than the regional average. There were nine cases without data. Given that provision of employment and retaining population is a major mountain development issue, it is good to note that Production phases often have strong employment but where Processing, Distribution/Marketing and Consumption practices were located in the MRL, these do not always

provide better than average opportunities at present. As the service sector dominates most MRL economies, this could be an important issue to consider in terms of sustainability and resilience.

4.3.1.2 How many employed within the MRL

Whilst some VCs employ a substantial number of people (over 100) at various stages of the VC (e.g., Speyside Whisky); most VCs employ fairly small numbers. This matches the predominance of SMEs recorded in the discussion of VC actors (Section 4.2.3). Some MRLs (e.g., Sierra Morena, Jura/Berne, Alto Molise) report higher than national average unemployment. Although the VC actors may not employ many people in the MRL, these are often small working populations, and any permanent and well-paid employment is therefore valuable.

Table 4: Number of Employees in MRL across VC practice stages

No of FTE employed in VC	**Practice stage where employees are situated** (# of cases)			
	Production	**Processing**	**Distribution/ Marketing**	**Consumption**
<25	6	9	10	4
25-50	3	3	3	1
51-100	1	0	0	2
>100	7	4	1	4
NDP	6	6	7	12
Total[9]	23	22	21	23

4.3.1.3 Types of employers

The majority of employers at the Production stage are, unsurprisingly, farmers or other primary producers, except in the knowledge and tourism value chains. Most of these are family businesses or sole traders but, in the wine and whisky cases, they are larger companies. Co-operatives are employers in the Trento and Alto Douro Wine, Sierra Morena Ham and Grisons Grain VCs. There were no data provided from four cases.

Employers become more heterogenous at the Processing stage. Some cases still have farmers as active employers; and there are also references to family businesses associated with butchering, brewing, and tourism. There are more references to co-operatives (Weiz Lamb and Serra da Estrela Cheese join the earlier list) and many more cases have large company employers at this stage. A similar pattern of heterogeneity is found for Distribution/Marketing employment, with a mix of small family firms in the MRL; co-operatives and bigger organisations

[9] Please note, lower totals for Processing and Distribution/Marketing stages reflect the adapted stages of the unconventional value chains (see Section 2)

involved in transport, logistics, and marketing. There were no data or non-standard data provided from four cases. Employers in the Consumption stage of the VCs are more homogenous, covering wholesalers, retailers – in person and online- and the HORECA (hotel/restaurant/café) sector. A couple of more unusual employers include the public sector (via procurement for canteens), museums, and investors. Finally, there are also many more cases with no data (n=7) for the Consumption stage.

4.3.1.4 Average wages paid in the VC

The majority of cases providing data (n=9) suggest that the VC pay above the minimum national wage for the Production stage; with three being at the average wage and four (Tuscan Chestnut Flour, Sjenica Lamb, Carpathian Bio-Honey, Huesca Wine) paying below the official minimum wage. There were no data provided from seven cases. A similar pattern, that most VCs pay above the minimum wage, is found for Processing, Distribution/Marketing and Consumption stages of the value chain. This suggests that the VCs, whilst not always large employers, generally provide well renumerated jobs.

However, the ability to calculate these data is complicated by the fact that most farmers are self-employed and often use family labour (sometimes unpaid) or do not have formal work contracts. Therefore, available wage data may not reflect the full extent of hours worked; and those cases reporting payment below the minimum wage are highlighting the income is often spread over long working days, making the rate per hour much lower that it might appear from the overall income earned.

4.3.1.5 Livelihood viability

The VCs provide viable livelihoods in the sense that actors continue to participate in one or more of the VC stages. Prior to the shocks of Covid-19 and Ukrainian war, Brasov Certified Ecotourism VC livelihoods were strong and increasing. In the case of Huesca Wine, the importance of their VC for traditional and local food supplies is also highlighted. In the case of Grison Grains, the valorisation within the VC improves prices gained and helps the farm businesses involved in the Production phase to afford the increased costs of mountain production.

For some cases, the VC is part of wider set of economic activities for producers (e.g., Weiz Lamb, where only a few farmers rely solely on revenue from lamb sales, most have sheep as part of mixed enterprise; Grisons Grains producers, too, are often mixed enterprises of livestock and arable; in the case of Carpathian Bio-Honey bee-keeping is mainly a hobby; and for Rethymno Carob Flour and Tuscan Chestnut Flour, trees are part of the landscape but not the primary commodity farmed). Finally, the Transdanubian A-E Knowledge VC is premised on supporting a viable livelihood that is decoupled from traditional economic activities, but many actors have to supplement their incomes as the VC is being developed.

However, some partner data suggests that VC livelihoods may reflect a lack of better alternatives, rather than a positive choice (e.g., Maleshevski Tourism). Often the agricultural practices as part of the Production stage are seasonal and do not provide year-round stable jobs for local people (e.g., Alto Douro Wine). Furthermore, viability is becoming increasingly squeezed when inflation

of input costs is not matched by prices paid at the Production and Processing stages (e.g., Sjenica Lamb). In some cases, the Production phase of the VC may not be viable without the payment of subsidies (e.g., Betic Organic Olive Oil). This should be put in the context of general low income for rural, particularly farmer, mountain residents. For example, farmers in the Swiss Alps earn on average only 52% of the national median reference income (Federal Statistical Office 2022a). In addition, viability consists of wages set against the cost of housing and the ability to access other important services such as transport, health facilities, and childcare. In areas of depopulation, these services are often disappearing, whereas in popular mountain areas, housing costs are often very high (e.g., Speyside Whisky). Further discussion of the ability of new entrants to access land or start up VC practices is discussed in Section 4.3.2.

In some cases, co-operatives increase the viability of the VC to provide a good living for the mountain actors, by sharing costs and ensuring good prices are paid by the supermarkets. Likewise, some cases (e.g., Betic Organic Olive Oil) contrast the stable and better paid work in plants found in the Processing stage with the more seasonal and unstable type of employment found in the Production stage. Where breeders also participate in the Processing stage, they have stronger and more viable incomes (e.g., Sierra Morena Ham, Alto Molise Cheese). However, some the Processing stage in some VCs is more labour intensive, meaning that low-cost labour is needed to make the business viable.

4.3.1.6 Distribution of the economic valorisation at each stage

In most cases, value changes are distributed along the value chain stages. Outliers include the Tuscan Chestnut Flour VC where it is estimated that >75% of market value is added at the Production stage; and Alto Douro Wine where it is estimated that 51-75% value is added at the Production stage. The Sumava Beef VC undergoes value added at Processing stage; whilst the Maleshevski Tourism and Betic Organic Olive Oil VCs undergo more value added at the Distribution/Marketing stage. Finally, only in a few cases most of the market value change is estimated to happen at the Consumption stage of the VC (Huesca Wine, Elmali Tomatoes, Maleshevski Tourism). This suggests that if Processing and Distribution/Marketing practices are localised in the MRL, these areas can make a major contribution to national economic performance.

Table 5 Distribution of where Market Value change occurs along the Value Chains

% value change	**Practice stage where value change occurs** (# of cases)			
	Production	**Processing**	**Distribution/ Marketing**	**Consumption**
<25	7	5	8	4
25-50	5	8	4	3
51-75	1	1	1	2
>75	1	0	0	1

NDP	9	8	8	13
Total	23	22	21	23

In the case of the Serra da Estrela Cheese VC, the partners calculated the share of Gross Value Added (GVA) in 2021 based on the quantities and price per unit across the four VC stages to generate percentages – finding that the total value change for their VC was 4.5 million Euros in 2021. Huesca Wine provided the overall GVA of the wine sector for Spain and how the MRL contributed to these figures, and value change across the stages was also provided for the Grison Grain VC. In both the Serra da Estrela Cheese and Grison Grain cases, interviewees and workshop participants challenged the published data being used to calculate these figures and provided useful local nuance. However, many partners (n=17) did not supply any information on the actual market values for their VCs and were unable to calculate the when and how the values changed along the value chain.

4.3.1.7 Contribution to GDP

Only in a few cases did partners estimate the overall contribution to GDP (n=7) and, in all these cases, the contribution of the entire VC was less than 25%. For example, in 2018, the entire Romanian tourism sector accounted for 5% of the total GDP, thus the proportion of the Brasov Certified Ecotourism will be very small.

4.3.1.8 Value chain relationship to taxes and grants that affect valorisation

Many VCs generate tax revenues for local, regional, and national governments. At the Production stage, these taxes include personal income tax, sales tax, value-added tax, and regional variations (TARI and IRPeG in Italy). However, in some cases there are no tax revenues from MRL parts of the VC at the Production stage as they rely on common pool goods (e.g., Speyside Whisky, Carpathian Bio-Honey). During the Processing stage, income, sales, and value-added taxes generate revenue but there are additional sources from taxes on profits or revenues and insurance contributions. The Distribution/Marketing stage sees excise duties added, such as in the Speyside Whisky case. It should be noted that there is a large variation in taxation regimes across the cases – for example, VAT in Switzerland (Grisons Grain, Tête de Moine PDO cheese) is 2.5% for food compared to 20% in the UK for products such as Speyside Whisky. In the Brasov Certified Ecotourism case in Romania, tax on wages are around 47% compared to base rate tax of 20% in the UK (applying to those working in the Speyside Whisky VC).

However, many VCs also receive state grants or subsidies at the Production stage – these include CAP pillar 1 agricultural payments and pillar 2 (areas of natural constraint and other rural development) payments – these types of production or agri-environmental payments are also available in the non-EU cases (Serbia, Switzerland, Turkey, and UK). Some cases report grants associated with Processing infrastructure and the Romanian State has provided support to the tourism sector to recover from the Covid-19 Pandemic. The same cases also identified support with Distribution/Marketing from either the EU or national governments. However, no cases with

data provided for this question identified any grant or state support associated with Consumption stage of the value chain.

4.3.1.9 How the MRL relates to the wider situation

Most cases suggested that their MRL economic performance was fairly typical of their wider MRR (e.g., Sumava Beef), although in some cases, it was not. The Speyside Whisky MRL had areas of population growth when the wider MRR tends to suffer with rural depopulation. This is the opposite to the Tuscan Chestnut Flour VC, where the Tuscan MRR had less depopulation and a younger demographic than their MRL. Speyside Whisky and Trento Wine also reported higher than average wages and employment rates, which contrasts with other areas, such as Alto Molise Cheese where the employment rate was lower than the national average.

Some cases illustrated how monetary values and profits, particularly in VCs with large companies, tended to accrue in lowland areas. The situation in the Vila Nova de Foz Coa MRL is typical of the Alto Douro MRR and national picture for Portugal with most profits recorded in Porto, which houses the headquarters of large wine companies. Often the dominance of small producers in mountain areas reflected a wider pattern of many small producers across rural areas. In these cases, the fewer large businesses dominate the total production data reported by volume or market value (e.g., Huesca Wine). A similar picture is found for the Sjenica Lamb VC. However, in the case of Grison Grain, it was illustrated how their VC were able to obtain higher price per kg than non-mountain conventional grains; this may be due to their co-operative business model.

Sometimes, the special nature of the VC is untypical of other places. For example, Brasov Certified Ecotourism had lower employment potential than wider Romanian tourism due to having less employers, a limited spatial area to operate and business preferences of collaborating rather than employing people.

4.3.1.10 Overall judgement of change

Although the analysis splits up the valorisation into three discrete types, many partners highlight the intrinsic interactions between different valorisations. For example, the Betic Organic Olive Oil highlights how the premium prices are dependent on the unique qualities of the Subbética Cordobesa mountain range.

Overall, most cases (n=19) believe that the VC has increased the economic capital. The reasons given for this judgement relate to the production of premium products, strong territorial branding, reviving traditions, and the synergistic affect through assemblage with other activities and VCs. In two cases (Transdanubian A-E Knowledge and Maleshevski tourism VCs) the overall evaluation was that the economic territorial capitals remained the same. Two cases did not provide data.

Using local inputs to generate premium products (Weiz Lamb, Sjenica Lamb, Betic Organic Olive Oil, Huesca Wine, Grisons Grain) is seen as the reason for increased economic values, although more value accrues to retailing actors than the producers. Where there is vertical integration across the stages within the MRL, there is particularly strong economic valorisation that increases the ability to invest and innovate (e.g., Sumava Beef, Trento Wine). Some of the emergent VCs

(e.g., Carob and Chestnut Flour) have strong consumer demand driving a previously mothballed industry.

In many cases where the later VC stages take place outside the MRL (see Section 4.4), the economic valorisation could be further increased by re-localising the value change at these stages. This was stressed by a number of cases across the meat, cheese, crop and alcohol value chains. Furthermore, where premium prices provided more income to producers, they also make the product more of a luxury item, which could reduce sales particularly during times of austerity. Thus, export orientated VCs (e.g., Elmali Tomatoes) see increasing valorisation across the stages but this benefit also means they are vulnerable to increased supply from other countries or currency changes.

In several cases, the PDO certification was seen as a major contributor to the positive economic valorisation processes (e.g., Tête de Moine PDO cheese, Sierra Morena Ham). However, in these same cases, partners questioned whether the Production stages, with the additional high costs required to maintain the PDO standards, would be viable without significant public subsidies. Therefore, there are important links between the valorisation and enabling institutions (see Section 4.6). These links may not be formal institutions – they may also relate to customs and traditions – for example the delay in payments typical in the Czech Republic explains why farmers prefer to export beef to Germany instead.

Reviving traditions has led to recovery of abandoned natural and built capital (Tuscan and Corsican Chestnut Flour) and is increasing the resilience of the MRL to global changes through revitalising Production techniques that are adapted to the local terroir (e.g., Huesca Wine). This is increasing the territorial capital for the VCs in the future.

In some cases, the additional income provided by these VCs can be important to help cross-subsidise the other activities undertaken by MRL producers and as vital inputs into the local economy (e.g., Carpathian Bio-Honey). In other cases, the economic valorisation is part of a wider assemblage with supporting associated VCs (Weiz Lamb supporting cosmetics or clothing VCs, Alto Douro Wine supporting almond or olive oil VCs). Many noted synergies with rural nature or food tourism in the area (e.g., Serra da Estrela Cheese, Betic Organic Olive Oil, Speyside Whisky), this can support investment in the focal VC and provide complementary employment and livelihood options.

In two cases (Transdanubian A-E Knowledge and Maleshevski Tourism), the economic capital remained the same. The Maleshevski Tourism case is an emergent VC and the tourism VC may be in need of support to ensure the economic returns accrue to local people. In the Transdanubian example, the VC actors are exploring how to marketise knowledge and expertise and how they can localise the benefits of their knowledge production, avoiding dependence on insecure public funding.

Only in the Brasov Certified Ecotourism case did the data suggest economic capital had decreased 2019-22 although the prior trends had been positive. This is due to the drop in tourism due to the Covid-19 restrictions and then the impact of the war in neighbouring Ukraine. There

were two cases with no further data to explain why economic values had increased (Western Stara Planina HNV and Drome Lamb).

4.3.2 Socio-cultural valorisation leading to socio-cultural outcomes

The idea of an extended value chain analysis is to look beyond economic development to wider socio-cultural issues pertinent to mountain rural development. This recognises that value chains can influence socio-cultural development within the MRL. The focus of this section is on dimensions of social capital and collaboration, traditional cultures, human capital, and distribution of opportunities. The spatial distribution of these outcomes is addressed in Section 4.4.

4.3.2.1 Accessibility of VC to local entrepreneurs

Part of sustainable development is making economic opportunities accessible to local people so they can benefit from the local assets. At the Production stage of the VC, most cases feel that participation in the VC is accessible to local entrepreneurs but in some cases (Sumava Beef, Transdanubian A-E Knowledge, Trento Wine, Alto Douro Wine, Speyside Whisky) the costs of entry make the VC inaccessible to local entrants even at the Production stage. This pattern continues for Processing stage and the Distribution/Marketing stage, with most cases stating that there is high or medium accessibility for local entrepreneurs to participate in the VC activities. Again, there are cases with low accessibility at the Processing stage (e.g., Betic Organic Olive Oil) and low accessibility in the Distribution/Marketing stag (e.g., Alto Douro Wine). However, by the Consumption stage, only one case (the very specific Transdanubian A-E Knowledge) was suggested as being inaccessible to local entrepreneurs. There were three cases at Production, three cases at Processing, seven cases at Distribution/Marketing, and seven cases at the Consumption stage where no data were provided.

4.3.2.2 Local ownership of VC assets

In the same vein, it is useful to consider if local people own the assets used in the mountain VCs. Most cases reported high or medium local ownership of assets and control of the VC finances at the Production stage. Local ownership drops slightly for the Processing stage, but the majority of cases still reported high or medium ownership, with only two having low ownership (Brasov Certified Ecotourism and Speyside Whisky). There is much more diversity in the data for the Distribution/Marketing and Consumption stages – particularly by the Consumption stage where there are only two cases reporting high local ownership (Transdanubian A-E Knowledge and Huesca Wine). This is partly explained by much of the Distribution/Marketing and Consumption stages taking place outside the MRL.

4.3.2.3 Trust and co-operation

In general, there are high reported levels of trust and co-operation within the Production stage of the VCs; although the Sumava Beef and Serra da Estrela Cheese report low levels. There are more cases reporting low levels of trust and co-operation in the Processing stage (with Brasov Certified Ecotourism, Betic Organic Olive Oil and Elmali Tomatoes joining the initial two cases) but most cases still report a positive situation. Likewise, there are still more cases reporting

medium or high levels of trust and co-operation at the Distribution/Marketing stage, but the number of low trust cases have increased (e.g., Sjenica Lamb VC reports lower levels of trust at this stage). This pattern is repeated for Consumption; with patterns of trust evenly spread across high, medium and low. The cases with low trust and co-operation have changed (Rethymno Carob Flour and Tête de Moine PDO Cheese join Sumava Beef, Brasov Certified Ecotourism, and Serra da Estrela Cheese).

4.3.2.4 Sharing

In terms of sharing information and material within the VC stages, most cases report high or medium degree of sharing – those cases reporting low sharing correlate with low trust in two cases (Sumava Beef, Serra da Estrela Cheese) but also Carpathian Bio-Honey (possibly as it is quite a small scale and distributed set of actors.) There is less sharing at the Production stage for some cases (Rethymno Carob Flour, Sumava Beef, Serra da Estrela Cheese, Brasov Certified Ecotourism, Sjenica Lamb, Tête de Moine PDO Cheese, Grisons Grain and Elmali Tomatoes), possibly related to the type of production undertaken. Some of these cases reporting low trust at the Processing stage (e.g., Betic Organic Olive Oil) still report medium amount of sharing. It is much more polarised by the Distribution/Marketing and Consumption stages – with almost equal numbers of cases reporting high degree of sharing as low degree of sharing.

4.3.2.5 Ability to participate in decisions

In terms of local people being able to participate in VC decisions, most cases reported this to be low across all stages. So even where there is good trust, co-operation and sharing between actors in the VC, it is not always possible for local residents to influence or participate in choices made within the VC that affect their local natural resources or territorial capital.

4.3.2.6 Connecting local people to natural resources

This question was interpreted in different ways – some discussed how the institutions constrained or regulated access (Betic Organic Olive Oil, Sierra Morena Ham, Brasov Certified Ecotourism, Tuscan Chestnut Flour), others talked about how the VC helped local people relate to the landscape (Corsican Chestnut Flour, Transdanubian A-E Knowledge, Speyside Whisky), and two cases (Huesca Wine, Serra da Estrela Cheese) talked about how access to natural resources generates outcomes (e.g., varietal recovery, maintains open landscape). In some cases (e.g., Brasov Certified Ecotourism), the data suggested that it is the enabling institutions that are responsible for ensuring sustainable access to nature is enabled.

In most cases, the main Production actors necessarily access the natural resources on which the VC depends, although access to land is a limiting factor in the Sumava Beef, Trento Wine, Alto Douro Wine, and Grisons Grain VCs. In the case of Elmali Tomatoes, access to ground water constrains the local Production stage of the VC, although the VC has good access to the land itself.

Water becomes an important factor for more cases in the Processing stage (e.g., Alto Molise Cheese considers this as constraint; noted as important by Sjenica Lamb and Grisons Grain; and having easy access to water was an enabling factor for the Weiz Lamb VC). There are constraints

on access to wider natural resources due to limited networks and competition from German buyers in the Sumava Beef VC. Low accessibility by local people to natural resources is also reported in the Carpathian Bio-Honey and Elmali Tomatoes VC cases.

By the Distribution/Marketing stage, access is more heterogenous – some cases suggest access is low or limited (Rethymno Carob Flour, Sumava Beef, Carpathian Bio-Honey, Elmali Tomatoes) but in other cases, the marketing actually raises public awareness of nature and farmed landscapes in the mountains (e.g., Grisons Grain, Serra da Estrela Cheese). This pattern may be explained in terms of who has access to the resources – whether it is the original producers or the consumers of the product.

By the Consumption stage, those cases reporting data suggest that the practices associated with Consumption actually increase consumers appreciation of the landscape and natural foundations of the products, including Rethymno Carob Flour, Transdanubian A-E Knowledge, Serra da Estrela Cheese, Alto Douro Wine, Brasov Certified Ecotourism, Speyside Whisky, Carpathian Bio-Honey, Huesca Wine, Betic Organic Olive Oil, Tête de Moine PDO cheese, Elmali Tomatoes, and Sjenica lamb.

There were increasing amount of missing data for this part of valorisation (two cases for Production, six for Processing, nine for Distribution/Marketing, and 10 for Consumption).

4.3.2.7 Cultural landscapes, traditions, and symbolic capital

Most cases suggest that the Production stage of the VC makes a high contribution to existing cultural landscapes – for example, the reinvigoration of chestnut trees as part of the landscape in Tuscany and Corsica. The contribution to cultural landscapes remains high throughout the VC for about half the cases as the landscape is part of the promotional approaches – such as Grisons Grains, although this case distinguishes between the traditional and industrial mills, the former is part of cultural landscapes. However, the disconnection between the landscape and the VC increases as we advance along the VC for the other cases where data were provided (e.g., Trento Wine has a low connection to traditional landscapes for the last two stages but high connection for the first two stages).

Most cases draw on traditions and customs to a high or medium extent in the Production stage; and whilst most cases still have a high or medium use of traditions in the Processing stage, it is less pronounced with one emerging VC (Carpathian Bio-Honey) having a low draw on tradition at this stage. The Distribution/Marketing and Consumption stages are dispersed with some cases still drawing heavily on custom and tradition (e.g., Rethymno Carob Flour) but more cases only have a medium or low draw by the Consumption stage (e.g., Serra da Estrela Cheese)

Most cases also draw on the unique symbolic capital of the area at all four of the stages (Production, Processing, Distribution/Marketing and Consumption). This finding generally confirms the CAF thesis that symbolic capital - the unique and special reputation of the MRL - is important to most of the VC across their stages. However, the Elmali Tomatoes VC is exceptional as it has a low dependence on symbolic capital at all stages. In a few cases, symbolic capital is not important at certain parts of the VC (e.g., the Production stage for Tuscan Chestnut Flour; the

Distribution/Marketing stage for Carpathian Bio-Honey; and the Consumption stage for Sjenica Lamb).

There appears to be no difference by VC cluster from a thematic analysis, suggesting that the context rather than commodity is the important thing to understand.

4.3.2.8 Education

All stages often required some form of further education and training. However, many Production and Consumption stage jobs do not have a higher educational requirement. The alcohol cases needed specific qualifications although surprisingly, it is the tourism and knowledge producers that have more need for a university degree (Transdanubian A-E Knowledge, Brasov Certified Ecotourism, Maleshevski Tourism) at the Production and Consumptions stages due to the different types of practices found in these VCs. There are more jobs associated with Processing or Distribution/Marketing stages that have higher educational requirements, including cases requiring a higher degree (Masters and above). This finding suggests that there are generally VC jobs that are accessible to those not wishing to leave the MRL for higher education. Conversely, those with higher educational requirements tend to be better paid.

4.3.2.9 Gender, age and migration status of those engaged in the VC

The Production and Processing stages of most VCs are staffed by mainly male actors, whereas the Distribution/Marketing and Consumption stages are more mixed genders. However, there are very few cases where the VC stage is staffed by predominantly females; the exceptions are the Consumption stage of the Rethymno Carob Flour, Sjenica Lamb and Betic Organic Olive Oil VCs, and the Distribution/Marketing stage for Grisons Grain). The mixed or women-centred Consumption stages might be connected with the tendency for household shopping and cooking to be still biased towards women; for example olive oil is a household staple in Spain.

The age profile of actors within the Production and Processing stages has very few cases where the majority are under 40 (Transdanubian A-E Knowledge and Brasov Certified Ecotourism for Production, and Weiz Lamb and Tête de Moine PDO Cheese for Processing); but most cases are less than 60 years old, suggesting the VC Production actors tend to be younger than the traditional farming demographic. More cases have predominantly young actors by the Distribution/Marketing and Consumption stages.

The actors are predominantly local for the Production and Processing stages of most VCs; but around half the cases involve a mixture of local and immigrant workers in the Distribution/Marketing or Consumption stages of the VC. The marked exception being the Transdanubian A-E Knowledge case which is developed by urban migrants moving to the MRL.

4.3.2.10 Health

There are occupational hazards associated with the VC at every stage (four cases did not provide data for this question). Many cases emphasised the demanding physical work at the Production and Processing stages and the exposure to risks from working with machinery or working in

remote or challenging conditions. Some cases noted exposure to potential disease (e.g., Sumava Beef) or pesticides (e.g., Trento Wine).

However, in general more cases that answered the question felt the VC generated positive or mixed than negative physical and mental health outcomes. The picture was most heterogeneous at the Production stage; where an equal number of cases (n=7) felt there were positive or negative outcomes. By the Consumption stage, the majority of cases (n=9) felt there were positive health outcomes and only one (Sjenica Lamb) felt there were negative health outcomes. There were several cases unable to provide data (e.g., 11 cases with no data or non-standard data for the Consumption stage).

We also asked about whether the VCs generated any impacts on the environment with implications for human health (e.g., potable water, food safety/nutrition, zoonotic pests, and diseases, and air quality). Across all VC stages the results were mixed, with more cases at the Production stage reporting a positive valorisation (n=7) or mixed valorisation (n=10) concerning impacts with human health implications than at other stages. Conversely, four cases reported predominantly negative impacts during the Distribution/Marketing stage, which was the most cases reporting for this stage (there were 14 cases unable to answer this question). The negative impacts were mainly associated with pollution from transport.

There did not appear to be strong patterns by cluster – for example, one VC involving livestock might suggest there were negative or mixed health impacts, but other VC involving livestock might suggest positive impacts for the same VC stage.

4.3.2.11 How the MRL compares to the wider situation

In many cases, the socio-cultural valorisation processes and outcomes are typical for the MRR or even the entire country (e.g., Alto Douro Wine, Carpathian Bio-Honey). However, there were some examples where VCs were doing better than the overall picture for particular dimensions.

For example, the Trento Wine VC shows higher socio-cultural values comparing to national levels in the wine sector. The Tuscan Chestnut Flour VC had a more gender balanced work force and Rethymno Carob Flour VC has a more educated workforce than typical for the region. Both the Huesca Wine VC and Speyside Whisky VCs are based in a region with a more equitable distribution of income and less poverty than the Spanish or Scottish national average. Due to the particular approach of the Serra da Estrela Cheese VC, there is a very strong focus on the preservation of traditional breeds, that is different from other PDO cheese in Portugal. The Betic Organic Olive Oil VC also shows how the PDO highlights and help valorise the unique cultural landscape. The Elmali Tomatoes VC has better outcomes in terms of finding land, helping each other, making decisions together and accessing information than is typical for Turkey. However, although most socio-cultural values were higher than for the MRR or Member State values, they were lower in the MRL for co-operation and trust and cultural heritage in the Brasov Certified Ecotourism VC. The Sumava Beef VC reports that the human, culture and social capital within the MRL is generally below the average of the Czech Republic due to peripheral location, historical development and lack of local identity- this is echoed by the Alto Molise Cheese VC.

4.3.2.12 Overall judgement of change

The majority of cases (n=12) providing a judgement felt that the socio-cultural capitals had increased by the end of the VC, although the number is smaller than for the economic valorisation. No cases felt the socio-cultural capitals had decreased; but six cases (Brasov Certified Ecotourism, Corsican Chestnut Flour, Grisons Grain, Maleshevski tourism, Sjenica Lamb, and Sierra Morena Ham) felt the capital base was unchanged. There were missing data for five cases. The reasons for static or positive socio-cultural valorisation were associated with tradition, knowledge, co-operation, and the distribution of benefits.

The connection between tradition and cultural heritage is strong in many VCs, which contributes to positive socio-cultural valorisation (e.g., Tuscan Chestnut Flour). This is particularly important in light of increasingly industrialised food chains that decouple land from local cultures and traditions. Many cases stressed the link between the VC and the traditional landscapes in the MRL, which provide a collective identity for the residents. These values are particularly important where depopulation means that local knowledge and traditions could be lost. The VCs are helping to preserve these traditions through their branding and the associated tourism additional value chains (e.g., Alto Douro Wine). It is important that consumers are aware and reward these links, and consumers can help to develop and sustain shared cultural capital embodied in the mountain product (e.g., Tête de Moine PDO cheese).

Many VCs require, and sustain, traditional knowledge about Production and Processing practices. Many VCs build on the long-term connection between producers and their land. These are not only about links to the past, but are important aspects in resilience to climate change, invasive species and pathogens affecting yields (e.g., Huesca Wine). Some VCs are also preserving certain unique breeds (e.g., Serra da Estrela Cheese), and genetic diversity is an important aspect of environmental security as well as socio-cultural value. These traditions are also part of contemporary life and celebrations linked to production help maintain social capital and desirable lifestyles for residents in remote regions (e.g., Sierra Morena Ham). However, in some cases, there are questions about reifying tradition in product branding that is not representative of the current situation in the MRL (e.g., Speyside Whisky).

Trust and co-operation have increased in some VCs (e.g., Tuscan Chestnut Flour, Huesca Wine) which can help reclaim previously abandoned land and generate a positive momentum for the VC. This is important for rural development as well as the VC. However, this is not the case for all VCs and some point to the lack of co-operation as a reason why the VC is not performing as well as some actors believe it could (e.g., Sumava Beef).

Furthermore, the positive socio-cultural values can be undercut by economic negative impacts and often local actors involved in the Production and Processing stages are more vulnerable to these shocks. When economic margins are tight, there is more likelihood of physical and mental health risks at these VC stages. As with the economic valorisation processes, there is diversity in how the outcomes are realised; where the practices are localised, and actors have strong social values, the outcomes are positive. However, non-local retailers can exploit tradition and local

branding for their own gain. The cases seek to sustain tradition and cultural landscapes whilst improving the livelihoods of the VC producers to ensure the overall sustainability of the MRL.

4.3.3 Environmental valorisation leading to environmental outcomes

The H2020 MOVING project highlights the foundational role that mountain environments play in value chains. Therefore, additional description of the important territorial capitals enrolled in the VCs are provided here. The spatial distribution of these outcomes is addressed in Section 4.4.

4.3.3.1 Use of MRL natural resources

In terms of proportion of natural resources used in the VC that are local to the MRL, most cases are dominated by local natural resources at the Production stage. The exceptions to this are the Corsican Chestnut Flour VC (only 25-50%) and Transdanubian A-E Knowledge (only 51-75%). The Processing stage is similar although slightly more cases are disconnected from local natural resources at this stage (e.g., Slovakian Bio-honey has <25% use of local natural resources by the Processing stage). The situation becomes much more mixed during the Distribution/Marketing and Consumption stages, where some cases still have more than 75% local natural resources; but, likewise, some cases use less than 25% local natural resources. Therefore, whilst the VC becomes progressively decoupled from MRL natural resources in some cases, it is not true for all.

4.3.3.2 Use of MRL farmed resources

The majority of the cases draw their farmed resources primarily from the MRL at the Production stage, the exceptions being the Corsican Chestnut Flour VC and the Carpathian Bio-Honey VC where less than half the farmed resources used in the VC come from the MRL. This changes slightly at the Processing stage, where the majority of cases providing data still rely primarily on farmed resources from the MRL, but it is the Speyside Whisky and Betic Organic Olive Oil that join the Carpathian Bio-Honey in having less than half their farmed resources coming from within the MRL. The data are sparser for the Distribution/Marketing and Consumption stages, with the tourism cases being the most coupled at Consumption stage. Thus, we can observe the same pattern as for natural resources.

4.3.3.3 Competition for MRL resources

Another important contextual factor is the degree of competition for the farmed and natural resources in the MRL between the focal value chain under analysis and other value chains in the area. Most of our cases have competition for resources at the Production stage. It is possible that those cases without competition might be in areas of monoculture (e.g., Trento Wine, Huesca Wine, Sierra Morena Ham, Betic Organic Olive Oil) or where the practices are very complementary (e.g., Carpathian Bio-Honey, Brasov Certified Ecotourism). The Processing stage continues to suggest more cases facing competition than not, whereas it is an equal split for the Distribution/Marketing and Consumption stages. This particularly matters when considering if the resources are already not being used at a sustainable rate within the VC, as competition for resources may amplify the problems.

There is an interesting tension between mountain areas used for forestry and the desire to use livestock grazing to keep a more open mosaic of wooded pastures in the Sumava Beef, Serra da Estrela Cheese, and the Tête de Moine PDO Cheese value chains. The integrated management of wooded pasture is an emblematic landscape with ecological values as trees provide shade, help protect the soil, increase water retention, and mitigate GHGs.

4.3.3.4 Sustainable use of resources across the VC stages

Cases were asked to evaluate if the MRL natural resources were being used at a sustainable rate. In the majority cases, participants evaluated the VC to be using the MRL natural resources at a sustainable rate at all stages. Value chains reporting that it was not sustainable were five cases at the Production stage (Corsican Chestnut Flour, Speyside Whisky, Betic Organic Olive Oil, and Elmali Tomatoes), two at the Processing stage (Speyside Whisky, and Elmali Tomatoes) and three at the Distribution/Marketing stage (Trento Wine, Huesca Wine, and Grisons Grains). The amount of no data returns increased through the stages, potentially because the later stages are not located in MRL and therefore were not using the MRL natural resources.

The following types of pollution or negative valorisation of natural capital were reported to sometimes occur at each stage of the VCs:

Production:

- GHG emissions from livestock (Weiz Lamb)
- Air pollution (Trento Wine, Sumava Beef, Brasov Certified Ecotourism)
- Soil erosion (Corsican Chestnut Flour, Trento Wine, Alto Douro Wine, Huesca Wine, Grisons Grain)
- Water pollution (Trento Wine, Alto Douro Wine, Elmali Tomatoes)
- Waste generation (Maleshevski Tourism, Elmali Tomatoes)
- Agro-chemical pollution (Serra da Estrela Cheese, Alto Douro Wine)
- Soil pollution (Elmali Tomatoes)
- Overgrazing (Sjenica Lamb – occasionally on particular land parcels, Sierra Morena Ham)

Seven cases said there were no pollution issues at the Production stage, or that the VC practices helped to prevent pollution (Rethymno Carob Flour, Alto Molise Cheese, Transdanubian A-E Knowledge, Maleshevski Tourism, Tuscan Chestnut Flour, Huesca Wine, Betic Organic Olive Oil). This was often due to the fact the VC required the producers to adopt restorative or organic practices. Other VC cases qualified the impacts listed above as being actively managed or reduced through VC practices (Sumava Beef; Alto Douro Wine, Trento Wine, Grisons Grain, Sjenica Lamb, Serra da Estrela Cheese). In the Alto Douro Wine VC, they distinguish between small farmers' overuse of pesticides and larger companies adopting good environmental practices. There were four cases that did not provide data.

Processing:

- Waste generation (plastic packaging) (Weiz Lamb, Brasov Certified Ecotourism, Elmali Tomatoes)
- Water Abstraction (Speyside Whisky)

- Pollution from the use of energy/electricity (Speyside Whisky)
- Water pollution (Speyside Whisky, Sjenica Lamb, Huesca Wine)
- Air pollution (Brasov Certified Ecotourism, Speyside Whisky)

As with the Production practices, some cases argued that the VC Processing practices had little effect on the environment (Alto Molise Cheese, Sumava Beef, Tuscan Chestnut Flour, Carpathian Bio-Honey). Further cases argued that due to the adoption of practices associated with water stewardship and waste re-use, there was no overall negative impact (Rethymno Carob Flour, Trento Wine, Alto Douro Wine, Maleshevski Tourism, Huesca Wine) or the effects are greatly mitigated (Speyside Whisky).There were seven cases that did not provide data.

Distribution/Marketing:

- Air pollution from transport (Weiz Lamb, Alto Molise Cheese, Brasov Certified Ecotourism, Sjenica Lamb, Speyside Whisky)
    - Others argue the emissions are small compared to other sectors (Sierra Morena Ham, Huesca Wine, Tête de Moine PDO Cheese, Grisons Grain; Elmali Tomatoes)
- Plastic and other packaging waste (Weiz Lamb, Sumava Beef, Trento Wine, Serra da Estrela Cheese, Brasov Certified Ecotourism, Speyside Whisky)

Mountain areas are often remote and difficult to access, which means there are limited options to decarbonise transport networks. Those with a more localised VCs, particularly where Consumption happens mainly within the MRL and MRR, have a lower footprint at this stage (e.g., Rethymno Carob Flour; Maleshevski Tourism, Carpathian Bio-Honey). There was no data provided from seven cases.

Consumption:

- Air pollution from transport (Weiz Lamb, Brasov Certified Ecotourism, Grisons Grain)
- Food waste (Grisons Grain)
- Plastic and other packaging waste (Weiz Lamb, Alto Molise Cheese, Rethymno Carob Flour– but packages can be recycled, Sumava Beef, Brasov Certified Ecotourism, Speyside Whisky, Sjenica Lamb, Huesca Wine – but package can be reused)

In some cases, there was no current pollution problems, but if the VC were to expand in value and numbers of consumers, then this could change (e.g., Maleshevski Tourism). There was no data provided from ten cases.

4.3.3.5 Impact on biodiversity

The VCs are built on important mountain habitats and biodiversity hotspots in our 23 MRLs. This reflects the fact that the MOVING MRRs include Biosphere Reserves (n=14) and/or National Parks (n=10). These designations were thought to offer opportunities as well as constraints for many of the VCs in the MRLs.

Many (n=10) cases reported positive effects on biodiversity and habitat quality at the production stage (e.g., biodiversity developed through sustainable grazing management in Weiz Lamb,

Sjenica Lamb and Serra da Estrela (sheep) Cheese VCs). This is a rare example of a strong theme by VC type, with all sheep-based VCs providing data arguing strongly that grazing is correlated with good biodiversity outcomes. Sumava Beef and Alto Molise (cow) Cheese also reflect positive biodiversity from grazing regimes, but the Tête de Moine PDO (cow) Cheese VC suggests that potential negative effects of overspecialised land use. This risk from the VC can be offset by other habitat restoration approaches (e.g., perches for raptors, dry stone walls for ermines etc.) Only one case related their comments on biodiversity to aquatic systems (Speyside Whisky).

Almost an equal number (n = 9) reported mixed effects on biodiversity from the Production stage (e.g., balancing the preservation of open forestry with introduction of exogenous species in the Tuscan Chestnut Flour VC). Two cases felt the VC has a negative impact at the Production stage (Corsican Chestnut Flour, Elmali Tomatoes). There are a lot less data for the later stages of the VCs (missing data from between 17 to 21 cases as we go across the stages). The situation is mixed across those cases reporting on this aspect.

Potentially, these findings suggest there could be more focus on bringing out the positive effects of the VCs on biodiversity, given the ongoing biodiversity crisis particularly affecting vulnerable ecosystems in mountain areas.

4.3.3.6 Impact on climate mitigation

In terms of the contribution of the VC to climate change or climate mitigation, the data are quite mixed. At the Production stage, the majority of cases with data suggest they are GHG neutral, and a few cases also sequester carbon (Rethymno Carob Flour, Tuscan Chestnut Flour, Huesca Wine) – however, some livestock, tourism and crop cases are judged as contributing to GHG emissions. It is complex to balance the emissions from livestock with the sequestration of carbon in pasture and soil. Many of the crop (particularly tree-based) VCs highlight the contribution that the permanent vegetation cover makes to GHG sequestration (e.g., Huesca Wine).

The situation changes for the Processing stage, where most cases making a judgement believe the VC contributes to GHGs; with none sequestering GHGs, and only one case evaluated as neutral (Sumava Beef). The Distribution/Marketing and Consumption stages also reflect that the VCs tend to generate GHGs, which links to the concerns about air pollution arising from transport already highlighted above. This raises opportunities for off-setting emissions further down the VC stages through more GHG-neutral or sequestration-occurring Production practices. For example, Speyside Whisky companies are investing in peatland restoration to help ensure the resilience of springs in periods of drought, as water is a foundational territorial capital for their VC. However, this has the added benefit of sequestering carbon and helping them achieve net zero targets for the industry. Furthermore, where there is more co-operation, emissions from transport within the MRL could be decreased through minimising journeys needed to deliver inputs and pick up the commodities. Finally, re-localisation of Consumption can reduce the air pollution and GHG emissions by reducing food miles.

4.3.3.7 How the MRL compares to the wider situation

As with economic and social valorisation, many cases felt their MRL environmental values and outcomes were typical of other extensive Production in mountain regions (e.g., Carpathian Bio-honey, Sierra Morena Ham). However, the Speyside Whisky MRL was drier than the rest of the MRR, making the vulnerability to water quantity specific to that area. In some cases, the partners felt that the extensive nature of Production practices meant there was less pollution than in other VCs, particularly in the lowland areas (e.g., Tuscan Chestnut Flour, Serra da Estrela Cheese, Transdanubian A-E Knowledge). Some cases felt that intensive VCs (e.g., conventional wine production) could be downgrading MRL environmental values (these were non-MOVING VCs, e.g., in Tuscany) and our cases highlighted the importance of organic practices to mitigate environmental impacts (e.g., Betic Organic Olive Oil, Huesca Wine, Sumava Beef). This can be contrasted with the argument in the Alto Douro Wine VC that small wine producers are more negatively impactful than larger producers, as larger producers proactively seek to conserve the environmental values of the MRL. The Brasov Certified Ecotourism, Alto Molise and Sumava Beef cases reported higher environmental values than the averages for the MRR and Member State. The Elmali Tomatoes VC felt some aspects (soil, water and air pollution and erosion control) within the MRL were better than the national average, but crop diversity was lower than in the rest of Turkey. In some cases, the specifics of the MRL did generate some particular outcomes; the Tuscan Chestnut Flour MRL has particularly steep slopes, meaning that the chestnut forests are particularly important to prevent soil erosion; and the Rethymno Carob Flour VC also noted a higher than average estimated soil erosion by water than for the rest of Crete and Greece due to the topography.

4.3.3.8 Overall judgement of change

Overall, the outcomes are less positive than from economic or socio-cultural perspective. Although the majority of cases (n=10) believe the environmental capital has increased, in a number of cases the environmental capitals remain the same (n=5) and in three cases (Trento Wine, Speyside Whisky, Sjenica Lamb) they are judged to have decreased by the end of the VC. There were missing data for five cases.

The reasons given for these changes are now described. As noted in section 4.3.2.11, traditional management practices can help to conserve native animal and plant breeds and improve the landscape mosaic. This provides valuable habitat and offers increased resilience in the face of climate change; as well as increasing climate mitigation (e.g., Tuscan Chestnut Flour increasing sequestration by actively growing trees). Traditional practices in pastures and forests can help reduce wildfire risk (e.g., Corsican Chestnut Flour) and maintain habitat for wildflowers (e.g., Western Stara Planina HNV). Indeed, some VCs are responsible for maintaining pastures or arable land use in mountain areas (e.g., Grison Grains) or promoting more diverse landscape mosaics (e.g., Tête de Moine PDO Cheese wooded landscapes). Some cases (Carpathian Bio-Honey, Transdanubian A-E Knowledge) are primarily concerned about sustainability and ecosystem services, illustrating regenerative farming.

In many cases, the partners suggest that environmental territorial capital is largely protected or enhanced, with more negative impacts occurring in the later stages (due to increased reliance on fossil fuels and packaging in the Distribution/Marketing and Consumption stages). However, whilst many VCs are practicing responsible management and minimising their effects as far as possible, many of the VCs connected to global markets practice intensive land uses (e.g., the wine VCs) with resulting use of natural resources being greater than more extensive land uses. Surface and ground water scarcity are highlighted by a number of different types of VCs (including Brasov Certified Ecotourism) – given that mountains are the source of freshwater not only for the MRL and MRR but for the associated lowlands, and climate change is likely to increase both floods and droughts, this is a serious concern. Reducing water use and reusing processed wastewater can help here.

