MOVING
MOuntain Valorisation through INterconnectedness and Green growth

D4.6: Upgrading Strategies for the Value Chains

Report on the Global Upgrading Strategies

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Acronyms

AB	Agricultural Business
A-E	Agro-Ecological
AECS	Agri-Environment Climate Scheme
AKIS	Agricultural Knowledge and Information Systems
ANC	Areas of Natural Constraint
AVC	Additional Value Chain
CAF	Conceptual Analytical Framework
CAP	Common Agricultural Policy
CC	Climate Change
CLLD	Community-led local development
CSR	Corporate Social Responsibility
DOC	Denominazione di Origine Controllata
FVC	Focal Value Chain
G	Governance, Territoriality and Cooperation Cluster
GHG	Green House Gases
GVCs	Global Value Chains
HNV	High Nature Value
I	Innovation and Infrastructure Cluster
ICT	Information and Communications Technology
LAG	Local Action Groups
LEADER	Liaison Entre Actions de Développement de l'Économie Rurale
LULUCF	Land Use, Land Use Change and Forestry
LUS	Land Use System
MAP	Multi-Actor Platform
MRL	Mountain Reference Landscape
MRR	Mountain Reference Region
N	Nature and Ecosystem Services Cluster
NGO	Non-Governmental Organization
P	Policy Cluster

PDO	Protected Designation of Origin
PGI	Protected Geographical Indication
PV	Agro-Photovoltaics
SES	Social Ecological Systems
S	Social and Demographic Cluster
SME	Small to Medium-sized Enterprise
STEEP	Social, Technology, Economy, Environment, Politics & government
V	Value and Quality Products Cluster
VC(s)	Value Chain(s)
VC-A(s)	Value Chain Assemblage(s)
WP	Work Package
YF	Young Farmers

Executive summary

WP4 (Participatory appraisal of vulnerability and performance of value chains) set out to analyse diverse mountain Value Chains (VCs) as assemblages of practices within nested socio-ecological systems across Europe. The focus is on the Value Chain assemblage (VC-A) incorporating a focal VC and additional VCs that interact within specific mountain territories and rely on territorial capital. This deliverable considers if the VC-A is vulnerable to threats; and how these VC-A can be made resilient, whilst supporting sustainable mountain development.

The deliverable synthesises insights from the ongoing youth engagement work (England and Creaney, In Progress); and analyses of vulnerabilities of the land use systems (González-Moreno et al., 2022) of the VC-A (Zagata et al., 2023); and the participatory analysis of the VC-A (Blackstock et al., 2022).

All 23 of the VC-A cases reported some vulnerabilities, related to social and demographic trends; lack of infrastructure or innovation; governance challenges; threats to nature; difficulties in capturing value or promoting their quality products; issues with public policy and external shocks (e.g. inflation spikes, pandemics). These are common rural or mountain development challenges – in H2020 MOVING we consider how a VC-A might contribute to solutions.

All the 23 VC-A were also able to identify strategies to 'upgrade' their VC-A in ways that would make their practices more sustainable and resilient to the above threats (see Table **1**). These strategies covered the standard typology of VC upgrading, from improving the product; improving the process; taking on new functions along the VC stages (production, processing, distribution & marketing, consumption) or diversifying into complementary VCs. The latter is part of the VC-A approach promoted in the H2020 MOVING project.

Table 1: Types of upgrading strategies used in MOVING

Type of Upgrading Strategies	Case Study Examples
Product	Cretan Carob VC (Greece) stakeholders have upgraded from animal feed to human health food products (carob flour as a gluten-free product) to get a better premium.
Process	Tete de Moine VC-A (Switzerland) producers are starting to install photo-voltaic infrastructure on their barn roofs to reduce their greenhouse gas emissions, increase energy security and reduce costs.
Function	The Weiz VC (Austria) sheep farmers came together to form a cooperative to run a slaughterhouse and process their lamb products to maintain a viable industry in their area.
Inter-chain	The Sumava beef VC (Czech Republic) works with the rural tourism VC to diversify farm incomes, build consumer demand through supplying tourism venues and generate greater understanding of mountain farming through interactions with urban visitors.

Horizontal	Serra da Estrela VC-A (Portugal) shepherds are exploring the potential of a cooperative to increase the premium paid for their milk and to reduce the transaction costs accruing to the cheese processor through having one point of sale.
Vertical	Elmali Tomato and Pepper VC-A (Turkey) producers are working with wholesalers, particularly consumer cooperatives to set up long-term contracts to help with planning and secure prices.

These types of upgrading were initially focussed on economic objectives; but increasingly the literature also considers social and environmental objectives for upgrading. Our findings confirm this evolution; with the VC-A upgrading strategies firmly embedded in wider objectives for mountain sustainable development and can be mapped to the mountain development challenges highlighted above. Furthermore, the H2020 MOVING project also reflects a move from analyses of individual firms to understanding horizontal (within a VC stage) and vertical (along the chain) relationships that can support the VC-A upgrading.

The benefit of taking a VC-A perspective is to reinforce the neo-endogenous rural development approach. This approach highlights the importance of place-based development valorising the specific territorial capital in each diverse mountain case, whilst understanding the importance of exogenous actors such as public and private policy actors, consumers and tourists.