Partners would like to see the efforts to protect and sustain territorial environmental capital in the MRL rewarded by price premiums from consumers. Some do not believe that the environmental aspects of mountain brands are well developed or recognised by consumers (e.g., Betic Organic Olive Oil). Further efforts to re-localise Consumption to reduce food miles were also noted (e.g., Sumava Beef).

4.3.4 Final outcomes

As well as the judgements about whether the economic, socio-cultural, and environmental territorial capitals were increased, the following sections describe the types of outcomes that were generated by the VCs by the end of the Consumption stage. These findings were based on the summary of focal VC diagrams (see section 7.1). Many other issues are implicit in other parts of the data collection template and therefore these represent the main aspects highlighted by the regional partners.

We also asked about what outcomes were sought for the VC. As with the valorisation sections, these outcomes were often intertwined and difficult to categorise – for example, the maintenance of a landscape mosaic is economically, socio-culturally, and environmentally relevant. Another example is how tourism is creating more demand for public transport that also benefits local residents in terms of accessing employment, meeting friends and reducing GHGs. Where these desired outcomes are not currently found, this will be the focus for T4.5 (MOVING project team, 2022c) and T4.6 (MOVING project team, 2023).

4.3.4.1 Current economic outcomes

The findings for the economic outcomes are illustrated in Table 6 below. The numbers refer to what was interpreted from the diagrams, but other VCs may also achieve the same outcomes. The information about whether the VC improved economic territorial capital can therefore be interpreted as how the VC has led to these outcomes.

Table 6: Final Economic Outcomes

Types of Outcomes Achieved	Value Chain
• Income from profits and wages (n =12)	Weiz Lamb, Drome Lamb, Alto Molise Cheese, Trento Wine, Maleshevski Tourism, Serra da Estrela Cheese, Brasov Certified Ecotourism, Carpathian Bio-Honey, Betic Organic Olive Oil, Huesca Wine, Elmali Tomatoes, Speyside Whisky
• Supplementary incomes (n =2)	Rethymno Carob Flour, Transdanubian A-E Knowledge
• Support for traditional farming practices that maintain farmland biodiversity (n=3)	Weiz Lamb, Western Stara Planina HNV, Sumava Beef
• Quality commodity/local food production (n=8)	Weiz Lamb, Sumava Beef, Corsican Chestnut Flour, Tuscan Chestnut Flour, Serra da Estrela Cheese, Sjenica Lamb, Grisons Grain
• Creation of infrastructure (n=3)	Rethymno Carob Flour, Betic Organic Olive Oil, Speyside Whisky
• Support for associated VC including tourism (n = 6)	Corsican Chestnut Flour; Drome Lamb, Trento Wine, Serra da Estrela Cheese, Alto Douro Wine, Speyside Whisky
• Local employment (n = 10)	Weiz Lamb, Corsican Chestnut Flour, Drome Lamb, Trento Wine, Serra da Estrela Cheese, Alto Douro Wine, Betic Organic Olive Oil, Huesca Wine, Grisons Grain, Elmali Tomatoes
• Retaining added value in the local economy (n=6)	Drome Lamb, Maleshevski Tourism, Brasov Certified Ecotourism, Sjenica Lamb, Carpathian Bio-Honey, Sierra Morena Ham, Tête de Moine PDO Cheese
• Tax revenue (n = 7)	Rethymno Carob Flour, Trento Wine, Alto Douro Wine, Brasov Certified Ecotourism, Betic Organic Olive Oil, Huesca Wine, Speyside Whisky
• Access to public funding for environmental protection (n = 3)	Western Stara Planina HNV, Transdanubian A-E Knowledge, Trento Wine
• Integrating primary producers with food, drink and tourism (n=3)	Weiz Lamb, Rethymno Carob Flour, Betic Organic Olive Oil
• Improved marketing and visibility for return customers (n = 2)	Weiz lamb, Carpathian Bio-Honey

4.3.4.2 Current socio-cultural outcomes

The findings for the socio-cultural outcomes are illustrated in Table 7 below. The numbers refer to what was interpreted from the diagrams, but other VCs may also achieve these outcomes. Note that in some cases, there were also negative outcomes (e.g., concerns over unhealthy consumption in the Speyside Whisky VC). The information about whether the VC improved socio-cultural territorial capital can therefore be interpreted as how the VC has led to these outcomes.

Table 7: Final Socio-cultural Outcomes

Types of Outcomes Achieved	Value Chain
• Social connections (n = 5)	Corsican Chestnut Flour, Tuscan Chestnut Flour, Maleshevski tourism, Brasov Certified Ecotourism, Carpathian Bio-Honey
• Including collaborative producer groups (n =2)	Drome Lamb, Weiz Lamb
• Strengthened territorial identity (n = 6)	Weiz Lamb, Rethymno Carob Flour, Carpathian Bio-Honey, Betic Organic Olive Oil, Grisons Grain, Speyside Whisky
• Worthwhile activities • (n =3)	Drome Lamb, Transdanubian A-E Knowledge, Sjenica Lamb
• Slowing rural population decline (n = 6)	Corsican Chestnut Flour, Trento Wine, Alto Douro Wine, Sjenica Lamb, Huesca Wine, Brasov Certified Ecotourism
• Preservation of traditional landscapes (n = 13)	Sumava Beef, Corsican Chestnut Flour, Drome Lamb, Rethymno Carob Flour, Alto Molise Cheese, Trento Wine, Tuscan Chestnut Flour, Serra da Estrela Cheese, Alto Douro Wine, Carpathian Bio-Honey, Huesca Wine, Tête de Moine PDO Cheese, Sjenica Lamb
• Preservation of traditional knowledge and heritage (n = 13)	Rethymno Carob Flour, Alto Molise Cheese, Trento Wine, Tuscan Chestnut Flour, Serra da Estrela Cheese, Alto Douro Wine, Brasov Certified Ecotourism, Carpathian Bio-Honey, Sierra Morena Ham, Huesca Wine, Grisons Grain, Tête de Moine PDO Cheese, Brasov Certified Ecotourism
• Increased opportunities for local residents (n =3)	Corsican Chestnut Flour, Maleshevski Tourism, Speyside Whisky
• Increased skills for local workers (n = 4)	Trento Wine, Tuscan Chestnut Flour, Alto Douro Wine, Speyside Whisky
• Promotion of healthy foods (n = 4)	Rethymno Carob Flour, Maleshevski tourism, Carpathian Bio-Honey, Betic Organic Olive Oil
• Other health outcomes (n = 1)	Brasov Certified Ecotourism

• Linking local residents to food and land (n = 3)	Alto Molise Cheese, Tuscan Chestnut Flour, Weiz Lamb

4.3.4.3 Current environmental outcomes

The findings for the environmental outcomes are illustrated in Table *8* below. The numbers refer to what was interpreted from the diagrams, but other VCs may also achieve these outcomes. The information about whether the VC improved environmental territorial capital can therefore be interpreted as how the VC has led to these outcomes. Although there are strong environmental outcomes for the MRL, the overall valorisation was mixed when it came to adding environmental values – for example, the Elmali Tomatoes, Sierra Morena Ham and Speyside Whisky VC raise concerns about over-exploitation of water resources.

Table 8: Final Environmental Outcomes

Types of Outcomes Achieved	Value Chain
• Mountain biodiversity (habitats and species) (n = 9)	Western Stara Planina HNV, Sumava Beef, Corsican Chestnut Flour, Transdanubian A-E Knowledge, Alto Molise Cheese, Serra da Estrela Cheese, Sjenica Lamb, Grisons Grain, Brasov Certified Ecotourism, Carpathian Bio-Honey (particularly sustaining pollination)
• Preserving or encouraging eco-friendly land management techniques (n = 8)	Drome Lamb, Transdanubian A-E Knowledge, Trento Wine, Alto Douro Wine, Brasov Certified Ecotourism, Betic Organic Olive Oil, Sierra Morena Ham, Huesca Wine
• Maintaining a productive agro-silvo ecosystem (n = 3)	Corsican Chestnut Flour, Rethymno Carob Flour, Tuscan Chestnut Flour
• Preservation of heritage species/ varieties (n=4)	Trento Wine, Serra da Estrela Cheese, Alto Douro Wine, Sjenica Lamb
• Prevention of wildfires (n = 2)	Corsican Chestnut Flour, Serra da Estrela Cheese
• Carbon capture and storage (n = 5)	Drome Lamb, Rethymno Carob Flour, Tuscan Chestnut Flour, Betic Organic Olive Oil, Tête de Moine PDO cheese
• Reducing GHG emissions (n = 4)	Maleshevski tourism, Brasov Certified Ecotourism, Carpathian Bio-Honey, Speyside Whisky
• Provision of renewable energy through by-products (n=1)	Weiz Lamb
• Soil and water protection (n=4)	Transdanubian A-E Knowledge, Tuscan Chestnut Flour, Brasov Certified Ecotourism, Betic Organic Olive Oil

• Awareness and appreciation of environmental outcomes (n=7)	Weiz Lamb, Western Stara Planina HNV, Drome Lamb, Maleshevski Tourism, Brasov Certified Ecotourism, Carpathian Bio-Honey, Grisons Grain
• Reduced waste (n =4)	Weiz Lamb, Maleshevski tourism, Carpathian Bio-Honey, Speyside Whisky

4.3.5 Desired outcomes

The achieved outcomes, as perceived by the VC research partners and validated by their MAPs, can be compared to information provided on what is desired from these mountain VCs. These are additional valorisation outcomes sought through continuing to achieve the outcomes described above but doing more to capture value in the MRL and/or to make the VCs resilient, sustainable, and embedded. These themes will be revisited in T4.5 (MOVING project team, 2022c) and T4.6 (MOVING project team, 2023).

4.3.5.1 Desired economic outcomes

- Income and revenue to local land managers (e.g., Serra da Estrela Cheese)
- Increased local retail and consumption to maintain value additions in the MRL or MRR (e.g., Grisons Grain)
- Job opportunities including opportunities for women, who often struggle to find flexible work to fit around caring responsibilities (e.g., Weiz Lamb)
- Provision of amenity for other VCs – e.g., tourists enjoying the landscape, promotion of area as destination for tourists (e.g., Carpathian Bio-Honey)
- Increased opportunities for start-ups (e.g., Maleshevski tourism) and re-investment in the MRL by existing companies (e.g., Alto Douro Wine)
- Demonstrating the potential for green economy and making the economic returns reflect the high environmental credentials, protection of the brand (e.g., Betic Organic Olive Oil)
- Additional income from conservation activities (e.g., Transdanubian A-E Knowledge)
- Stronger returns based on branding or certification processes (e.g., Sierra Morena Ham, Sjenica Lamb)

4.3.5.2 Desired socio-cultural outcomes

- Maintaining family farms and options for diversification within agriculture and associated sectors (e.g., Weiz Lamb)
- Maintaining mountain populations (e.g., Huesca Wine)
- Preservation of traditional practices and cultural landscapes (e.g., Alto Molise Cheese)
- Empowerment of local stakeholders through co-operation across the VC (e.g., Tête de Moine PDO Cheese)

- Improved skills, education, and training for the local population (e.g., Tuscan Chestnut Flour)
- Improved services for the local population (e.g., Sjenica Lamb)
- Enhanced regional identity and collective focus point (e.g., Speyside Whisky)
- Improved health outcomes (e.g., Carpathian Bio-Honey)
- Increased traditional foods with health benefits (e.g., Rethymno Carob Flour)
- Conflict resolution with other land-based activities (e.g., Serra da Estrela Cheese)

4.3.5.3 Desired environmental outcomes

- Increased biodiversity (e.g., Carpathian Bio-Honey)
- Preservation of native breeds and improved animal welfare (e.g., Serra da Estrela Cheese)
- GHG mitigation (e.g., Rethymno Carob Flour).
- Reduced pollution (e.g., Trento Wine).
- Reduced wildfire risk (e.g., Rethymno Carob Flour).
- Maintenance or restoration of landscape for important habitats (e.g., Brasov Certified Ecotourism).
- Soil protection (e.g., Weiz Lamb)
- Reduced risks from flooding or landslides due to cultivation activities (e.g., Tuscan Chestnut Flour)
- Promotion of resource efficiency and eco-innovations (e.g., Maleshevski Tourism).
- Economic rationale to preserve clean air and good environmental health (e.g., Alto Douro Wine).
- Increased relationship with nature particularly through organic production (e.g., Sumava Beef)

4.3.5.4 Who sought these outcomes?

These outcomes were sought by a combination of actors. In all cases, the outcomes were sought by local VC actors – however, in only a few cases (Tuscan Chestnut, Sjenica Lamb, Elmali Tomatoes, Sumava Beef, Corsican Chestnut Flour) were the results sought by mainly local actors with little influence from external actors. In contrast, the Speyside Whisky outcomes reflect views of mainly external actors, who have business interests in the MRL but were not local residents.

There were some conflicts within these local actors – for example, the Serra da Estrela MRL has some conflicts between forest, conservation, and agricultural interests in terms of the balance

between building, cleared land, and forested lands. Different views of viability and desirability of the Transdanubian A-E Knowledge VC also existed between newcomers and existing farmers.

In some of these cases, the local actors' preferences also reflect norms held by their non-MRL consumers and wider society (e.g., Weiz Lamb, Maleshevski Tourism, Alto Douro Wine, Brasov Certified Ecotourism, Sumava Beef, Sierra Morena Ham, Huesca Wine, Grisons Grain, Betic Organic Olive Oil, Tête de Moine PDO cheese, Rethymno Carob Flour, Alto Molise Cheese, Trento Wine. There was no data available from two cases.

4.3.6 Summary

These findings map well onto the overall objectives of the EC Long Term Vision for Rural Areas[10], and provide a useful foundation to develop further strategies for sustainable mountain development and how to future-proof these against exogenous drivers of change. Overall, the valorisation processes highlight a push for locally-embedded VCs. This can be positive in terms of (re)democratising the relationship between local people and the mountain territorial capitals. However, it is also important to illustrate the role that mountain areas play in national and international sustainable development, so that areas that are geographically distant are still considered relevant and important to the decisions of urban citizens and consumers.

4.4 Spatial analysis and tele-coupling

This section addresses how the value chains are structured across space and to what extent the outcomes identified accrue to the MRL or MRR. Spatial aspects of the VC assemblage are discussed in Section 4.7.7. For reference, Table 1 in Section 3 notes the geographical areas that each value chain is based in terms of four spatial categories (MRL, MRR, Country, International) for each of the VC case studies.

4.4.1 Global value chains and markets

Over half of the VC cases (n=13) describe themselves as global value chains (with four cases not providing this data). The other cases (Weiz Lamb, Transdanubian A-E Knowledge, Serra da Estrela Cheese, Carpathian Bio-Honey, Huesca Wine, and Grisons Grain) are not described as global value chains

For these non-global VCs, the main markets for their products are from all over the country (Weiz Lamb, Serra da Estrela Cheese), urban (Transdanubian A-E Knowledge), local residents or visitors to the MRL (Carpathian Bio-Honey, Huesca Wine, Grisons Grain).

[10] A long-term vision for the EU's rural areas | European Commission (europa.eu)

The global value chains also have national consumers and markets across the EU. Residents and visitors to the MRL are also important consumers even for global VCs (e.g., Sumava Beef; Trento Wine). Specific export markets mentioned by cases are (listed in alphabetical order):

- Australia (Brasov Certified Ecotourism)
- Asia-Pacific (Speyside Whisky)
- Brazil (Alto Douro Wine)
- Canada (Alto Molise Cheese)
- EU generally (Brasov Certified Ecotourism, Speyside Whisky, Alto Molise Cheese)
- France (Alto Douro Wine, Betic Organic Olive Oil, Tête de Moine PDO Cheese)
- Germany (Sumava Beef, Alto Douro Wine, Betic Organic Olive Oil, Tête de Moine PDO Cheese)
- Israel (Brasov Certified Ecotourism)
- Italy (Betic Organic Olive Oil)
- Japan (Betic Organic Olive Oil)
- Middle East (Sjenica Lamb)
- Russia (Elmali Tomatoes)
- Spain (Tête de Moine PDO Cheese)
- Turkey (Sumava Beef)
- UK (Alto Molise Cheese)
- Ukraine (Elmali Tomatoes)
- USA (Alto Douro Wine, Speyside Whisky, Betic Organic Olive Oil)

However, many global VCs involve exports to many countries – for example whilst France and Germany might be the main export market for the Tête de Moine PDO Cheese, it is exported to over 40 countries in total.

4.4.2 Where do the VC practices take place?

As shown in Table 9 nearly all the VCs are tele-coupled to spaces outside the MRL and MRR. The majority of the tele-coupling occurs at later stages in the VC, with most Production practices located in the MRL although some VC practices are mainly sited in the MRR (see Rethymno Carob Flour, Transdanubian A-E Knowledge, Serra da Estrela Cheese, Huesca Wine). Some VC practices extend beyond the national boundaries to including international spaces at the Distribution/Marketing and Consumption stages of the VC. Other cases have much more territorial practices, strongly rooted in the MRL (e.g., Sumava Beef, Grisons Grain).

Table 9: Proportion of practices across space for each practice stage

Majority of practices:				NDP		
MRL	National	Split across scales	Practice stage			
MRR	Inter-national					
Name of VC			Production	Processing	Distribution	Consumption
1.	Weiz Lamb		>75% in MRL	>75% in MRL	51-75% in MRR, rest National	51-75% in MRR, rest National and international
2.	Western Stara Planina HNV					
3.	Sumava Beef		>75% in MRL	>75% in MRL	>75% in MRL	Split between MRR, National
4.	Corsican Chestnut Flour					
5.	Drome Lamb					
6.	Rethymno Carob Flour		25-50% MRR (rest split across MRL, National and International)	Split mainly between MRR and National	Split mainly between MRR and National	Mainly National
7.	Transdanubian A-E Knowledge		Split between MRL, MRR and National	Split between MRL, MRR and National	>75% national	Mainly MRL
8.	Alto Molise Cheese		Split between MRL, MRR and national with the majority in the MRR	>75% MRR	>75% MRR	Mainly MRL and MRR with some national and international practices
9.	Trento Wine		>75% in MRL	>75% in MRL	51-75% MRL but some in MRR, national and international	51-75% national, rest split across MRL, MRR and international
10.	Tuscan Chestnut Flour		>75% MRL	51-75% MRL, rest MRR	>75% MRR	>75% MRR
11.	Maleshevski Tourism		Split equally across MRL, MRR and National	Split equally across MRL, MRR and National	N/A	Split equally across MRL, MRR and National

12.	Serra da Estrela Cheese	>75% MRR	>75% MRR	<25% MRL, 25-50% MRR, 25-50% National	>75% national
13.	Alto Douro Wine	>75% MRL	51-75% MRL rest MRR	Mainly MRR and National	Split across MRR, National and international
14.	Brasov Certified Ecotourism	Split between MRL and National	N/A	N/A	51-75% National, some international
15.	Sjenica Lamb	>75% MRL	51-75% MRL, rest mainly national or MRR	Predominantly MRL and MRR, some National share	51-75% MRL, rest National
16.	Carpathians Bio-Honey	Split equally between MRL, MRR and National	Split equally between MRL, MRR and National	Split equally between MRL, MRR and National	Split equally between MRL, MRR and National
17.	Betic Organic Olive Oil	>75% MRL	>75% MRL	51-75% International, rest mainly national	51-75% International, rest mainly national
18.	Sierra Morena Ham	>75% MRL	Split between MRL, MRR and another region	>75% national	>75% national
19.	Huesca Wine	>75% MRR	>75% MRR	>75%MRR	>75% MRR
20.	Grisons Grain	>75% MRL	51-75% MRL, rest MRR and National	>75% MRL	Mainly MRL and MRR, some national
21.	Tête de Moine PDO Cheese	>75% MRL	>75% MRL	51-75% international, some MRR and National	51-75% international, some MRR
22.	Elmali Tomatoes	>75% MRL	>75% MRL	51-75% international, rest mainly national	51-75% international, rest mainly national
23.	Speyside Whisky	>75% MRL	Spilt MRL and National	>75% national	>75% international

We also asked about how rural the areas are where Production, Processing, Distribution/Marketing and Consumption take place. For the 11 cases reporting an evaluation, most of the Production and Processing practices take place in rural areas; with only the Brasov Certified Ecotourism reporting that the Production practices take place in predominantly urban

settings (due to the different way they conceptualised their tourism VC – see Figure 15). When it comes to the Distribution/Marketing and Consumption stages, most practices evaluated take place in intermediate types of space (neither fully urban or rural) or a mix of urban and rural spaces. However, the Tête de Moine PDO Cheese and Betic Organic Olive Oil Distribution/Marketing practices occur in predominantly urban areas. By contrast, Grisons Grain Distribution/Marketing practices are found predominantly in rural areas, showing that these practices do not have to be undertaken necessarily by urban based companies. No data was provided for 14 cases.

4.4.2.1 Practices mainly within the MRL

Many cases have the majority of their Production practices taking place within the MRL but surprisingly not all – Rethymno Carob Flour, Transdanubian A-E Knowledge, Serra da Estrela Cheese and Huesca Wine report that less than 25% of their Production practices occur in the MRL, and Alto Molise Cheese have less than 50% of Production practices in the MRL. Slightly less cases have the majority of their Processing practices taking place in the MRL, Rethymno Carob Flour, Serra da Estrela Cheese, Brasov Certified Ecotourism, Sierra Morena Ham, and Huesca Wine report that less than 25% of their Processing practices occur in the MRL and Transdanubian A-E knowledge VC has less than half of Processing practices in MRL. By the Distribution/Marketing stage of the VC, many less practices are located in the MRL. Most cases have less than 25% Distribution/Marketing in the MRL; with only Alto Molise Cheese; Sumava Beef, Carpathian Bio-Honey and Grisons Grain having more than 75% of these practices in the MRL. By the Consumption stage, only two cases report having more than 75% practices in the MRL (Transdanubian A-E Knowledge and Grisons Grain) with Maleshevski Tourism having more than 50% practices in the MRL. There were four cases that did not provide data for this question. This suggests that although we selected VCs with direct reliance on mountain territorial capital, there is tele-coupling to other systems even at the production stage.

4.4.3 Where are the actors located?

Most LUS actors (e.g., farmers) are located in the MRL across the cases, although some cases did refer to LUS actors in the MRR; these are the strongly tele-coupled MRR cases (Serra da Estrela Cheese, Alto Douro Wine and Huesca Wine) and even one case (Rethymno Carob Flour) referencing some LUS actors at the national level.

Agricultural businesses (AB) were more heterogenous with about half the cases having the majority of agricultural business actors associated with their VCs in the MRL; however, there were still some cases (Rethymno Carob Flour, Sumava Beef, Serra da Estrela Cheese, Carpathian Bio-Honey) with less than 25% of their AB actors in the MRL. The Serra da Estrela Cheese has more than 75% AB actors in the MRR, and the Sumava Beef and Huesca Wine cases have more than 75% of these actors located within their Member State (MS) but outside the MRL or MRR; and the Grisons Grain has a sizeable minority of their agricultural business actors located internationally. Non-agricultural businesses were less local, with only a few cases having the majority of these actors in the MRL or within the MRR; again, the Sumava Beef VC had more

75% of these actors within the Czech Republic but external to MRL or MRR. No cases had the majority of these non-agricultural business actors located internationally, although the Speyside Whisky VC had an equal split between national and international locations for these actors.

Surprisingly given that brokers tend to have strong relationships with LUS actors, only two cases (Elmali Tomatoes and Trento wine) had more than half of the advisors based in the MRL; although the Sumava Beef, Serra da Estrela Cheese and Huesca Wine had more than 75% of advisors based in the MRR (making their advisors relatively local). Transdanubian A-E Knowledge, Alto Douro Wine, and Sierra Morena Ham have mainly national advisors. Some cases had a minority of advisors located internationally. There were some cases with locally active research actors (Trento Wine, Betic Organic Olive Oil, and Grisons Grain in the MRL, and Alto Douro Wine, Brasov Certified Ecotourism, Sierra Morena Ham and Huesca Wine in MRR) but others had support from research organisations located within their country but outside the MRL or MRR.

The situation for other actors is mixed – for example some cases have the majority of NGO actors located in the MRL, but most cases have a mix of NGO actors located in the MRL, MRR and at national levels, with a small number of international NGOs involved in some cases. The same pattern holds for civil society actors and the public sector– some actors are located in the MRL or MRR but mostly they are found across all four different spatial scales although only half the cases mention international public sector actors, and these are small proportion of the public sector actors involved in their VCs.

Only a few cases mention other actors (Rethymno Carob Flour, Brasov Certified Ecotourism, Carpathian Bio-Honey, Grisons Grain and Speyside Whisky); for Crete, these actors are found in all spatial areas; the 'others' for the Basov Certified Ecotourism case study are tourists (majority are international but also some Romanian tourists); Carpathian Bio-honey has separated 'bee-keepers' from LUS managers or agricultural businesses.

4.4.4 Where are the values changed and outcomes located?

4.4.4.1 Economic valorisation and outcomes

With regards to economic outcomes, valorisation at the Production stage of the VC mainly happens in the MRL for the majority of cases – however less than 25% of the economic valorisation at the Production stage occurs in the MRL for Rethymno Carob Flour, Serra da Estrela Cheese, Brasov Certified Ecotourism and Huesca Wine, corresponding with their Production taking place outside the MRL. The amount of economic valorisation within the MRL decreases along the VC so that only four cases (Transdanubian A-E Knowledge, Maleshevski Tourism, Carpathian Bio-Honey, Grisons Grain) suggest the majority of economic valorisation occurs in the MRL by the Consumption stage.

Within the MRR, only three cases suggest most of the valorisation for Production and Processing takes place within the MRR rather than the MRL (Serra da Estrela Cheese, Alto Douro Wine and Huesca Wine) whilst a couple of cases realise most valorisation relating to Distribution/Marketing and Consumption in the MRR (Tuscan Chestnut Flour and Huesca Wine). However, in most

cases, the main economic valorisation takes place elsewhere for the Production and Processing stage, although some value change occurs within this regional space.

Some economic value change occurs at the national scale for most of the cases, and there are many cases where more than half of the valorisation occurs at this scale: Brasov Certified Ecotourism for Production; Transdanubian A-E Knowledge, Speyside Whisky, Sierra Morena Ham, Serra da Estrela Cheese, and Betic Organic Olive Oil for Distribution/Marketing; and Trento Wine, Maleshevski Tourism, Brasov Certified Ecotourism, Speyside Whisky, Sierra Morena Ham, and Betic Organic Olive Oil for Consumption.

Alto Molise Cheese and Tête de Moine PDO Cheese state that low economic value change occurs internationally at the Production/Processing stages; but for Maleshevski Tourism more than half of the economic valorisation change at Production and Processing stages is located internationally. A few other cases (Maleshevski Tourism, Elmali Tomatoes, Tête de Moine PDO Cheese, and Betic Organic Olive Oil) also have more than half of their value change happening at the Distribution/Marketing and Consumption stage internationally; with Speyside Whisky creating more than 75% of Consumption stage value internationally. However, other (non-global VC) cases reporting these data do not change much value internationally at any stage.

These patterns suggest that whilst economic capital is generally increased in our VC cases, not all the values change within mountains. The values associated with Production are most likely to change in the MRL, but the patterns are heterogenous, and some global and national value chains change value across space, including internationally. These data suggest that nearly all VCs are tele-coupled to socio-ecological systems outside their MRLs and MRRs, as already illustrated in Table 9 above; and that whilst some valorisation and outcomes are generated within mountain areas, value chain-based development must take account of these relationships across space.

4.4.4.2 Socio-cultural valorisation and outcomes

Whilst the majority of socio-cultural (SC) valorisation and outcomes at the Production stage are accrued within the MRL, there are less cases reporting this link to the MRL than for the economic outcomes. Rethymno Carob Flour, Serra da Estrela Cheese, Brasov Certified Ecotourism and Huesca Wine report less than 25% of the SC outcomes accrued to the MRL during the Production stage. A similar pattern is found for the Processing stages of the VC, with more cases suggesting most change takes place in the MRL, but still a minority suggesting that not much change occurs at this stage in their MRL (Rethymno Carob Flour, Serra da Estrela Cheese, Huesca Wine). The pattern becomes split by the Distribution/Marketing stage with slightly more cases reporting less values being accrued in the MRL than for earlier stages in the VC, but still five cases seeing over 75% of socio-cultural value change from Distribution/Marketing occurring within the MRL (Weiz Lamb, Brasov Certified Ecotourism, Carpathian Bio-Honey, Grisons Grain, Elmali Tomatoes). The Consumption stage is also split in a similar fashion. This suggests that there is a fair amount of change in the MRL and there is a less pronounced spatial shift away from accrual in the MRL at the later stages of the VC than in the economic data.

Given that a fair amount of socio-cultural value change occurs in the MRL, it is not surprising that for cases reporting the data, there are not many where the majority of change is at the MRR. However, there are some (Serra da Estrela Cheese, Alto Douro Wine, and Huesca Wine) where more than 75% of value change occurs in the MRR at the Production and Processing stages. Only a few see most of the socio-cultural capital change in the Distribution/Marketing stage in the MRR (Tuscan Chestnut Flour, Maleshevski Tourism, Elmali Tomatoes). Slightly more cases report 51% or more socio-cultural value change at MRR level (Rethymno Carob Flour, Maleshevski Tourism, Tuscan Chestnut Flour, Sierra Morena Ham, Huesca Wine, Betic Organic Olive Oil).

Only two cases report a majority of socio-cultural values changing at national level for the Production stage (Brasov Certified Ecotourism, Tête de Moine PDO Cheese), two at the Processing stage (Rethymno Carob Flour, Tête de Moine PDO cheese), two for Distribution/Marketing (Transdanubian A-E Knowledge, Sierra Morena Ham), and five for Consumption (Trento Wine, Maleshevski Tourism, Sierra Morena Ham, Betic Organic Olive Oil, Grisons Grain). However, for all stages, more cases report a low degree of value change and outcomes occurring at the national scale, which is similar to the economic findings.

There are very few valorisation outcomes accrued at the international level: Maleshevski Tourism reports over 50% Distribution/Marketing value changes internationally; and Maleshevski Tourism together with Betic Organic Olive Oil are examples where the majority of socio-cultural valorisation occurs at international level for Consumption.

4.4.4.3 Environmental valorisation and outcomes

Most cases believe that the majority of environmental valorisation at the Production stage takes place in the MRL (14 cases report more than 51% of valorisation here) but in four cases only a small proportion of the environmental valorisation accrues in the MRL at this stage (Rethymno Carob Flour, Serra da Estrela Cheese, Brasov Certified Ecotourism, and Huesca Wine). Fewer cases (n=10) see the majority of environmental values generated by practices at the Processing stage accrue in the MRL, but there are some cases reporting small accrual (Rethymno Carob Flour, Serra da Estrela Cheese, Alto Douro Wine, Huesca Wine, Sierra Morena Ham). The pattern is more divergent by the Distribution/Marketing stage with some cases having more than half of the environmental value change happening in the MRL but others (Rethymno Carob Flour, Speyside Whisky, Sierra Morena Ham, Huesca Wine, and Betic Organic Olive Oil) having less than 25%. This split is also found for the Consumption stage - some cases believe more than 75% of environmental valorisation occurs in the MRL (Trento Wine, Carpathian Bio-Honey, Sierra Morena Ham, Grisons Grain, Turkish Tomatoes).

As most value change is happening at the Production stage in the MRL, it is unsurprising that most cases report minor environmental values accrued in MRR at the Production stage – the exceptions are Maleshevski Tourism, Serra da Estrela Cheese, Huesca Wine and Elmali Tomatoes, where more environmental value is added in the MRR than MRL. This is repeated for the Processing stage (where more added value is found in MRR than MRL) – with exceptions being Maleshevski Tourism, Serra da Estrela Cheese, Alto Douro Wine, Carpathian Bio-Honey,

Huesca Wine, and Elmali Tomatoes; Distribution/Marketing stage – with Elmali Tomatoes, Huesca Wine, and Maleshevski Tourism being exceptions; and Consumption stage – exceptions being Rethymno Carob Flour, Maleshevski Tourism, and Brasov Certified Ecotourism.

Likewise, little environmental value is changed at the national scale for Production; the exceptions being where 51-75% of value is changed nationally for Rethymno Carob Flour, Maleshevski Tourism, and Brasov Certified Ecotourism. The same is found for the Processing stage, with the exceptions being 51-75% of value change at the national level for Rethymno Carob Flour and Maleshevski Tourism. For Distribution/Marketing environmental value is changed nationally within the Transdanubian A-E Knowledge case (more than 75% is added at this scale) and Rethymno Carob Flour, Maleshevski Tourism and Grisons Grain, which suggest that more than 51% environmental valorisation occurs at national level. For Consumption, Maleshevski Tourism, Betic Organic Olive Oil, and Grisons Grain suggest that more than 51% of value change occurs at the national scaley.

Finally, only Maleshevski Tourism reports any real value change happening internationally at Production and Processing stages. In addition to Maleshevski Tourism, Betic Organic Olive Oil, Alto Douro Wine, and Weiz Lamb all suggest more than half of the environmental valorisation occurs at the international scale.

4.4.5 Summary

This section suggests a heterogenous pattern regarding how many of the VC practices are based within the MRL or MRR. However, in all cases, there are tele-coupling processes taking place. Generally, these consist of the MRL being a sending socio-ecological system, producing commodities that are processed, distributed and/or consumed in other spaces. However, some of the MRLs are also receiving systems for different VC stages. Many VCs rely on non-territorial inputs through the four VC stages. The increasing importance of tourists as consumers of the final product travelling to the location where Production and Processing is practiced explains how some MRLs have become a receiving system for the Consumption stage of the MRL. This qualitative evaluation of whether and how economic, socio-cultural, and environmental values are generated and retained in the mountains is an important aspect of the participatory value chain analysis. Several cases have highlighted the desire to re-localise and retain economic value in the local area. It appears that, to do this, it would require moving the later VC stage practices around Distribution/Marketing and Consumption to the MRL or MRR areas.

4.5 Enabling infrastructure

In this section we highlight the prevalence of physical and digital infrastructure that is utilised to support the 23 focal Value Chains associated with the MRLs. Physical infrastructure can include transport and energy, and digital infrastructure includes the use of internet connected devices and activities. These are enabling aspects for the VC, as they are not developed or maintained only to support the VC and would exist even if the VC were not present.

At the Production stage, the presence of enabling physical infrastructure was recorded in 18 VCs, however Rethymno Carob Flour and Tuscan Chestnut Flour felt that the VC was not enabled by the existing infrastructure. No data was provided in 3 cases; noting that 'no data provided' also represents instances when non-standard responses were recorded (see Section 2). Examples of physical infrastructure include water and energy supplies, road networks, hiking trails, biomass plants, and agricultural machinery for the agriculture-based VCs, along with rail and airport transport for the tourism-based cases. Infrastructure provision occurred at the MRL scale in all cases except Elmali Tomatoes, though most cases also reported provision at the MRR or national scale, with three VCs (Brasov Certified Ecotourism, Huesca Wine, and Sierra Morena Ham) relying on international physical infrastructure at the Production stage.

The situation for digital infrastructure was similar to physical infrastructure at this practice stage. Examples included internet coverage and cabling, digital tracing schemes for livestock, and meteorological recordings for crop-based VCs. The scale of the provision varied, with some cases (n=11) reporting MRL provision of digital infrastructure and some (n=10) also reporting national or EU provision.

At the Processing stage, all those who responded (n=20) indicated that physical infrastructure was present to support their VCs. At this stage more physical infrastructure was provided at the regional or national scales, but there were still cases with provision at the MRL scale (n=15). As well as many similar examples mentioned at the Production stage, other additional examples here include transport, slaughterhouses, warehouses, and mills. Surprisingly, housing was only mentioned by one VC (Speyside Whisky).

Enabling digital infrastructure was present at the Processing stage in 18 VCs and absent in one VC (Tuscan Chestnut Flour); with four cases not providing data[11]. Examples include ICT (Information and Communications Technology) for traceability, digital hiking and biking maps and digital financial accounting software. The scale of digital infrastructure provision covers the MRL but has more provision from the regional or national scales.

At the Distribution/Marketing stage physical infrastructure was present in all VCs who responded to this question (n=17, NDP=5). Physical infrastructure becomes more international at this stage, with seven cases recording international level provision. Export ports also become increasingly important at this practice stage. For the more globally reaching VCs the main export ports (air and water) are: Crete Chania Airport and Port; Mainland Greece's Eleftherios Venitzolos Airport; Piraeus port; Malaga and Valencia ports; and ports in Central Scotland. Very similar numbers and break-down of responses was recorded for digital infrastructure as physical infrastructure here.

Additional digital infrastructure examples at the Distribution/Marketing stage include online selling platform technologies (and websites), stock control software and social media. Whilst there is some reliance on digital infrastructure within the MRL (n=5), the provision at this stage tends to move to regional, national, and international provision.

[11] Including Brasov Certified Ecotourism VC, which did not use this stage in its conceptual approach.

Finally, for the Consumption stage, all VCs (n=18) indicated the presence of enabling physical infrastructure. Additional examples here include restaurants and takeaways, care homes or schools and food delivery services. No data was provided in five cases.

Presence of digital infrastructure was identified in all cases (n=17) at the Consumption stage. Additional examples of digital infrastructure include online booking platforms and e-commerce. In terms of the geographical scale of the Consumption stage infrastructure, where recorded roughly half of the VCs utilised infrastructure that was regional or national in scale, and the other half utilised international scale infrastructure. No data was provided in six cases.

Through the four stages, various attempts have been made by various VCs to tailor and utilise existing physical and digital infrastructure in ways that help to meet national and international net zero targets. These include circular economy activities, energy use reduction, improved water management (Speyside Whisky), organising zero waste events (Transdanubian A-E Knowledge), or organic production by the Trento Wine VC. Almost all VCs highlighted recognition of the importance of ensuring sustainable use of the physical transport and energy infrastructure in connection with climate change awareness and achieving net zero targets.

Thus, overall, physical and digital infrastructure are present and important in the majority of VCs across all four practice stages. This highlights the importance of the wider enabling environment in providing a viable setting within which the VCs can thrive. Furthermore, internationality of scale increases as we move through the practice stages, drawing attention to the importance of these infrastructures for product distribution, brand and image marketing, and consumption of the final products.

4.6 Enabling institutions

This section looks beyond the value chain, to the wider institutions that set the conditions for the practices involved, and the rules/norms used by the actors in the VCs. Data included provides an overview of strategies and visions, projects and programmes, the financial and regulatory environment, knowledge, advice & skills, co-operation, and certification processes.

4.6.1 Strategies and visions

The presence of at least one sectoral or territorial strategy or vision documents with a direct relationship to the VC being studied was identified in 20 cases at some stage along the chain. No data were provided for three cases.

The majority of these were identified in relation to the early VC stages, including 16 cases with sectoral strategies relevant to the Production stage and 12 cases reporting strategies relevant to the Processing stage, reducing to 10 cases for Distribution/Marketing, and nine cases for Consumption.

At the Production stage, strategy documents relating agriculture, rural development and food & drink objectives were identified for a range of value chains, including Sjenica Lamb, Carpathian

Bio-Honey, Huesca Wine, Speyside Whisky, and Rethymno Carob Flour; where these VCs are identified as part of a wider economic development strategy. In the context of Grisons Grain and Sumava Beef, strategies identified relate more specifically to organic farming, and strategies for collective working were identified in the case of Drome Lamb. Environmental objectives were also the subject of strategies at this early stage of the chain, including unconventional (tourism-related) VCs, for whom the environment represents important territorial capital underpinning visitor products.

Strategies at the Processing stage include those specifically relating to the type of product being processed, such as butchery and associated quality standards in meat and cheese processing (e.g., Weiz Lamb, Sierra Morena Ham, Tête de Moine PDO Cheese), smart specialisation strategies (e.g., Rethymno Carob Flour), and tourism development (Maleshevski Tourism). Development strategies, including rural and economic development objectives, were identified at both Processing and Distribution/Marketing stages. Other strategies relating more specifically to the Distribution/Marketing stage include branding and marketing (e.g., Serra da Estrela Cheese, Tête de Moine PDO Cheese) and transportation (e.g., Tête de Moine PDO Cheese). In the case of Betic Organic Olive Oil, strategies relating to organic production were also highlighted here, and in association with the Consumption stage. Others identified at the Consumption stage relate to topics such as lifestyle trends (e.g., Weiz Lamb) infrastructure development (e.g., Brasov Certified Ecotourism), and tourism development (e.g., Maleshevski Tourism, Brasov Certified Ecotourism, and Speyside Whisky).

Territorial strategies were also most prevalent at the Production stage (n=18), reducing across the VC stages (Processing, n=12, Distribution/Marketing, n=9, Consumption, n=7). Topics such as regional development (e.g., Weiz Lamb, Tuscan Chestnut Flour, Sumava Beef, Transdanubian A-E Knowledge, Alto Molise Cheese) and sustainability (e.g., Maleshevski Tourism, Alto Douro Wine, Betic Organic Olive Oil, Sierra Morena Ham, Huesca Wine, Tête de Moine PDO cheese, Speyside Whisky, Drome Lamb, Rethymno Carob Flour, Trento Wine) objectives were highlighted across multiple VC cases. Other common topics include 'farm-to-fork' and/or food & drink related strategics (e.g., Betic Organic Olive Oil, Speyside Whisky, Huesca Wine, Carpathian Bio-Honey, Tête de Moine PDO cheese); tourism/regional promotion (e.g., Maleshevski Tourism, Serra da Estrela Cheese, Tête de Moine PDO Cheese) or national/regional parks (e.g., Grisons Grain, Speyside Whisky, Serra da Estrela Cheese, Weiz Lamb). In the cases of Tête de Moine PDO Cheese and Carpathian Bio-Honey, strategies relating to professional practices and codes of conduct were highlighted, whilst strategies to enhance endogenous research and innovation were identified in the context of Rethymno Carob Flour.

4.6.2 Projects and programmes

Sectoral or VC-specific programmes or projects were identified in relation to the Production stage in the majority (n=19) of value chains. No data on sectoral projects or programmes were provided at any stage in relation to four cases.

Examples of VC-specific projects and programmes include:

- The Créalait project (Tête de Moine PDO Cheese) which is aimed at developing the processing of dairy products in the territory of the canton of Jura and making it possible to supply a larger part of the population with local products.
- The Centralparks project (Brasov Certified Ecotourism), which is aimed at building management capacities of Carpathian protected areas for the integration and harmonization of biodiversity protection and local socio-economic development. In Brasov, there is also the Piatra Craiului National Park Administration (PCNPA).
- The ÖPUL programme (Weiz Lamb), which relates to the promotion of an agriculture which is appropriate to the environment, extensive and protective of natural habitats, is intended to foster the environmentally sound management of the agricultural areas in Austria.

Other examples at the Production stage includes: shepherds school (Serra da Estrela Cheese); Polomka apiary project (Carpathians Bio-Honey), traditional olive groves sectoral intervention (Betic Organic Olive Oil), Life bioDehesa Project (Sierra Morena Ham), Programme for Landscape Maintenance (Sumava Beef), Territorial Pastoral Plan (Drome Lamb), Sectoral Operational Programmes (Rethymno Carob Flour) and LEADER projects (Transdanubian A-E Knowledge).

Again, the prevalence of this type of enabling institution was found in fewer instances as the VC progressed towards Consumption (Processing, n=12, Distribution/Marketing, n=11, Consumption, n=7). Examples of projects at latter stages include:

- EXTENDA (Betic Organic Olive Oil) is the Trade Promotion Agency of Andalusia, which is dedicated to the international promotion of Andalusian products and the expansion of Andalusian business in foreign markets.
- The Queijeiras Project (Serra da Estrela Cheese) project is about female empowerment, entrepreneurship and territorial valorisation.
- Swiss Mountain Aid (Grisons Grain) is committed to helping the mountain population, by providing supports to generate sustainable projects and employment in these regions.
- Agriliens (Drome Lamb) is a platform for connecting farmers, to highlight innovative initiatives, share practices, and accumulate information in the Dröme Valley in Biovallée.

Other examples of programmes and projects relevant to the later VC stages includes: regional nature parks (Tête de Moine PDO Cheese); LEADER (Huesca Wine); Oilox Project (Betic Organic Olive Oil); Genuss Region Österreich (Weiz Lamb); PCNPA: Project CRESFORLIFE (Brasov Certified Ecotourism); Switzerland Cheese Marketing (Tête de Moine PDO Cheese); responsible alcohol consumption campaigns (Speyside Whisky); and Vindalpes Project (Drome Lamb).

Territorial projects and programmes with a direct relationship to the function and performance of the VC were found in 13 cases – in each of these cases relating to the Production stage, reducing across the chain to only four cases relating to Distribution/Marketing (Drome Lamb, Speyside

Whisky, Betic Organic Olive Oil, Tête de Moine PDO Cheese) and five cases relating to Consumption (Weiz Lamb, Maleshevski Tourism, Speyside Whisky, Carpathian Bio-Honey, Grisons Grain). No data on territorial projects or programmes was provided for nine cases.

Examples of territorial projects and programmes includes:

- Almenland Branding (Weiz Lamb)
- Collaboration between University and city (Maleshevski Tourism),
- Educational events for beekeepers (Carpathians Bio-Honey)
- Projects of regional development (Grisons Grain)
- PERM (Tête de Moine PDO Cheese)
- Spey catchment Initiative (Speyside Whisky)
- European Capital of Culture (Transdanubian A-E Knowledge)
- Alto Medio inner areas (Alto Molise Cheese)
- OLIVE2ENERGY (Betic Organic Olive Oil)
- Tourist promotion of Jura region (Tête de Moine PDO Cheese)
- National Action Plan for Sustainable Public Procurement (Weiz Lamb)
- Traditional breakfast in kindergardens project (Carpathian Bio-honey)
- Grison VIVA (Grisons Grain)
- Diageo/Edrington learning programmes (Speyside Whisky).

4.6.3 Regulatory environment

Legal obligations associated with different stages of the case study VCs were identified in all but one case. In 20 of those VCs, legal obligations were associated with the Production stage, 18 with the Processing stage, 14 with Distribution/Marketing, and 13 with the Consumption stage.

Safety legislation, including general health and safety and food safety legislation, was identified in the majority of VC cases (n=16), and quality-related certification and standards was also frequently reported (n=14). Other frequently reported legal obligations relate to agriculture (n=12) and employment, taxation, or social protections (n=10).

Other examples relevant to specific types of mountain VC include legislation providing for animal welfare, traceability, and/or veterinary requirements (Weiz Lamb, Sjenica Lamb, Carpathian Bio-Honey, Sumava Beef, Alto Molise Cheese, Tête de Moine PDO Cheese, Drome Lamb) and hospitality and tourism (Maleshevski Tourism, Brasov Certified Ecotourism, Weiz Lamb, Huesca Wine). Laws supporting elements of food processing and progress along the latter stages of the value chain were also identified in a number of cases, including Alto Molise Cheese, Betic Organic Olive Oil, Carpathian Bio-Honey, Drome Lamb, Grisons Grain, Huesca Wine, Tête de Moine PDO Cheese, Rethymno Carob Flour, Sumava Beef, and Weiz Lamb – and in some VCs legislation

supporting responsible consumption or consumer rights were also identified (Speyside Whisky, Elmali Tomatoes, Drome Lamb, Rethymno Carob Flour).

The regulatory environment relating to the VC case studies in MOVING also includes national and regional provisions for territorial planning and management (e.g., Grisons Grain, Tête de Moine PDO Cheese, Transdanubian A-E Knowledge) as well as provisions for special mountain areas, including:

- Serra da Estrela Natural Park (Serra da Estrela Cheese)
- Piatra Craiului National Park (Brasov Certified Ecotourism)
- Sierras Subbéticas Natural Park (Betic Organic Olive Oil)
- Cairngorms National Park (Speyside Whisky)
- Balaton Highlands National Park (Transdanubian A-E Knowledge)

Legal provisions for aspects of the environment, climate change, recycling etc. were also mentioned in several cases (Maleshevski Tourism, Sjenica Lamb, Grisons Grain, Speyside Whisky, Sumava Beef, Alto Douro Wine).

4.6.4 Certification processes

Two categories of certification processes were considered in relation to the VCs selected: those associated specifically with territorial or quality assurance processes, and other forms of certification relating to the structure of the VC and how it generates outcomes.

Regional and/or quality assurance certification schemes were associated with 19 of the case study value chains. In the case of Elmali Tomatoes, there were no schemes available, and a further three cases where no data was provided (Western Stara Planina HNV, Tuscan Chestnut Flour, Sjenica Lamb). This type of certification was most commonly associated with the Production stage of the VC (n=19), reducing across the later stages (Processing, n=16, Distribution/Marketing, n=13, Consumption, n=12).

A number of the VCs being studied involve products that are classified as either Protected Designation of Origin (PDO, n = 10) or Protected Geographical Indication (PGI, n =2), which are geographical indications that establish intellectual property rights for specific products, whose qualities are specifically linked to the area of production.

For PDO products ‘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’[12]. In MOVING the VCs using PDOs include Alto Molise Cheese, Betic Organic Olive Oil, Corsican Chestnut Flour, Alto Douro Wine, Tête de Moine

[12] Geographical indications and quality schemes explained (europa.eu)

PDO cheese, Rethymno Carob Flour, Sierra Morena Ham, Serra da Estrela Cheese, and Trento Wine.

For most PGI products, 'at least one of the stages of production, processing or preparation takes place in the region. In the case of wine, this means that at least 85% of the grapes used have to come exclusively from the geographical area where the wine is actually made[13].' In MOVING these include Huesca Wine and Speyside Whisky.

Other examples of territorial/quality assurance processes identified includes:

- Food quality certification (Weiz Lamb)
- Organic certification (Weiz Lamb, Alto Douro Wine, Betic Organic Olive Oil, Huesca Wine, Grisons Grain, Sumava Beef, Drome Lamb, Trento Wine)
- Other organic (e.g., inputs, exports): (Carpathian Bio-Honey, Tête de Moine PDO Cheese, Elmali Tomatoes, Betic Organic Olive Oil)
- Traceability (Weiz Lamb)
- GMO-free food (Weiz Lamb)
- Food quality standards (Sierra Morena Ham, Alto Molise Cheese, Speyside Whisky)
- ISO standards (Rethymno Carob Flour)
- HACCP (Serra da Estrela Cheese, Sumava Beef).

Fewer examples of 'other' certification processes were identified overall. In 11 cases those identified were associated with the Production stage, eight with processing, five with Distribution/Marketing and four with Consumption.

Examples of these relate to:

- Agricultural practices (Elmali Tomatoes, Speyside Whisky, Trento Wine)
- Integrated plant protection (Alto Douro Wine)
- Processing practices to ensure authenticity of product (Speyside Whisky, Alto Molise Cheese)
- Hospitality certification (Speyside Whisky).
- Breed association registration (Serra da Estrela Cheese)
- Tourism-related certification (Maleshevski Tourism, Brasov Certified Ecotourism)
- Mountain/regional/traditional product branding (Brasov Certified Ecotourism, Grisons Grain, Speyside Whisky, Sumava Beef, Drome Lamb, Alto Molise Cheese, Trento Wine, Rethymno Carob Flour, Huesca Wine, Tête de Moine PDO cheese)

[13] Geographical indications and quality schemes explained (europa.eu)

- Gastronomy (Brasov Certified Ecotourism)

No data was provided on other certification processes in relation to eight VCs, and in four cases (Rethymno Carob Flour, Sumava Beef, Huesca Wine, Grisons Grain) it was specified that no other certification schemes were present.

4.6.5 Financial environment

Data on financial practices relevant to the VCs being studied were identified in almost every case for the Production stage (n=21) and reduced in numbers across the later VC stages (Processing = 14, Distribution/Marketing = 13, Consumption =10). A combination of public sector (including application to support schemes, grants and subsidies, such as CAP) and private financing (including income/revenue, savings, loans/credit, investors) were cited as means of funding the value chain. No data were provided in two cases.

In terms of access to capital, issues are most prevalent at the Production stage (12 VCs), for example, in the case of Drome Lamb, 'strong dependence of this sector on the CAP' is described, and, in the case of Rethymno Carob Flour, 'low credit support and high taxation on capital' is identified as an issue. Some issues are also reported in the later stages (Processing, n=8, Distribution/Marketing, n=5, Consumption, n=4), such as, issues of accessing support for new factories/renovations in the Grisons Grain VC; and impacts of the Covid 19 pandemic affecting revenues in the Brasov Ecotourism VC. In the case of two value chains, there are no issues with access to capital at any stage of the chain (Maleshevski Tourism, Elmali Tomatoes), and 11 other cases reported no issues in at least one stage of the chain. Indeed, the Turkish partners reported 'easy access to finance resources'. These results arise for different reasons, the first could be related to the fact that rural homestay tourism has low capital requirements but the latter to the fact that high value crops like tomatoes provide strong investment potential. No data were provided in three cases and data were also missing to a large extent across the later VC stages.

Nine value chains are associated with new private sector investment at least in one stage of the chain; in one case at the Consumption stage (Speyside Whisky), four at the Distribution/Marketing (Serra da Estrela Cheese, Carpathian Bio-Honey, Huesca Wine, Tête de Moine PDO Cheese) and Processing stages (Rethymno Carob Flour, Speyside Whisky, Huesca Wine, Grisons Grain), and six at the Production stage (Rethymno Carob Flour, Drome Lamb, Speyside Whisky, Huesca Wine, Betic Organic Olive Oil, Tête de Moine PDO Cheese). These investments include examples such as: installation of photovoltaic cells on dairy roofs being funded as a result of compliance with environmental standards in the Tête de Moine PDO cheese VC; and the Speyside Whisky VC is associated with carbon markets relating to peatland restoration. However, several partners also specified no new private investment associated with the VCs being studied – particularly at the Production stage (n=12), but also some at the Processing (n=7), Distribution/Marketing (n=6), and Consumption stages (n=3). This suggests that for some value chains, there is a reliance on the public or within sector investment, which could be vulnerable to austerity budget cuts or downturns in profitability. There was a large amount of missing data relating to this topic; in five cases no data were provided across all stages of the chain, and only four partners provided data relating to the Consumption stage.

Public subsidies or incentives to support value chain practices are more common in the early stages (Production, n=20, Processing, n=13), with only five examples accessing this type of support at the Distribution/Marketing stage (Weiz Lamb, Carpathian Bio-Honey, Betic Organic Olive Oil, Tête de Moine PDO Cheese, Grisons Grain), and four at the Consumption stage (Maleshevski Tourism, Brasov Certified Ecotourism, Speyside Whisky, Carpathian Bio-Honey). CAP is a key example of this type of support, including Pillar 1 and RDP measures. Examples of special national measures to support businesses were also cited in response to the Covid 19 pandemic (e.g., Brasov Ecotourism, Speyside Whisky). Although some partners reported that no subsidies or incentives were available to support VC practices at the Consumption stage (e.g., Huesca Wines), these numbers were quite small relative to the amount of missing data – particularly at the latter stages of the chain. These figures confirm that there is a strong reliance on agricultural, rural or regional development policies for these VC in Production and Processing stages, which also reflects the importance of policies related to areas of natural and additional constraints.

Fifteen value chains reported tax obligations associated with at least one stage of the chain, with six chains reporting taxes relevant across all four stages (Rethymno Carob Flour, Sumava Beef, Huesca Wine, Tête de Moine PDO Cheese, Elmali Tomatoes). Taxes include examples such as VAT, income tax, real estate taxes, etc. This also relates to the findings reported in Section 4.3.1 discussing the contribution of the VCs to local, regional and national taxation revenues, as a counterbalance to the input via incentives or grants from the public sector at the Production and Processing stage. No data is available for five chains (Western Stara Planina HNV, Corsican Chestnut Flour, Trento Wine, Tuscan Chestnut Flour, and Alto Douro Wine).

The impact of other fiscal charges was felt by ten value chains (at least one stage); in three cases (Sjenica Lamb, Huesca Wine, and Elmali Tomatoes), partners report fiscal charges impact every stage of the chain. Conversely, no impact was reported in at least one VC stage by seven chains; Rethymno Carob Flour and Sumava Beef report no impact across three out of four stages. A large amount of data was relating to fiscal impacts was unavailable; for the Production stage of 12 chains, Processing stage of 15 chains, Distribution/Marketing stage of 13, and Consumption stages of 17 chains.

The impact of land prices is felt by sixteen value chains, the majority of those at the Production stage (n=13), whereby the cost of land is making it harder for the VC to operate. Three chains are impacted by land prices at the Processing stage (Rethymno Carob Flour, Sjenica Lamb, Betic Organic Olive Oil), two at the Distribution/Marketing stage (Rethymno Carob Flour, Sjenica Lamb) and two at the Consumption stage (Sjenica Lamb, Brasov Certified Ecotourism). Interestingly, no impact is felt by the Rethymno Carob Flour and Sjenica Lamb chains at the Production stage. No impact of land prices at any stage is reported in the case of Alto Molise Cheese and Maleshevski Tourism. However, the case of Speyside Whisky illustrated that it is possible that the impact of land prices may not be felt directly by the VC, due to the relative cost of land in terms of setting up and running a distillery – plus most have been established for many years. No data for any VC stage is provided for four VCs (Weiz Lamb, Western Stara Planina HNV, Corsican Chestnut Flour, Tuscan Chestnut Flour).

4.6.6 Collective Action Institutions

The collective action institutions listed here should cover those that would exist without the VC (in other words, they enable the VC but are not part of the VC). However, as with the financial institutions, it was difficult to maintain this distinction in the data reported. No data on collective institutions were provided by three partners, and four partners specified that there were no institutions of this type associated with one or more stages of their case study VCs. However, collective action institutions are associated with twenty case studies at least one point across the VC. Production-related collective action institutions were identified in relation to 18 of these cases, 12 in relation to the Processing stage, eight in relation to Distribution/Marketing, and nine relating to the Consumption stage. These commonly include institutions that accumulate actors by profession, task, and physical location, for example:

- Professional organisations:
    - Farmers/breeders/beekeepers associations/chambers (Weiz Lamb, Carpathian Bio-Honey, Huesca Wine, Grisons Grain, Elmali Tomatoes, Sumava Beef, Transdanubian A-E Knowledge, Alto Molise Cheese, Betic Organic Olive Oil, Tête de Moine PDO Cheese, Drome Lamb);
    - Tourism associations (Brasov Certified Ecotourism)
    - Trade unions (Drome Lamb)
- Task:
    - Collective infrastructure (slaughterhouse) provision (Drome Lamb)
    - Collective marketing (Tête de Moine PDO Cheese)
    - Gourmet associations (Alto Molise Cheese)
    - Quality schemes (Betic Organic Olive Oil, Sierra Morena Ham, Tête de Moine PDO Cheese)
    - Education (Weiz Lamb, Maleshevski Tourism, Tête de Moine PDO Cheese)
- Physical location:
    - Regional groups/initiatives/partnerships/networks, e.g., environment, national park (Speyside Whisky, Sumava Beef, Weiz Lamb, Betic Organic Olive Oil, Rethymno Carob Flour)
    - LAGs (Weiz Lamb, Alto Molise Cheese)

A number of partners specifically identify co-operatives as a collective institution actively enabling their focal VC, these include: Betic Organic Olive Oil, Tête de Moine PDO Cheese, Alto Douro Wine, Drome Lamb, Serra da Estrela Cheese, Elmali Tomatoes, Huesca Wine, Rethymno Carob Flour, and Trento Wine. These were not only important for economic valorisation, turning territorial capital to monetary value through lowering costs and increasing the visibility and demand for the products but were also valued for their pastoral care and support to actors working

in remote and isolated areas. As highlighted in Section 4.3.2, trust and informal co-operation are important in some cases, although some cases also suggest a lack of co-operation at certain stages (Corsican Chestnut Flour at the Production stage; Sumava Beef and Carpathian Bio-Honey at the Processing stage).

The two tourism cases present opposite findings. Partners indicated there was support provided for collective action institutions in the Maleshevski Tourism case but in the case of Brasov Certified Ecotourism the governance systems in the MRL are not encouraging co-operation and collaboration, which is reflected in the fragmented structure of the VC.

4.6.7 Knowledge advice and skills

Some form of provisions for training and skills relevant to the case study VC was identified in all but two cases (Western Stara Planina HNV, Corsican Chestnut Flour).

As reported in Section 4.4.3, a particularly low proportion of advisors are located in the MRL areas of the VCs being studied. Local actors were identified as important in the case of Trento Wine, and in the case of Elmali Tomatoes, a range of local training and advice was identified to support farmers in occupational health and safety in the early VC stages (Production and Processing). In the case of Serra da Estrela Cheese, training was identified within the MRR to support the Production stage – in particular, for newcomers becoming shepherds, and also more generally on the production of small ruminants. Although the majority of advisors were reported as being situated within the MRR, in the case of Huesca Wine a range of formal and informal training and advice was also identified at the MRL scale, including generational transfer of information, agricultural companies and education providers.

A low provision of formal training was also reported in relation to the Production and Processing stages of the Alto Molise VC, but there is widespread knowledge of the area's cheese-making tradition. Similar findings regarding lack of provision were identified at the Distribution/Marketing stage for the Sumava Beef, Transdanubian A-E Knowledge, and Elmali Tomatoes VCs, and at the Consumption stage of the Elmali Tomatoes VC.

However, training provisions, including various levels and settings, were identified by most cases relating to the Production stage of all but one of the 20 VCs with data provided. Provisions were also identified in associated with the Processing, Distribution/Marketing, and Consumption stages of 14, seven, and nine VCs respectively. The range of topics were identified in association with training provision available to the VCs being studied, includes:

- Animal care and breeding (Weiz Lamb, Serra da Estrela Cheese, Carpathians Bio-Honey, Sierra Morena ham, Tête de Moine PDO cheese, Drome Lamb)
- Plant/crop/pasture management (Weiz Lamb, Tuscan Chestnut Flour, Sierra Morena Ham, Tête de Moine PDO Cheese, Trento Wine, Huesca Wine, Alto Douro Wine)
- Agriculture practices (Huesca Wine, Elmali Tomatoes, Sumava Beef, Drome Lamb, Rethymno Carob Flour, Trento Wine, Alto Douro Wine)

- Biodiversity/environment (Brasov Certified Ecotourism, Tête de Moine PDO Cheese, Trento Wine, Huesca Wine, Alto Douro Wine); tourism/hospitality (Brasov Certified Ecotourism, Betic Organic Olive Oil)
- Marketing & communication (Brasov Certified Ecotourism, Huesca Wine, Weiz Lamb, Tête de Moine PDO Cheese, Alto Molise Cheese)
- Health & food safety (Elmali Tomatoes, Tête de Moine PDO Cheese, Rethymno Carob Flour)
- Processing practices, e.g., distilling, butchery, winemaking (onenology/somellier) (Speyside Whisky, Alto Molise Cheese, Weiz Lamb, Carpathian Bio-Honey, Tête de Moine PDO Cheese, Sumava Beef, Drome Lamb, Sierra Morena Ham)
- Sensorial (Huesca Wine, Betic Organic Olive Oil, Tête de Moine PDO Cheese, Speyside Whisky)
- Legislation (Weiz Lamb)
- Logistics, e.g., exporting (Alto Molise Cheese)
- Cooking (Weiz Lamb, Grisons Grain)
- Business management (Brasov Certified Ecotourism).

The availability of knowledge advisors to support different stages of the case study VCs was also reported, whereby 18 cases reported advisors relevant to the Production stage, 13 with advisors relevant to the Processing stage, eight relevant to Distribution/Marketing, and nine providing support for the Consumption stage. In a small number of cases, no provision was believed to be available to support practices in particular stages – these include the Processing and Consumption stages of the Rethymno Carob Flour VC, the Processing stage of the Tuscan Chestnut Flour VC, and the Processing stage of the Elmali Tomatoes chain.

4.6.8 Summary

The section has illustrated that the VCs assessed in this exercise are influenced by enabling institutions. Although this section is conceptually distinct from the valorisation activities occurring through the VC stages, in practice, this became blurred. Institutions that set out the 'rules of the game' regarding how the mountain-based VCs can operate were reported alongside information about how the VCs were able to valorise their territorial capitals, for example, the price of land is closely connected to the accessibility of the VC to local entrepreneurs in Section 4.3.2.

4.7 Assemblage

This section includes data relating to relationships between the focal value chain (FVC) discussed in previous sections and one or two additional value chains (AVC), which we describe in terms of value chain 'assemblage'. Data relates to the same set of concepts (practices, actors, outcomes,

etc) used in previous sections. On the whole, this section suggests that value chain assemblage results in positive outcomes for the individual chains involved.

4.7.1 What mountain value chains are assembled with the focal value chains?

A wide range of focal value chain products have been discussed in previous sections, and an equally wide range of additional value chain products were identified in the context of value chain assemblage. The type of products and nature of relationships vary depending on the FVC in question. Examples of AVCs identified are presented using the same clusters as introduced in Section 3.1 onwards. These include:

- Meat products (lamb, beef, venison) but also livestock breeding (pigs, sheep, goats)
- Crop VCs (dried rusks, flour, olive-based products, almonds, compost, fertilisers)
- Cheese (curd cheese, white cheese in brine)
- Honey and beeswax products,
- Alcohol VCs (gin, craft beer, grappa)
- Tourism and recreational activities (gastronomic tourism, adventure tourism, winter sports, climbing & walking tourism, wildlife tourism, sporting, fly fishing, large-scale retail, farm shops, cultural tourism)
- Public goods (rewilding/nature restoration)
- Other VCs (mineral water, forest/wood products, digital technologies, bioenergy/energy production, wool)

Partners selected one (n=12) or two (n=8) additional value chains that form an assemblage with their focal value chain, which are listed below in Table 10. The analysis that follows in the rest of Section 5.7 is based on the assemblage of focal and additional VC(s) reported in the template. There will be an assemblage of VCs in all MRLs, even if no data were reported for analysis.

Table 10: Additional Value Chains (AVCs) selected

	Focal Value Chain	Country	AVC1	AVC2
1	Weiz Lamb	Austria	*Dairy (curd cheese)*	*N/A*
2	Western Stara Planina HNV	Bulgaria	*No data*	*N/A*
3	Sumava Beef	Czech Republic	*Tourism*	*N/A*
4	Corsican Chestnut Flour	France	*No data*	*N/A*
5	Drome Lamb	France	*Conventional lamb & sheep meat*	*N/A*
6	Rethymno Carob Flour	Greece	*Animal feed*	*N/A*
7	Transdanubian A-E Knowledge	Hungary	*Rural tourism*	*N/A*

8	Alto Molise Cheese	Italy	*Beef*	*Tourism*
9	Trento Wine	Italy	*Grappa*	*N/A*
10	Tuscan Chestnut Flour	Italy	*Chestnut honey*	*Chestnut beer*
11	Maleshevski tourism	North Macedonia	*No data*	*N/A*
12	Serra da Estrela Cheese	Portugal	*Lamb*	*Curd cheese*
13	Alto Douro Wine	Portugal	*Cultural tourism*	*Almonds & olive oil*
14	Brasov Certified Ecotourism	Romania	*Rural tourism*	*N/A*
15	Sjenica Lamb	Serbia	*Sjenica Cheese*	*Dried meat*
16	Carpathian Bio-Honey	Slovakia	*Pollen based health products*	N/A
17	Betic Organic Olive Oil	Spain	*Compost*	*N/A*
18	Huesca Wine	Spain	*Other products using the HUESCAlimentaria Quality seal e.g., almonds*	*N/A*
19	Sierra Morena Ham	Spain	*Pigs (non PDO ham)*	*N/A*
20	Grisons Grain	Switzerland	*Animal products (beef, milk, manure)*	*Tourism*
21	Tête de Moine PDO Cheese	Switzerland	*Gruyere PDO*	*N/A*
22	Elmali Tomatoes	Turkey	*Peppers*	*Cucumbers*
23	Speyside Whisky	UK (Scotland)	*Food and drink tourism*	*N/A*

These AVCs include crop or livestock-based VCs, alcohol, inputs to food production, and several are tourism-related. There are no additional value chains explicitly associated with knowledge (unlike the FVC) but the HUESCAlimentaria Quality seal involves informing the customer of the product terroir and associated positive qualities.

The majority of additional VCs have existed for more than ten years, with half existing for more than fifty years. Five of these AVCs are new to the MRL (less than 10 years existence) - these are sometimes long-established value chains in other mountain areas, for example, beef production from dairy farms in Alto Molise; or rural tourism accommodation in the Transdanubian Mountains. However, some AVCs are quite emergent such as the Slovakian production of 'bee bread' or health food products from pollen, the Spanish HUESCAlimentaria local food certification, and chestnut beer in Tuscany.

The rest of this section explains how the dimensions of the Conceptual Analytical Framework (Moretti et al., 2021a) such as practices, flows or actors are interwoven within the mountain VC assemblages.

4.7.2 What assemblage practices are associated with different VC stages?

By considering the range of additional value chains in terms of those associated with livestock-based products, crop-based products, and tourism products, the range of practices involved at the Production stage in part mirrors those associated with the range of focal value chains (described in Section 4.2.2). There were no data provided in four cases.

For the livestock products (including meat, dairy, manure), Production practices include pasture management (including sowing, mowing and soil management) and other aspects of feeding (e.g., winter feeding), breeding and care for animals, herd management (shepherding, milking, slaughter), and associated practices such as machinery maintenance and transportation. For crop-based (and beekeeping) products various practices relate to aspects of cultivation and harvest. For the AVC tourism products, which follow a slightly different series of stages to agri-food products, 'Production' practices described relate to the provision or identification of products and services for marketing/sale, including accommodation and food-related products, sites of touristic interest, events, complimentary products and services. Other practices at this early stage of the VC for the additional products identified include destination level organisation (e.g., strategizing sustainable tourism) and promotion (campaigns, competitions), and establishing means of communication. Again, this mirrors the practices described in the FVC section.

At the Processing stage, a variety of practices specific to the additional VC products were identified, for example: for milk-based products (e.g., cheese), heating, stirring, pressing, cutting, salting, and maturation; stages of boiling and distillation for alcohol production; weaning and slaughter of livestock, and deboning, salting, drying, and maturing of dried meat products; preparation and mixing products (e.g., carob meal) with other crop products for animal feed products; extraction, straining and bottling of honey; and other processes relating to quality control. For non-agri-food products, such as tourism, this next stage has also been associated with aspects of organisation and publicity (strategies, events, tours), but also practices relating to transport that start to connect consumers (visitors) with the VC product.

Moving on to the Distribution/Marketing stage, some value chains begin to involve intermediary actors, such as traders and organisations tasked with product/provider (e.g., retail, hospitality, booking platforms), and regional level (e.g., quality certification (such as the PDO certification), collective and territorial tourism marketing, promotion and communication of product messages, as well as transporting products to eventual point of sale. Others retain responsibility for distribution and marketing of products closer to the source of production and/or processing (e.g., direct marketing on social media, websites etc., local market and/or farm gate promotion and sale). It is at this stage that practices implemented across many of the value chains become more homogeneous, although vary in terms of scale of the VC product and market in question.

Practices in the Consumption stage for agri-food products are often described in terms of the place or actor involved; for example, home consumption following direct purchase or via retailers, or consumption in restaurants or other hospitality venues, either by locals or visitors. For tourism products, practices in the Consumption stage are often described in terms of visitor experiences of the place and products in it (including accommodation, food, activities, tours, events). Again,

practices in this final stage of the value chain are similar across the different chains. In the case of tourism value chains, Consumption represents a significant proportion of practices implemented. Indeed, Consumption practices often 'replace' (or adapt) the early stages (Production and Processing) of more traditional agri-food type value chains due to the service-based nature of tourism products within the destination (e.g., accommodation, tours) and connecting products to their market (e.g., transport and related infrastructure).

Overall, adaption of the focal value chain practices was required in only a few cases. These included the minor changes such as the addition of milking at the Production stage for Weiz Cheese, and different Processing practices between meat and dairy value chains (e.g., Alto Molise cheese and beef production). Even more adaptation of practices occurs when food-based VCs are assembled with tourism VCs (e.g., Alto Molise, Alto Douro, Grisons, Speyside, Sumava). Sometimes there is adaptation practices even when two non-traditional VCs are assembled e.g., Transdanubian A-E Knowledge production and Transdanubian rural tourism; or Slovakian Bio-honey and bee pollen products.

Overall, this suggested that the assemblages have co-evolved to build on shared practices but also provide the incentive to adapt practices in order to bridge between separate VCs when it is in their common interest.

4.7.3 What territorial capitals are utilised by AVCs at each VC stage?

A range of territorial capital is enrolled in the additional value chains, similar to the focal value chains being studied (Section 4.2.1). Some of these are listed in Table 11, below.

Table 11: Territorial capital utilised across key stages of additional value chains studied

Production	
Economic	Buildings (mills, distilleries, barns); Accommodation and hospitality facilities; Accessibility of place; Labour; Sheep; Museums; Goods/services; Capital for equipment; Breeding infrastructure; Machinery (e.g., dryers); Land ownership; Electricity
Socio-cultural	Heritage and traditions (inc. oral traditions); Knowledge; Trendiness of place; Skills (e.g., beekeeping); Societal attention (e.g., importance of pollinators); Hospitality and rural events
Environmental	Landscape, grassland, pastures, plants, water; 'Traditional look'/attractiveness; Tranquillity of place; Protected landscapes; Biodiversity; Unpolluted environment; Mosaic landscape; Daylight; Renewable energy opportunities
Processing	
Economic	Buildings (e.g., distilleries, accommodation, mills, warehouses); Transport infrastructure; Visitor interpretation; Time; Capital for equipment, wages; Machinery/equipment; Technologies; Traceability; Quality control/certifications
Socio-cultural	Culture; Knowledge; Discipline, professionalism, self-regulation; Agro-ecological practices; Intergenerational knowledge transfer; Staff know-how; Trust between actors; Organic management
Environmental	Landscape, grassland, mountain; Biodiversity; Natural casing for sausages

Distribution and marketing	
Economic	Reputation/branding; Booking platforms; Built infrastructure; Mobile phone; Internet access; Sales networks & infrastructure; Proximity to retailers; Marketing/branding based on landscape value; Distribution channels (long and short); Export-oriented product; Travel agencies, tour operators, websites, booking services
Socio-cultural	Social & media networks; Personal contacts; Consumer awareness/consumers seeking local goods; Storytelling, traditions, cultural heritage
Environmental	Landscape (& associated imaginaries); Biodiversity; Location; Mountain landscape, grassland; paths, signage, and trekking routes
Consumption	
Economic	Livestock breeding; Mountain villages; Facilities (e.g., restaurants); Other activities for tourists; PDO certification; Food & drink products; Distinctive taste & quality; Prestige; Quality labelling; Local economic flow; Image and differentiated quality; Gastronomic & touristic activities
Socio-cultural	Local traditions and celebrations; Support for sustainability; Local networks; Reputation of premium product; Consumer trust; Social interactions; Consumer awareness; Social cohesion; Support of sustainable production; Local knowledge & skills
Environmental	Landscape; Biodiversity; Nature; Weather; Pollen from non-polluted environment; Mountain landscape; Grassland; Paths, signage, and trekking routes

All the assemblages providing data (n=19) have common territorial capitals, explaining why the assemblage has evolved. Economic and built territorial capital shared by focal and additional VCs includes elements of farm infrastructure, and processing and sale infrastructure, demand generated by proximity to markets or through migration, and the importance of specific products (e.g., whisky generated in the focal VC underpinning tourism products in the additional VC). Shared socio-cultural capital resources include traditional and community know how (e.g., cheesemaking), labour force, co-operative organisation, business contacts, managerial, business, and marketing skills, cultural heritage and traditions, and the importance of landscape, place, and heritage. Finally, shared environmental capital includes elements of the physical environment (pastures, grassland, vineyards, water), livestock (sheep), function (pollination), effects of management practices (chemical free pasture), and combinations and perceptions of the physical environment (landscape and scenic qualities). These shared capitals illustrate how the assemblage can help to positively reinforce the importance of local mountain assets to a range of value chains, making the assets more valuable for mountain development and more important to protect from shocks and drivers of change in the future.

4.7.4 Actors, infrastructure, and institutions

For many of the additional value chains (n=14) new actors are involved. In five cases (Carpathian Bio-Honey, Sierra Morena Ham, Sjenica Lamb, Serra da Estrela Cheese, and Elmali Tomatoes) the VC involves common actors across both chains and no further actors are required. Examples of new actors identified includes suppliers of raw materials and relevant machinery for the AVC (e.g., for compost production in the Spanish Betics); experts in relevant production/processing

methods (e.g., cheesemaking in Weiz); tourism actors – such as in Sumava, Speyside, Alto Molise, Alto Douro, and the Transdanubian Mountains, where FVC products assemble with tourism AVCs, and Brasov, where the AVC represents a different sector of the tourism market (rural tourism). However, no data were provided in six cases.

Some cases (n = 9) noted the use of additional supporting infrastructure in the additional value chains, these include farming infrastructure, specific equipment, and facilities (e.g., relating to dairy production in Weiz and Grisons), regional services (hotels, transport, roads), and digital infrastructure (e.g., relating to tourism bookings in Speyside, and quality certification in Huesca). No data was provided in 10 cases, and four further assemblages (Trento Wine and Grappa, Transdanubian A-E Knowledge and Tourism, Brasov Certified Ecotourism and Rural Tourism, and Carpathian Bio-Honey and Pollen) confirmed that common infrastructure was used across the focal and additional chains, so no additional provision was required.

Additional institutions are involved in eight of the additional value chains providing data: Weiz Dairy, Alto Molise Tourism, Alto Douro Tourism, Speyside Food and Drink Tourism, Sierra Morena Non-PDO ham, Huesca Quality Seal, Betic Compost, Grisons Tourism, and Gruyere Cheese from the Jura/Berne. These include tourism authorities (Alto Douro, Alto Molise) and relevant public sector departments and regulatory authorities (Betic, Sierra Morena, Jura/Berne). However, no data were provided in 11 cases. As with actors and infrastructure, where the AVCs were similar, there were existing common institutions across focal and additional VCs such as in Trento (wine and Grappa), Brasov (Eco and Rural Tourism), Slovak Carpathians (Bio-Honey and Pollen), Speyside (Whisky and FD Tourism), and Grisons (Grain and animal products).

These findings suggest that our assemblages can use existing constellations of actors to support more than one VC; but that often new constellations of actors are required to bring additional knowledge, finance, or materials (see Section 4.7.5 below). Likewise, enabling institutions can underpin a range of mountain VCs, but sometimes understanding institutions outside the traditional VC milieu can be useful (e.g., moving from a focus on agri-food to understanding tourism). Finally, the findings confirm that public or private investment in infrastructure can aid more than one value chain in many cases.

4.7.5 Flows and relationships

From the total of 28 additional value chains identified across the 23 mountain territories, materials are reported to flow between 21 focal and their associated additional VCs. No material flow data are available for five VCs, and no material flows are reported between the Elmali Tomatoes (FVC) and Pepper and Cucumber AVCs. In terms of the direction of material flows, nine are bidirectional between the FVC and AVC (e.g., Sumava Beef and Tourism, Alto Douro Wine and Tourism, Brasov Eco- and Rural Tourism), and eight involve material flows from one to the other (e.g., Scotch Whisky to food and drink tourism). Three cases provided details about the specific flows (e.g., practices in the Carpathian Pollen VC can lead to reductions in the Bio-honey VC). No data on directionality of material flows were available for eight of the additional VCs identified.

In terms of information flows, the relationship between 14 focal and additional value chains are described as bidirectional, three identify information flows from the focal VC to the additional VC (Grain to Tourism in Grisons, and from the Elmali Tomato VC to both Peppers and Cucumbers), and one as flowing from the additional VC to focal VC (Chestnut Beer to Chestnut Flour in Tuscany). Information flow data is therefore missing relating to 10 of the additional VCs identified.

Bidirectional flows of finances occur between eleven of the focal and additional VC assemblages, and five describe some other relationship (e.g., one-directional from the additional value chains in Grisons to the mountain Grain FVC). Although there are financial flows, no directional relationship was reported in relation to the two additional VCs' connection to Elmali Tomatoes, and between the Huesca Wine and Quality Seal chains. No data is available in relation to financial flows for nine of the additional VCs identified.

Flows of by-products between the focal and additional value chains has been identified in 10 cases, whereby flows are bidirectional between VCs in six cases (Weiz, Rethymno, Alto Molise, Alto Douro, Serra da Estrela, and Betic), from the focal to additional VC in three cases: Sumava Beef to Tourism; Trento Wine to Grappa; and Speyside Whisky to Food and Drink Tourism; and from additional to focal VC in Grisons (animal products to Grain). In three cases, no by-product flows were identified between focal and additional value chains (Jura/Berne and both AVCs in Elmali) – and no data was provided for the remaining 15 assemblages.

Bidirectional flows of externalities were identified between 10 assemblages, and a further three cases identified flows of externalities- either from the focal VC to AVC (Sumava Beef to Tourism, Betic Organic Olive Oil to Compost) or AVC to FVC (Grisons Tourism to Grain). In Elmali, no flows of externalities were identified in either assemblage. In the remaining 15 assemblages no data were provided.

In terms of rural development, flows between VCs in the context of assemblage sometimes represent sustainable use of by-products (e.g., manure in Grisons, barrels in Trento) or transfer of final products from one chain for sale/consumption in the other – which is particular apparent in the context of tourism AVCs (e.g., Speyside Whisky, Sumava Beef). Shared resources are also important, including shared infrastructure and facilities (e.g., Weiz) and alternative means for local products and services to be sold in the context of tourism (e.g., Brasov, Transdanubian Mountains). In terms of information flows, examples include shared knowledge (e.g., Rethymno Carob Flour) and common marketing strategies (e.g., Trento), which represent important intangible connections that strengthen VCs through people, relationships, and representations of the area (e.g., Transdanubian Mountains). Area based support for multiple chains is also reflected through bidirectional financial flows (e.g., Alto Molise, Rethymno, Speyside, Sumava, Trento, Weiz).

4.7.6 Valorisation

The impact of the VC assemblage on economic, socio-cultural and environmental outcomes in the MRL are presented in tables illustrating the range of cases, which reveal a largely positive impact resulting from the VC assemblage.

Table 12 illustrates the positive trend economic effects from assemblage, including 14 cases where economic outcomes were amplified and six where negative outcomes were reduced by the assemblage. There were however, two cases where negative outcomes were amplified and five where positive outcomes were reduced. Examples of positive economic outcomes from the assemblage include additional/diversified farm income (Carpathians, Jura/Berne, Rethymno, Serra da Estrela, Weiz, Sjenica) and complementarity of products in the context of area/destination's branding (Alto Molise, Grisons, Speyside. Sumava, Trento). Negative outcomes relate to competition for inputs (Rethymno), reducing supply of FVC product (Carpathians), increased import of resources from other regions (Alto Molise), and the increased competition for housing for locals (Speyside).

Table 12: Effect of assemblage on focal VC economic outcomes

Net effect:							**NDP**
+ve	**Neutral**	**-ve**	**Impact on outcomes**				
Assemblage			**Amplify positive**	**Counteract negative**	**No affect**	**Counteract positive**	**Amplify negative**
1	Weiz Lamb/Dairy		Yes				
2	Western Stara Planina HNV						
3	Sumava Beef/Tourism		Yes	Yes			
4	Corsican Chestnut Flour						
5	Drome Lamb/Sheep Meat						
6	Rethymno Carob Flour/Animal feed		Yes			Yes	
7	Transdanubian A-E Knowledge/Rural Tourism			Yes			
8	Alto Molise Cheese/Meat		Yes			Yes	Yes
9	Trento Wine/Grappa		Yes				
10	Tuscan Chestnut Flour/Honey/Beer		Yes				

11	Maleshevski Tourism					
12	Serra da Estrela Cheese/Lamb/Curd Cheese	Yes				
13	Alto Douro Wine/Cultural Tourism	Yes				
14	Brasov Certified Ecotourism/Rural Tourism		Yes			
15	Sjenica Lamb/Cheese/Dried Meat					
16	Carpathian Bio-Honey/Pollen/ Pollination	Yes			Yes	
17	Betic Organic Olive Oil/Compost	Yes				
18	Huesca Wine/Quality Seal	Yes				
19	Sierra Morena Ham/Non-PDO Ham				Yes	
20	Grisons Grain/Animal Products/Tourism	Yes	Yes			
21	Tête de Moine PDO Cheese/Gruyere PDO	Yes				
22	Elmali Tomatoes/Peppers/ Cucumbers		Yes			
23	Speyside Whisky/FD Tourism	Yes	Yes		Yes	Yes

In terms of socio-cultural outcomes, Table 13 also illustrates that the net effect of assemblage is positive. Positive outcomes were amplified in 16 cases and negative outcomes reduced in three, compared to only four where positive outcomes were reduced and three where negative outcomes were amplified. Examples of positive socio-cultural outcomes from assemblage include regional identity building (Huesca, Speyside, Transdanubian Mountains, Weiz), incentive to preserve native breeds and local products (Alto Molise, Serra de Estrela, Sjenica Lamb), and preservation of traditional ways of life (Grisons, Rethymno). Negative outcomes relate to things such as competition for staff (e.g., Speyside), issues associated with gendering and misbalance of age in staffing (Trento), conflicting interests between visitors and local people (Sumava), and the risk of trivialising heritage and traditions (Alto Molise).

Table 13: Effect of assemblage on focal VC socio-cultural outcomes

Net effect:							NDP
+ve	Neutral	-ve	Impact on outcomes				
Assemblage			Amplify positive	Counteract negative	No affect	Counteract positive	Amplify negative
1	Weiz Lamb/Dairy		Yes				
2	Western Stara Planina HNV						
3	Sumava Beef/Tourism		Yes	Yes		Yes	
4	Corsican Chestnut Flour						
5	Drome Lamb/Sheep Meat						
6	Rethymno Carob Flour/Animal Feed		Yes			Yes	
7	Transdanubian A-E Knowledge/Rural Tourism		Yes				
8	Alto Molise Cheese/Meat		Yes	Yes		Yes	Yes
9	Trento Wine/Grappa		Yes				Yes
10	Tuscan Chestnut Flour/Honey/Beer		Yes				
11	Maleshevski Tourism						
12	Serra da Estrela Cheese/Lamb/Curd Cheese		Yes				
13	Alto Douro Wine/Cultural Tourism		Yes				
14	Brasov Certified Ecotourism/Rural Tourism		Yes				
15	Sjenica Lamb/Cheese/Dried Meat						
16	Carpathian Bio-Honey/Pollen/ Pollination		Yes				

17	Betic Organic Olive Oil/Compost	Yes				
18	Huesca Wine/Quality Seal	Yes				
19	Sierra Morena Ham/Non-PDO Ham					
20	Grisons Grain/Animal Products/Tourism	Yes				
21	Tête de Moine PDO cheese/Gruyere PDO	Yes				
22	Elmali Tomatoes/Peppers/ Cucumbers			Yes		
23	Speyside Whisky/FD Tourism	Yes	Yes		Yes	Yes

Similarly, but to a slightly lesser extent, Table 14 shows that positive environmental outcomes in the focal value chain were amplified in 11 cases, and negative outcomes reduced in four cases as a result of the assemblage with additional value chains. However, in five cases positive outcomes in the FVC were counteracted by assemblage, and negative outcomes were also amplified in three cases. Examples of positive environmental outcomes from assemblage include increased appreciation of the value of local landscapes (Carpathians) and genetic diversity (Huesca), use of by-products (Grisons), and preservation of landscapes and environment (Alto Molise, Sumava). Negative outcomes on the environment include amplification of effects associated with the (over)use of natural resources (e.g., Sierra Morena, Trento), and tourism-related impacts/degradation (e.g., Speyside, Sumava, Transdanubian Mountains).

Table 14: Effect of assemblage on focal VC environmental outcomes

Net effect:						**NDP**
+ve	**Neutral**	**-ve**	**Impact on outcomes**			
Assemblage			**Amplify positive**	**Counteract negative**	**No affect**	**Counteract positive**	**Amplify negative**
1	Weiz Lamb/Dairy						
2	Western Stara Planina HNV						
3	Sumava Beef/Tourism		Yes			Yes	Yes
4	Corsican Chestnut Flour						
5	Drome Lamb/Sheep Meat						

6	Rethymno Carob Flour/Animal feed	Yes	Yes			
7	Transdanubian A-E Knowledge/Rural Tourism				Yes	
8	Alto Molise Cheese/Meat	Yes	Yes		Yes	
9	Trento Wine/Grappa					Yes
10	Tuscan Chestnut Flour/Honey/Beer	Yes				
11	Maleshevski Tourism					
12	Serra da Estrela Cheese/Lamb/Curd Cheese		Yes			
13	Alto Douro Wine/Cultural Tourism					
14	Brasov Certified Ecotourism/Rural Tourism	Yes				
15	Sjenica Lamb/Cheese/Dried Meat					
16	Carpathian bio-honey/Pollen/ Pollination	Yes				
17	Betic Organic Olive Oil/Compost	Yes				
18	Huesca Wine/Quality Seal	Yes				
19	Sierra Morena Ham/Non-PDO Ham				Yes	
20	Grisons Grain/Animal Products/Tourism	Yes				
21	Tête de Moine PDO cheese/Gruyere PDO	Yes				
22	Elmali Tomatoes/Peppers/ Cucumbers			Yes		
23	Speyside Whisky/FD Tourism	Yes	Yes		Yes	Yes

4.7.7 Spatial Distribution of the Assemblage

Spatial distribution of practices, actors, and outcomes in the VC assemblages across the four levels defined in the MOVING project (see Section 4.4) are presented in this section[14].

First considering practices, Table ***15*** illustrates that in eight cases more than half of assemblage practices are undertaken locally (MRL) and in a further two cases more than half of assemblage practices are undertaken inside the MRR. In only three cases (Speyside Whisky/FD Tourism, Carpathian Bio-Honey/Pollen, Sierra Morena Ham/Non-PDO products), more than 25% of assemblage practices are undertaken within the national scale.

Table 15: Proportions of assemblage practices across space

Proportion of practices:							**NDP**
<25%	**25-50%**	**51-75%**	>75%	**Spatial Scale**			
	Assemblage			**MRL**	**MRR**	**Nation**	**International**
1	Weiz Lamb/Dairy			>75%	<25%	<25%	
2	Western Stara Planina HNV						
3	Sumava Beef/Tourism			25-50%	25-50%	<25%	<25%
4	Corsican Chestnut Flour						
5	Drome Lamb/Sheep Meat						
6	Rethymno Carob Flour/Animal Feed			25-50%	25-50%	<25%	<25%
7	Transdanubian A-E Knowledge/Rural Tourism			>75%			
8	Alto Molise Cheese/Meat			>75%	<25%	<25%	<25%
9	Trento Wine/Grappa			<25%	25-50%	<25%	<25%
10	Tuscan Chestnut Flour/Honey/Beer			>75%	<25%	<25%	
11	Maleshevski Tourism						
12	Serra da Estrela Cheese/Lamb/Curd Cheese			<25%	>75%	<25%	
13	Alto Douro Wine/Cultural Tourism			>75%			

[14] Note – in some cases 'NDP' in Tables 10, 11 and 12 is understood to mean no practices, actors, outcomes at that spatial scale (e.g., Weiz Lamb, Table 10, where data in the other cells equates to 100%) – and in some cases categories allocated as approximations based on answers given

14	Brasov Certified Ecotourism/Rural Tourism	<25%	>75%	<25%	
15	Sjenica Lamb/ Cheese/Dried Meat				
16	Carpathian Bio-Honey/ Pollen/ Pollination	<25%	<25%	51-75%	Unsure
17	Betic Organic Olive Oil/Compost	>75%	<25%	<25%	<25%
18	Huesca Wine/Quality Seal	Unsure	Unsure		
19	Sierra Morena Ham/Non-PDO Ham	25-50%		51-75%	
20	Grisons Grain/Animal Products/Tourism	>75%			
21	Tête de Moine PDO Cheese/Gruyere PDO	25-50%	25-50%	<25%	<25%
22	Elmali Tomatoes/Peppers/ Cucumbers	51-75%	25-50%	<25%	<25%
23	Speyside Whisky/FD Tourism	25-50%	25-50%	25-50%	<25%

In terms of actors, Table 16 tells a similar story: more than half are located within the MRL in seven cases, and in a further three cases more than half are located within the MRR. In one case (Sierra Morena Ham/Non-PDO), more than half of assemblage actors are located on a national scale, and in four further cases more than a quarter are located at a national scale (Sumava Beef/Tourism, Carpathian Bio-Honey/Pollen, Tête de Moine PDO Cheese/Gruyere PDO, Speyside Whisky/FD Tourism).

Table 16: Proportions of assemblage actors across space

Proportion of practices:					**NDP**			
<25%	**25-50%**	**51-75%**	>75%	**Spatial scale**				
	Assemblage			**MRL**	**MRR**	**Nation**	**International**
1	Weiz Lamb/Dairy			>75%	<25%	<25%	
2	Stara Planina HNV						
3	Sumava Beef/Tourism			25-50%	25-50%	25-50%	<25%
4	Corsican Chestnut Flour						
5	Drome Lamb/Sheep meat						
6	Rethymno Carob flour/Animal feed			25-50%	25-50%	<25%	<25%
7	Transdanubian A-E knowledge/Rural Tourism						
8	Alto Molise Cheese/Meat			>75%	<25%	<25%	<25%

9	Trento Wine/Grappa	<25%	25-50%	<25%	<25%
10	Tuscan Chestnut Flour/Honey/Beer	>75%	<25%	<25%	
11	Maleshevski Tourism				
12	Serra da Estrela Cheese/Lamb/Curd Cheese	<25%	>75%	<25%	
13	Alto Douro Wine/Cultural Tourism	51-75%	>75%		
14	Brasov Certified Ecotourism/Rural Tourism	<25%	>75%	<25%	
15	Sjenica Lamb/Cheese/Dried Meat				
16	Carpathian bio-honey/Pollen/ Pollination	25-50%	25-50%	25-50%	Unsure
17	Betic Organic Olive Oil/Compost	>75%	<25%	<25%	<25%
18	Huesca Wine/Quality Seal	Unsure	Unsure		Unsure
19	Sierra Morena Ham/Non-PDO Ham	25-50%		51-75%	
20	Grisons Grain/Animal Products/Tourism	>75%			
21	Tête de Moine PDO cheese/Gruyere PDO	25-50%	25-50%	25-50%	<25%
22	Elmali Tomatoes/Peppers/ Cucumbers	51-75%	25-50%	<25%	<25%
23	Speyside Whisky/FD Tourism	25-50%	<25%	25-50%	<25%

Outcomes are similarly skewed towards the local and regional end of the spatial scale (Table 17), with a maximum of 25% being realised at the international scale, and only in one case more than half (indeed, more than 75%) being realised at the national scale (Sierra Morena Ham/Non-PDO products).

Table 17 Proportions of assemblage outcomes across space

Proportion of practices:					**NDP**
<25%	**25-50%**	**51-75%**	**>75%**	**Spatial scale**	
Assemblage		**MRL**	**MRR**	**Nation**	**International**
1	Weiz Lamb/Dairy				

2	Western Stara Planina HNV				
3	Sumava Beef/Tourism	25-50%	25-50%	25-50%	<25%
4	Corsican Chestnut Flour				
5	Drome Lamb/Sheep Meat				
6	Rethymno Carob Flour/Animal Feed	25-50%	25-50%	<25%	<25%
7	Transdanubian A-E Knowledge/Rural Tourism				
8	Alto Molise Cheese/Meat	25-50%	25-50%	<25%	<25%
9	Trento Wine/Grappa	25-50%	25-50%	<25%	<25%
10	Tuscan Chestnut Flour/Honey/Beer	25-50%	<25%	25-50%	
11	Maleshevski Tourism				
12	Serra da Estrela Cheese/Lamb/Curd Cheese	<25%	>75%	<25%	<25%
13	Alto Douro Wine/Cultural Tourism	25-50%	51-75%		
14	Brasov Certified Ecotourism/Rural Tourism	<25%	>75%	<25%	
15	Sjenica Lamb/ Cheese/Dried Meat				
16	Carpathian Bio-Honey/ Pollen/ Pollination	25-50%	25-50%	25-50%	Unsure
17	Betic Organic Olive Oil/Compost	>75%	<25%	<25%	<25%
18	Huesca Wine/Quality Seal	Unsure	Unsure		
19	Sierra Morena Ham/Non-PDO Ham			>75%	
20	Grisons Grain/Animal Products/Tourism	>75%			
21	Tête de Moine PDO Cheese/Gruyere PDO	25-50%	25-50%	<25%	<25%
22	Elmali Tomatoes/Peppers/ Cucumbers	51-75%	25-50%	<25%	<25%
23	Speyside Whisky/FD Tourism	51-75%	<25%	<25%	<25%

The combinations in space favouring MRL and MRRs is to be expected, given the focus on MRL assemblage that can illustrate how assembled VCs can contribute to mountain rural development.

However, as with Section 4.4, these assemblages are tele-coupled into their wider MRRs, countries and even global value chain relationships. Therefore, supporting such mountain assemblage can have local positive outcomes, but also positive outcomes in wider space. However, the findings also highlight that not all assemblages are synergistic, so Section 4.7.8 discusses not only why assemblages can work well, but also where there are conflicts.

4.7.8 Synergies and Conflicts

Synergies were identified in relation to 16 assemblages and conflicts were identified in relation to 10. No data was provided in the remainder of cases, except to specifically stipulate there were no conflicts within three assemblages: Trento Wine and Grappa, Tuscan Chestnut Flour and Honey/Beer, and Sierra Morena Ham and Non-PDO products. The range of synergies and conflicts described relate closely to information on valorisation in the context of assemblage in Section 4.7.6.

Synergies include those relating to practices and shared use of territorial capital, such as facilities and services (Weiz), different products resulting from the same basic production practices (Carpathian, Rethymno, Sjenica), overcoming seasonality (Jura/Berne), the use of by-products (Grisons, Trento) and externalities, such as pollination (Tuscany). The importance of shared regional identity and brand placement (Weiz), shared institutions (Jura/Berne) and objectives (Speyside, Sumava), and improved outcomes for actors across VCs (Alto Molise, Serra da Estrela) were also described – as well as an addendum that improved collaboration would result in greater benefits for both types of tourism value chain (Brasov).

Key conflicts identified relate to competition for resources, such as water, land, bee colonies, milk supplies (Alto Molise, Carpathians, Elmali, Transdanubian Mountains), social and environmental impacts of tourism (Speyside, Sumava), and other conflicts of interest between actors, practices, and objectives (Betics, Grisons, Rethymno, Sierra Morena, Transdanubian Mountains).

These assemblage synergies and conflicts extend the benefits and concerns expressed regarding the FVC valorisation sections (from Section 4.7.6 onwards). Therefore, as planned in the Conceptual Analytical Framework, addressing how the interactions between practices, actors and valorisation processes are synergistic or conflicting can give additional important insights into the opportunities and challenges for mountain development.

4.7.9 Summary

This section points to the importance of relationships and connections across value chains within the context of mountain landscapes – particularly in terms of sharing or delivering resources and supporting positive valorisation processes.

In some cases, the assemblage case studies were so closely related that the foundational Production practices and actors were the same (or so closely related) that it was only at the Processing phase that complementary chains came into existence (e.g., Carpathians Bio-Honey and other Pollen products, Rethymno Carob Flour for human and animal consumption, Tuscan

Chestnut Flour, Honey and Beer). In these examples, assemblage represents alternative markets for common territorial capital, increasing income opportunities, and supporting traditional socio-cultural practices and land management objectives.

In other cases, the concept of assemblage represents connections between different but complementary economic sectors, such as food or drink production and tourism. This type of assemblage is fundamentally underpinned by the focal product from one value chain (e.g., Alto Douro Wine, Speyside Whisky, Sumava Beef) flowing into the other (food and drink tourism, rural tourism), becoming a territorial resource utilised in the context of a wider territorial tourism product sold to visitors– both in terms of the tangible product, but also in terms of cultural significance and associations with the place where it is produced.

Fundamentally, the concept of assemblage supports improved understanding of the interconnections between value chains and their wider significance of the mountain landscape they are based. While tele-coupling links ensure that many of the mountain value chains are connected beyond the local and regional area, positive net effects of assemblage in terms of economic, socio-cultural, and environmental outcomes has been identified in the majority of cases. Similarly, the greatest proportion of assemblage outcomes are realised at the MRL or MRR scale.

5 Concluding Discussion

The findings presented above are now summarised in Section 5.1 and then supplemented by some methodological reflections in Section 5.2. The discussion then considers what these findings mean in terms of the wider literature and the implications for policy and practice in Section 5.3. As this deliverable is an important step towards achieving the objectives of the overall WP4 looking at participatory appraisal of vulnerability and performance of value chains, the final section (5.4) considers how these findings can serve the rest of WP4 and the remaining WPs in the H2020 MOVING project.

5.1 Summary of findings

This deliverable summarises the patterns and emerging analytical themes from a three-step data collection process. These data were collected across the 23 value chain (VC) examples, representing a diversity of value chains from traditional agro-food (meat, cheese, plant-based, alcohol) value chains to value chains based on tourism, public goods, and knowledge. They cover the diversity of European mountain areas and include several cases outside the EU itself.

These VCs are situated in mountain areas with typical mountain and rural development challenges, such as depopulation, low wage or seasonal employment, difficult access due to lack of physical and digital infrastructure, fragile ecological systems facing extreme weather events, soil management challenges, and the need to preserve protected species, habitats and landscapes. These areas have often turned their challenges into opportunities, harnessing their

geology and ecology as sought-after qualities, attracting visitors and lifestyle migrants as well as providing valuable place-based branding.

Some VCs are emergent, small scale niche products seeking to grow their markets whereas others are more economically dominant and are currently seeking ways to become more sustainable. Both were important to assess in terms of lessons for future mountain policy – it is important to provide the conditions that allow start-ups to develop and become successful, but also to support established economic activities, whilst mitigating any potential negative impacts on vulnerable mountain areas.

The first step considered the focal value chain in terms of its structure and function; addressing the practices performed by different actors that valorise mountain territorial capital and generate the values associated with the final product. As part of this analysis, the role of infrastructure and institutions were considered to understand to what extent there is an enabling environment supporting these mountain VCs. A large range of mountain territorial capitals (over 300) are drawn on for our focal value chains across the 23 cases, covering economic (financial, built, human), socio-cultural (social, cultural, symbolic), and environmental (natural and human/animal welfare) capital assets. These were valorised using a range of practices across the four stages of the value chain – Production, Processing, Distribution/Marketing and Consumption. There were similarities of Production and Processing practices within clusters (meat, cheese, plant, alcohol, tourism) but these varied widely between clusters. However, by the Distribution/Marketing and Consumption stage practices, there was more similarities between the clusters. The unconventional VCs, particularly tourism, adjusted the stages to make more sense for their practices (as described in the methodology).

A wide range of actors including land-use system managers, NGOs, civil society, broker/advisors, agricultural businesses, non-agricultural businesses, public sector representatives, research and actors classified as ‘other’ were involved. Most actors tended to be small-medium sized organisations with average levels of technological uptake; but there was a mix of ‘for-profit’ and ‘not-for-profit’ actors engaged in the practices. Looking at the actors in terms of practice stages there was a dominance of men working in the earlier stages of the VCs (i.e., Production and Processing) and a greater balance/dominance of women working in the later stages of the VCs. Actors at the first three stages tended to be local, whilst a more international range was present at the Consumption stage. Actors within the tourism-based VCs tended to be younger than those in the agriculture-based VCs throughout the practice stages.

In terms of valorisation and outcomes, most cases felt the VC did improve the economic, social, and environmental outcomes and therefore the valorisation did add a range of values to the territorial capital, although the findings were most positive for the economic aspects. The tourism and public good VCs seemed more vulnerable to economic headwinds than the other clusters. The economic values were changed (mainly added) across the four stages, with few cases capturing much value at the production stage. Many VCs were seen to provide valuable employment, and pay relatively good wages in some cases, especially where this is collectively organised and there is vertical integration between production and processing in the same

mountain area. Although there is limited data on the contribution of the mountain VCs to wider economic development, some of the VCs are nationally important in terms of tax revenue and excise duties (particularly alcohol).

There were many socio-cultural benefits identified from the VC practices, including protecting cultural landscapes, increasing connection to the mountains, building and maintaining trust and social networks, and providing opportunities to young people, women and immigrants (generally at later stages in the VCs). There was high local ownership, and the VC Production and Processing stages were seen to be accessible for local people to enter the VC in the mountain areas. However, it appears to be more difficult for local people to participate in decision making about their local VCs at the moment.

The environmental valorisation is slightly less positive – although many cases believe that the environmental capital assets were improved, some cases were more neutral, and some felt the values had been damaged by the VC. However, in these latter cases, there were mitigation practices underway to protect the resources, such as water, soils or habitats. As the VCs are strongly dependent on natural or farmed resources in the mountain areas, and in some cases, face competition for these resources from other VCs and actors, it is important to ensure that use is sustainable and resilient to climate change pressures. The perception is that the VC Production practices in the mountain areas are mainly carbon sinks, despite the emissions from livestock production, but the VCs can become contributors to greenhouse gas emissions at later stages in the value chains, particularly associated with the energy involved in Processing and Distribution practices.

Most VCs were enabled by local, regional and national provision of physical infrastructure (e.g., roads, access to electricity etc) but their remote location means they were often struggling with connectivity of transport, energy and internet. The cases enrol a range of institutions such as involvement in projects, contribution to wider sectoral or territorial strategies, and benefitting from public and private investment in their practices. VCs are governed by regulations across all four stages; which is important given the data under socio-cultural and environmental valorisation sections that highlighted the physical and mental risks for the Production and Processing practices; and the pressure on some natural resources arising from increasing Production and Processing in these fragile environments. Certification, including the 10 cases using PDO and two cases using PGI, were seen as very important in terms of both the economic valorisation and also in embedding the VC in the mountain area, ensuring that the benefits were at least partially localised in mountain communities. Collective action institutions and provision of education and training were also important to the VCs, even if not directly set up for VCs – increasing the skills of local workers was seen as an important way to retain young people in the areas.

The analysis considered how embedded the VCs were in the mountain reference landscape (MRL); the wider mountain reference region (MRR); as well as being tele-coupled to other locations in the wider nation-state or beyond. Around half of the VCs describe themselves as global value chains, with export markets in the rest of Europe, the Americas, and Asia. Most of our VCs are tele-coupled to spaces outside the MRL and MRR. The majority of the tele-coupling

occurs at later stages in the VC, with most Production practices located in the MRL although some VC Production and Processing practices have important linkages with their wider MRR, possibly influenced by their interactions through PDO status. Some VC practices extend beyond the national boundaries to including international spaces at the Distribution/Marketing and Consumption stages of the VC. Only a few cases have much more territorial practices at the later stages of the VCs strongly rooted in the MRL. Therefore, although some valorisation takes place at the Production stage, within the MRL, much of the economic valorisation occurs at the Distribution and Consumption stages and these are often not embedded in the MRL or MRR. Indeed, many cases raised the need to embed more of the Processing and Distribution/Marketing practices in their MRLs. Furthermore, the desired to embed the benefits of valorisation of the Consumption phase may explain why there are many agro-food VCs working with tourism to generate a wider mountain VC assemblage.

Finally, the analysis was extended, not just to go beyond an economic focus to consider other developmental issues such as inclusion, empowerment and environmental protection described above, but also to consider how the VC is interconnected to, and dependent on, other VCs in the MRL. A total of 28 additional VCs were identified, covering more agri-food products (meat, crop, cheese, honey and alcohol) but also tourism, public goods and other provisioning services (compost, nature, animal feed). Most MRL assemblages share similar practices across the four VC stages (Production, Processing, Distribution/Marketing and Consumption) although where there were assemblages combining different types of VC (e.g., beef production and tourism) so adaptation was required. The findings suggest that our assemblages can use existing constellations of actors to support more than one VC; but that often new constellations of actors are required to bring additional knowledge, finance, or materials. In general, the assemblage amplified positive valorisation effects in the focal VC or counteracted any problems – however there were some examples of conflicts as well as synergies. These conflicts were often regarding competition for scarce resources, such as water, or skilled staff. Whilst the assemblage emerges from shared MRL territorial assets and actors, the assemblages are also tele-coupled across space, therefore, supporting such mountain assemblage can have local positive outcomes, but also positive outcomes in wider space.

Many of the issues highlighted above are aspects picked up on other rural VC analyses, highlighting the need to protect the territorial assets; retain value in the rural areas; and use tele-coupling to become the receiving system (e.g., tourism) not just the sending system exporting inputs for value-adding activities in more accessible peri-urban locations. The focus on mountain VCs amplifies these concerns as mountain areas are physically fragile, their remoteness and topography make it more difficult to improve both physical and digital access, and primary industry production activities have additional natural constraints due to soil, slope, and climate. However, mountains also have unique and precious cultural landscapes that are important assets for their value chains. Furthermore, whilst vulnerable to climate change, the MRLs are also cooler and wetter than their lowlands, making them important refugia for habitats and species; better able to withstand droughts and heatwaves; and more attractive to visitors seeking mental and physical retreat from the demands of modern urban living.

5.2 Methodological reflections

As stated previously, the focus in T4.3 and T4.4 was to operationalise the Conceptual Analytical Framework across 23 heterogenous VCs in a way that generated rich qualitative narratives and some comparable quantitative indicators of performance. This proved extremely challenging, given the extent of different topics and ideas required to give a full characterisation of the socio-ecological system(s), practices, actors and valorisation, and the fact that the real world makes boundaries between concepts fuzzier than they might appear in academic definitions. For example, many partners struggled as the Production of a commodity often gave rise to multiple products involving different business models. From a pure VC analysis perspective, it is good to select a business model to focus on, to better understand how the valorisation occurs. However, this became rather limiting when trying to connect the VC to the wider MRL assemblage and system. Hence, in many cases, the initial granularity was substituted for a more generic assessment of a VC involving multiple products.

As is common with many VC analyses, the ability to use secondary data sets was very limited. There were rarely data available for the specific VC within the specific MRL, although we did try to use benchmarking to NUTS regions or the national level statistics to help with evaluation of whether the MRL was doing better or worse than the wider system. Where sector or VC data were available, these data were not geographically specific to mountain areas. Partners did try to get quantified primary data but most of the issues being asked about were considered sensitive commercial activities and few actors were willing to 'open their books' to the researchers. These mountain VCs often involve both collaboration and competition between producers, making data provision in workshops unlikely. Despite having interviews, business actors were not willing to share quantitative data although they were willing to provide narrative accounts of how the VCs performed.

Therefore, there was limited quantitative data provided, despite efforts to make data sets available to help with comparative quantification. The main approach has been to convert open ended responses by partners, validated by their Multi-Actor Platforms (MAPs), to structured data that can be quantitised to see more clearly where patterns emerge. Despite guidance, training and 1-to-1 meetings, some data were not reported in ways that allowed comparison. Therefore, as noted in the relevant findings sectors, there were often cases unable to provide data, or who provided useful commentary about the situation but in ways that could not be accommodated in the closed excel categories for analysis. Some partners were not able to provide data for some aspects of the data collection at all, either due to inability to get information from secondary sources or from their Multi-Actor Platforms; or because of the demands that the methodology put on small teams, often from non-academic SMEs.

The approach used in H2020 MOVING is extremely complex. It requires the ability to understand the connections between multiple systemic aspects within the MRL and across space. It requires researchers to collaborate across disciplines, sectors, and geographies, often taking us to areas where we did not have strong expertise or experience. It is unsurprising that the responses tended to tail off in later stages of the VC, particularly where the practices and valorisation processes

occurred outside the MRL or MRR in diffuse locations across the wider country or Europe. For many, these were practices and actors that were not part of their prior research experience and with whom they did not have strong relationships. Most researchers in the project have a strong normative position on the importance of primary industries in the mountain regions, making them champions for their VCs and MRLs. This may have given rise to some positive readings of the data, for example, the promotion of livestock VC as positive for GHG mitigation in MRLs. However, this positive outlook is essential if we were to build strong and trust-based regional MAPs where we ask busy primary producers to undertake lengthy and challenging participatory research activities.

Finally, the focus on participatory validation and social learning as part of the approach has been challenging to implement. Bringing together actors from the VC assemblage has meant creating new combinations of local and non-local actors; and combining agricultural and service sector expertise. These geographical and sectoral divides were circumvented through using online and in person approaches; and making the different perspectives a virtue in terms of having multiple ways to read and evaluate the VC diagrams. The visualisations of the data in terms of four diagrams were also challenging to fill in but provided a more engaging summary of the material in a way that was easier for participants to interpret than a more conventional scientific presentation or report.

However, the social learning engendered by the research has been very enriching. The researchers have learned a great deal from their participants and from each other through sharing ideas and strategies in the online discussions. The participants have been exposed to other views, and, where busy land managers could spare the time, able to see how their activities are the foundation for often global industries. Ongoing engagement can help illustrate how these actors can harness more of the VC opportunities as well as make visible the importance of their activities to the wider region and national decision makers. However, much of the data were collected during the ongoing effects of the Covid-19 pandemic, and the start of the cost-of-living crisis. This has meant that sometime participants could not attend due to staff shortages or illness, and they are more than ever focussed on business survival in the short-term. Whilst our next steps have much to offer in terms of helping with mountain sustainability, we have little to offer in terms of helping them counteract the doubling of input costs and softening consumer demand.

5.3 Implications for policy and practice

This research took two lenses – (1) understanding how the mountain VC add value to the territorial capital and therefore, how mountain VCs can contribute to national/European goals such as the green recovery from the Covid-19 pandemic, and the Green Deal[15] goals (including climate mitigation and biodiversity protection or restoration) and (2) along the lines of the Long Term

[15] A European Green Deal | European Commission (europa.eu)

Vision for Rural (in this case Mountain) Areas[16], to ensure those living, working, and providing the mountain territorial capital will get the rewards from the VC activities.

In terms of wider VC scholarship, our cases include a spectrum of VCs from emergent, niche, or unconventional VCs to more established global value chains trading commodities or premium products across the world. Our findings highlighted the importance of considering the importance of tourism and knowledge based VCs (Lessmeister, 2008) given the global importance of tourism for many rural areas. Mountains are fragile and protected areas that offer particular opportunities for non-agricultural VCs (Sgroi, 2020) – the emphasis on assemblage helps to highlight the opportunities of crossing sectoral divisions to combine the primary and tertiary sector in well organised mountain development. Mountains have valuable non-renewable natural resources (Tucker et al., 2021) that need protecting, including paying close attention to adaptation to climate and other stresses (Baig et al., 2020) that can challenge the performance of the VCs.

Some of our findings resonate with other VC studies to show that value is added at later Processing or Distribution stages (e.g.,O'Rourke et al., 2016) with producers only securing value-add if they are well organised and entrepreneurial (Choudhary et al., 2015). However, there is little conclusive economic valorisation data that helps us understand how monetary value is added within the practices and by particular actors. Instead, our findings highlight the importance of non-monetary processes that support VCs, such as the gendered and age distribution of employment (Oduol et al., 2017) or to what extent the VC depends on traditions, culture and local knowledge (Innocenti and Oosterveer, 2020). As such, the findings follow the 'pro-poor' development in the recent literature (Tobin et al., 2016). Reducing poverty, improving life chances and attention to the distribution of benefits are important parts of the Long-Term Vision for Rural Areas. One of the strengths of the MOVING approach is to consider the importance of VCs for development (Fabre et al., 2021) and translate many of the findings from the development literature based in the Global South to enrich and renew an understanding of mountain rural development in Europe.

Our findings demonstrate that it is often practices and actors at work beyond the MRL that explain how mountain VCs behave (O'Rourke et al., 2016). This supports the call to consider the multi-scale nature of mountain development, combining endogenous and exogenous actors and governance arrangements (Tucker et al., 2021). Indeed, contradictory or non-aligned policy objectives are highlighted as major governance problems for mountain areas (ibid) and this deliverable has started to highlight which institutions are involved in order to identify alignment issues further in WP7. Furthermore, some of our VCs struggle to distinguish their products from non-mountain areas, despite facing more costs of production, making it harder to be competitive (Sanz-Canada et al., 2015). It raises the importance of actors being able to harness the branding of mountain settings to generate a premium (Pagliacci et al., 2022).

[16] A long-term vision for the EU's rural areas | European Commission (europa.eu)

Finally, the research has highlighted the importance of collaboration – and the need for social innovation and collaboration is even higher in mountain areas (Pachoud et al., 2020) than other rural areas. However, there seem to be differences in the foundations for collaboration between cases, and there are some gaps and challenges regarding brokers that are often vital for supporting sustainable VCs that can adapt to future challenges (Ingold, 2017). The participatory nature of the project is helping to facilitate collaboration, where possible, and developing more brokering relationships could be an area for support in the rest of the project.

5.4 Next steps for H2020 MOVING

The material remains descriptive at present, illustrating the rich variety of how VCs are assembled and practiced across European mountains. These patterns and themes will be further explored as part of the vulnerability/resilience analysis (T4.5) in the autumn/winter 2022, leading to D4.5 Report on Vulnerability and Resilience Performance of 23 Reference Region Value Chains in February 2023. The emerging strategies to make the VCs more resilient and sustainable will be summarised in D4.6 Report on Vulnerability and Resilience Performance of 23 Reference Region Value Chains in April 2023. The data, organised into quantitised categories in an MS Excel spreadsheet and qualitative data in the NVIVO 12 software, are also available for further exploitation by individual cases, clusters and the WP5 (Cross-case comparison and benchmarking), WP6 (Participatory multi-level foresight) and WP7 (Policy analysis and roadmap).

Previous analyses (reported in T3.3 Participatory Vulnerability of Land Use Systems) illustrated where MRLs were sensitive and therefore vulnerable to the effects of climate and depopulation. These insights will be further developed in T4.5 and combined with the information from this deliverable regarding how the current MRL VC cases are performing, including attention to areas where the values not always changed for the better; or where value is added but in ways that do not improve the sustainability of the MRL and their communities. For example, it is good to note that Production phases often have strong employment but where Processing, Distribution/Marketing, and Consumption practices were located in the MRL, these do not always provide better than average opportunities at present. As the service sector dominates most MRL economies, this could be an important issue to consider in terms of sustainability and resilience. Also, there is a lot of interest in helping mountain areas meet 'net zero' national carbon targets, but mountain areas are often remote and difficult to access, which means there are limited options to decarbonise transport networks. Finally, many cases are looking to assemble agri-food VCs with tourism. However, our tourism VCs had mixed outcomes and were hard hit by the Covid-19 pandemic and war with Ukraine. Whilst tourism may trade on experiences and imagery, tourists have material footprints and tourist development can exacerbate competition for land and water, so it is important that we share lessons about how to make the assemblage sustainable.

The Youth Engagement activities (T1.5) will collect experiences of how young people view their development challenges in the MRL and where they can benefit from the MRL VC opportunities. The importance of knowledge and training have come up for example, as well as the lack of local advisors and brokers in the MRLs, suggesting possible opportunities to provide skilled and

interesting employment for local young people. The discussion topics for the engagement workshops can build on the findings in this deliverable and these data can be compared with the information already collected to strengthen the sustainability findings and contribute to the summary of potential Global Upgrading strategies (T4.6).

This deliverable starts to illustrate interesting narrative to pursue around issues of innovation, governance, gender and age that can suggest potential ways to cross-compare between the cases to achieve stronger mountain development outcomes. The importance on certification has emerged as an interesting area to explore, coupled with the fact that few cases were currently using certification to promote the specific mountain nature of their products. The benefits of using the EU's voluntary Mountain Quality Mark (Pagliacci et al., 2022) remains something to consider within WP7 on developing a road map for the EU mountain policy. It would also be useful to consider, where things are not looking sustainable, how VCs can help ameliorate areas of deprivation and support any need for a Just Transition away from a carbon hungry sector to a more carbon neutral economic activity. Finally, our research must be forward looking, and the participatory multi-level foresight research will consider whether and how the MRL and MRR can sustain positive valorisation given potential changes in STEEP drivers over the next 20 – 30 years.

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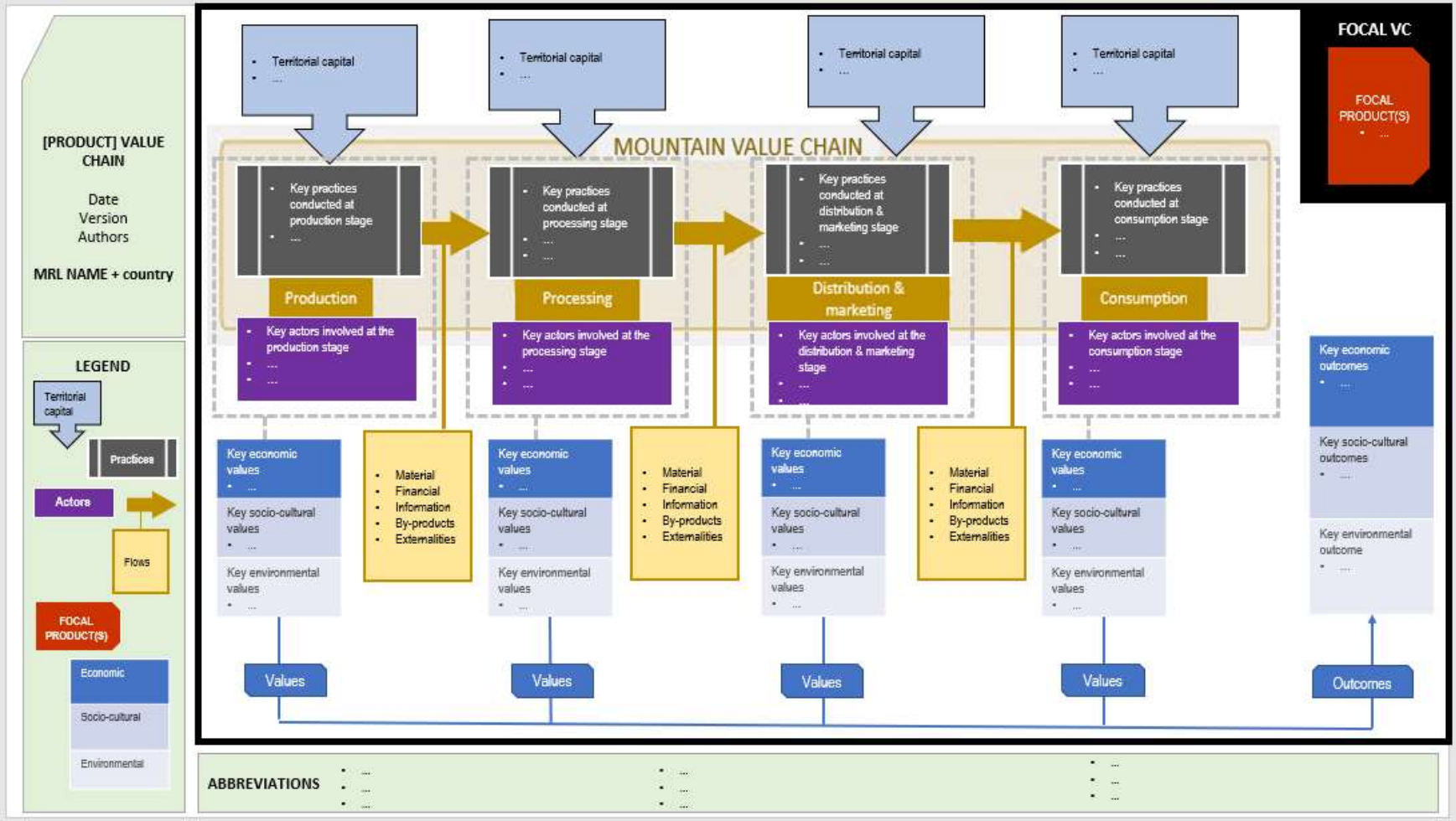
7 Appendix

7.1 Focal Value Chain diagram & summary

This Appendix provides a summary of the extended value chain analysis conducted in each of the 23 cases. In each case a diagram representing the focal value chain is also provided. Each of these component parts of the value chain is represented in the diagram (Figure 1): Territorial capital is represented in the blue arrow boxes at the top – which feeds into: Key practices performed at each stage along the chain (which are the dark grey boxes) – by: Actors, which are included in the purple boxes. The four practice stages – Production, Processing, Distribution/Marketing, and Consumption are shown the mustard colour – connected by arrowed and linked boxes which indicate the: Key flows, which pass between the practice stages in the form of products and by-products (including tangible and intangible flows). At each stage of the chain, valorisation occurs – which in included in shades of blue at the bottom to separate out economic, socio cultural and environmental values (which can be positive or negative). Ultimately, the chain also generates outcomes which are shown on the far right in terms of the same three elements. Each partner has produced a version of this diagram based on analysis of their value chain case study. The vignettes accompanying the diagrams in this appendix highlight the rich data collected and summarised in the deliverable.

Figure 1: Focal Value Chain (FVC) diagram template



7.1.1 Austria – Weiz Lamb

Authors: Karner, S.; Steinwender, D.; Suschek-Berger, J. (Karner et al., 2022a)

Weiz Lamb summary:

In the mountainous areas of the Weizer Bergland region pasture farming with cattle and sheep for meat, milk and dairy production prevails. The sheep are herded either on alpine pastures or on meadows at an altitude of 400 to 1270 metres above sea level.

The valleys are characterized by agriculture landscapes. In addition to grassland and arable farming, fruit and wine growing also play a role. The consequences of climate change are already noticeable.

Sheep farming in the region of Weiz has been a tradition for centuries, with lamb serving as staple food until the end of the 19th century. Until the 1950s, wool was the main product, later dairy and lamb meat products became increasingly important, while wool started to become a by-product. In the beginning of the 1990s, some innovative sheep farmers recognised the trend towards high-quality lamb and started to market lamb and sheep milk products together. When the local dairy closed down for failing to meet EU standards, the sheep farmers founded a cooperative to run this dairy by themselves. They also put back the local slaughterhouse into operation together with local premium beef producers, free-range pork farmers and two small local butchers. The sheep farmers of the region of Weiz process and distribute their products via a cooperative consists of about 320 members, approx. 150 active sheep farms, most of them selling lamb meat. The number of dairy producing farmers is consciously limited to avoid oversupply and a subsequent drop in prices.

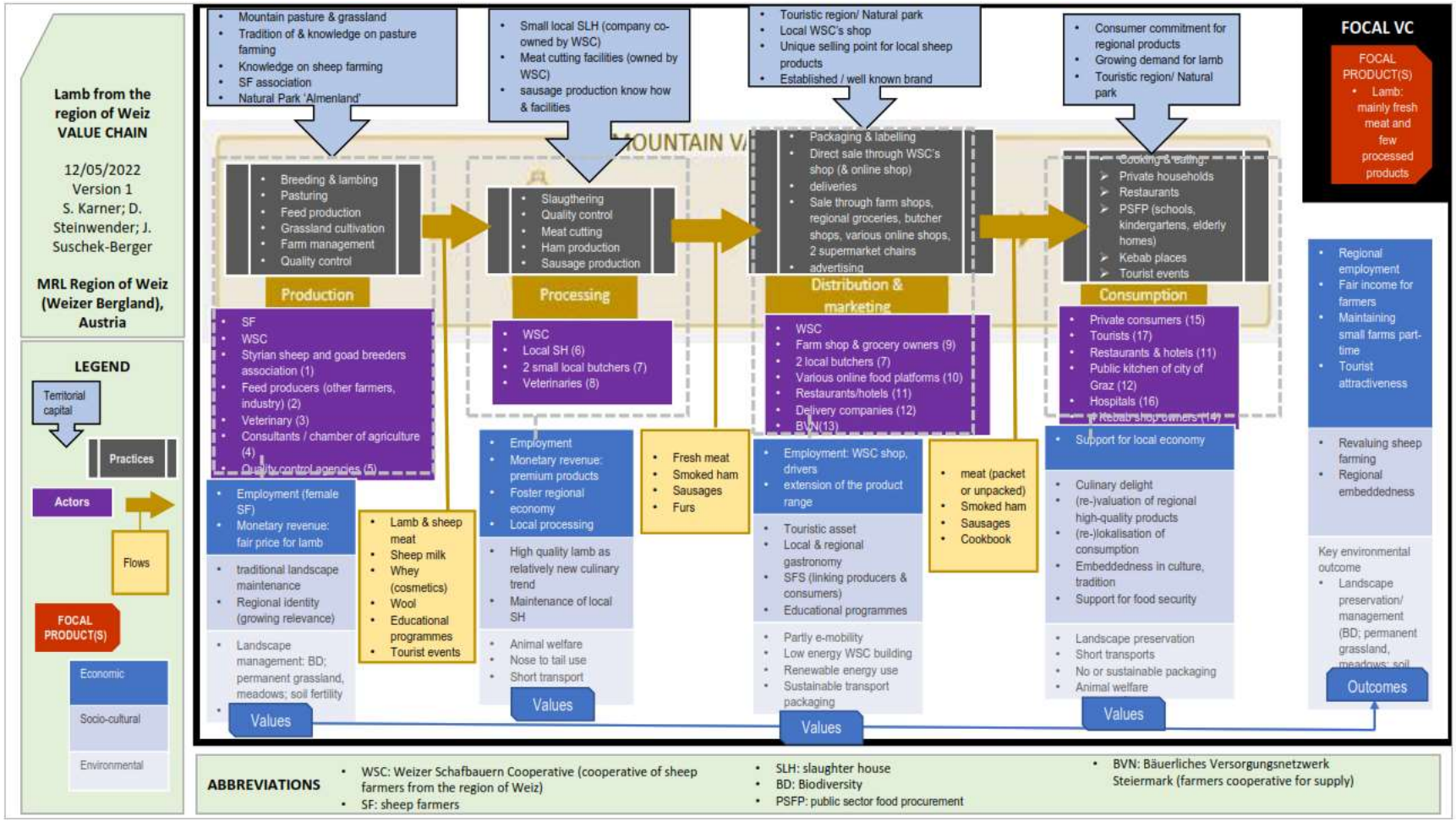
Founding this cooperative was crucial for the survival of the sheep farmers in Weiz for several reasons: a) the cooperative owned dairy and co-owned slaughter-house allows independence and a fair price for the farmers; b) the joint marketing the introduction of an own brand increased their market power compared to the situation of being a single farmer; c) the cooperative has a diversified marketing strategy, including the ongoing development of new products. Their products are sold directly to consumers, to the local gastronomy and via food retailers.

However, the wool is barely used commercially, and only some of the sheep farmers are ambitious to further explore innovative ways of generating value from the wool. Currently, a LEADER project on the use of sheep wool in palliative therapy is ongoing, which is accompanied by research partners, in order to explore its usability and therapeutical effectiveness.

Within the scope of MOVING the potential for the marketing of the wool with a particular focus on links to regional climate protection activities is explored. This includes potential for the use of wool as climate friendly substrate for facade greening, vertical farming and locally sourced fertilizer. Thereby linkages with the regional ‘Climate and Energy Model Region’ initiative will be establish, a visioning process, and various LEADER activities around topics such as value creation, natural resources & cultural heritage, common goods.

Figure 2: Weiz Lamb FVC diagram

(Karner et al., 2022b)



7.1.2 Bulgaria – Western Stara Planina HNV (High Nature Value Farming)

Authors: Redman, M. Kazakova, Y. and Stefanova, S.(Redman, 2022)

Summary:

The Western Stara Planina (WSP) is located in north-west Bulgaria in the extreme west of the Stara Planina mountain reference region (MRR) at the border with Serbia. It covers an area of 1,662 km^2 and includes five municipalities (LAU2) in two NUTS 3 regions.

For simplicity, the MRL for this case study was selected as the four municipalities within Montana Province (BG312): Chiprovtsi (MON36), Georgi Damyanovo (MON14), Berkovitsa (MON02) and Varshets (MON12) with a total area of 1,290 km^2 and a population of 28,691 inhabitatants.

The region is predominantly mountainous with altitudes ranging from between 400 – 700 metres on the lower slopes of the region to over 2,000 metres in the high mountains. In accordance with Van Asselen and Verburg (2012), land cover can be described as predominantly "medium intensity / natural forest" together with "Agro-silvo-pastoral systems" and "Extensive open rangeland" – what might be broadly defined as a "Mosaic semi-natural system" consisting of "Grassland and forest".

Depending upon altitude, the predominant local farming systems are typically small-scale extensive grazing (sheep, cattle and goats) and low input / semi-intensive cropping, including cereals, rapeseed, perennial crops (fruit orchards) and some vegetables. This encompasses a combination of i) arable land on some larger farms at lower altitudes, ii) small-scale mixed farming in the mountain valleys, iii) forested slopes with patches of meadows for hay-making and some small cultivated plots, plus iv) pastures for grazing (mainly common grasslands) in the high mountains.

Due to the traditional low input and extensive agriculture, taken together with the low population density and mountain relief, the majority of farmland is considered as High Nature Value (HNV).

The concept of "HNV farmland" was developed in the early 1990s from a growing recognition that the conservation of biodiversity in Europe depends on the continuation of low-intensity farming systems across large areas of countryside where the prevailing farming system *"…supports or is associated with either a high species and habitat diversity, or the presence of species of European, and/or national, and/or regional conservation concern or both"* (Oppermann *et al.*, 2012; European Commission, 2020).

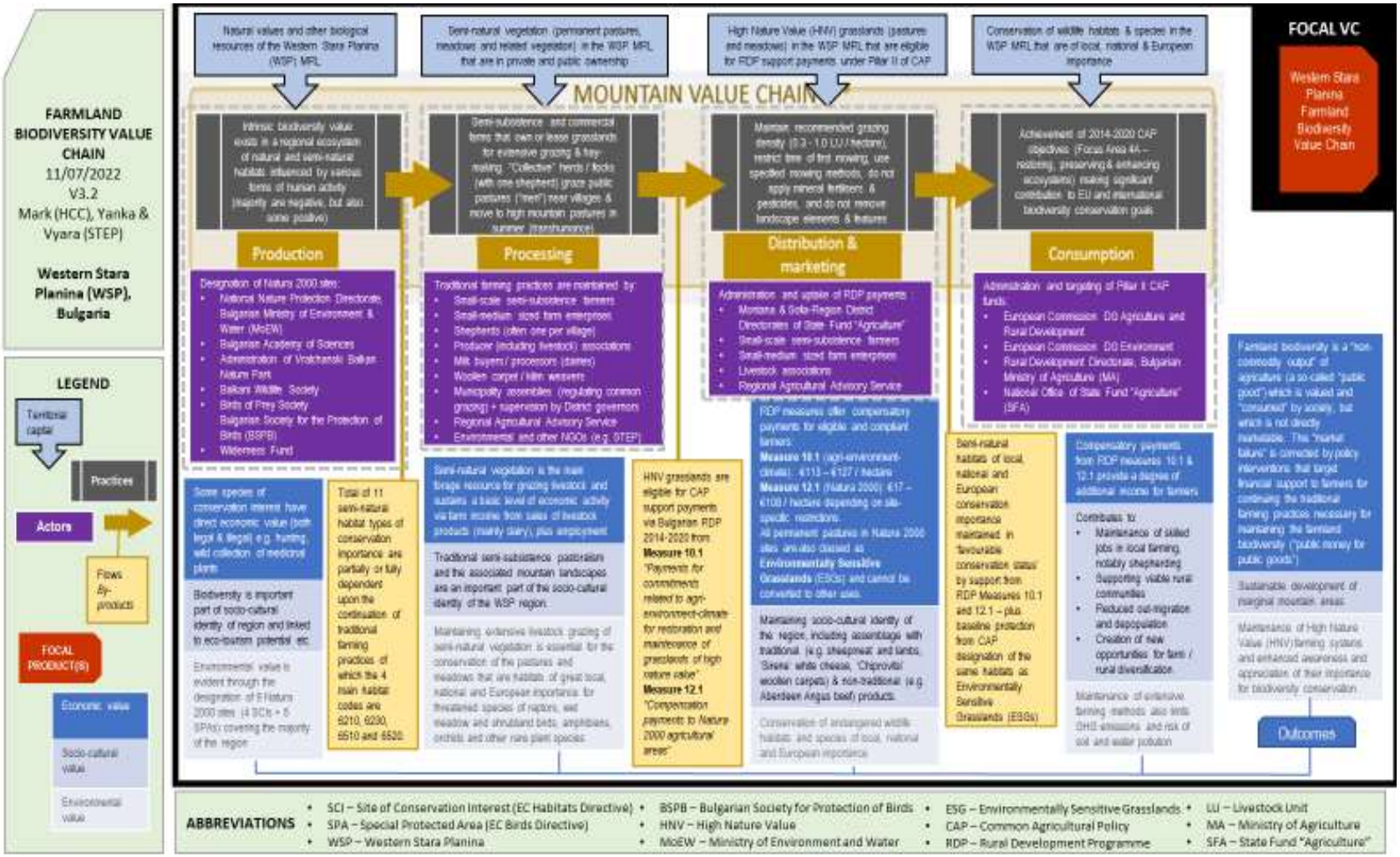
Farmland biodiversity – specifically the "*presence of priority habitats of European significance that are dependent upon the continuation of traditional agriculture*" - is one of several "non-commodity outputs of agriculture" (so-called public goods) which are valued by society, but which are not directly marketable. Nonetheless, they can be marketed indirectly (e.g. via product labelling schemes) as well as supported with effective policy interventions that are targeted at maintaining and/or enhancing their delivery *('public money for public goods')*.

The HNV concept was officially acknowledged in Bulgaria with EU accession and the inclusion of agri-environmental support for the restoration and maintenance of HNV grasslands in the 2007-2013 and 2014-2020 *Bulgarian Rural Development Programmes*. This was a significant policy innovation at the time and established an entirely new mountain value chain involving the use of public money (EU funds) to secure public goods (biodiversity) from private providers (farmers and other land managers) via area-based compensatory payments for compliance with clearly defined management requirements.

For the 2014-2020 period, the payment rate for maintaining traditional hay-making on HNV hay meadows was €113.15/ha and €126.80/ha for maintaining extensive grazing on HNV pastures.

Figure 3: Bulgaria –Western Stara Planina High Nature Value Farming FVC diagram

(Redman et al., 2022a)



7.1.3 Czech Republic – Sumava Beef

Authors: Zagata, L.; Husak, J.(Zagata and Husak, 2022b)

Summary:

Sumava (Šumava in Czech, Czech Forest in English) is well known and highly popular mountain range in the Czech Republic. The region is located in the South-West area of the Czech Republic along the Czech-German borders. The mountain range is 190 km long and covers 1.671 km^2. Average height in the mountains is 921 m.a.s.l. The highest peak on the Czech side is Plechy (1.378 m.a.s.l.) and on the German side it is Grosser Arber (1.456 m.a.s.l.). The German side of the mountains in the South is steeper and higher than the Czech area in the North.

Sumava mountains is formally associated with the National Park that has been established in 1991. Main reason for establishing the National Park is presence of unique natural elements, namely moorlands, primeval spruce and beech forests, mountain meadows, wild rivers and glacier lakes. Sumava is called 'Green Roof of Europe'.

Historically, the region was mainly inhabited by German-speaking population. After the WWII (1945) the Czech government ordered the expulsion of the Germans, which resulted in massive depopulation of the entire area and decay of many rural settlements in the region. In 1950's the region has become 'a no-go zone' due to the rise of the Iron Curtain separating the Communist Czechoslovakia from the Western Germany. The entire region went through a long period of economic and cultural devastation. The region is affected by this historical burden. Current development of the region is visibly dependant on this past trajectory.

Sumava mountains and the entire region has undergone a tremendous change since 1989. Local economy was significantly changed by economic transformation. This included transformation of the State-owned (large-scale) farms into private agricultural businesses.

Natural conditions of the region (high altitude, short vegetation period, cold winters, small and steep land plots) in combination with the high nature-value is suitable for extensive agriculture. The vast majority of farms in Sumava uses organic methods. Agriculture in Sumava has been recognized as a mean for maintaining 'traditional' look of the landscape. Local farms thus cooperate with the National Park and provide ecosystems services in terms of 'no-forestry' managements. These farms focus on extensive animal husbandry (beef, sheep and game).

- *added after the case study research* - - - - - - - - - - - - - - - - - - -

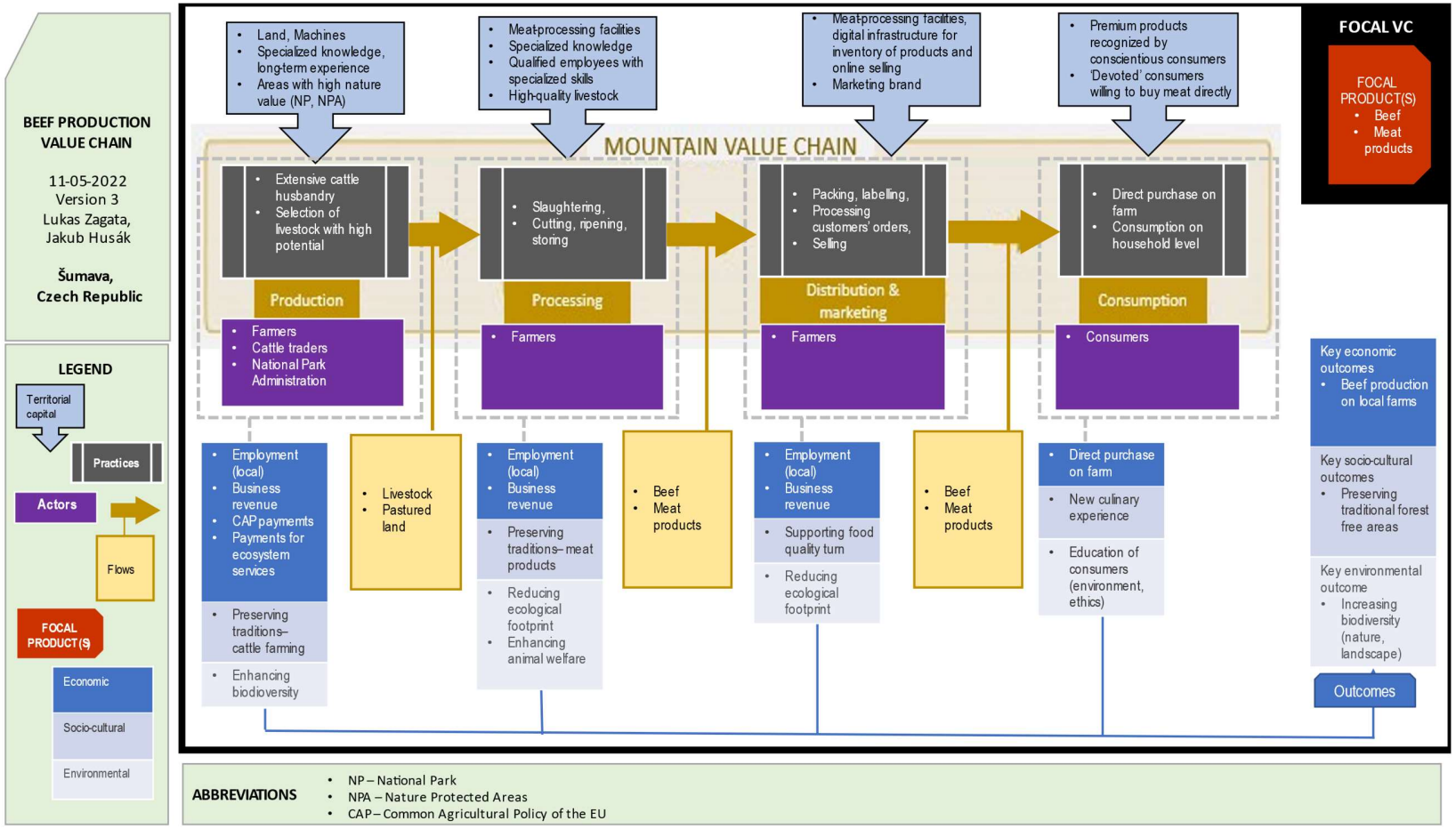
Regional economy and particularly agricultural sector in the MRL is unique due to specific historical trajectory. As a result, there is small number of farms, with very high hectare sizes, no private owners of land and specific regulative framework related to the National Park. Local farms are quite diverse in terms of their ability to valorise production. There is not a single business model that would be common for the farms.

Main actors in the MRL include farmers specialized in beef. They directly cooperate in the region with the National park, who oversees the management of natural resources in the region. Farmers

rent land from the National Park that is farmed according to specific requirements of the National Park to enhance high nature value of the region. Cooperation between farmers and National Park includes many bottlenecks due to diverse interests of both groups. The main issues are related to conservation/usage of natural resources, farming practices and intensity of farm production. Local municipalities are not engaged in these relationships and overall, their ties to farms and agricultural practices are negligible. Value chain focused on beef production also often clashes with inhabitants, particularly with tourists and weekend-house owners from (originating from urban areas) who are less tolerant to negative externalities of farming.

Figure 4: Czech Republic – Sumava Beef FVC diagram

(Zagata and Husak, 2022a)



7.1.4 France – Corsican Chestnut Flour

Authors: Sorba, J. (Sorba, 2022b)

Summary:

The "farina castagnina" Value Chain, in PDO since 2010, is the result of the revival of an activity at the heart of the old food system of Corsica. The very small economic and demographic dimensions of the value chain contrast with the spatial, socio-cultural and ecosystem influence of the chestnut grove. Most of the time, the different stages are concentrated within the same production unit, which sells the flour directly to nearby local or tourist customers (see below).

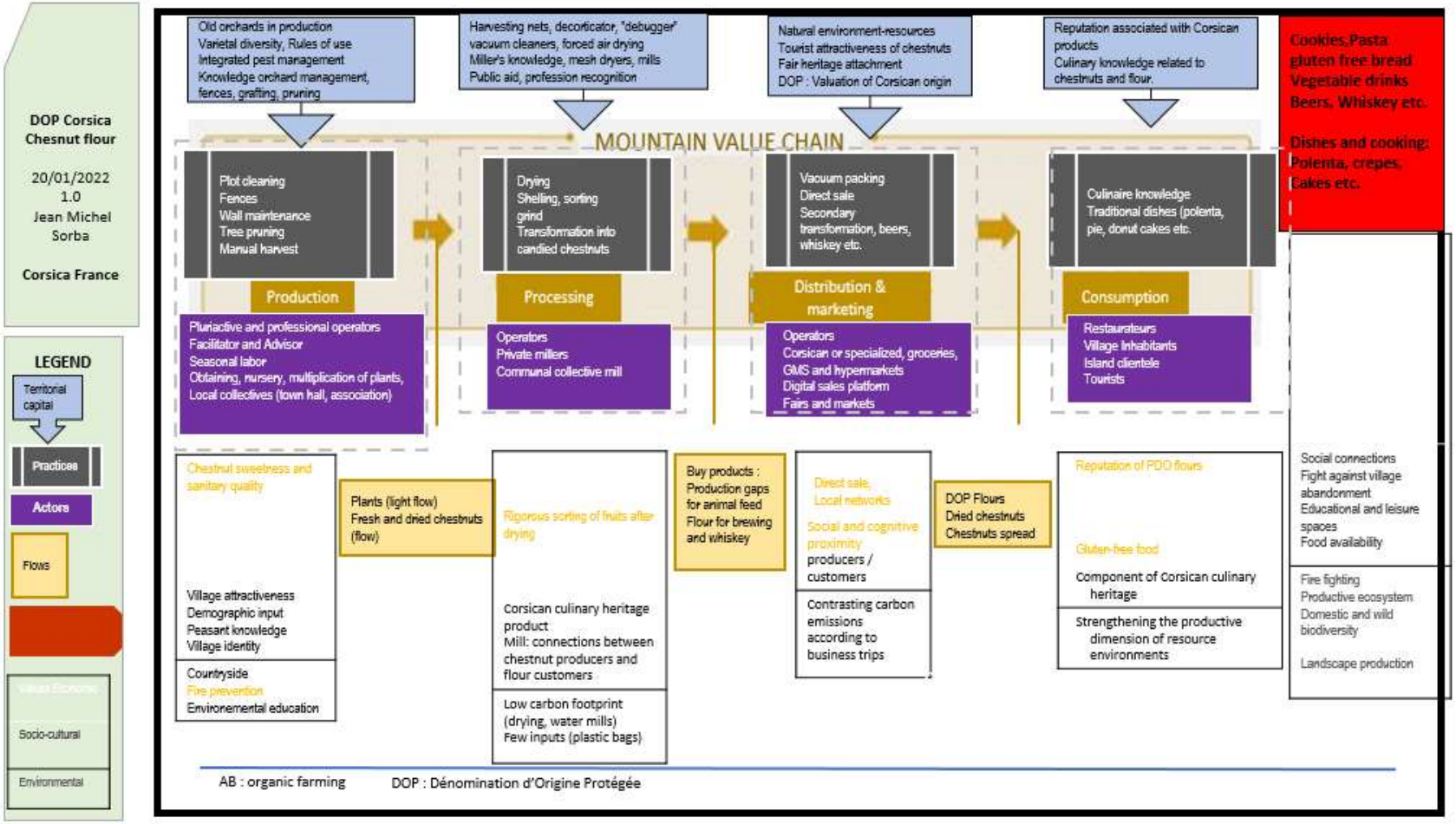
The chestnut grove covers an area of 35,000 ha and has around fifty varieties. The anteriority of the activity is at the origin of a biophysical territorial capital, of ancient productive orchards, of know-how in managing orchards (care, pruning, low walls, etc.), of transformation (drying, sorting, and milling) which are connected to knowledge of culinary use and "knowledge to appreciate."The valorization of flour gave an institutional and commercial existence to chestnut farming. In 2019, there were 69 castaneiculturists, 3 millers and 55 processors on the island (combining production, dryer, oven and mill). AOC certification has resulted in: the creation of one group of producers and processors of chestnuts which bring together all the actors upstream of the VC (arboriculturists and millers) and another group, the ODG, "Defence and Management organization", which ensures the definition and the internal control of flours, the respect of the specifications, implements studies and distributes a technical and organizational information. Other regional organizations intervene for the financing of equipment and specific and collective structures. The chambers of agriculture contribute to the council. Finally, a state organization provides health surveillance and disease control. The characteristics of the chestnut tree and Corsican chestnut groves (shape of the tree and absence of chemical treatment) give access to the vast majority of orchards to organic farming and to AB specifications (70 à 80 % de la production). This collective choice is reflected in the choice of the integrated fight against the gall wasp (Torymus sinensis).

Before the arrival of the gall wasp disease (cynips), the production of AOP flour varied from 110 to 200 tonnes for a declared area of 700 ha. The cynips crisis shaking the business, production fell to 34 tonnes in 2014 and 16 tonnes in 2018. But the strong contribution of the population and the inhabitants to the implementation of the plan of fight against the cynips in the villages (observation of the plants, release of the predatory insect, Torymus sinensis, money donation) showed the patrimonial attachment of the Corsicans to the chestnut groves. VC benefits from a demand market and a remunerative market which retains the characteristics of a domestic mountain activity (direct sales, interpersonal networks, fairs, local shops, e-commerce). Today the chestnut grove is a resource for 4 other PDOs (Lonzu, Prisuttu, Coppa, Mele di Corsica) and for other productive and non-productive activities (timber, education, tourism, development, etc.). Mobilizing the ecosystem is not enough to deal with old and new vulnerabilities (abandonment, aging trees, diseases and climate change). The challenges are to maintain or even increase the

orchards in the project area (renovation, planting), to consolidate the production of PDO flour, to identify the strategies and conditions (technical and organizational) for the coexistence of the different uses of trees and orchards. It is planned that a mechanism combining the production of knowledge and the establishment of management rules will be put in place in the MRL, bringing together CV operators, local elected officials, associations and the institutions concerned (the Regional Natural CV is an essential point of support for the sustainability of chestnut groves, through renovation or new plantations. DOP flour contributes to the maintenance of a productive ecosystem mobilized for 4 other DOPs, three pieces of cured pork (Prisuttu, Coppa and Lonzu) and a honey from the DOP mele di Corsica range. It contributes to the protection of villages against fires, to the maintenance of cool areas near villages, to domestic and wild biodiversity useful for the environmental education of younger generations. Finally, they participate in the landscape and cultural identity of the MRL and its tourist appeal.

Figure 5: France – Corsican Chestnut Flour FVC diagram

(Sorba, 2022a)



7.1.5 France – Drome Lamb

Authors: Trentin, M.; Chevalier, E.; Riffard, L. (Trentin et al., 2022)

Summary:

Within the mountain reference landscape (MRL), farming activities are mainly based on sheep, goat and cattle breeding. The 13 communes of the MRL are sparsely populated, with a wealth of woodland, moorland and other pastoral areas. The two most important alpine pasture plateaus are Font d'Urle, in the commune of Bouvante, and the plateau of Ambel Toubanet, in the commune of Omblèze.

Extensive pastoral systems are favourable to this environment and allow the management of natural areas (prevention of fires and avalanches by opening up the environment) and the regulation of the environment (carbon storage, regulation of plant diversity) (Ruiz-Mirazo et al. 2009). In particular, the suckling sheep system is traditionally present in the mountainous areas of the Drôme and, together with the goat system, allows good use of the grassland and shrub resources of these disadvantaged environments (Poux et al., 2008).

Nine of the thirteen communes of the MRL are located within the perimeter of the Vercors Regional Natural Park (PNRV), and eleven communes are within an N2000 "Habitat, fauna and flora" directive zone. A large number of breeders in the value chain (VC) live and work within these protected areas, a factor that influences production practices and the supply of inputs. One of the farmers markets its products under the name "Marque Parc".

Almost all the lambs are reared on grass. In this production model, the lambs are essentially fed on their mother's milk and grass. In a pastoral production model, the animals are left free or semi-free range in their natural environment for most of the year. Depending on the lambing date, the lambs go up to the mountain pastures for the summer and come down in the autumn. Once down, most of them are slaughtered for sale at the end of the year.

The marketing context in the Drôme, characterised by numerous informal outlets, direct sales or in the market, as well as in collective sales outlets (producers' shops), allows a mainly localised sale of the production. This is partly due to the geography and configuration of the catchment area. Indeed, the Drôme valley is a highly frequented place, aware of the challenges of the circular economy and where consumers willingly turn to local production.

However, this social dynamic is not the only reason that favours the sale of products from the sector in short circuits. Within the MRL, and within the close confines of the Drôme valley, the meat industry has access to a set of specialised companies that ensure a fluid and rapid passage between the production stage and the making of the final product, with a value added that remains within the territory. Thus, the small slaughterhouse in Die, a village in the valley, is a strategic location for the killing and preparation of carcasses. The slaughterhouse is managed by the farmers, guaranteeing a democratic division of the slaughter operations and a management of working hours favourable to the calendar of each farm. The slaughterhouse is an essential link in

the value chain. Its central location in the region saves time and energy for farmers and reduces travel costs.

Part of the lambs raised in the region are sent to the slaughterhouse in Sisteron via a cooperative. The slaughtering and subsequent distribution are handled by the cooperative, which will sell the final product under the name "Agneau de Sisteron".

On the other hand, if the animal is slaughtered in slaughterhouses close to the valley (Die and Romain-sûr-Isère), the carcass will be transported back to the farm, or to a cutting plant. In the workshops, professional butchers cut up the carcasses arriving from the slaughterhouse and transform them into meat ready for marketing. For the farmer, entrusting this link in the chain to expert service providers enables him to obtain quality cuts and facilitates direct sales.

The proximity of the farms to these essential companies ensures the anchoring of the sector in the territory and allows for the development of dialogue between the actors in the chain.

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With a view to federating the breeders, the 1972 pastoral law set up legal tools enabling them to manage and exploit the pastoral domain efficiently in order to preserve it: the pastoral group (GP) and the pastoral land association (AFP). The latter allows the association of landowners (public or private) on an agro-pastoral perimeter, with the aim of ensuring the development and management of the perimeter by breeders. These land structuring tools are particularly important for pastoral recovery and improvement projects. Pastoral groups are an instrument for collective action in terms of land management and development of rural and mountain areas. There are two types: traditional and concerted management, the latter now called pastoral collectives (PC). In the first case, the herds of several farmers come together to go to the mountain pastures. This allows for the pooling and sharing of grazing areas, and the pooling of one or more shepherds. In the case of CPs, a group of farmers come together, not to group their herds, but to contribute economically and technically to the development of pastoral areas.

The support of these legal tools by the local authorities and the support provided by organisations close to the sector (Departmental Ovine Federation, Departmental Mountain Economy Association) encourage the implementation of numerous concrete actions, allowing the development of the sector on a territorial scale. These collective means of action make it possible, first of all, to cut management and production costs, to unite breeders around know-how and breeding practices and to develop sustainable strategies in the face of the constraints suffered by the sector.

Indeed, the sector is facing different types of problems: climatic changes, particularly in terms of rainfall and temperatures, which have an impact on fodder resources and the quality of grassland, demographic pressure which weighs on land occupation and use, and a context of predation which is of increasing concern to breeders.

Drought is an increasingly global problem that affects agriculture as a whole. In the context of the sheep meat industry in the Drôme, the lack of water is affecting the grassland resources on which the flocks feed. Particularly in mountainous areas, vegetation cycles are altered by changing weather conditions, often limiting the availability of quality grass. In addition, in order to cope with the difficult water supply, requests for funding for the construction of watering troughs and retention basins in the mountain pastures are recurrently included in the pastoral plans.

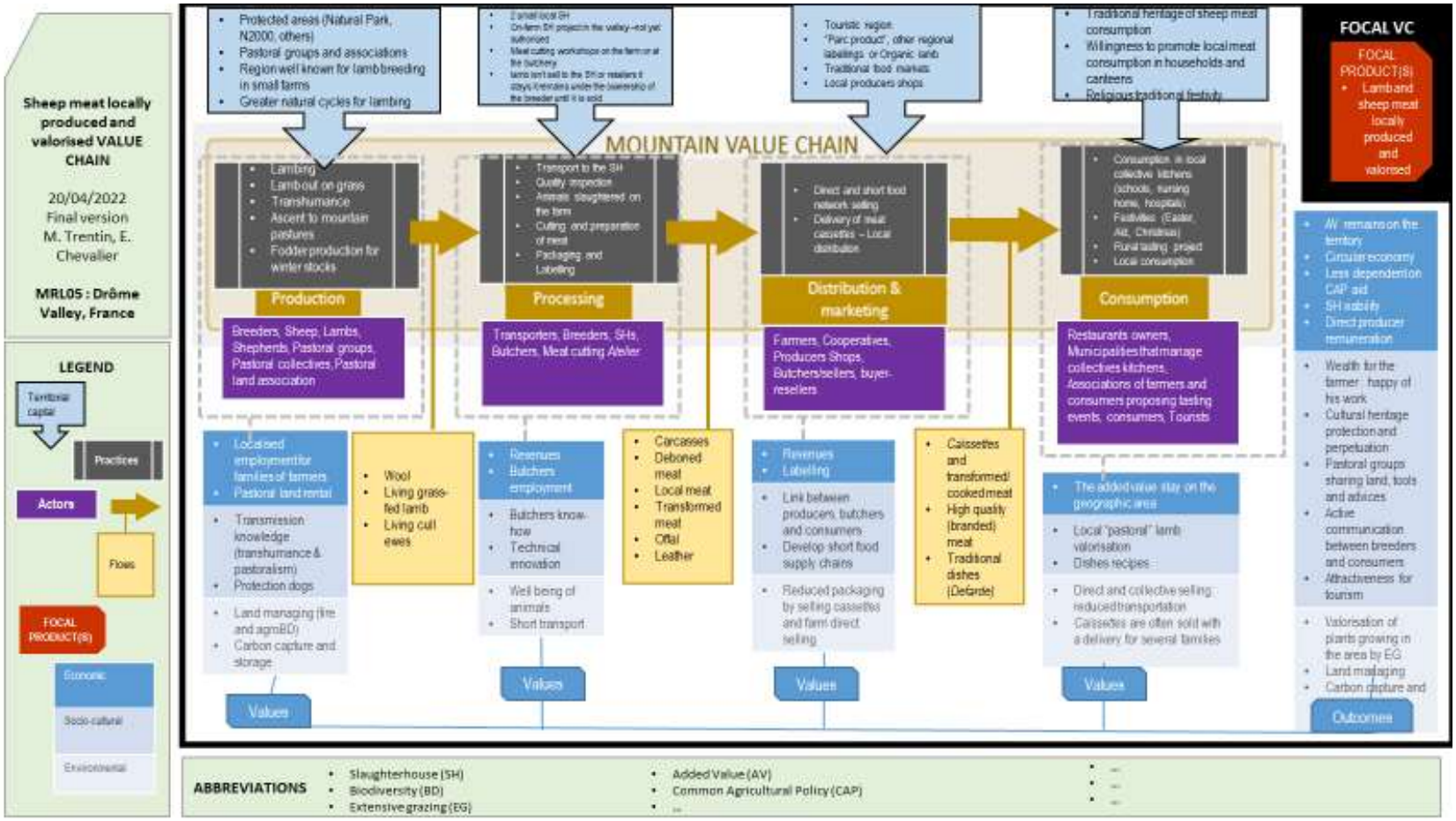
Demographic pressure and the attractiveness of the region for tourists are creating new sources of conflict over the use of the land and its resources. The cohabitation of leisure and agricultural activities is a major issue for this mountain region. Bilateral awareness raising to promote respect for all users and the search for synergies are part of local development projects.

Finally, the problem of predation. This situation is getting worse every year and is a daily concern for farmers and institutions. It is a politically delicate subject that brings different actors with contrasting ideas and principles to the table. Politicians often fail to make a decision and the situation remains unstable. The viability of the sector is jeopardised by the presence of these large predators. Strategies are in place (compensation, guard dogs, GPS collars, pack monitoring platforms, etc.), but they are not always accessible or effective. The development of solutions is at the heart of the breeders' debates and requires the involvement of all users of mountain areas and consumers.

The sustainability of the sector is an issue that must be considered at the same level as its viability. It is important to understand the links between these two counterparts. The sector itself promotes a virtuous model of production and its existence is essential for the maintenance of the environment; its preservation is an issue that needs to be studied collectively and solutions must be quickly put into practice.

Figure 6: France – Drome Lamb FVC diagram

(Trentin and Chevalier, 2022)



7.1.6 Greece – Rethymno Carob Flour

Authors: Triliva, S. (University of Crete, UoC); Pigounakis, K. (UoC); Vavvos, A. (UoC); Kafkalas, J. (UoC); Piteris, C. (Rest of Crete, RoC); Skrapaliori, K (RoC). (Triliva et al., 2022)

Summary:

The Central Rethymno MRL is a semi-mountainous area between the two major massifs of Crete: White Mountains and Psiloritis Mount (Ida), consisting of a typical landscape of Crete, with steep slopes, mainly covered with shrubby vegetation, oaks, kermes oaks, carob trees, and olive trees. In this mountainous landscape, many small villages (with less than 500 residents) are scattered around. The dominant land use systems are agro-silvo-pastoral, and they are deeply connected to the traditional way of life of the inhabitants. Carob trees have traditionally been part of the landscape's conservation and environmental capital by contributing to healthier soil and fewer greenhouse gas emissions (Tous, Romero, & Batlle, 2013; Palacios-Rodríguez et al., 2022). They are ideal for the arid and dry, organic-farming conditions and non-irrigation production systems. The carob farmers apply "holistic" approaches, which rely on indigenous and traditional knowledge. Concomitantly, they are of economic importance in the MRL. An important aspect of the agricultural sector is that smallholders predominate the farming units producing several products under low-intensity systems and exploit marginal resources to sustain their livelihoods (fi-compass, 2020). Carob pods are a product produced in the MRL.

In times of great need, famine, occupation and the turmoil of wartime in WWII, Cretans processed carob pods into carob flour as a substitute for wheat and a source of valuable nutrients. After the 1960s, the production declined precipitously because of harvesting abandonment, the destruction of carob trees for firewood, land use changes valorised by subsidies for olive oil and olive trees, and migration of younger inhabitants of villages to city centres. Carob pod harvesting has traditionally brought a supplementary revenue to farmers. This traditional way of life has changed drastically in the past 40 years within the MRL. Constant mass migration to cities and abroad, the aging population and the land use development policies have led to land and traditional farming, grazing and forestry decline and abandonment (Dretsis, Briassoulis & Kosmas, 2017). Since Greece joined the European Union in 1981, EU subsidies have influenced agricultural practices and many traditional conservation practices were replaced with more intensive ones (Lyrintzis, 1996). The subsidies included livestock and olive farming. The olive oil and olive tree subsidies led to intensive olive monocultures that replaced large numbers of carob trees and ultimately transformed the diverse land use mosaics, creating today's less diverse agroecosystems (Lorent et al., 2009; Siebert, 2004). According to the CoP stakeholders, these subsidies "wreaked havoc" on carob production due to land use and cover changes, its association with famine and its subsequent processing exclusively for animal feed and lower and fluctuating price yields. All of these make it a socially and economically undervalued crop (Battle & Tous, 1997). Along with this abandonment of harvesting, demographic changes and the destruction of carob trees, there was a loss of know-how (e.g., grafting, renewing and pruning techniques) and the use of chemical pesticides to combat olive lace insects causing total loss of production from 1980 to 1985 within

the MRL. “Production of carob plummeted” according to stakeholders, affecting the mills that processed carob in the MRL.

Nevertheless, although carob is a characteristic example of abandonment, its low requirements concerning orchard management, suitability for the part-time farming practices of small-holders or those that have moved to nearby cities, the harvesting of carob pods was continued by some farmers or re-started one or two generations later. Several stakeholders cultivated carob trees under the auspices of a subsidised reforestation program (Blackstock and Flanigan). The program “was not effective as a reforestation effort” according to extension officers in the MRL, but two farms planted large numbers of trees and renewed their production capacity. In the past decade, carob pod prices have increased from 0.20 Euro to 1.20 Euro per kg (the largest increase was in 2021). Pod prices vary greatly and are driven by the more valuable carob seed market (Correia & Pestana, 2018). These price increases have valorised interest in carob cultivation.

A carob pod consists of pulp and seeds. The seeds are exported abroad for processing into “locus bean gum” that yields the highest contributor to the carob market due to its exploitation in the pharmaceutical and other industries (Allied Market Research, 2020). The pulp, representing 90% of the carob pod and the seeds 10% of the pod. The pulp is processed in the one mill run by the CRETA CAROB company within the MRL into chips, flour, carob honey/ molasses, coffee, cola, and other products for human consumption. Carob flour can be used as a food ingredient in a range of food products such as baked goods, pasta, dairy drinks, health bars, and dietary supplements (Papaefstathiou, et al., 2018). The CRETA CAROB company is one of the five European companies that process carob into flour. It was established in 2007. The company sells flour and other carob by-products internationally (95% of its products are sold abroad). Moreover, a larger company within the MRR, Mills of Crete (Mills of Crete Flours) is also processing carob flour. Both company’s marketing and distribution strategies have capitalized on the fact that Crete was the site of Ancel Keys’ Mediterranean diet research (Keys & Keys, 1975) and that valorised the “Mediterranean diet phenomenon” (Sofi, Abbate, & Casini, 2010). These associations, along with new research and innovation in food science and technology, have allowed carob flour to re-emerge as a coveted nutritious and healthy substitute for gluten-rich flours (Stavrou, Christou, & Kapnissi-Christodoulou, 2018; Papagiannopoulos et al., 2004; Goulas et al., 2016; Tsatsaragkou, 2014). Carob flour is now used in traditional “Cretan diet” recipes and re-emergence as a “superfood” for a sector of local and national bakeries, confectioners, contributing to the production of a long, yet narrow, chain of carob-based products. The bakery and confectioner businesses are valorised by Crete’s tourism and hospitality industries (ELSTAT). Carob flour and other carob products are sold in supermarkets and health food stores all over Crete and in large cities in Greece and they are also marketed via ecommerce. The food industry plays a fundamental role in Crete’s economy and the country’s manufacturing industries and can retain its role as a key growth driver in the MRL, MRR and the country.

Traditionally, carob flour was processed for animal feed within the MRL and these agri-businesses for animal feed production were volarised by subsidies for livestock farming, which increased the size of flocks and the need for fodder and transformed livestock farming to an intensive activity

(Lorent et al., 2009). Four different types of mills for carob processing into animal feed exist within the MRL and there are 5 mills for carob flour to animal feed processing:

- Two mills (the oldest is in operation since 1910). In these mills, the pulp is kibbled in various grades and sold to manufacturing companies that produce animal feed within the MRL. The seeds are exported to Italy and Spain and processed to produce locust bean gum. A wholesaler based in Athens links the local market with the other European carob seed markets.
- One mill purchases the carob pods from farmers and processes them for animal feed.
- One mill that purchases carob pulp/flour from other mills, adds other ingredients to produce animal feed and sell it within the MRL, MRR and other islands.
- One Public Agricultural Cooperative Lab that processes carob to produce animal feed.

These businesses are profitable, provide services to farmers ("function as advisory contacts") and contribute to the local dairy and meat agri-business initiatives that sustain the livestock sector (Lorent, et al., 2009).

The VC's development has been valorised by the social and scientific capital regarding carob in the MRL, leading to research telecoupling efforts. A cultural centre dubbed "Cultural Centre of Panormo: Epimenidis" and non-profit company with the title "CAROB OF CRETE" were founded to preserve the cultural significance of carob and to start research focusing on the distinct genotype, cultivars, propagation methods, and how the trees adapt to different microclimates within the MRR. The research effort started this past year with funding from Crete's Regional Government with aims at contributing greatly to knowledge about local cultivars and increasing carob pod cultivation. Recently food science research valorised carob flour use since it has been found to be a source of many valuable components such as dietary fibre, polyphenols, minerals, and contains small amounts of fat and is a natural sweetener.

The multifunctionality of carob trees and the carob flour produced from them are obvious in the analysis of the value chain. The environmental, economic and social role of carob pod and flour production and processing in the rural mountainous communities of the MRL is obvious by the growing interest and consumer demand for the products that are being produced. The valorisation and preservation of the carob flour value chain is important for the local economic development and for the preservation and management of the semi-forest landscape and traditional village life. Further innovation can contribute to the broadening of the value chain, increase in production and ultimately, to mitigate the abandonment of carob harvesting and carob farming practices, loss of historical and cultural heritage, and the decline in the population of the traditional villages in the region.

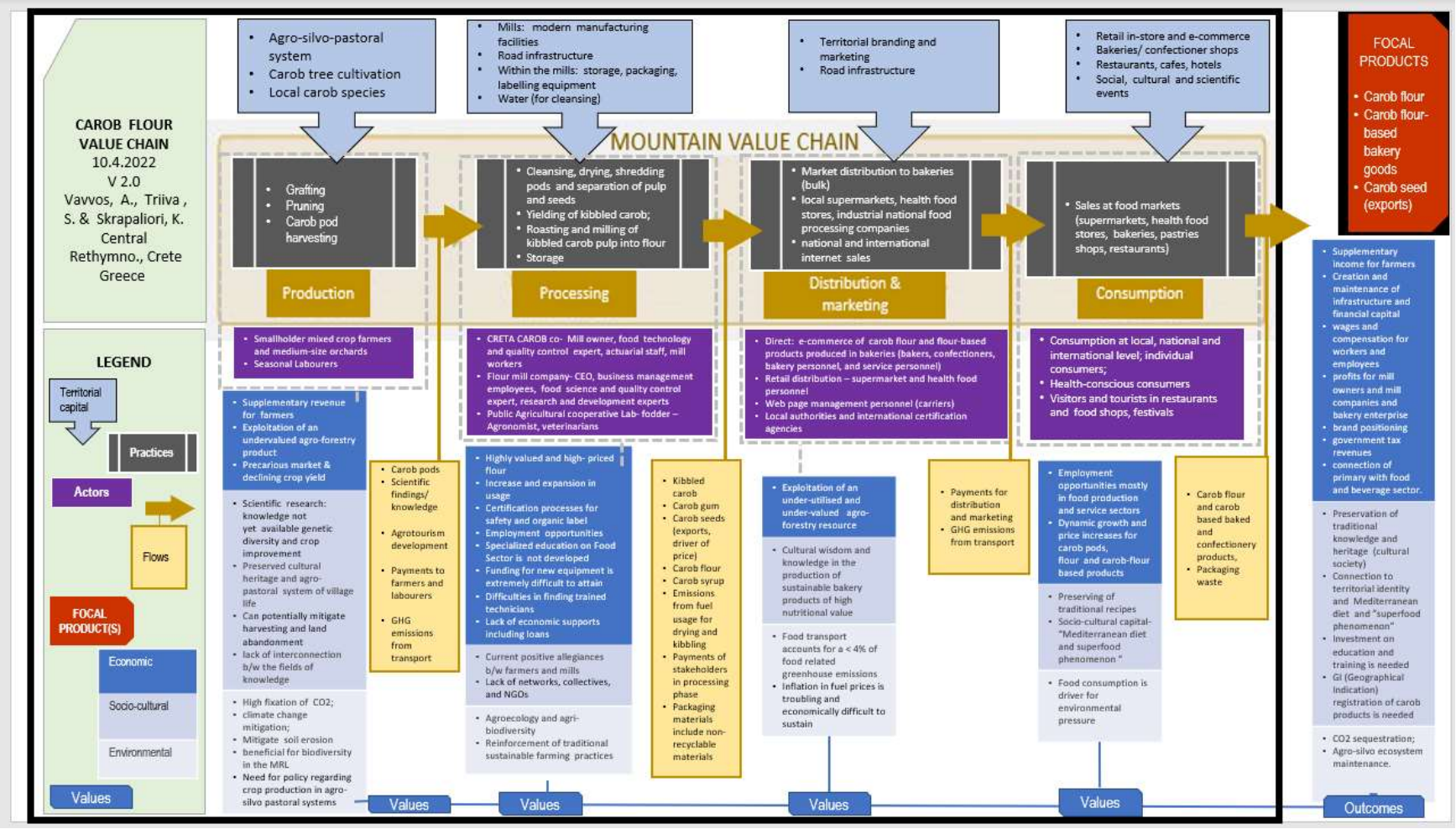
Nevertheless, there are many questions and uncertainties concerning increases in pod production while minding traditional agroforestry and non-intensive practices and environmental imperatives. Agroecological practices and how funding can support them, and government programming are

also an issue of concern. Other concerns include how carob pod production can meet the demand for carob flour and if orchards can produce consistently.

For the mills and processing sector, there are questions whether the existing infrastructure will be efficient in producing adequate quantities while maintaining high quality and questions regarding competition from other carob flour producing countries. The fact that carob seeds are exported and not processed locally whilst being the drivers of the price of carob pods is also an issue of concern. As is the lack of training, vocational education, and support for young farmers. Considering the climatic change scenario with the concomitant need to increase the production of flour, the sustainability of the value chain requires novel perspectives as to how the semi-mountainous villages and the agro-silvo-pastoral way of life can be supported.

Figure 7: Greece – Rethymno Carob Flour FVC diagram

(Vavvos et al., 2022)



7.1.7 Hungary – Transdanubian A-E (Agro-Ecological) Knowledge

Authors: Nemes, G.; Orbán, É. (Nemes and Orbán, 2022a)

Summary:

BASICS, OBJECTIVES AND MAIN PRODUCT OF LVC

Cold Mountain Shelter (CMS) is a small community of young, educated environmentally conscious lifestyle migrants, living right next to the lake Balaton, a prime rural tourism destination. They together own some 8 has of sloping land, mainly long abandoned vineyards and orchards, produce food through permaculture, forest agriculture, contour farming, extensive animal husbandry, etc. mainly for self-consumption. Their main product for sail, however is: trainings, courses and knowledge days for the complex interactive transfer of knowledge on sustainable livelihoods in various topics, such as food production and processing, construction, water and energy management, community functioning and community development. They also rent out equipment (eco-friendly toilets e.g.) and give advice (friendly or commercially, depending on the context) to other communities. The plan is that on the long run, income from this knowledge economy will make CMS an economically viable, sustainable place for living, without having to get additional external income, jobs, etc. This well complies their other main objective, that is to make an effect on society, pushing for more ecological and sustainable livelihoods in general.

TERRITORIAL CAPITAL

The area where CMS is situated is not well suited to agriculture and VC farmers' knowledge of farming is also poor, with many tools, infrastructure and conditions lacking. It is not possible to make a living solely from farming here, especially not through ecological practices. However, the site is typically very attractive to lifestyle migrants is a prime area for gentle/active/experiential tourism. Our local VC, looking for off-grid environmental solutions and creating transferable knowledge to sell at the same time is following a conscious, viable strategy, aimed at a significant nish in the knowledge market. Territorial capital, besides environmental values, buildings, and tools, includes the human and community resources and skills, co-operation culture, adaptive and innovation capacity and relational capital of VC members already living in the area. They represent a critical mass, attracting people, projects, possibilities to improve the CMS project.

ACTIVITIES

During **knowledge production**, they gather traditional and up-to-date knowledge/information on sustainable livelihoods, adapt it to their own circumstances, turning information into experienced, lived knowledge within their individual and community life and territory. The plan is to monitor and analyse these processes, develop training materials and creating a coherent, credible and transferable knowledge base on sustainable livelihoods. However, for this a more enhanced **knowledge processing** stage would be necessary. During this they should document and analyse their knowledge production, lifting their experiences and tacit knowledge to a conscious level on the one hand, and create training materials, videos, handouts, etc. on the other. Their

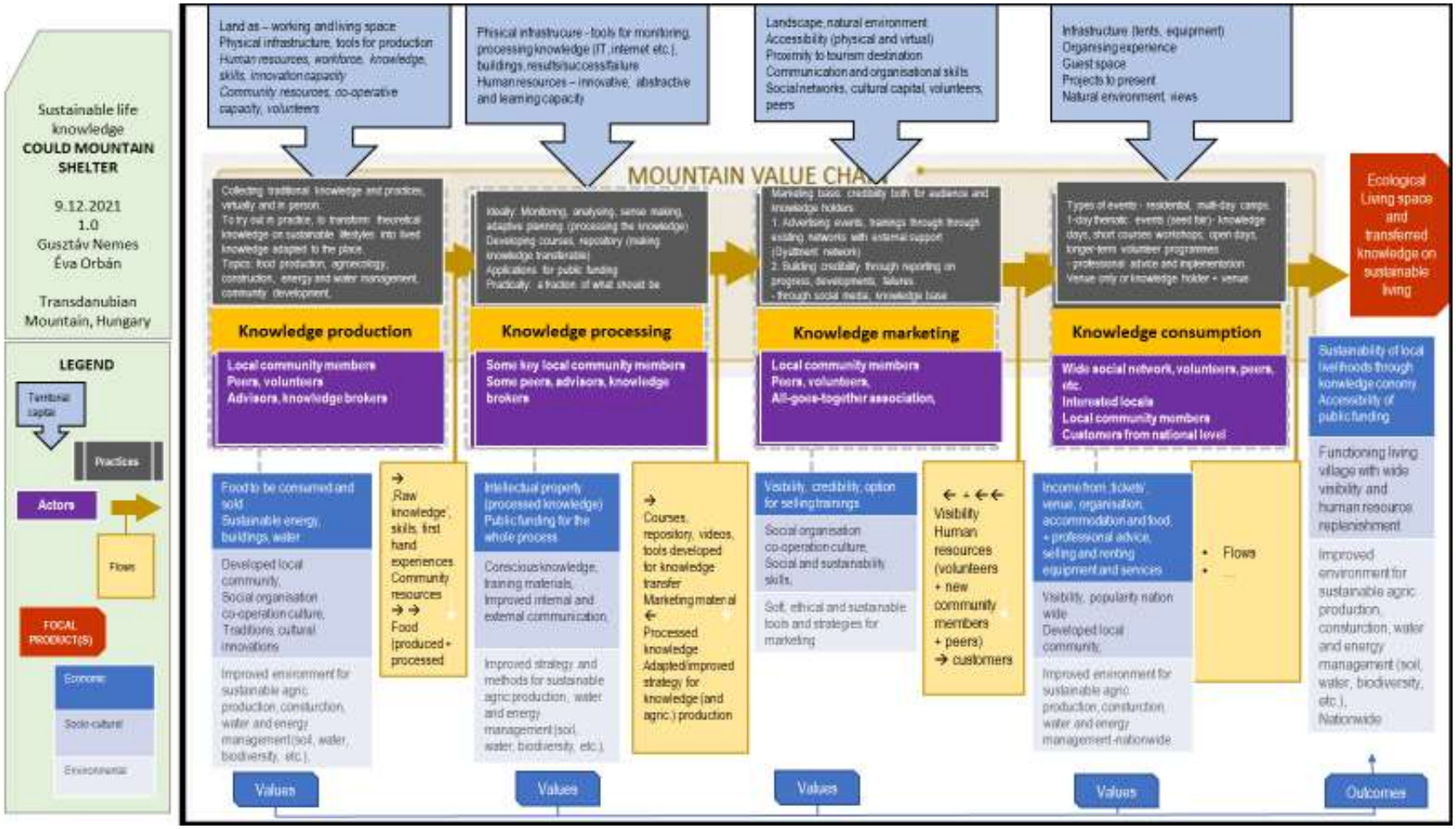
knowledge marketing is based on CMS being a credible, authoritative place for sustainable livelihoods, originating from their previous activities (such as organising the Gyüttment Festival). They inform potential customers, volunteers about their trainings and other activities through existing hubs and social networks reasonably successfully. However, to reinforce their credibility for the long run, they should communicate much more about their everyday actions, achievements and failures much more on social media. The actual **consumption/distribution –** the knowledge transfer – takes place mainly on their site, in the form of trainings, courses (from one day to a week), open days and volunteer programmes. They gain income through providing the space/platform, practice place, organisation, food and accommodation for the trainings currently, inviting external knowledge holders. This is a good system on the one hand, since it allows them to extend their own knowledge and as they normally have tenders to pay for the programmes it is even financially viable. However, being dependent on public money and external knowledge cannot be a long-term strategy. To actually achieve significant, safe income through knowledge economy, they need to act as knowledge owners, that is beginning this summer.

GENERATED VALUE

The VC's activities are relevant for land use, saving and creating environmental and community values, turning abandoned land back into production, through regenerative, agri-ecological practices. It is also an excellent example of how a conscious and powerful community can create and spread knowledge about resilience and sustainability. They represent an important socio-economic trend, spreading fast in developed countries, trying to find links between innovation and tradition.

Figure 8: Hungary – Transdanubian A-E Knowledge FVC diagram

(Nemes and Orbán, 2022b)



7.1.8 Italy – Alto Molise Cheese

Authors: Belliggiano, A.; Bindi, L.; Bispini, S.; Ievoli, C.; Pistacchio, G.; Romagnoli, L.; Scotti, I.; Rocha, R. (Belliggiano et al., 2022)

Summary:

The VC is included in the MRL, a portion of the Molise region. It is part of the Inner area Alto e Medio Sannio, characterised by a strong tendency towards depopulation, lower average incomes than in the region and very low population density. However, there is a tourist vocation that tends to strengthen, also as a consequence of the pandemic: village tourism and experiential cultural tourism are increasing and represent a segment of tourist demand. There is a tendency for the area to intercept this demand and position itself in it (assemblage with tourist VC).

The final product of the value chain has been identified as spun paste cheese.

Fundamental elements for VC are the PDO (Protected Designation of Origin) of Caciocavallo Silano (which is produced in Agnone) and the PAT (Traditional Food Products), which represent a differential for some productions and enterprises operating in the area.

The products in the value chain are divided into three categories:

- Fresh (fiordilatte and stracciata): the consumer trend is in the direction of having a fresh product and the absence of seasoning causes interference in the way systems are organised in the area.

- Semi-mature (scamorza, caciocavallo)

- Matured (caciocavallo).

Caciocavallo cheese, which was previously identified as the final product, on the other hand, is a product with significant value, also from an economic point of view.

According to statistics, there is a trend towards a 5% increase in demand for spun paste products; there is a trend towards consumption of PDO and PGI certified products and there is a growth in international markets for spun paste products.

The distribution channels include different modes: - normal trade, - direct sales (relevant in the area, also from an economic point of view, due to its importance for the survival of businesses and second pillar of the CAP), - large-scale retail trade, - speciality shops, - gourmet (non-domestic consumption: HoReCa).

As far as competition within the VC is concerned, for fresh and semi-cured products there is a move towards their homologation, therefore, the issue of differentiation is related to the brand and the process of loyalty concerns the habit of buying a certain brand. On the other hand, stracciata contributes to differentiating the fresh product and is also of interest to large-scale retail trade. Cured products, on the other hand, are framed in a process of cooperation and competition, as horizontal (between producers) and vertical (producers and breeders) interrelationships have been observed. There is also a diffused process of imitation, so that many new entrepreneurs are

investing in dairy processing, with a critical massification process (all of which affects the reputation of the product in the area).

At the production stage, pasture meadows are the main and strongly characterising element. Milk production is allowed by practices, such as: haymaking, grazing, animal nutrition, milking and milk management and milk delivery and finally direct milk processing. The main actors of the stage are farmers, small family farms where everyone knows how to do everything, sufficiently interchangeable; animal feeders, veterinarians, farm processors. The influence of CAP, RDP, the region and the Department of Agriculture is noted, as well as the relationship with local government and with the Alto Molise LAG. As for the economic results, the existence of a farm viability is observed and the net income, in many farms, sufficiently regenerates all the resources used in the production process, giving the possibility of perpetuating the activity. Production also contributes to preserving landscape and protecting agrosystems. Milk produced at this stage of the value chain moves on to the next stage for processing (in the last period because of the problems on raw materials linked to pandemic and Ukraine war some raw milk leaves the value chain to be transferred outside the area, also outside Italy). Other times, instead, farmers transform their milk directly into spun paste products, which are sold directly. Beef meat is a by-product of the stage and it enables assemblage with the meat production value chain.

At the processing stage, dairy culture and reputation play an important role in production specialisation and relationships (both horizontal and vertical). The practices involved, in order to obtain spun paste cheese, are processing with raw milk and curing and they are made possible thanks to family businesses, skilled labour, suppliers, institutions (regional government), banks, experts (food technologists) etc. The spun paste cheese obtained goes to the next stage in order to be purchased and sold, but can also be directly sold from cheesemakers in their farm and specialty shops. At this stage, profits are generated, and wages are distributed. Milk processing also enables preservation of traditions about dairy production and the creation of employment.

Material and immaterial flows concerning credits, spun paste cheese, traditions, by- products (butter) move on to the next stage, identified as Distribution and marketing, which involves territorial capital elements like quality of products, brand and the naturalistic value of the area. Practices established in this stage regard direct sale (both for local and touristic buyers) and tasting, retailer network organisation, e-commerce and traditional marketing. Actors involved at this stage are traders, retailers, consultants, transporters, certifiers and enable the creation of key values like branding, profits, employment and consolidate reputation and contribute, indirectly, to ecosystem services.

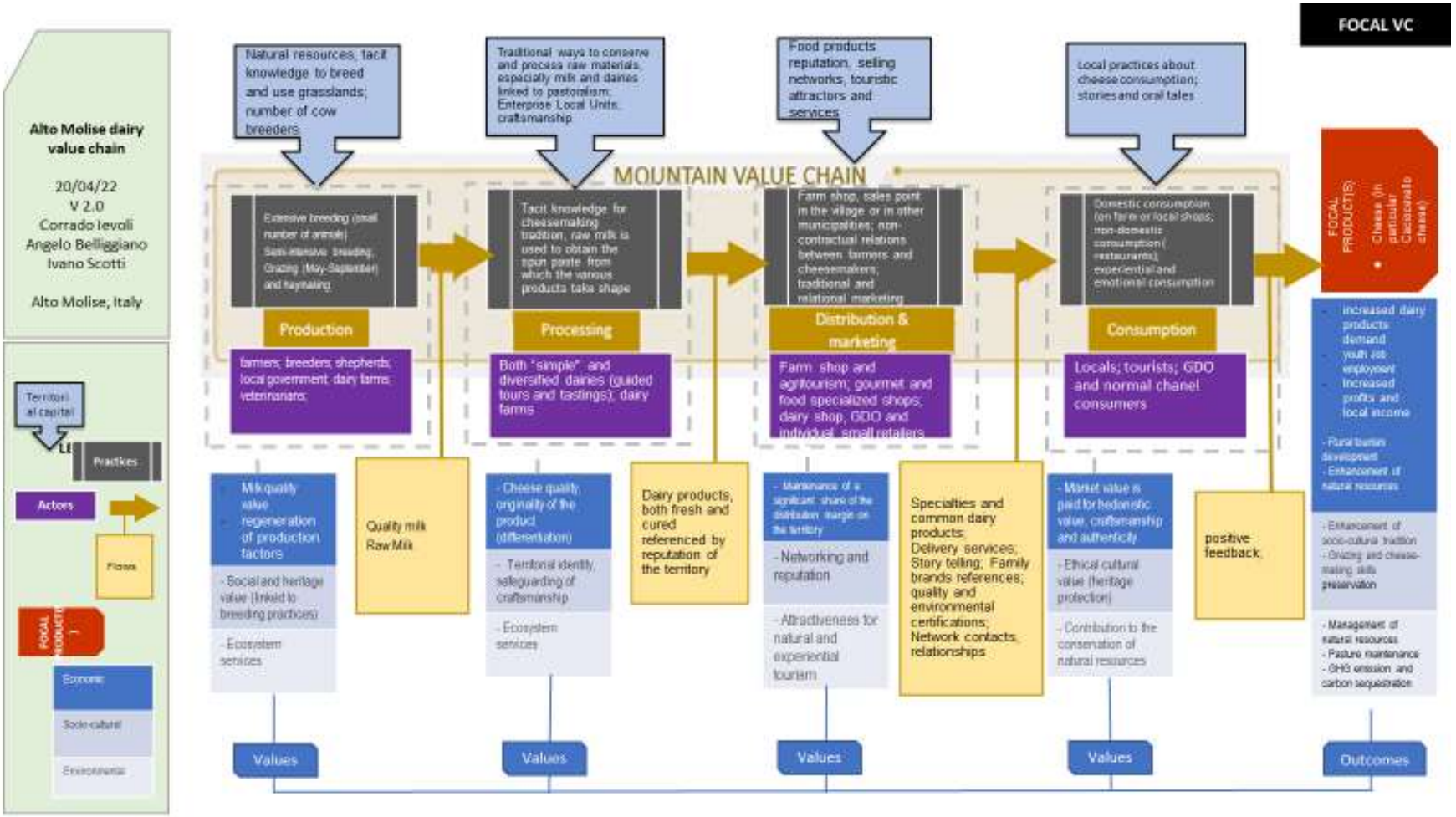
After the products have been distributed and purchased, they are ready for consumption, a stage involving culinary traditions together with pastoral and rural culture. Consumption practices generate reputation feedback and involve actors like regulars and tourists.

The VC generates profits for companies and leads to investments, as well as income for families, generating employment (employment is also a result in socio-cultural terms) and wages. It also generates empowerment, i.e., growth in community awareness of a land resource that can be

utilised, and from an ecological point of view, it contributes to the maintenance of the landscape and biodiversity.

Figure 9: Italy – Alto Molise Cheese FVC diagram

(Ievoli et al., 2022)



7.1.9 Italy – Trento Wine

Authors: Micheloni, C.; Kleshcheva, E.; Trioli, G. (Micheloni et al., 2022)

Summary:

The value chain under study is located in the autonomous Trento Province. Agriculture plays an important role in the province, but it is progressively abandoning higher areas (where animal husbandry managed on pasture was the most common farming activity). Since the last decades farm activity has concentrated on plant production (grape, apples, berries, vegetables). Tourism is very important and counts on the high environmental and landscape quality also shaped by farming. The type of landscape is typically alpine but with the advantage of a wide central valley with straight North-South direction (Adige valley), good infrastructures and a city in proximity. The province includes 3 Natural parks, a UNESCO reserve (Dolomites) and several protected areas; about one third of the province territory is protected and offers shelter to several endangered animal species, including wolf and bear that may lead to conflicts with farming activities, as well as thousands of plant species.

The key territorial capital at the very base of the VC are the vineyards which produce the grapes for wine production. They are closely related to other environmental assets, such as specific territorial morphology with a high and diversified viticultural vocation, availability of water resources for irrigation, biodiversity (especially in altitude). Human, social and cultural capital lay in a long-standing tradition in viticulture (as well as in other farming value chains) and cooperation within the MRL, besides a high level of professionalism of winegrowing and wine-making operators. The material (built) capital is the terrace land management where large parts of the vineyard are planted and the wineries (infrastructures built for grape processing, wine fining and bottling), some of which are very modern and technologically advanced. Finally, the mountain landscape itself is a very valuable asset, allowing the presence of well-established tourism that helps both consumption and dissemination of Trentino wine (Trento DOC and other local wines).

The main steps in the process characterising the value chain are vine-growing and production of grapes, followed by grape processing including pressing, fermentation, clarification, ageing, bottling and packaging. These steps and their order vary depending on the type of wine produced (white or red, still or sparkling). Grape growing in higher altitudes has higher production costs, as often it involves many manual operations all over the growing season. Grape production and processing practices take place exclusively within the MRL and the Trento Province. Distribution and marketing involve actors on local, national and international level as the wine is distributed through several channels: supermarkets, Horeca, export, private clients. An important share is consumed locally by incoming tourists.

There are different types of input actors in the value chain:

- Grape growers (farmers owning vineyards and selling grapes to the cooperatives or larger private wineries);

- Cooperative wineries or large private wineries processing the grape produced by suppliers (associated farmers in the case of cooperatives);
- Small and large private companies performing the whole production cycle.

Historical peculiarity of the MRL is the predominance of cooperative wineries, nowadays responsible for 85% of wine production in the province. Along the production and processing steps, technology and input suppliers, advisors on viticulture and winemaking and extension officers become an important part of the VC. There are two important universities/research centres giving direct input (knowledge) for the wine production chain: Fondazione Edmund Mach (geographically out of the MRL) and University of Trento. Distribution and marketing operations are performed by winery managers, national trade agents, sommeliers, brand ambassadors, wine importers. An important role in territorial management belongs to the PDO consortia (especially for Trento DOC) and producers' associations.

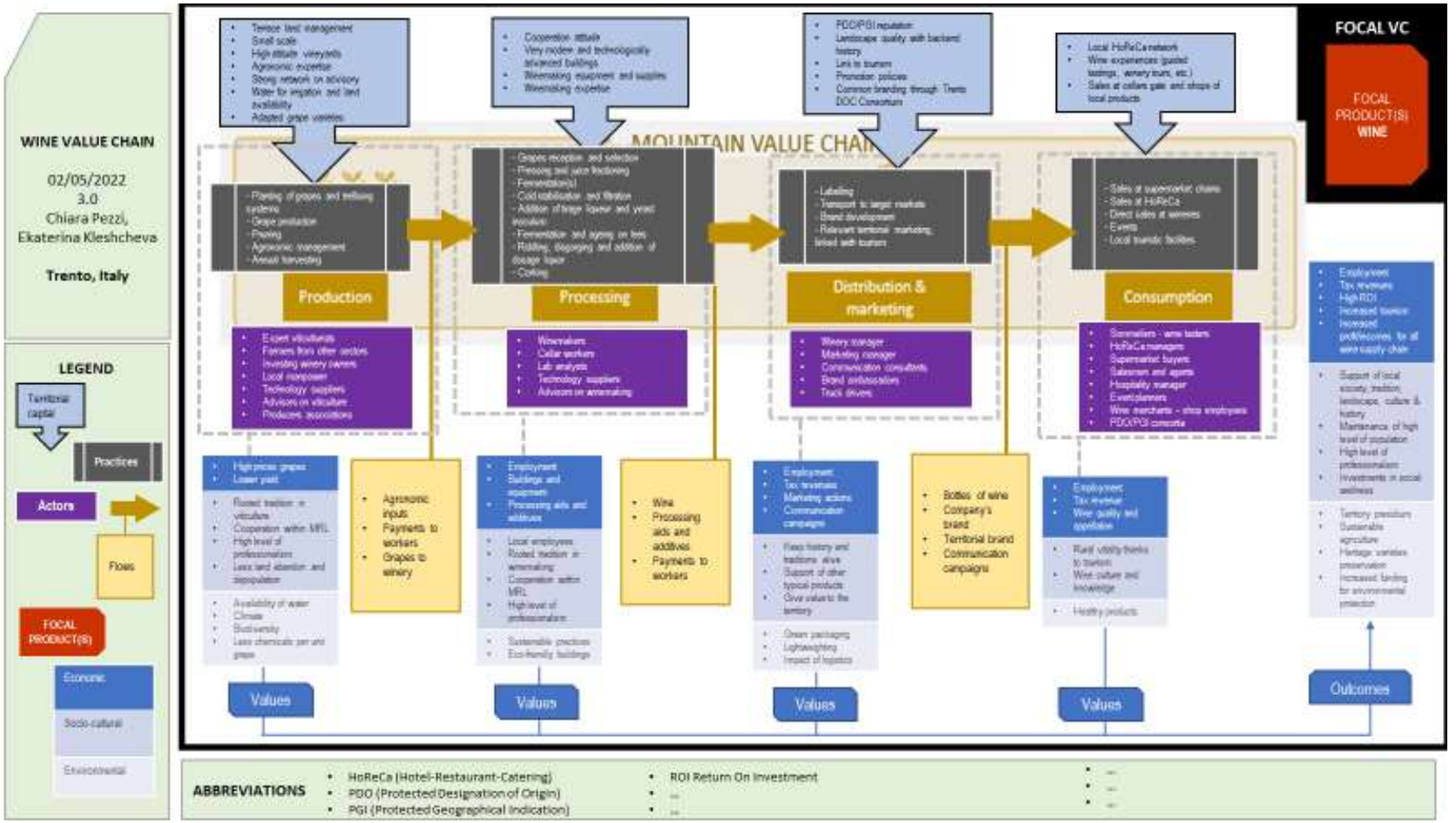
Environmental impact of the value chain is not homogeneous and highly depends on the type of vineyard management implemented. Recently some private companies and cooperative wineries are taking a more eco-sustainable approach and choose to invest in the development of the local ecosystem, maintaining its biodiversity and landscape value. In the last few years, the trend of organic viticulture seems to gain more and more followers in the province and even the conventional farm management is highly regulated in terms of use of phytosanitary products (IPM), water for irrigation, etc. The innovative aspects relate to the fact that vineyards start to be planted at an altitude higher than usual, in areas identified as suitable for vineyards based on a study on climate change. The shift of vineyards to higher areas is transforming marginal mountain areas into valuable areas in the near future. It's important to to mention though that the vineyard going uphill needs more developed infrastructure, available work forse and possibly a different irrigation regime. Soil fertility can be a weak point in the MRL, an interesting way to save it is to couple small wine production with family farming animal husbandry.

The general governance framework is formed by EU regulation for wine production, national, regional and local authorities performing controlling and stimulating functions (subsidies), Consortia of different PDOs, defining territorial marketing strategies.

The valorisation of final product (wine) is another difficult point to analyse within the MRL as Trentino wines production has a two-fold typology: a) top quality wines, strongly linked to local vocation and characteristics; b) high quality industrial wines. For the first group, composed by producers of different sizes, the limiting factor is the small amount of wine and labels offered, which also impacts its capacity to communicate and promote its own image. The industrial group is less linked to local resources and more sensitive to global market trends. It relies on long standing first- and second-degree cooperatives and it reaches high quality standards within the market needs of a global market (constant profile, homogeneity, certification, compositional parameters).

Figure 10: Italy – Trento Wine FVC diagram

(Pezzi and Kleshcheva, 2022)



7.1.10 Italy – Tuscan Chestnut Flour

Authors: Colabianchi M.; Allali T.; Felici F.; Moretti M.; Brunori G. (Allali et al., 2022b)

Summary:

Chestnut forests date back to the 11th century in the MRL with an uninterrupted demand for chestnut flour since then. The chestnut flour production is linked to a series of practices characterising each stage of this VC.

Practices assembling the chestnut flour VC aim at creating value progressively through the different stages. It all starts with a well-maintained chestnut grove. The continuous cleaning of the ground is crucial because the producers believe that a well-maintained ground is a key factor for the upcoming stages. Raw chestnut fruits are collected by small farms to be processed into flour following a traditional procedure. Like all other practices in the VC, the collection of chestnut is done manually to select the best fruits. The practice of sorting and selecting the best fruits are iterative operations that takes place few other times and are very important for the value accumulation along the chain, since these practices affect the quality of the flour; and consequently, increase its economic value. An important practice for this value chain at the processing stage is drying the chestnut, this operation is done in small buildings called locally "metato". A metato is a two-floor building where the ground floor contains the fire source (usually a four-year dried chestnut firewood), while on the upper side raw chestnuts are piled-up and receive heat and smoke from below. This practice facilitates the processes of peeling and grinding the chestnuts. Moreover, the smoke gives a particular taste to the final product. The drying practice requires certain skills and experience, especially with the lack of new technologies. The person responsible for the metato and the drying process must be able to control the appropriate amount of fire and ensure the best dispersion of fruits to ensure an ideal dried fruit. A well dried fruit facilitates the peeling and grinding practices; as both practices are done manually, another selection round of the best fruits precede these practices. The very few functional mills available in the area receive the dried and peeled chestnut to be grinded into flour. Similarly, for this stage experience and specific skills are needed by the operators. In addition to controlling the dried chestnut conservation conditions (mainly temperature and humidity of the mill building), millers must take good care of the millstone's sharpness and cleanliness while grinding. A noteworthy element is that the knowledge required to conduct the practices at processing level are mainly learnt by transferring it from a generation to another without taking part in any kind of courses. Most of actors took knowledge from the elders, either their parents or volunteering for trainings at other mills and drying buildings. Once the flour is ready, it will be packed and sold usually on-farm to pre-defined clients. Finally, it is noticed that the traditional aspect of the VC is very important where almost no innovations have been introduced to these practices.

Different actors of different natures are part of the chestnut flour VC. The main actors are farmers, millers, and drying building managers "metatari", who are members and representatives of associations and cooperatives; additionally, there are local authorities' representatives (with less interest to the VC). We noticed an obvious gender unbalance among the actors of our VC at the

processing stage (80% males), while at other stages there is a gender balance (50% males, 50% females). 95% of the VC's actors are older than 40 years; the remaining 5% are mainly young women. The revival of the chestnut flour production helped new relationships to emerge and reinforced new ways of collaborations between different actors, where every single one is a pillar, and her/his presence is indispensable for the VC.

Chestnut flour VC is relatively a short one, therefore, the detected flows within the different stage were limited. Like forests, chestnut groves provide communities with a range of ecosystem services, such as: CO_2 sequestration, soil preservation, water flow, mushroom, and comestible fruits, etc. Residuals were mainly reported in the form of GHG emissions.

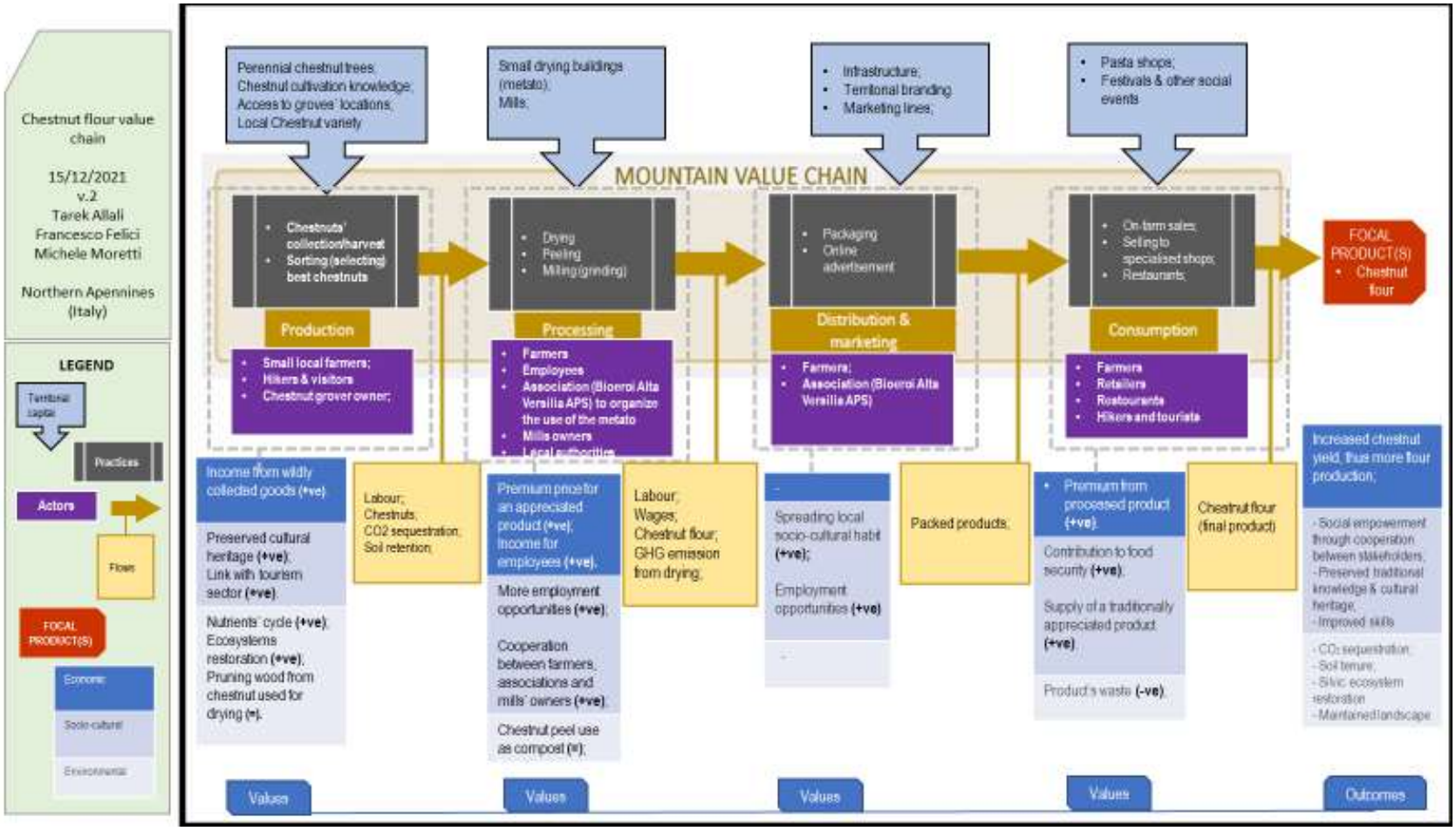
The values determined in our analysis were positive at all stages, either being economic, environmental, or socio-cultural values. Above all, the chestnut flour VC has always had a significant cultural and historic importance. This socio-cultural value is seen through the well-preserved patrimony and cultural heritage, social empowerment through cooperation and trust among actors, and preserved traditional knowledge. Overall, other values and outcomes that were detected during our analysis may be seen in the revival of abandoned chestnut groves (and recovery of abandoned assets), employment opportunities, increase of chestnut yield which implies to higher flour production, silvic ecosystem preservation, and well-maintained mountainous landscape, etc. In other words, we may say that these values and outcomes express the positive change in the "capital stocks" found in the MRL. Finally, the knowledge and consolidated tradition in the use of the chestnut tree can promote forest management as a tool for climate change mitigation.

With respect to the analysis of the conductive enabling environment, a consensus among the interviews has been reported for the severe lack of infrastructures either physical or digital. Additionally, incentives and financial support is completely absent or in some cases it favours only large businesses. Accredited certifications of all kinds were not reported except for the HACCP.

The chestnut flour VC is linked with other VCs, where the most important one is the chestnut honey VC. Honey production in general and chestnut honey has been practised by locals for centuries. The two VCs show a good example of symbiosis, beekeepers find a refuge in the chestnut forests during the transhumance from the seaside to ensure the survival of their beehives. The beehives installed within the chestnut groves increase dramatically the pollination and therefore better yield, while the chestnut provides the honey some organoleptic characteristics like all other forest trees' species.

Figure 11: Italy – Tuscan Chestnut Flour FVC diagram

(Allali et al., 2022a)



7.1.11 North Macedonia – Maleshevski Tourism

Authors: Ramadani, N.; Sokolevska, E. (Ramadani and Sokolevska, 2022a)

Summary:

According to scientific research from a few years ago, Maleshevski mountains region is on the first place in terms of oxygen concentration in the air in Europe, and fourth in the world. On the contrary of that value, anthropogenic factor is 99% present in the occurrence of wildfires. Illegally caused wildfires, for the purpose of logging and illegal use of the forests are still present and even more frequent in the last years due to the inappropriate forest management policies and absence of forest guard services. Smoke from the wildfires pollute the air and threaten strong environmental values in the region led by clean air and biodiversity of the landscape. Taumatopea pityocampa attacks pine forests and it's spreading rapidly. Aerial treatment with insecticides is a necessary practice that should be implemented. The absence of adequate water management practices leads to irrigational problems. Anyway, nature and its balance still allow sustainable use of the forest species - non-timber forest products, social activities in nature followed by enjoying the landscape, fresh air, restaurants, accommodation among the mountains and green economic results out of the mentioned activities. Challenges for keeping that valuable balance come out of climate change consequences as well. Sustainable and resilient practices should be frequently involved and given preference.

Air bath, rehabilitation opportunities, traditional and ecological food, endemic flora and fauna, rich and diverse landscape, agricultural products, frequent festivals, carnivals, sport events, mountainous tours, local handcrafts, livestock as a traditional tourist attraction-a visit to the sheepfold etc. are values that must maintain sustainable. Values mentioned above are led by 500 weekend houses by the lake in Berovo and 100 weekend houses around the Pehcevo waterfalls, apartments, hotels with excellent rural accommodation facilities, mountain trails in the length of 280 km, lake, waterfalls and rare but at the same time indigenous, pine dominant forests. 30% of the population in Malesevski mountains region live out of economic benefits which come out of rural tourism value chain, traditionally, actively and effectively. Economic benefits mainly arise from accommodation capacities, offers and sales of quality ecological products from local/regional mountain resources through a butcher kitchen. A novelty in the region is the standardized cuisine that unites local producers. Cheese and honey are a brand by which the Maleshevski mountains region is popular. Regionally produced aronia, raspberry and wild strawberry juices and jams are nationally spread and ecologically recognized by consumers. Alternative medicine products, produced in the cleanest region in Europe include the healthiest forest species (Pinus Sylvestris, Taraxacum officinale, Epilobium angustifolium, Sambucus nigra etc). In recent years, with the help of digital technology, great progress has been made in the promotion and sale of products. Processing and promotion activities are part of the travel agencies work beside the private businesses work which combine more products through exposed offers on the webpages and social media pages. Production stage includes: Pehcevo waterfalls, Berovo lake, mountain hiking and biking tours, Eco-farm Berovko, Maleshevski ecological products, Milky farm Malesh, Grain

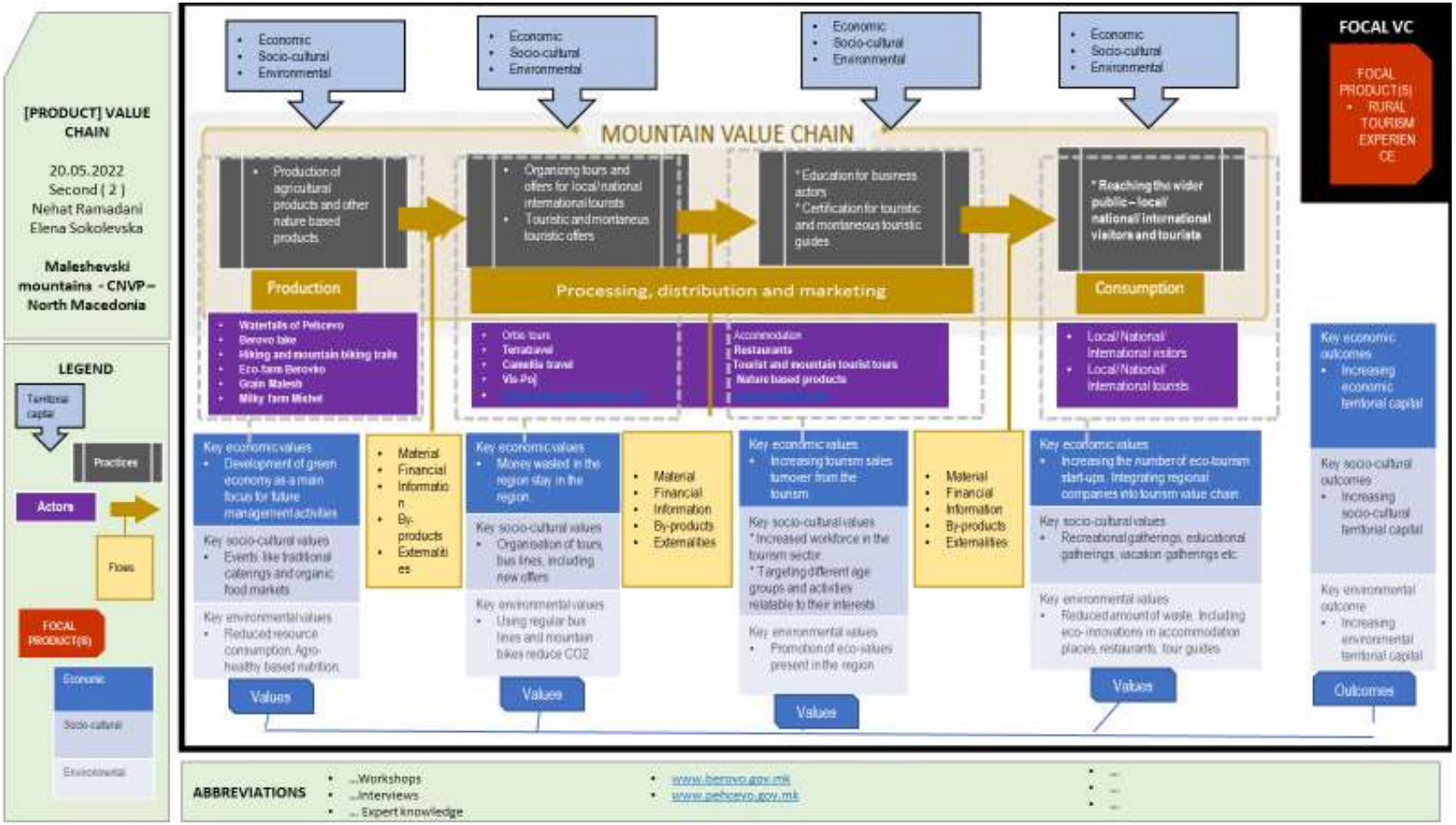
Malesh etc. We connected the processing and distribution and marketing stage: Orbis tours, Terra travel, Camelia travel, Via-poj, www.berovoadventure.mk, www.berovko.mk, accommodation, restaurants, tourist and mountain tourist tours, nature-based products. The consumption stage includes: Local, National and International visitors and tourists.

Regional government is making efforts to promote rural tourism through various activities, but it seems that more knowledge and political local/regional/national actions are needed. Regional stakeholders collaborate and invest in maintaining traditional rural tourism sustainable through education, awarding scholarships, increasing the workforce in the tourism sector, supporting young people ideas for businesses etc. as much as the local/regional/financial conditions allow. Large investors are still necessary in order to keep young people in the region by creating appropriate working and living conditions. The infrastructure for tourism development is adequate and well represented but not sufficiently maintained. As a regional problem in the last years is the absence of adequate irrigation systems and inappropriate water use management. Regional authorities and decision-makers make effort for solving this starting-point problem.

The interest and demand of domestic and foreign visitors and tourists is greatest during the summer period, but other seasons awake interest as well depending on the product - landscape they're aiming to consume. Combination of more products can gain visitors and tourists interest for consumption of Maleshevski mountains regional products more often. For the purpose of larger changes, time is as relevant as implementation practices.

Figure 12: North Macedonia – Maleshevski Tourism FVC diagram

(Ramadani and Sokolevska, 2022b)



7.1.12 Portugal – Serra da Estrela Cheese

Authors: Esgalhado, C.; da Veiga, J.; Pinto Correia, T.; Marques, É. (Esgalhado et al., 2022)

Summary:

Serra da Estrela Cheese is a PDO product made exclusively with raw milk from two autochthonous sheep breeds: Bordaleira da Serra da Estrela and Churra Mondegueira. We focus our analysis in bordaleira SE, the most common breed. The cheese production used to be a family affair. The man were shepherds, the woman cheesemakers. Shepherding remains a male dominated trade but cheesemaking grew to be more than a 1-person job.

Sheep must be produced under extensive and outdoor grazing. Transhumance used to be a normal practice, and flocks brought to the highlands during summer. Nowadays very few shepherds do it. Instead, shepherds have opted for improved pastures and fencing their land in the lowlands, and closer to the settlements. This was made possible by the decrease in the number of sheep and of other agricultural practices that allowed for more low altitude pastures. Bordaleira SE produces less than other milk breeds, 0.6-1.5 l/day whereas Lacaune or Awassi can produce 1-3 l/day (ANIDOP 2021). Milk from bordaleira SE has more fat content and is needed less to make 1kg of cheese (+/- 5l per kg), and usually costs 10 to 30 cents/l more than others. Shepherds have seasonal contracts with cheesemakers and usually sell all their milk to the same cheesemaker for the season. The milking period is between September and May. PDO producers need to be enrolled with the breed association ANCOSE that keeps track of the genealogy

Currently, there are 29 small to medium PDO Cheese manufacturers – 10 are self-sufficient whilst the others buy all or part of the used milk (Martino et al., 2021). The Serra da Estrela cheese is an artisanal product, and the only machine that can be used during manufacture is a pneumatic press. PDO certification is made at the cheese factory level, identified by the label and casein mark. The price difference between a DOP cheese and a non-DOP cheese is around 3 €/kg when bought directly from the cheesemakers (DGADR, 2017). According to the cheesemakers in 2021/2022 cheese prices ranges between 14-16€ kg when selling to intermediaries (SH308, SH310). EstrelaCoop is the cheese Producers Cooperative and is dedicated to technical assistance to members and to the defence of the Protected Designation of Origin – Serra da Estrela.

In 2020, large retail markets sold 82% of the total production of Serra da Estrela PDO cheese, while intermediaries and traditional markets accounted for 15% and 3% of the production, respectively (DGADR, 2021). It is only medium-large cheesemakers that sell to big retailers, which are 3-5 enterprises (Martino et al., 2021). Only a small percentage of the production is destined to the local and international markets, with over 90% of production destined for the national market, mainly large cities (DGADR, 2021). In fact, it is difficult to find a PDO cheese for sale in Serra da Estrela local stores of traditional products. There is no clear demarcation among the consumers between the PDO cheese, made with local milk from native breeds, and non-PDO,

and often unwillingness to pay the price difference. In local restaurants and hotels is not common practice to sell the PDO Cheese and was only found in high market tourism.

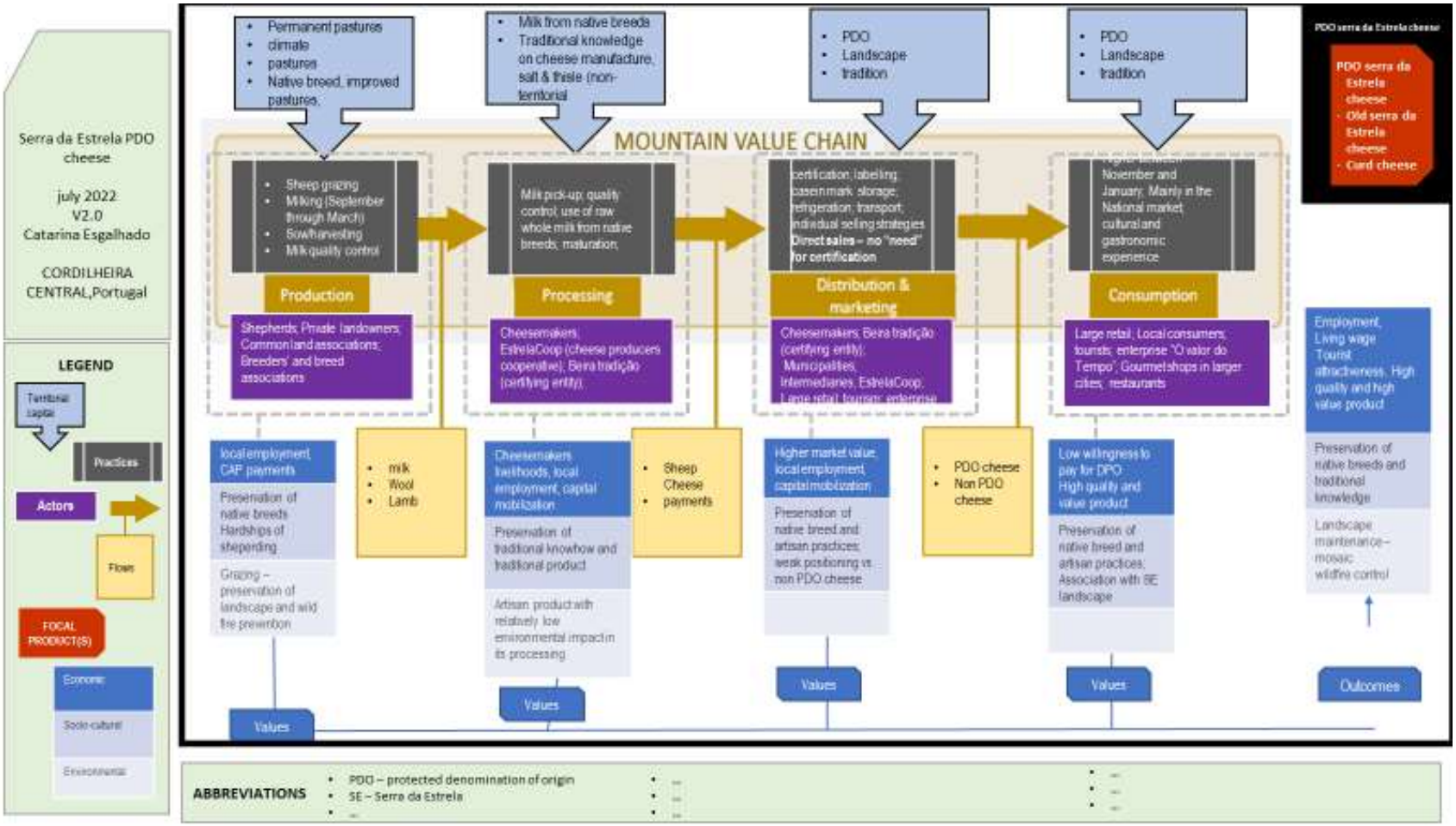
Lambs, wool and curd cheese are important byproducts of this VC.

There is a lot of interest in this VC, and there are some projects and programs in place for its valorisation. There have been 2 editions of a school of shepherds, a project dedicated to the women cheesemakers, a program for the valorisation of the cheese (alongside other 2 PDO cheeses from the region), and 3 of the 18 municipalities (outside of our MRL) have specific support schemes such as extra subsidies for the shepherds on top of CAP measures. Valor do tempo is a large enterprise that has been investing in PDO products from the region. They developed a new product that uses the cheese and started buying large quantities at 20-25€/kg from EstrelaCoop (that buys from producers). They have recently launched a pillow that uses the wool from bordaleira SE.

There is cultural value in preserving native breeds and traditional knowhow in the cheese making process. However, there is a disconnection between the value chain and the core mountain territory, as shepherds are favouring pasture at the foothill. Sheeps and shepherding offer important services in controlling shrub encroachment and maintaining the mosaic of the landscape. This minimizes the risk of wildfires and increases the attractiveness of the landscape. Altitude pastures are also important for water quality and in maintaining biodiversity.

Figure 13: Portugal – Serra da Estrela Cheese FVC diagram

(Esgalhado, 2022)



7.1.13 Portugal – Alto Douro Wine

Authors: Carvalho, A. S.; Santos, L. (Carvalho and Santos, 2022)

Summary:

The Maciço Noroeste Mountain Reference Region (MRR) provides ideal conditions to crops like grape, olive, chestnuts, or almonds. The case focuses on the higher area of the Alto Douro Vinhateiro valley, that contains a major part of the Alto Douro Demarcated Region (PDO), the most significative area of wine production.

The Alto Douro Demarcated Region (PDO) is the oldest demarcated and regulated region in the world, since 1756. It was acknowledged as "World Heritage of Humanity" by UNESCO for Cultural, Evolutive and Living Landscape in 2001. Another point of interest are the cave engravings of Vila Nova de Foz Côa, classified as World Heritage, by UNESCO, in 1998, that can be found displaced over an area of 200km^2.

The history, biodiversity, autochthonous varieties grapes, the high-altitude vineyard often grown in terraces and the unique mosaic are the most important natural capital of the region. Built capital are the winery buildings, the winemaking equipment that, in combination with human capital, practical knowledge and agronomic expertise, are at the base of very high-quality wines.

The reputation of Porto´s wine is an important financial capital by its own. The environmental capital is mainly the water, the rocky soil, the climate (with high differences in temperature) and freshness.

The main practices associated with production of mountain wine is planting vineyards and growing/managing them to produce grapes. The oenological itinerary has important steps as crushing, fermentation, maturation and other correction treatments like stabilization and fining. The distribution and marketing are generally carried out by the own wineries and include bottling and packaging, import and export markets. Processing and marketing is taking plavce only partially in the area, as it is mainly managed in the Western part pf the valley. Consumption takes place all over the world, but also in small scale with visitors at the wineries, wine tours, local events, and promotion in export market.

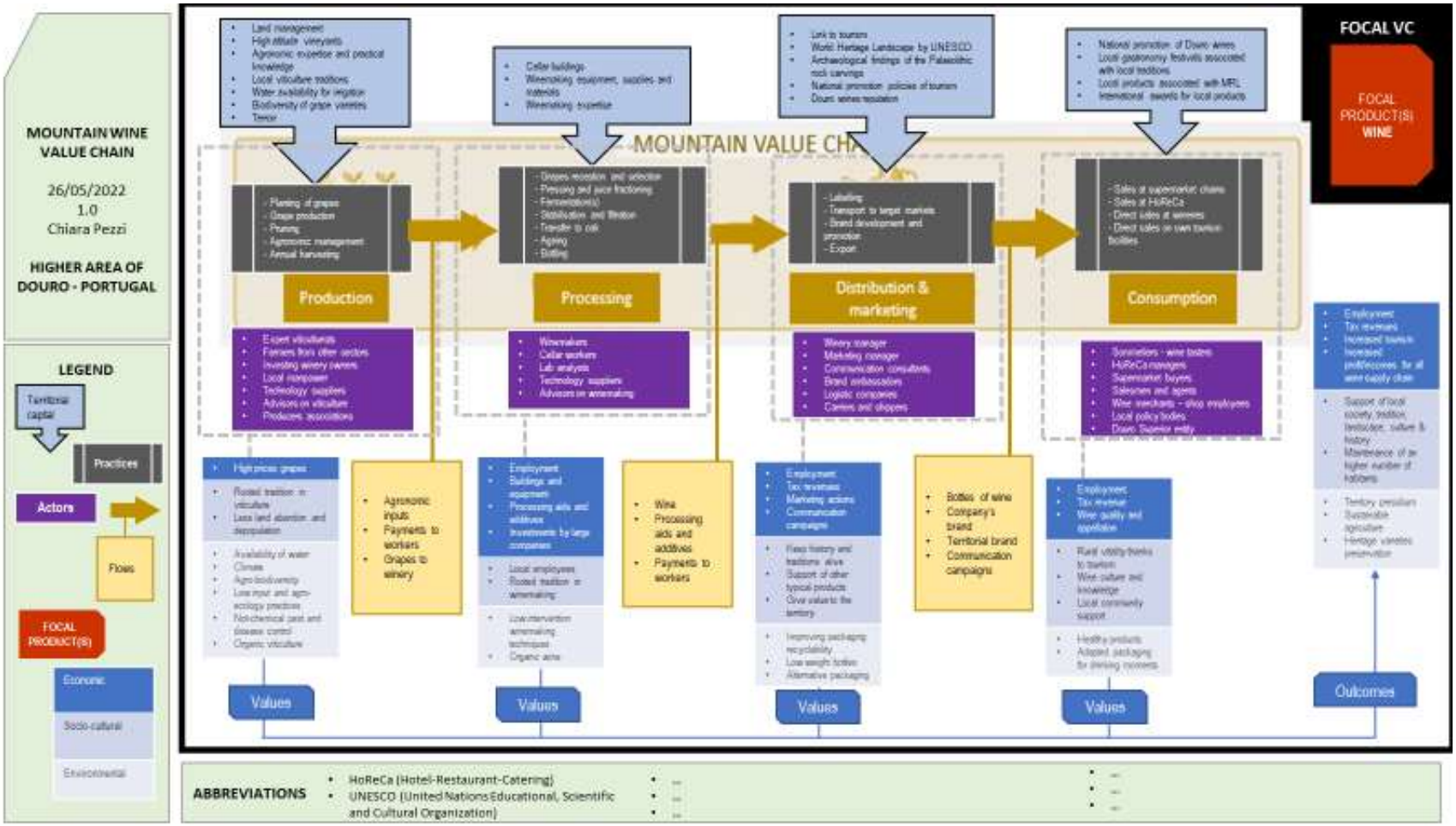
The actors of the chain are expert viticulturist, investing winery owners, winemakers - normally farmers, cellar worker, technology suppliers. In the distribution and market, there are the logistic companies, carriers, and shippers and in consumption step, salesmen and agents, receptionists, importer, exporters, retail and Horeca managers.

There are important economic values generated at different stages of the value chain as employment, buildings & equipment, tax revenue, wine quality and appellation. Socio-cultural values are stopping depopulation that means less land abandonment, tradition, support tourism. Environmental values are reduced use of chemicals per unit of grape, agro-biodiversity, low input practices, local community support.

For what concern environmental education (in all age groups) it is an urgency for the creation of environmental policies for sustainable agriculture and the mitigation and adaptation to climate change.

Figure 14: Portugal – Alto Douro Wine FVC diagram

(Pezzi, 2022)



7.1.14 Romania – Brasov Certified Ecotourism

Authors: Redman, M.; Rogozan, C.; Alexa, A. (Redman et al., 2022b)

Summary:

The Piatra Craiului National Park is a high-quality tourist destination in Romania, but also a fragile landscape and vulnerable ecosystem that is under great pressure from inappropriate development. The touristic destination associated with the Piatra Craiului National Park encompasses a total of seven LAUs: Zărneşti (40492), Bran (40633), Fundata (40991) and Moieciu (41471) in Braşov county (RO122) plus Dâmbovicioara (16329), Dragoslavele (16472) and Rucăr (18527) in Argeş county (RO311). Certified ecotourism is an innovative form of tourism very well-suited to the sustainable development of the local area. The services that are offered locally in partnership with the National Park Authority and local businesses are fully certified by the Association of Ecotourism in Romania (AER).

The territorial capital of the Piatra Craiului National Park comprises natural capital (e.g., land use, landscape, scenery) and socio-cultural capital (e.g., traditional knowledge and cultural heritage). Piatra Craiului is a mountain massif that is widely considered a “jewel in the crown” of the Romanian Carpathians. Land use is a combination of traditional semi-subsistence pastoralism and deciduous forest, but the landscape is dominated by a 25 km long limestone ridge (highest elevation is 2,238 metres) with deep gorges and caves. This creates a unique mountain landscape that is highly appreciated nationally and internationally.

Regarding the cultural capital of the destination, most of the national parks in Romania don`t include any human settlements, but the Piatra Craiului National Park has two villages on its territory, Măgura and Peștera, which together with the LAUs represent the social-cultural capital of the destination, through their traditions and customs (e.g., local and traditional architecture, clothing and gastronomy, local celebrations etc.) and their traditional knowledge.

Taking into consideration the unconventional nature of our value chain, i.e., ecotourism – service, the main stages of the value chain are different from the classical, production value chain (production, processing, distributing, marketing, and consumption). Therefore, the main stages of the tourism value chain are the following: production (support activities) & marketing (promotion) and consumption (including the sub-stages: transportation, hospitality services: accommodation and food and beverages, and leisure activities). The main practices for each of the stages include:

- Production and promotion stages: providing support and certification, promotion the eco-destination (AER), conservation of natural ecosystems, regulation and management, communication with local community (PCNPA);
- Consumption - Transportation: 50% of the transportation should be eco and the transportation infrastructure should not stand out from the natural landscape;
- Consumption – Accommodation and food and beverages: existence of management plan and complying with national legislation; provide real, relevant, specialised and correct

heritage interpretation, comply with local architecture; proper energy and water resources usage; partnerships and contribution to the sustainable development of local communities; safeguarding local culture, traditions and cuisine.

- Consumption – Leisure activities: existence of management plan and complying with national legislation; provide real, relevant, specialised and correct heritage interpretation
- proper energy and water resources usage; minimum disturbance to wild animals and natural landscape partnerships and contribution to the sustainable development of local communities; safeguarding local culture, traditions and cuisine

Out of these stages the hospitality and leisure activities have business operators certified by AER. According to AER, certified business operators must comply with the following key practices:

- Nature conservation and protection.
- Employing local human resources.
- Raising awareness and educating the local community and tourists about the environment and the need to respect the nature.
- Having a minimum negative impact on the natural and socio-cultural environments.

Considering the above-mentioned main stages of the ecotourism value, the main actors involved, which are certified by AER, are the following:

- Production and marketing: Association of Ecotourism Romania (AER), Piatra Craiului National Park Administration (PCNA) and National Centre for Tourism Information and Promotion Zărnești (Visit Zărnești);
- Consumption – transportation: locals with carts, RegioCălători (train) and TransbusCodreanu (bus);
- Consumption – accommodation and food&beverages: Vila Hermani (CARPATHIAN NATURE TOURS S.R.L.), Carmi Guesthouse (GREEN TRAVEL S.R.L.).
- Consumption – leisure activities, Active Travel (ACTIVE TRAVEL S.R.L.), Carpathian Nature Tours (CARPATHIAN NATURE TOURS S.R.L.), Absolute Carpathian (ECOSHOP S.R.L.), Noroc România (GRIND ADVENTURE S.R.L.), Romania Active (RANDO ACTIVE S.R.L), DiscoveRomania (DAOS JOURNEYS S.R.L.).

The consumers are represented in our value chain by the tourists, which are both foreign and from Romania. According to the recent studies, the profile of the tourists coming into eco-destinations is: nature travellers (under 50 years old, very active) and culture travellers (older than 50 years old, main interest are on cultural aspects). Less than 25% of the tourists are coming from Romania, the majority coming from European Union states (Germany, France, Spain, Austria, Denmark) and United Kingdom, Australia, USA and Israel.

The key values of the ecotourism value chain in Piatra Craiului National Park are:

- Economic: Low VC employment, medium no. of employees, good net total turnover (NTT) until 2019 (for business operators).
- Socio-cultural: Low cooperation, the VC is not enough focused on cultural heritage.
- Environmental: Sustainable use of resources, positive outcomes for biodiversity and/or habitat quality in the MRL.

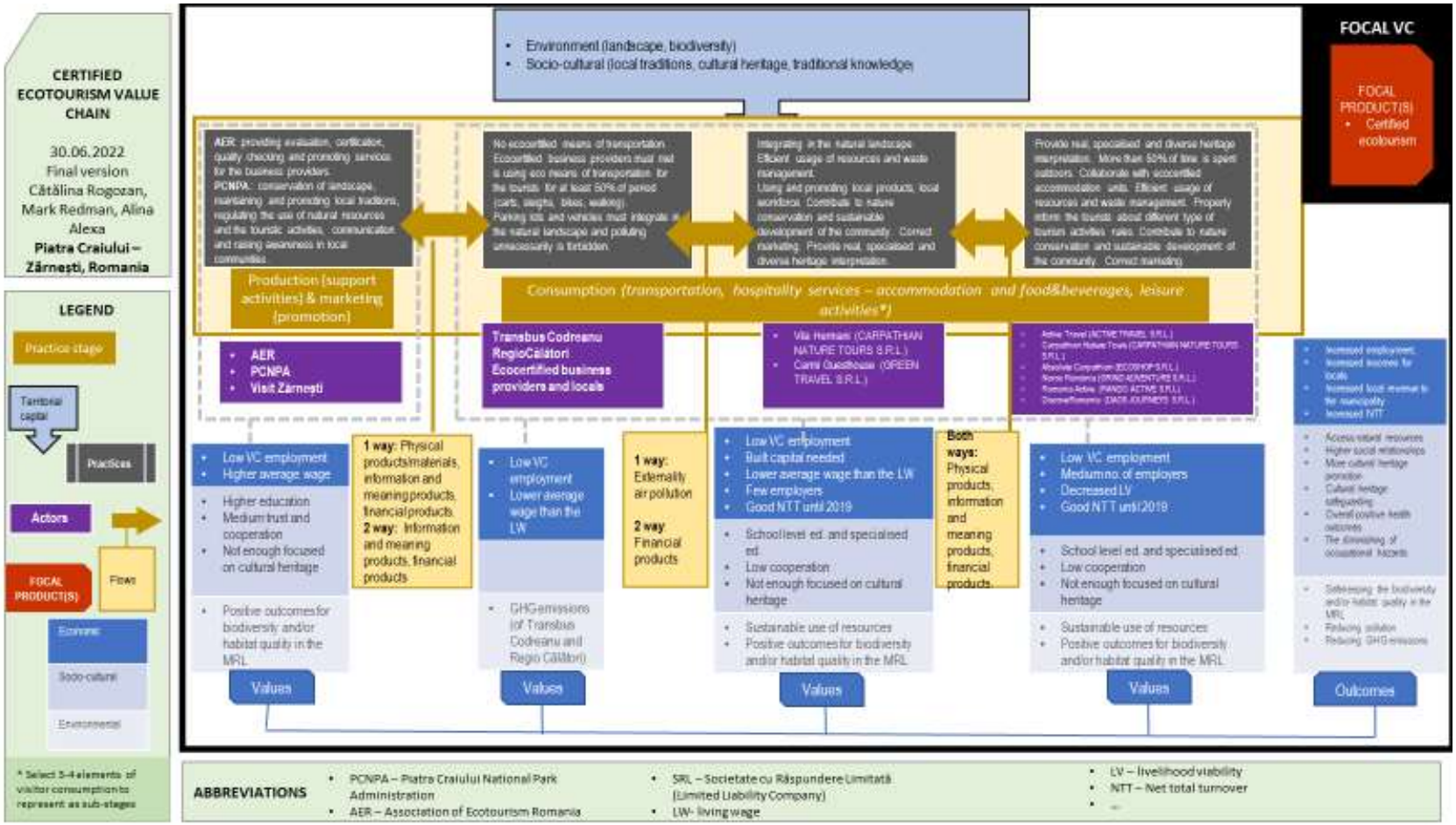
The key outcomes are:

- Economic: Increased employment, increased income for locals, increased local revenue to the municipality, increased NTT
- Socio-cultural: Access natural resources, higher social relationships, more cultural heritage promotion, cultural heritage safeguarding, overall positive health outcomes.
- Environmental: Safekeeping the biodiversity and/or habitat quality in the MRL, reducing pollution, reducing GHG emissions.

The environment that is enabling the concept of ecotourism in Piatra Craiului National Park is comprised of the Association of Ecotourism in Romania, Piatra Craiului National Park Administration and local authorities. By implementing the concept of ecotourism in the region, we can agree that the economic, socio-cultural, and environmental territorial has increased.

Figure 15: Romania – Brasov Certified Ecotourism FVC diagram

(Rogozan et al., 2022)



7.1.15 Serbia – Sjenica Lamb

Authors: Tar, D.; Zivadinovic, T.; Arends, J. (Tar et al., 2022)

Summary:

Sjenica lamb, a fragmented value chain

Territorial capital

The natural conditions of the area are providing a good context for the market competitiveness of Sjenica sheep PDO, which by its reputation and quality, is one of the products that are in the base of the whole production system of the Pester Plateau Mountain ecosystems.

The Sjenica sheep production depends on the supply of green feed in the short summer season. Robust and less demanding, this sheep is also a good choice for the fragile but rich pastures and meadows of the Sjenica region. Its management, along with water management, is crucial to secure enough supply of food for animals during the grazing season, as well as during winter time (mowed grass for feeding sheep). The vast surfaces of high-quality pastures where the genetically adopted (autochthonous) Sjenica sheep grazes, along with available labour force and local knowhow, directed the population towards livestock production, including dairy and meat processing.

Types of Actors and practices

As a contrast to the strong production system, and a high-quality product, there is little consolidation of the value chain in its actors pulling together.

Traditionally in the state-led socialist system, there was an organised buyout of the lambs and sheep, with the role of the state cooperative to bring animals and/or lamb meat to the market. During those times, export was a very important marketing channel as the sheep was well received at Italian, Middle East and North Africa markets. However, the market economy changed it all to the fact that the state led system and cooperatives were replaced by the middleman and traders who hold the key to the better valorisation and market access for farmers. Farmers continued to focus on their production role, leaving the organisational and trading roles to external actors. There are no associations or cooperatives formed by farmers, focusing to contracting production or marketing of local products, including Sjenica lamb meat.

Livestock production is entrusted to the relatively large number of registered households – still, out of 5000 of them, the majority of those who keep sheep have up to a few dozen, with a maximum of 100-150 sheep. In the last decade, there are several larger families that increased their flocks to 500-600 sheep, (even few with about 1000 animals), creating, to some extent, a counterbalance to a large number of households that leave the agricultural sector for some other economic activities or because of age (elderly households).

All operations, from fodder production, breeding, to even slaughtering (in unregistered farm facilities) are conducted on the farms. There is very few inputs brough outside of the region, while

production is very close to uncertified organic production. The most used fertilizer is manure, while sheep receive very little medical treatment due to the strong and healthy genetics and accommodation to the harsh weather extremes.

The high-quality mountain pasture resources attract each year another 10.000 sheep head from other regions to Pester in order to spend the summer season in the area. Farmers receive 10-15 Euro per head, and an opportunity to milk the sheep during the summer period for keeping the animals for grazing till late autumn.

The sheep are usually sold to traders and local processing companies but without predictable agreements and durable contracts so that farmers are in continuous state of insecurity and lack of possibilities to plan their future. In addition, record keeping practices are poor, so there is less solid evidence on the need for management practices and their improvement.

The value chain does not include many diverse actors; they are rather similar in typology. There are no representative associations, nor producer cooperatives (only some family cooperatives). There are a few functional associations/NGOs, however they are more directed to training provision and project implementation using different funds, rather than organising joint farmers activities.

Locally there are several slaughterhouses (registered two) which are marketing lamb meat to the retail chains in Serbia and the region (Montenegro and North Macedonia), with occasional promotion to other foreign countries. The processing industries from other regions have better export opportunities so they sometimes team up with Sjenica actors to provide sufficient quantity.

Often animals are purchased alive and transported to other parts of the country to be used in traditional restaurants (grill houses) mostly as roasted lamb meat (the whole animal roasted). There are seasonal peaks for consumption that are around Easter holidays and Christmas, New year and/or Kurban Bayrami.

-

There is a strong reputation of Sjenica lamb protected as PDO. However, the label is not sufficiently promoted and used, causing that the meat is often not linked to its extraordinary origin. Also, there is little flexibility in the way it is offered at the market, usually as a whole or half animal, rarely as specific cuts that can be offered on the market and made easier for the use of the modern urban small family. There are no, or very few linkages to the delicatessen or exclusive butcher shops that could promote the high-quality meat through good quality cuts. Sheep skin and wool are not sold at the market, just sometimes used by families or handcrafting individuals for making small quantities of hand made products. There is no outlet or value for these by-products that could stabilise income or add value to the whole VC. Currently, wool and sheep skin are considered as waste that needs to be removed and that burdens their flows.

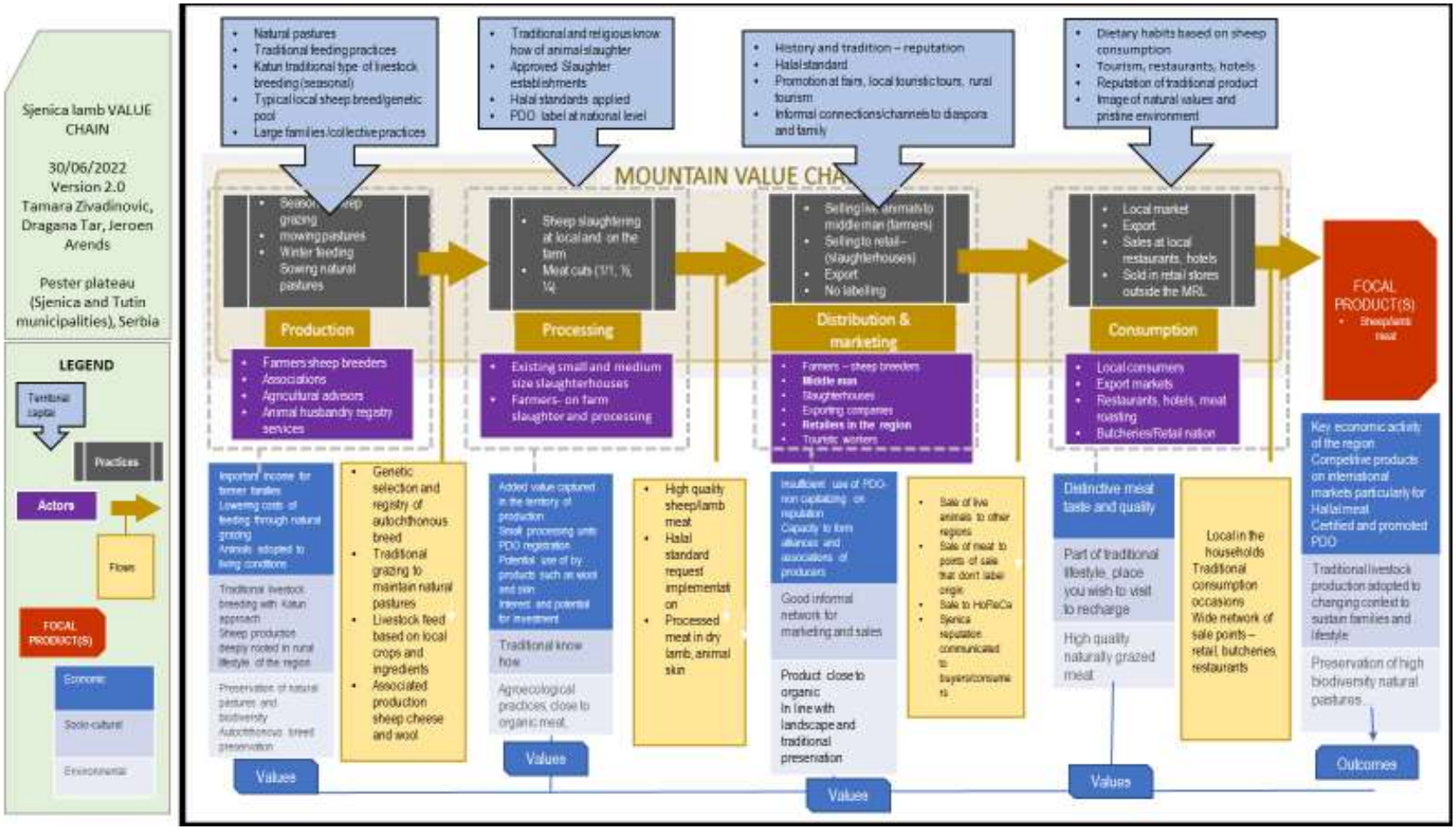
The central government level has introduced a number of livestock support subsidies in the last years in order to maintain or try to increase the level of production. This has had significant results and the number of sheep has been increasing. However, there are fears of sustainability of such

measures as there are no market linkages built to pull the demand and replace the subsidy mechanisms.

There are no organisations that take a leveraging role and reaching out to promote inter-municipal and regional cooperation, helping to connect agricultural households into farm associations, cooperatives and the market. The formation of public-private partnerships between all actors and the establishment of an agricultural and trading company that would assist in market positioning, seems as a logical strategy for the region. However, there are no viable agricultural budgets from the local municipalities. Organic production also is a significant potential, however, without a strong support expertise, and identified market opportunities, the organic certification investment does not see immediate effects,

Figure 16: Serbia – Sjenica Lamb FVC diagram

(Zivadinovic et al., 2022)



7.1.16 Slovakia – Carpathians Bio-Honey

Authors: Surová, D. (Surová 2022)

Summary:

The honey in bio quality from mountain areas in Slovakia practically exists in all mountain areas without chemical treatment in agriculture, forestry and in beekeeping. Mountain honey, without necessary being labelled as “bio” is highly valued as a healthy food product by local, regional and national consumers. Currently, a demand for mountain honey sold directly from a beekeeper is higher than an offer.

The VC bio-honey is from a territorial point of view dependent on a good quality (especially plant diversity and non-use of chemical treatment) of pastures, meadows and forests. Beekeepers usually own some land where the beehives and a necessary equipment building are installed. More rarely, they agree with a landowner to install the beehives on their land. Producers of bio-honey usually do not migrate during a season to safeguard honey quality from non-chemically treated environment and use only ecological treatment on bees. However, these ecological practices together with shorter mountain vegetation time and rare honeydew production reduce the amount of honey production in comparison with the conventional honey production in lowlands. The production stage is the most complex and demanding stage from the point of view of beekeeping knowledge, skills and time. On the same time, beekeeping in Slovak mountains is mostly a hobby activity practiced by beekeepers with a particular passion. The complex and sophisticated bee colonies functioning, diversity of the bee products and their health effects fascinate many and the number of registered beekeepers in Slovakia have been increasing. Beekeeping activity also enables a contact with nature, which is also positively valued by beekeepers.

The time when honey is ready to be extracted from the bee frames must be evaluated by an experienced beekeeper. Honey is a raw material, so the processing stage is relatively simple. It includes extraction, filtration, mechanic homogenization, storage and packaging. Equipment used in this stage is mostly powered by electricity. In this stage, usually the family members, including wives are helping.

Distribution and marketing are currently not sophisticated. Usually, the marketing is done by satisfied consumers, who do the recommendation to particular beekeeper. Consumers come personally and the honey is sold directly from a beekeeper.

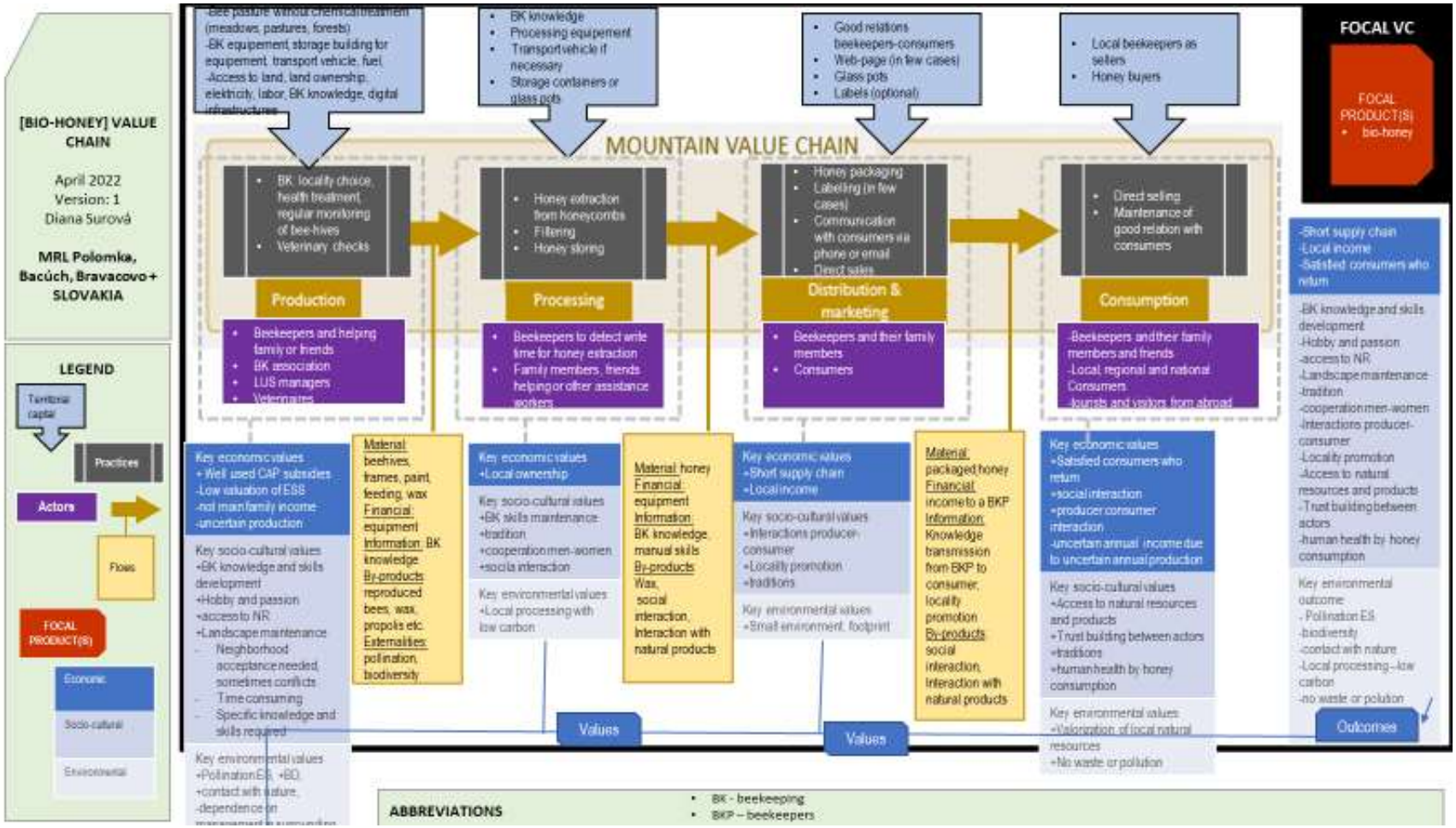
This VC seems to be spatially localised in local and regional level and rarely crosses the national borders.

It has several positive values, such as for example short supply chain, social interaction, rural locality promotion, provision of an access to natural resources, landscape maintenance, tradition, maintenance and development of beekeeping knowledge and skills, contact with nature, passion, pollination and support of biodiversity.

Some negative values or challenges were also observed, such as uncertain annual production of honey, not sufficient to be the main family income, time consuming activity especially during spring and summer. Sometimes the neighbours are against of beehives location close to their homes and conflicts may arise.

Figure 17: Slovakia – Carpathians Bio-Honey FVC diagram

(Surová, 2022)



7.1.17 Spain – Betic Organic Olive Oil

Authors: Zafra, A. (Zafra, 2022a)

Summary:

The mountain olive grove represents a significant percentage of the cultivated olive grove area in Southern Europe. It is a traditional agricultural system at serious risk due to numerous problems including due to climate change. Organic production is presented as an alternative that could help alleviate these difficulties and generate integrated solutions in a development model based on sustainability. However, it is necessary to consider the limiting factors of organic production, which is not always accompanied by benefits in the form of price differentials and public support. We have been able to confirm the close relationship between organic production and mountain olive groves in the Subbética Cordobesa, where 76.2% of the organic olive groves are located on plots with slopes of more than 20% degrees.

TERRITORIAL CAPITAL

Extensive livestock, mountain olive groves and geo-landscape are three essential pillars of the territorial capital of the Sierras Subbéticas Cordobesas. This type of olive grove has been characterised by a multifunctional character which provides a diversified production of biomass that generates a balanced energy relation. The surface area of mountain olive groves has remained stable over the last few decades in the area under study, and where land ownership is highly atomised.

PRACTICES

The management system associated with mountain olive groves is characterised by low mechanisation and difficult accessibility, old trees planted in an irregular framework and differentiated practices, also shaped by the specific requirements of organic production and, in some cases, public aid criteria. A family-type production system is very common, while various forms of business coexist in the processing stage, including huge cooperatives with thousands of members. Although the growing Spanish organic Extra Virgen Olive Oil (EVOO) production is mainly for export and mostly in bulk, in the analysed municipalities, national and packaged sales are gaining weight thanks to the existence of a diverse group of companies.

ENVIRONMENTAL, SOCIO-CULTURAL AND ECONOMIC VALUES

In the production stage, the cultural roots of this agro-system, its high mobilisation of human capital, income generation, as well as the provision of recognised eco-systemic services by this agro-system stand out. The main difficulty lies in making the production stage sustainable, where costs are above the market price, even with organic certification. The processing and packaging stage has been a remarkable development in the area. Despite the significant weight of the cooperative sector, the decision-making capacity of producers is weak, and the governance model has hardly evolved. On the other hand, the area certified under organic production is growing more slowly and seems to face certain bottlenecks. In contrast to the foregoing where

the benefits largely remain local, in the distribution, marketing and consumption stages, the added value generated goes outside the area, in a hierarchical and asymmetrical system in terms of price setting and the distribution of associated benefits. Better knowledge of the current and potential profile of consumers is also desirable.

KEY RESULTS

The ecological system of production related to mountain olive groves generates positive results in different ways: It contributes to the protection, conservation, and regeneration of soils and conservation of natural biodiversity; It concentrates a high number of local olive tree varieties and generates a mosaic effect in the landscape and prevents forest fires; It conserves water resources and the recovery of indigenous seed banks and significantly reduces the contribution of pollutants to soil and water; It represents a tourist attraction resource; Its coexistence with a protected area such as a Natural Park creates an opportunity to promote common objectives; However, it does not seem to have mobilised the necessary potential to become a differentiated product on the basis of these attributes. A certain price differential, small public subsidies and some market interests have to date not been sufficient to facilitate this.

MAIN COMPONENTS OF THE ENABLING ENVIRONMENT

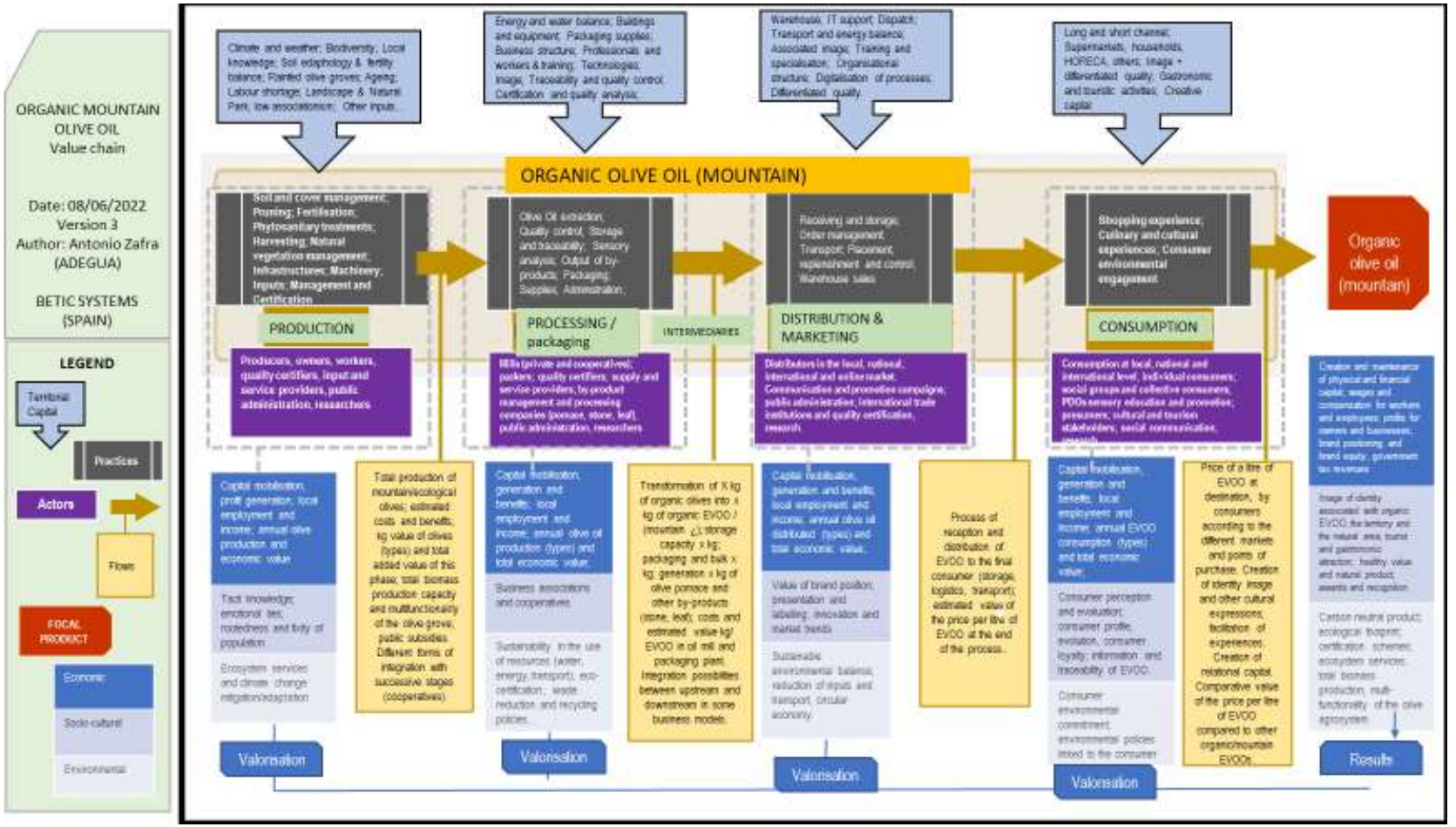
Differentiated value initiatives, new regulations and support systems, governance systems and interactions between actors as well as with other value chains and socio-ecological systems should contribute to shape the system, but in a fragile way.

The implementation of the new CAP - particularly through eco-schemes-, may bring about important changes that will favour this type of olive grove, leading to innovative practices and necessary associated monitoring. There is a general political and social consensus on the importance of keeping this agro-system alive, in line with the proposal of the European Green Pact and the Farm to Fork Strategy.

In the current context with multiple interconnected crises the coupling of this ecological mountain olive grove agro-system with other regional socio-ecological systems is a path to explore in order to reduce vulnerability and gain in resilience against the impact of these conjunctural problems and the added consequences of Climate Change.

Figure 18: Spain – Betic Organic Olive Oil FVC diagram

(Zafra, 2022b)



7.1.18 Spain – Sierra Morena Ham

Authors: Maestre-DÍaz, C.; Farhad, S.; del Mar Delgado-Serrano, M. (Maestre-Díaz et al., 2022a)

Summary:

Los Pedroches Protected Designation of Origin (PDO) Iberian Ham is the focal Value Chain (VC) in the Sierra Morena Mountain Reference Region. Iberian ham is a quite unique product. It is produced with Iberian breeding pigs raised in dehesas and fed mainly with acorns and other natural products such as pastures, insects and little animals, during the fall season. Feeding and exercising derive into (unsaturated) fat marbling, providing a very tasty and healthy product that reaches a very high price in the market, being considered a luxury product.

Dehesa in Spain (Montado in Portugal) is a unique social-ecological system and bio-cultural landscape described as savannah-like pasture and a multi-functional agro-silvo-pastoral system where agriculture, forestry and grazing are combined (Bélair et al., 2010). It only can be found in the southwest of the Iberian Peninsula. Rearing Iberian pigs is the practice with the highest value-added final product of *dehesa*, but these pigs are only 2-3 months a year in the system while other animals (sheep, cattle) graze in these lands the rest of the year. *Dehesa* is considered as a High Nature Value (HNV) Farming system (Pinto-Correia et al 2018), which therefore goes hand-in-hand with key local practices.

The quality, the price and the exceptional characteristics of Iberian ham make it a very attractive product, and there are many attempts to market other hams not produced with this breeding nor in extensive *dehesa* grazing systems. Iberian breeds are less productive than other breeding, *dehesa* is a very special ecosystem that cannot be reproduced anywhere, and extensive rearing system means a low carrying capacity by hectare. In addition, quality hams need a long curing process (up to 4 years), what means long time before producers receive a turnover and high risk because being a natural product, many things could go wrong. Hence, the number of authentic Iberian hams that can be produced is limited. For these reasons, the sector is very regulated and different rules and regulations exist. However, powerful industrial interests make these regulations to be relatively lax and permit that different products, not all following the traditional rules of Iberian ham production, can be marketed as such.

In this scenario, PDOs plays a very important role, because their specification documents clearly establish a traceability system to guarantee the origin, the production methods, and the unique characteristics of the products. Four Iberian ham PDOs currently exist in Spain, being Los Pedroches PDO, the youngest and the smallest one. This PDO is located in our MRL, embodied in the Sierra Morena (MRR) a mountain area in Andalusia that is also a Biosphere Reserve.

Los Pedroches PDO has a very strict regulation system that comprises a certification process in all the stages of the value chain: e.g., pure breed of pigs, fixed time of extensive grazing in *dehesa*, a maximum of 12 pigs by hectare, all the processing stages must be done in the territory, etc.

These rules aim to ensure the resilience and sustainability of the territory and the value chain and to also guarantee that most of the added value of the product remains within the territory.

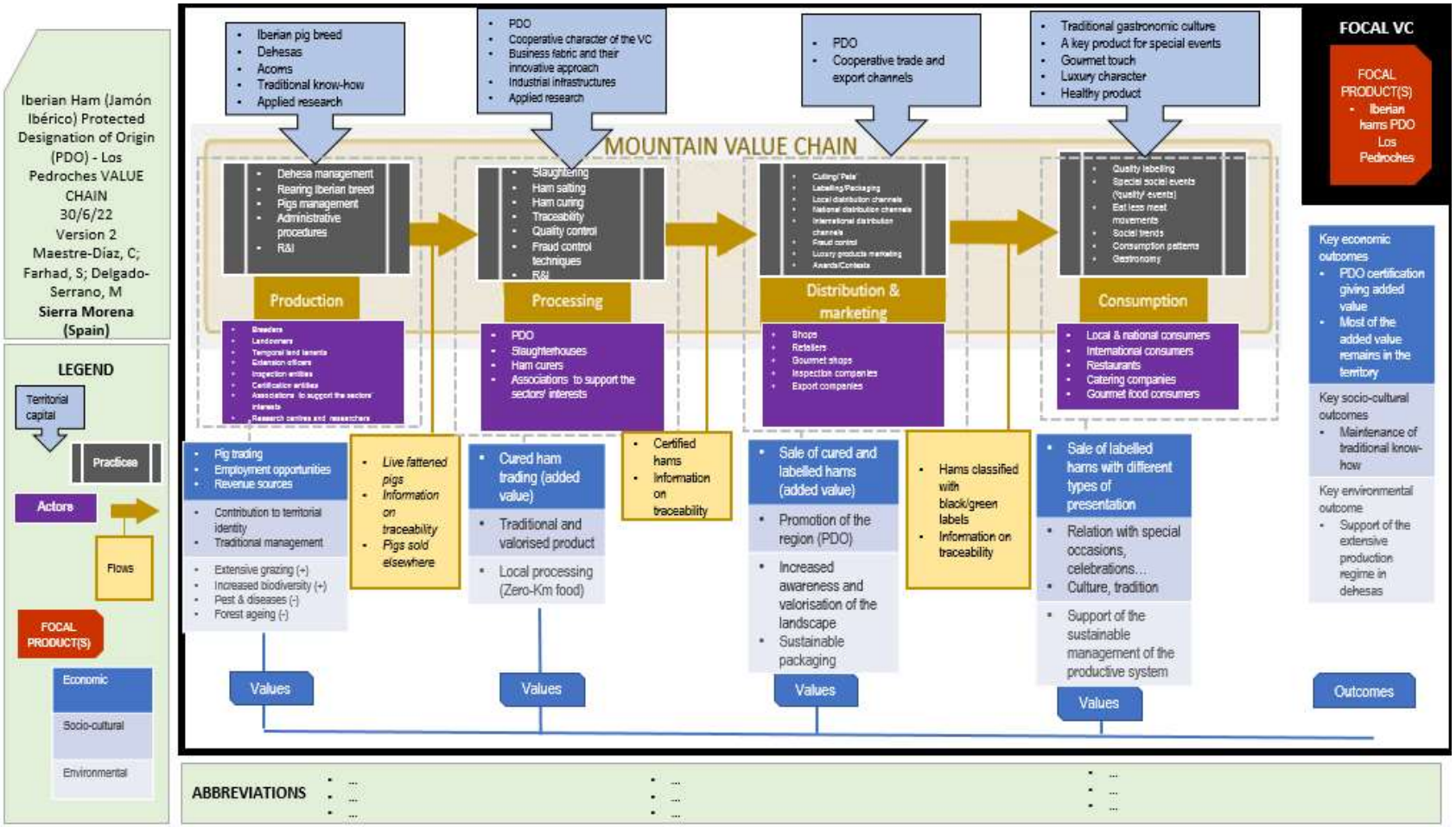
Twenty firms (June 2022) from the north of Cordoba conform the PDO, ranging from micro-SMEs to bigger companies and a cooperative that has traditionally played a key role in the area. There are also other farmholds and firms in the region producing Iberian ham but not following the PDO regulations such as certification and traceability processes. Indeed, most of the production in the area is not marketed as PDO, that is why we have selected this not PDO certified ham production as our assemblage VC.

Different threats affect the sustainability of this VC. The susceptibility of acorn production to climate change (rainwater and temperature), trees ageing and lack of management, holm oak pests (Phytophthora cinnamomi) and livestock overgrazing affect at the biophysical scale. Other socioeconomic threats are depopulation and lack of generational replacement, fraud and unfair competition, big entry barriers for young people (high price of land, need of big investments for processing, long turnover periods).

However, Iberian ham has been produced in the area since the ancient times, and a regulated production like the one promoted by the PDO can be a very important asset for the resilience and the sustainability of this mountain region.

Figure 19: Spain – Sierra Morena Ham FVC diagram

(Maestre-Díaz et al., 2022b)



7.1.19 Spain – Huesca Wine

Authors: Conte, A. P.; Ascaso, Á. (Conte and Ascaso, 2022)

Summary:

The following is a brief summary of the mountain wine value chain in the Pyrenees after having studied it in depth and analysed several relevant factors, which can be consulted below throughout this report.

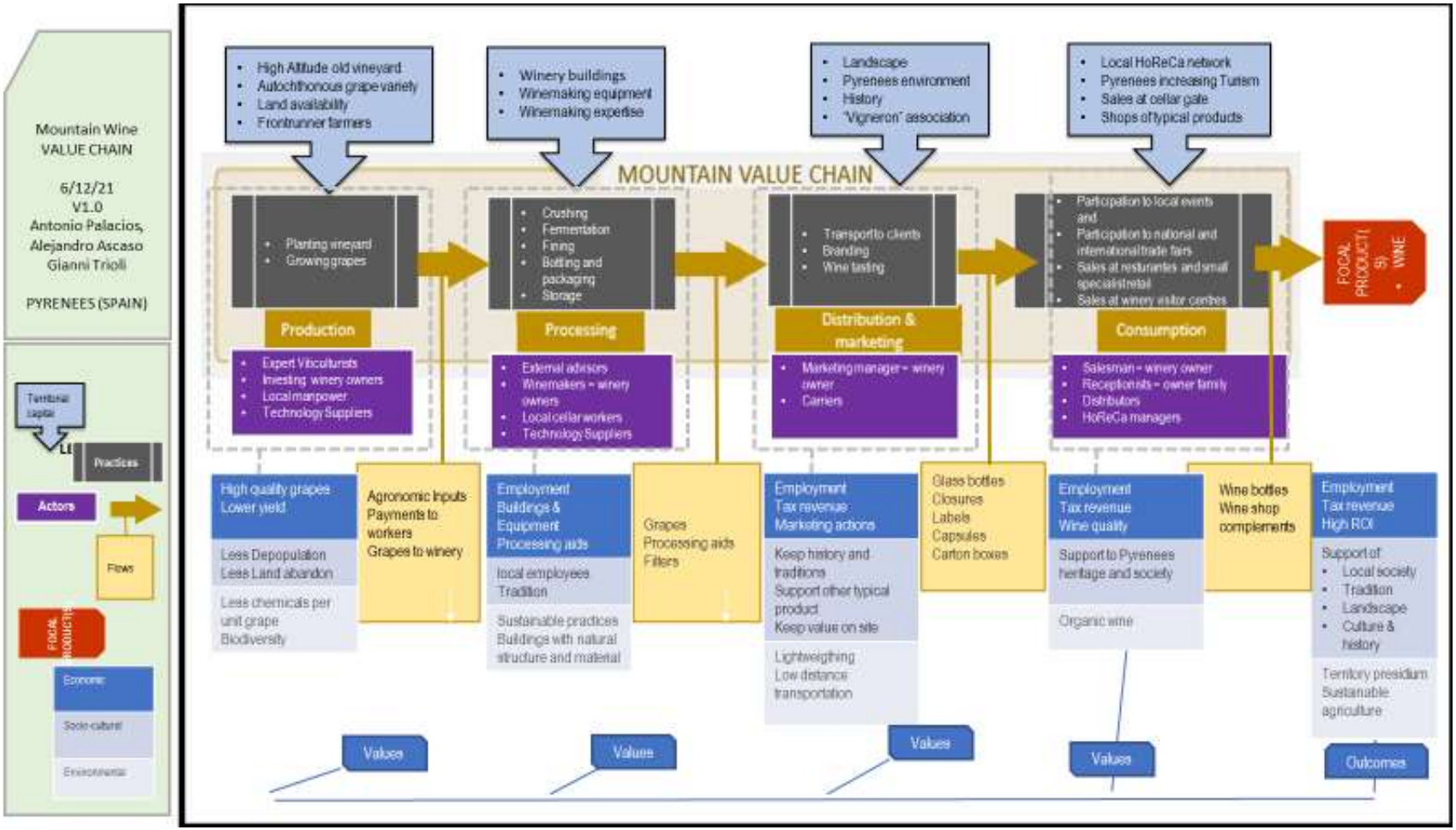
Consequently, the importance of this VC in the region of Huesca and in Aragon becomes clear, not only for the rigorous quality of its wines, environment-oriented perception and promotion of cultural heritage conservation, but for everything associated with it: soil preservation as a non-renewable natural resource (essential for human nutrition), recovery of already lost vine varieties (important in terms of genetic diversity). All linked to the concern of finding varieties that are best suited to each area in the current scenario of Climate Change.

In addition, organic cultivation is carried out and biodiversity is promoted in the plots. Special wines are obtained through innovative production processes and, correspondingly, contribute to population fixation in rural areas, with everything that entails for the economic and socio-cultural development of the area. And, of course, because of the region's strong attraction for both wine and gastronomic tourism, which are closely linked, as well as for its natural entity, sports and historical-cultural tourism.

This value chain forms part of a complete and special experience that the consumer is looking for in this region, and which is increasingly valued. On one hand, for the trace this wine, experience and landscape leave on the person, and on the other hand, for contributing directly to the sustainability of the territory, so sought after and so difficult to find on many occasions.

Figure 20 : Spain – Huesca Wine FVC diagram

(Palacios et al., 2022)



7.1.20 Switzerland – Grisons Grain

Authors: Geiser, A.; Schmitt, E.; Trüb, N.

Summary:

In this case study, we examine the value chain of grains grown in the mountains of the canton of Grisons (our MRL of just over 7000 km2 in Eastern Switzerland) under the umbrella of the Gran Alpin cooperative. This cooperative was founded by farmers in the 1980s and today has 169 members who are all organic farmers located at high elevations in the Grison Alps. Its aim is to maintain the value chain of organically grown mountain grains in Grisons after it had almost disappeared due to a lack of financial income opportunities from grain cultivation in the area. The advantage of growing grains in this area alongside the predominance of livestock farming is both an increase in biodiversity and the resulting ecosystem services, as well as a diversification strategy for farming households - and subsequent processors - which means additional income and an increase in regionally generated added value. The Gran Alpin cooperative is run from a head office with two staff and about four staff taking care of day-to-day operations, such as receiving and shipping, and packing and selling orders. The ca. 170 voting members of the cooperative elect a board of about 10 members - including 1 president - who support the office staff.

Grains have been grown in the MRL since prehistoric times. Due to increased international trade in the 20th century, arable farming became unprofitable in the harsh conditions offered by the MRL. Arable farming in the mountains was only maintained because of food security measures after the two world wars. Thanks to Gran Alpin it was taken up again - supported also by another change in direct payments, which are (since 2008) based on the area instead of the unit of livestock. In 2021 Gran Alpin farmers cultivated a cumulated area of around 190 hectares and produced a total of just over 700 tonnes of grain. Farmers have to follow crop rotation, which means they cannot grow the same type of grain on the same plot every year, and they also have to take into consideration how much grassland area they need to make hay for their livestock; there are no farmers who only grow cereals or have no livestock. The main challenges at production are the lack of adapted cultivars, extreme weather events, water availability and soil management.

Once the farmers have harvested the grain, they thresh it on the farm and temporarily store it either loose or in large bags. It is then transported as quickly as possible to one single central grain collection point in the MRL. Those who live closer to the facility (in the very north of the MRL) usually bring their grain themselves (or in groups), while those who live further away have their grain collected by the facility.

At the storage facility, the grain is cleaned, dried and stored as needed. This is where some of the most pressing problems of this VC are located. With about 15 different types of grain, Gran Alpin takes up a lot of silos in an old silo facility, but due to their small quantities of each type of grain, they don't fill up all the silos to full capacity. While there are plans to renovate a nearby

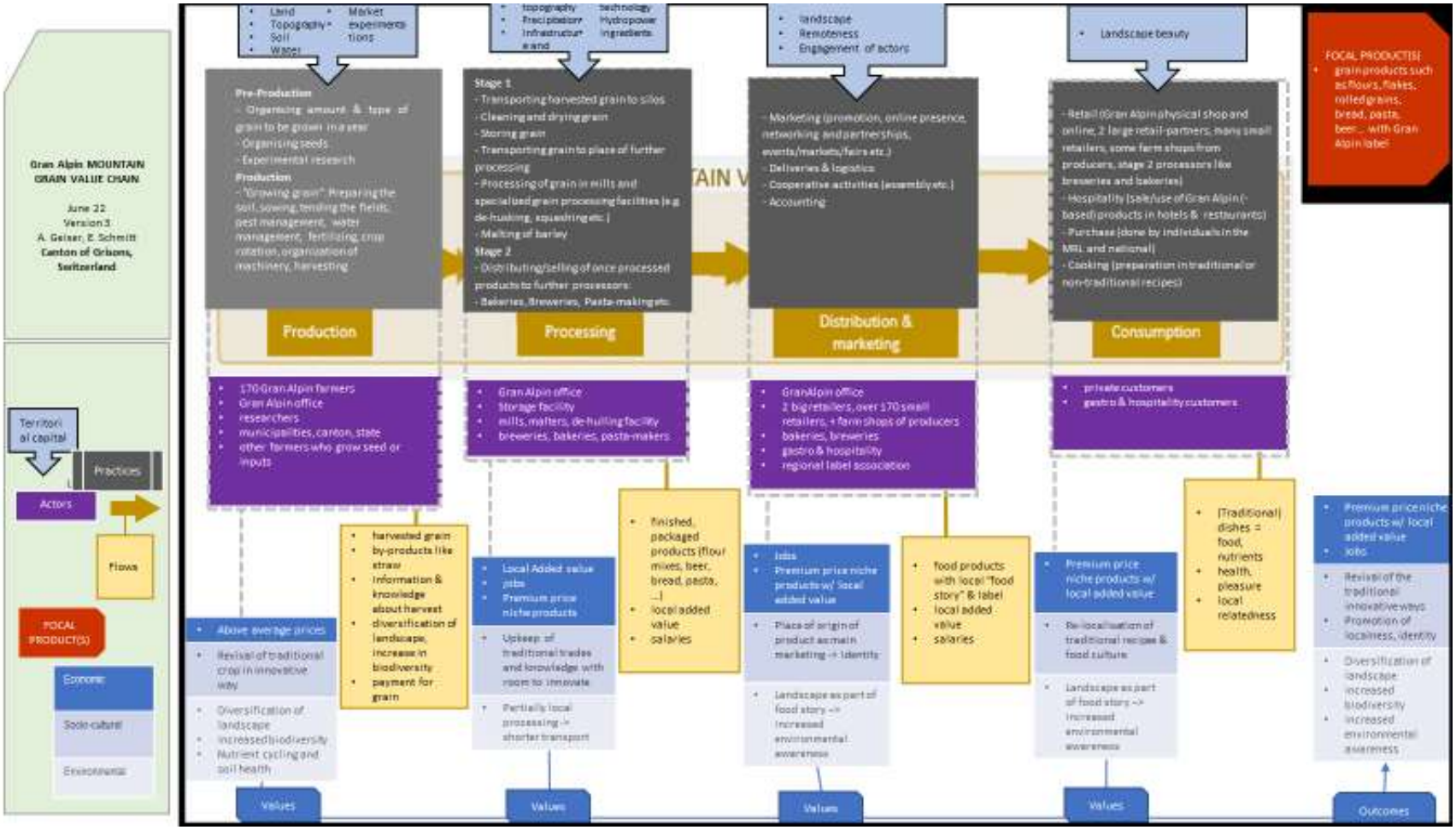
older facility, there is still a need for more storage space. The regularly changing and lack of skilled personnel, as well as communication difficulties are also important challenges at the processing stage.

Gran Alpin organises the destination for each quantity of grain. Grain that remains in the MRL (e.g., for one of the two mills or a hulling plant) is transported by road, while grain that leaves the MRL (in the case of barley to be malted in Germany it even leaves the state) is transported by Swiss rail. After a first processing stage in which the grain is milled, malted, de-hulled and rolled or crushed, Gran Alpin organises transport to a second processing stage. Part of it is processed into bread, pasta or beer by partner breweries and bakeries, while another part is packaged as flour, flakes or rolled grain that make up Gran Alpin's final products. The products are then sold by bakeries, breweries, and retailers to private households and restaurants. The products are associated with local and traditional recipes that customers can recreate often in association with tourism experiences or attachment to the region. The products are also directly associated with the region thanks to the different labels on the packaging (regional origin, mountain origin and organic). Although they are sold with quality and origin labels and at higher prices than the market average, we found that less than 10% of the final price goes back to the farmers.

Overall, this value chain is very small and struggles with the challenges of small volumes where the unit cost of logistics and infrastructure is very high. It will need investment and clear positioning in the near future, also because some valleys within the MRL are now developing their own ‘niche of the niche’ and breaking away from the main brand. On the other hand, demand is very high and so are prices. The potential is promising, and this VC can make a significant contribution to local sustainability and economic, socio-cultural and environmental value creation.

Figure 21 : Switzerland – Grisons Grain FVC diagram

(Geiser and Schmitt, 2022)



7.1.21 Switzerland – Tête de Moine PDO Cheese

Authors: Piccin, L.; Serra, D. (Piccin and Serra, 2022)

Summary:

OVERVIEW/TERRITORIAL CAPITAL

The MRR's main agricultural production is cattle milk production, in line with Swiss mountain agriculture, where the slopes prevent all other agricultural production. Indeed, 70% of Switzerland is covered by mountains (Alps and Jura) and 70% of its useful agricultural area (UAA) is pastureland (Confédération suisse, 2021). Livestock and the derived products such as milk, cheese and meat are therefore of major importance to Swiss agriculture. In the MRR grassland represents 85% of the UAA in the Bernese Jura and 68% in the canton of Jura.

Overproduction of milk led to the introduction of a milk quota in 1977, which was abolished in the 2007 Agricultural Policy. Since the 1990s, the price of milk has fallen steadily, no longer covering the production cost and forcing many farmers to abandon production. To compensate for the difference between the sales and the production price, Swiss farmers can rely on the system of direct payments, which are subsidies that represent about half of their income, in order to compensate for their protection of the rural landscape (notably wooden pastures, which is a typical landscape of Jura mountains), the environment and the biodiversity (payments for ecosystem services). Agricultural production and income are thus decoupled, which changes profoundly the role of farmers (Barjolle, 2010).

PRACTICES

The *Tête de Moine* value chain is organized by the *interprofession*, which manages the quality and volumes produced by assigning upstream production volumes to the milk producers, the cheese dairies and the refiners. There are 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, on which the smaller ones depend on.

The *interprofession* is also responsible for recording and managing the PDO with quality control and promotes the sales. About 60% of the production is exported, mainly to France and Germany which implies a high dependency to the European market and the Euro-Swiss franc exchange rate. The economic crisis of 2008 and the fall in the exchange rate in 2015 have significantly reduced exports. The *Tête de Moine* production is strongly linked (*assemblage*) to *Gruyère*, another major Swiss cheese PDO, to compensate the seasonal mismatch between production and consumption (Magnan, 2015).

Environmental, socio-cultural and economic values generated at different stages of the chain Faced with the loss of yield due to climate change, the opening of markets with Europe, demographic and economic growth and the increasing scarcity of fossil fuels, production costs are constantly increasing. Switzerland cannot compete with the European market because of its geomorphology and its high cost of living. In addition, there is a duopoly in Switzerland between

the two largest retailers (Migros and Coop) who apply high profit margins and strongly influence the pressure on milk prices.

Cheeses with a protected designation of origin (PDO) such as the *Tête de Moine* value chain have helped to secure a better milk price for the farmer and have long been seen as a solution to the milk crisis. This hard cheese is a niche product of high quality, thus justifying its label and relatively high price. It is a unique product because it is consumed with a girolle (invented in 1970), which cuts the cheese into a very thin slice resembling a rose. This innovation has led to a strong increase in sales and production and made it possible to register the product as a luxury and high-quality product. The value chain currently generates 400 jobs in the region and has an annual turnover of more than 80,000 Swiss francs, feeding the regional economic fabric.

ENABLING ENVIRONMENT (INNOVATION AND GOVERNANCE)

The Swiss agricultural policy adapted quite quickly to consider the constraints described above and to promote the link with natural resources and rural landscapes, introducing innovative policy schemes like payments for ecosystems services. The proximity with the Gruyère value chain helped local actors to adopt the same modalities of collective organization. As highlighted in a recent paper on the development of the Gruyère PDO (Le Guerroué et al, 2022), we can identify the main innovations in the production system:

The creation of the *interprofession*, the creation of a third-party certification system and the recognition of the PDO represent organizational innovations that have enabled both the Gruyère and Tête de Moine value chains to anticipate and adapt to changes brought about by international and national geopolitical developments. b) Scientific research provided knowledge to support the formulation of the new Swiss differentiation policy, and support in producing knowledge for professionals in view of the registration and promotion of the PDO.

Collaborations between Gruyère and Tête de Moine value chains are common. The product specifications are similar, and the production zones overlap. This is an advantage for the producers as they can sell the milk for one cheese or the other, in function of market trends. However, this couldn't be possible without a solid interprofessional system.

KEY OUTCOMES

Tête de Moine PDO is without any doubts a success story, and the trend gives reason for hope. However, actually the Tête de Moine value chain faces other threats such as the maintenance of woodland pastures and fodder production as well as its high dependency on public support linked to the Swiss Agricultural Policy.

The value chain faces new challenges. On one hand, it will have to meet the high societal expectations in terms of animal welfare and environmental friendliness. It is already doing so, to a large extent, by respecting requirements that are higher than the industry standards in terms of sustainability, with, in particular, the obligation to graze livestock, the majority use of farm fodder, the maintain of family farming on a human scale and the very significant use of new renewable energies.

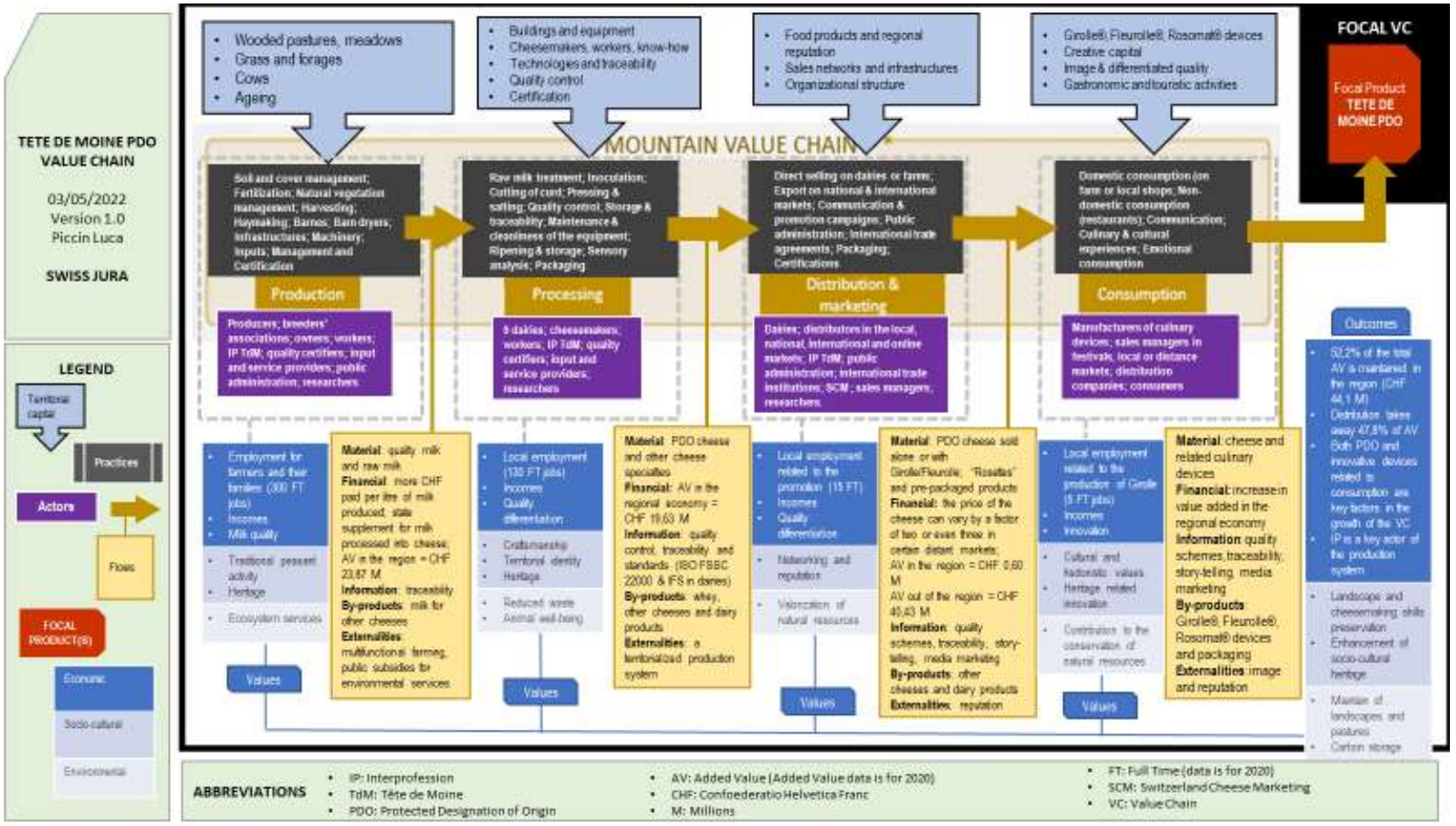
The objective of the value chain is also to continue to grow in a healthy way by maintaining a high added value for all the partners in the value chain, by developing new products and services, and by improving the quality of the products. This can be done in particular by developing new markets thanks to the innovative promotion methods introduced in recent years.

Maintaining high levels of product quality and protection is also a priority. The value chain will also have to consider the future of the Maison de la Tête de Moine in Bellelay, in the context of the restructuring of the abbey site. In this way, the willingness of the Canton of Berne will probably be decisive.

More policy support for better environmental integration in PDOs, as well as the promotion of diversification at farm and territorial level, is therefore needed to increase the resilience of the cheese production and of dairy farmers. A greater integration of actors (such as Regional Nature Parks) and issues linked to the territory (the enhancement of the landscape heritage of wooded pastures) is necessary to improve the sustainability and resilience of the MRL.

Figure 22: Switzerland – Tête de Moine PDO Cheese FVC diagram

(Piccin, 2022)



7.1.22 Turkey – Elmali Tomatoes

Authors: Yercan, M.; Adanacioğlu, H.; Tosun, D.; Kinikli, F. (Yercan et al., 2022a)

Summary:

Elmalı (LAU) is a small plateau in the Beydağları range of the western Taurus Mountains. Beydağları is close to the Mediterranean. Greenhouse cultivation has been carried out in Elmalı since 2000.Tomato has an important share in greenhouse vegetable production in Elmalı . Greenhouse tomato cultivation, which has reached very significant volumes in Antalya and its surroundings, ceases in summer period due to the extreme temperatures. Greenhouse activities, which cannot be done in coastal areas in summer, are carried out in places with plateau characteristics (Işıkhan and Sönmez, 2017). Domestic and export demands can be meet throughout the year by highland greenhouse cultivation. For this reason, greenhouse tomatoes produced in Elmalı in summer has an important.

The greenhouse tomato value chain consists of four stages: production, processing, distribution and marketing and consumption. The production stage includes providing inputs (nursery, chemical fertilizer, pesticide, pollination material), cultivation process (tillage-maintenance) and harvesting activities. The processing stage includes warehousing, cleaning, sorting, grading, packaging and labelling activities. In the distribution and marketing stage, mainly transport to markets (wholesalers, retailers and exporters) are carried out. The consumption stage includes domestic and foreign consumption. The main actors in the production stage can be specified as farmers, input suppliers, state-controlled irrigation unions that organize irrigation activities in the region, and the Ministry of Agriculture and Forestry. Input suppliers are companies operating in the private sector and agricultural cooperatives. The main actors in the processing stage are wholesale traders, retailers and exporters. These actors handle the processing and packaging of the product in the processing facilities. The main actors in the distribution and marketing stage are logistics companies, wholesale traders, commission agents (or brokers), exporters and chain retailers.

Greenhouse tomato is generally export oriented product. Because of the export-oriented tomato value chain, economic capital has an increasing tendency in all stage of value chain. But this value chain is under the effect of emerging conditions in neighbouring countries such as political conflict, extraordinary war conditions, unfair competition etc. This creates sometimes access supply and sharp decline on prices.

Pepper and cucumber produced in green house value are additional VCs that have important interactions with our focal VC because of resistance on pest and diseases, easy grow etc. Both first began in 2000s.

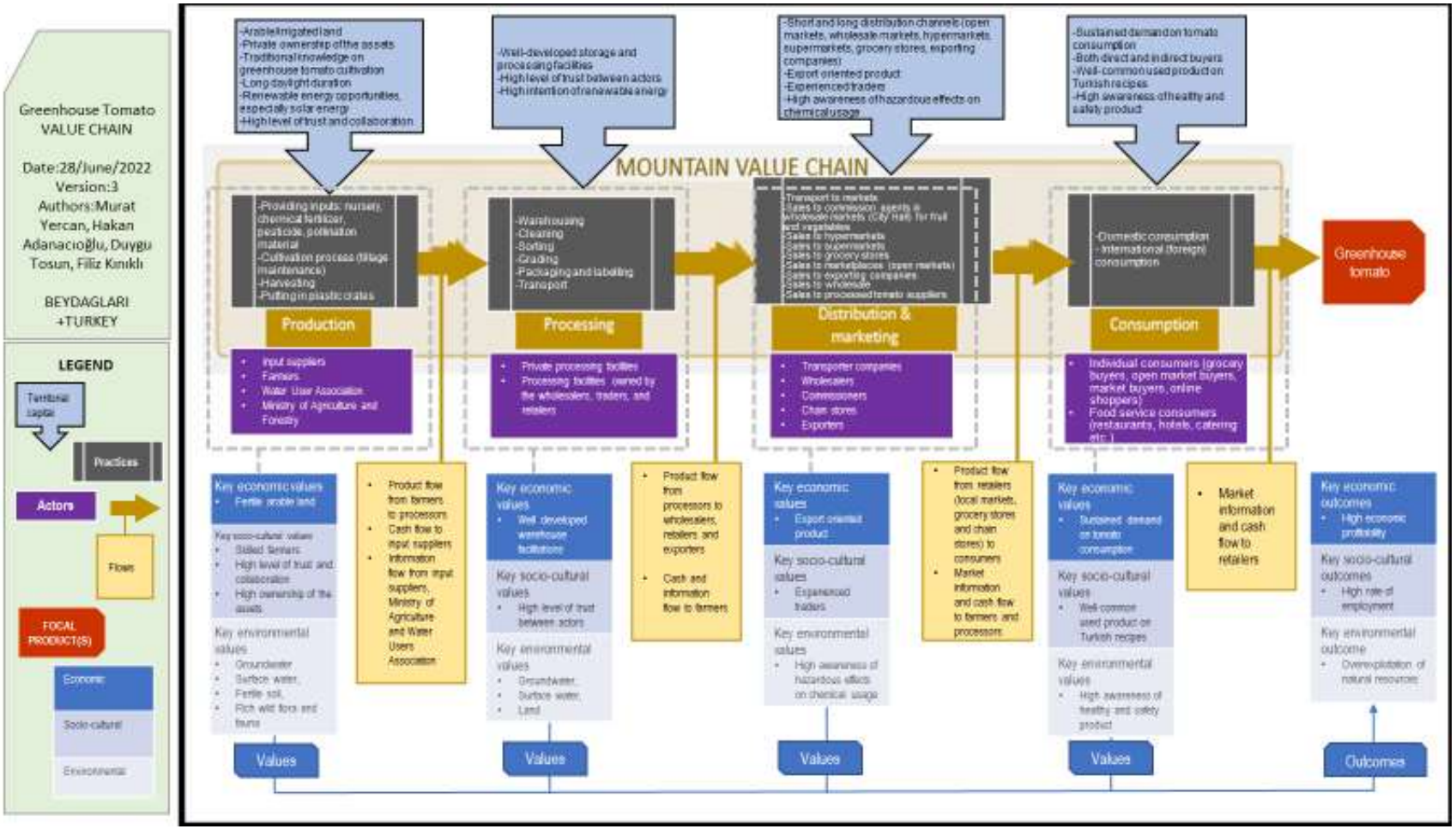
The highland greenhouse cultivation is important in the region, as it promotes effective use of regional sources, increases the income of people, and creates employment, thus reducing migration from rural areas. Irrigation problems has started in the region that expected to increase in the near future. The availability of irrigation is critical for the greenhouse tomato production.

Necessary measures against the negative effects of climate change have to be taken. Also, high input costs, crop diseases and labour shortages are the other challenges for greenhouse tomato production.

In order for the value chain to be sustainable, studies should be carried out on: planning of production; planning of using natural resources; increasing local products demand; finding alternative export markets; and improving consumer awareness of nutrition and agriculture.

Figure 23: Turkey – Elmali Tomatoes FVC diagram

(Yercan et al., 2022b)



7.1.23 UK (Scotland) – Speyside Whisky

Authors: Creaney, R.; Flanigan, S.; Hopkins, J.; Chabdu, A.; Matthews, K. B.; Miller, D.; Blackstock, K. L. (Creaney et al., 2022)

Summary:

Our Value Chain is Speyside Malt Whisky. Our MRL (Badenoch and Strathspey, and part of Moray) is home is 28 active whisky distilleries, with new distilleries planned for the coming year. Many of these distilleries produce Single Malt whisky as their final product, while others alternatively (or additionally) produce outputs for blended whiskies. Much of our MRL sits within one of two National Parks in Scotland – Cairngorms National Park which is an area that attracts many tourists, both for tourism and recreation opportunities but also to visit the nearby Malt Whisky trail which many of the 28 distilleries are a part. Several of the 28 distilleries also have visitor centres, and most distilleries in the MRL are owned by two large-scale parent companies (Diageo and Chivas). A range of territorial capitals are necessary for this whisky production and VC to occur within our study area. These include local knowledge, a mosaic of landscapes including peatlands, tree cover and grassland, some local barley production (although much is imported from the MRR and beyond), the physical distillery infrastructure, and various forms of water for mashing and cooling (some of the key whisky processing steps). Some spring water is also used for dilution of the raw spirit. Tourism is a key actor and connected VC (our additional VC is food and drink tourism) and the infrastructure for these overlaps with that of the whisky industry including accommodation, restaurants and visitor centres. Throughout our main VC connections to the landscape, history and cultural traditions are of utmost importance.

The main practices of the Single Malt Whisky VC occur across four main stages. At the **production stage,** there is peatland and upland management to control water flows (mainly used for whisky cooling) and the abstraction of small amounts of spring water into the distilleries. At the **processing stage,** the key practices are malting barley, creating mash, fermentation, distillation and maturation. At the **distribution and marketing stage**, the practices comprise bottling and labelling, transport to markets, brand development and visitor centre tours. Finally, at the **consumption stage,** the practices involve sales at a range of levels and locations including small specialist retail, supermarkets, hotels, restaurants, bars and distillery visitor centres themselves.

The actors involved across the VC are numerous and diverse ranging from catchment initiative and distillery managers (and workers), arable farmers, maltsters, hauliers, distilleries, coopers and warehouse operators at the production and processing stages, through to marketing and branding teams, Whisky association organisation, visitor centre and tourism staff, wholesales, retailers and hospitality workers at the distribution, marketing and consumption stages.

Our VC produces a range of economic, socio-cultural, and environmental values. At the production stage, value is created in terms of payments of ecosystem service, and negative values in terms of common pool resource conflicts and low water flows and higher temperatures from the distilleries' use of water (mainly for cooling). Greenhouse gases may also be omitted

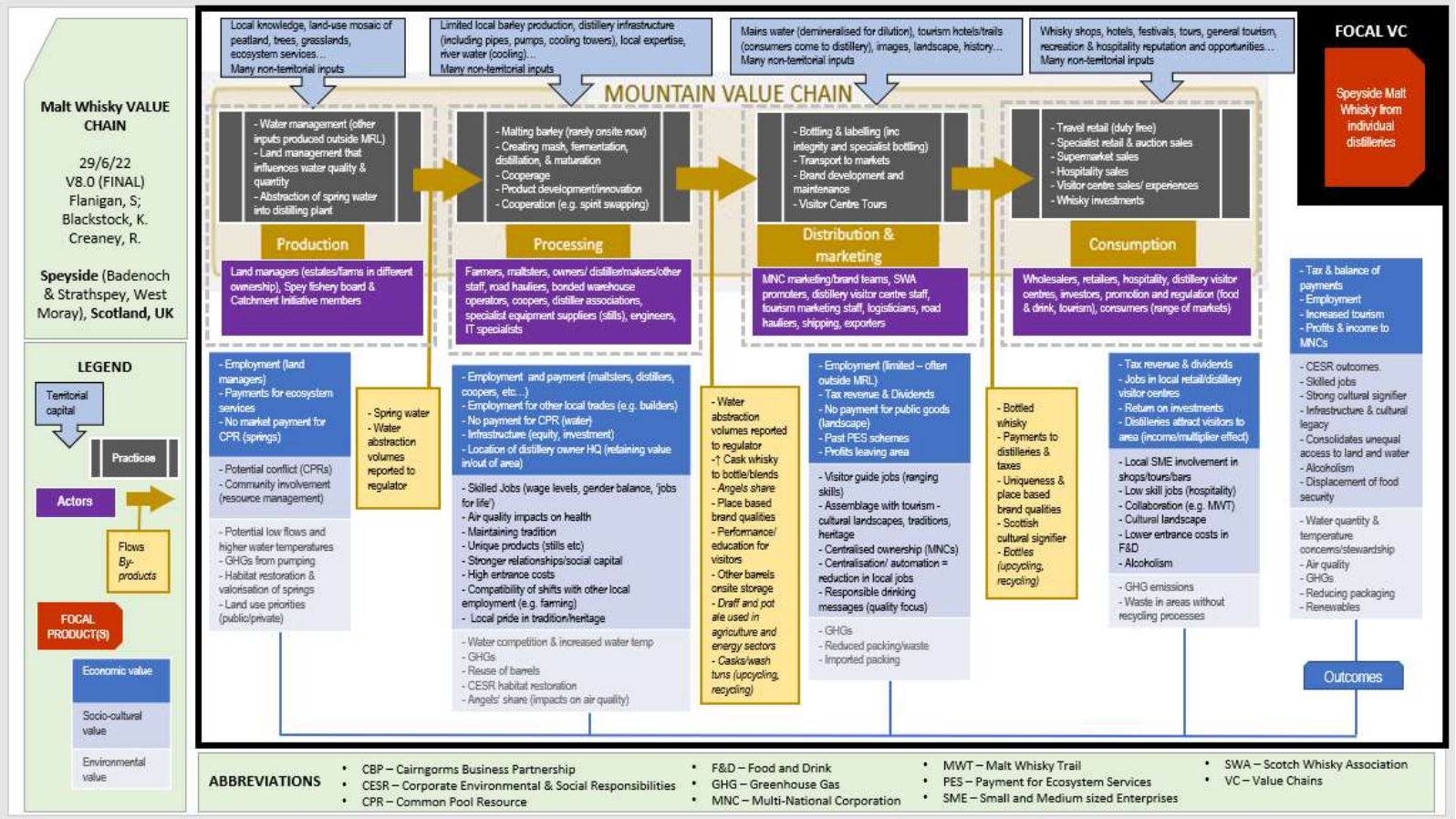
from the pumping of water. Throughout the rest of the VC economic value is created by way of employment opportunities, tax revenues and positive knock-on financial impacts on the tourism industry. In terms of socio-cultural values, skilled jobs, and an increased focus on cultural landscapes and traditions are created, however, there are also high entrance costs for businesses in the processing stages. In terms of environmental value, these are more mixed with more competition for water, and GHGs but also increasing focus on the reuse of packaging and barrels across the VC.

The VC is supported by a range of key regional infrastructure and governance institutions including digital infrastructure, energy suppliers, transportation networks, water infrastructure and tourism infrastructure. Key governance institutions include tourism organisations, knowledge and skills organisations, environment strategies and numerous organisations connected to the National Park and River Spey catchment area on which the VC derives its water at the production stage.

Outcomes from the VC are numerous including skilled jobs, profits, strong links to culture, continued focus on renewable energy production and research and development but also concerns with water quantity and temperature and air quality.

Figure 24: UK (Scotland) – Speyside Whisky FVC diagram

(Flanigan et al., 2022)



7.2 Regional MAPs involvement in the interviews for T4.3

Regional MAP name	Total participants in T4.3	Gender			Type of actor								
		Women	Men	Other	Public authority/ policy maker	Researcher	Business (agri)	Diversified or non-agri business	Innovation broker/ advisor	Producer and producers assoc'ns	NGO/ CSO	Civil society	Other
1.Weiz Lamb	**15**	5	10	0	3	1	2	4	2	2	0	0	1
2.Western Stara Planina HNV	**15**	6	9	0	1	3	4	2	0	1	4	0	0
3.Sumava Beef	**15**	7	8	0	4	1	5	2	0	1	2	0	0
4.Corsican Chestnut Flour	**18**	6	12	0	4	3	6	1	1	2	0	1	0
5.Drome Lamb	**8**	3	5	0	0	0	0	2	2	2	0	0	2
6.Rethymno Carob Flour	**22**	5	17	0	2	1	6	6	0	7	0	0	0
7.Transdanubian A-E Knowledge	**24**	6	18	0	2	4	1	2	3	0	2	1	9
8.Alto Molise Cheese	**25**	9	16	0	0	2	7	1	1	14	0	0	0
9.Trento Wine	**6**	2	4	0	2	0	2	0	0	1	1	0	0
10.Tuscan Chestnut Flour	**16**	8	8	0	1	0	10	0	0	5	0	0	0
11.Maleshevski Tourism	**12**	3	9	0	2	2	2	2	0	2	2	0	0
12.Serra da Estrela Cheese	**9**	2	7	0	1	1	2	2	1	2	0	0	0
13.Alto Douro Wine	**9**	2	7	0	0	3	3	0	1	2	0	0	0
14.Brasov Certified Ecotourism	**9**	3	6	0	4	0	0	5	0	0	0	0	0

15.Sjenica Lamb	**18**	2	16	0	4	0	2	1	2	6	3	0	0
16.Carpathian Bio-Honey	**13**	2	11	0	2	3	1	0	2	4	0	1	0
17.Betic Organic Olive Oil	**24**	0	4	20	4	1	11	2	2	0	0	0	4
18.Huesca Wine	**29**	4	25	0	8	9	3	0	3	6	0	0	0
19.Sierra Morena Ham	**9**	2	7	0	1	1	1	1	0	5	0	0	0
20.Grisons Grain	**13**	3	10	0	0	1	2	7	0	2	0	1	0
21. Tête de Moine PDO Cheese	**26**	4	22	0	1	2	0	3	4	14	0	2	0
22.Elmali Tomatoes	**3**	2	1	0	2	0	1	0	0	0	0	0	0
23.Speyside Whisky	**17**	6	11	0	4	3	0	5	4	0	0	1	0

7.3 Regional MAPs involvement in the T4.4 workshops

Regional MAP name	Total participants in T4.4	Gender			Type of actor								
		women	men	other	Public authority/ policy maker	Researcher	Business (agri)	Diversified or non-agri business	Innovation broker/ advisor	Producer and producers assoc'ns	NGO/ CSO	Civil society	Other
1.Weiz Lamb	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP
2Stara Planina HNV	10	7	3	0	1	5	0	0	0	0	3	1	0
3.Sumava Beef	14	5	9	0	0	0	11	1	0	0	2	0	0
4.Corsican Chestnut Flour	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP
5.Drome Lamb	11	8	3	0	1	1	0	0	2	3	0	1	3
6.Rethymno Carob Flour	8	3	5	0	2	0	2	2	0	1	0	0	1
7.Transdanubian A-E knowledge	6	2	4	0	1	0	0	0	0	0	2	0	3
8.Alto Molise Cheese	25	5	20	0	6	2	2	2	0	11	0	2	0
9.Trento Wine	10	3	7	0	0	1	1	0	4	2	2	0	0
10.Tuscan Chestnut Flour	20	7	13	0	4	4	5	2	0	1	1	3	0
11.Maleshevski tourism	9	2	7	0	1	1	2	2	0	1	1	1	0
12.Serra da Estrela Cheese	15	9	6	0	0	2	1	0	7	3	2	0	0
13.Alto Douro Wine	21	8	13	0	0	7	5	0	3	2	0	0	4

14.Brasov Certified Ecotourism	12	8	4	0	4	3	0	1	0	0	2	2	0
15.Sjenica Lamb	17	3	14	0	1	2	2	2	3	1	3	3	0
16.Carpathian bio-honey	8	0	8	0	1	0	0	0	2	4	0	1	0
17.Betic Organic Olive Oil	20	4	16	0	8	0	3	1	0	6	1	0	1
18.Huesca Wine	15	3	12	0	6	1	1	0	3	4	0	0	0
19.Sierra Morena Ham	9	2	7	0	1	3	1	0	3	1	0	0	0
20.Grisons Grain	7	3	4	0	0	1	0	3	0	2	0	1	0
21. Tête de Moine PDO Cheese	15	1	14	0	1	0	2	1	3	7	1	0	0
22.Elmali Tomatoes	11	5	6	0	3	3	1	0	0	4	0	0	0
23.Speyside Whisky	15	5	10	0	2	6	1	2	2	1	0	1	0

7.4 Extended Value Chain Analysis (EVCA) guidance and templates

The following guidance document and templates were used by partners to provide information specific to the 23 value chains across Europe.

- Methodological Guidelines for WP4 (Version 8.0, 28th March 2022)
- Extended Value Chain Analysis, template (Version 4.0, 25th November 2021)
- Diagrams, template for focal value chain, conducive enabling setting, spatial analysis, and assemblage (Version 1.0, 19th January 2022)
- Adapted diagram for tourism VCs (Version 1.0, 1st June 2022)

These documents are the most up-to-date versions used by partners during data collection and analysis and include relevant updates made as a result of consultation and reflection during the process. Each of these documents can be accessed via the James Hutton Institute MOVING project webpage found here: https://www.hutton.ac.uk/research/projects/moving-mountain-valorization-through-interconnectedness-and-green-growth-2020-2024

A blank version of the Excel document used by the Hutton team to perform descriptive analysis of data collected across the value chain case studies is also accessible via the Hutton webpage.

MOVING
MOuntain Valorisation through
INterconnectedness and Green growth