Finally, the upgrading strategies require adaptation, innovation and change. They require resources (human, financial, technological), enabling policies and digital or physical infrastructure. The findings suggest that more could be done to work with the exogenous private sector to guard against public policy dependency. Such relationships need to be carefully governed to ensure that mountain actors continue to be rewarded for provision of public goods and maintain a voice in the future of their communities and livelihoods.

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. It particularly, the deliverable addresses whether the VCs and their assemblages (hereafter, VC-A) or the territorial capitals on which they depend, are vulnerable or sensitive to any threats and if so, what might be done to make them more resilient. Even if the VC-As are not currently vulnerable, the deliverable also considers how any unsustainable patterns might be corrected, to ensure that VC-A support sustainable mountain development.

The deliverable synthesises on the findings in D4.3 (Blackstock et al., 2022) that included the individual Multi-Actor Platforms' (MAP) evaluation of the sustainability of the focal VC and the VC-A; and D4.5 (Zagata et al., 2023) that provided the MAPs' evaluation of the VC-A's contribution to the region's resilience to change. Together with insights from the Youth engagement task (England and Creaney, In Progress) and the work on vulnerabilities of land use systems (González-Moreno et al., 2022), a picture of how the VC-A are embedded in mountain territories, their contribution to the wider territorial development and how they are adapting to change can emerge.

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.

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[1], 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[2] 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. In particular, the extended approach addresses how the VCs depend on the specific

[1] By firm, we also mean individual farmers or processors who are 'sole traders' or 'partners' rather than a business firm.
[2] Defined in the CAF

mountain territory landscape, and therefore how VCs can be drivers of mountain landscape management (Moretti et al., In Press). The data were collected at the scale of the Mountain Reference Landscape (MRL), which are nested into larger Mountain Reference Regions (MRR) as described in D3.2 (González-Moreno et al., 2022). However, VC-A involve practices and actors from beyond the mountains, and in the case of global value chains, extend beyond Nation-state borders.

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. However, it is a novel approach, as commonly value chains are analysed separated from the landscape they are connected to, and the landscape dynamics analysed separately from the value chains that could add value to the landscape.

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

- What requires 'upgrading' in our 23 cases of mountain value-chain assemblages?

This question will consider if the VC-A or the resource system on which they are based are vulnerable, and if so, to what kinds of threats. The section will also consider where there are opportunities if VC-A are already perceived to be resilient and sustainable.

- What kind of strategies might help vulnerable mountain value-chain assemblages?

This question will consider what strategies could help those VC-A reporting vulnerabilities, drawing on strategies from the literature and the suggestions collected in prior deliverables. It will also consider those strategies already in use that make mountain VC-As resilient to threats, drawing from the adaptive capacities that have already been identified by the local MAPs.

- Which actors are, or could be, involved?

This question will complement the focus on where strategies are applied by considering the types of actors already involved in strategies to protect resilience or protect from threats, or where there needs to be action. It will consider the reported ability to act highlighted in earlier research.

- Where are, or could be, these strategies applied?

This question will focus on the strategies that are relevant to mountain development, given that the overall objective of MOVING is contribute to mountain sustainability and resilience. However, it is important to understand the influence of tele-coupling, where actions extend beyond the MRL or MRR and might be very important for outcomes within the MRL.

Overall, the deliverable synthesises what we've learnt about whether and how to upgrade mountain VC-A in ways that valorise and protect mountain territorial capital. The focus is on what the VC upgrading literature can add to the territorial development recommendations; and what this means in terms of practical solutions for our VC-A cases. Finally, it allows us to consider if

there are solutions that could be further discussed and developed in H2020 MOVING (through WP5 and WP7).

2 Methodology

This deliverable aims to lift up from the detailed analyses of the structure and functioning of the VC-As and whether they are vulnerable or resilient, to a more synthesised approach to how these 23 mountain VCs could safeguard their resilience and protect against vulnerabilities.

The deliverable has built upon the extremely rich data already collected throughout the WP4. Therefore, the deliverable is based upon qualitative thematic analyses of the existing materials collated by the case study partners and developed with their local multi-actor platforms.

The data sources analysed for this deliverable were:

- Information on land use system vulnerabilities and corresponding adaptive capacity reported in D3.2 (González-Moreno et al., 2022)
- Information on young peoples' perception of the MRL and role of the VC-A in sustainability reported in the interim draft of D1.5 (England and Creaney, In Progress)
- Information on the value chains, their assemblages and valorisation outcomes reported in D4.3 (Blackstock et al., 2022)
- Information on the vulnerability or resilience of VC-A reported in D4.5 (Zagata et al., 2023)

Analysis was undertaken using the QSR NVIVO 12 software combined with pivot tables in Microsoft excel where it was useful to build upon the quantised database developed for D4.3. The analysis applied the types of upgrading strategies developed in section 5 to the data associated with 23 mountain VC-A cases, linking the different types of strategies with the relevant aspirations or threats reported by the cases.

The draft findings were shared with the regional partners responsible for the prior tasks, to ensure our interpretation of the data was consistent with their understanding their cases. However, there was insufficient time between the finalisation of the D4.5 (start of March 2023) and the due date of this deliverable, to build in time to present and discuss these findings to the 23 regional MAPs.

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. Table 2 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 the additional value chain product referred to in the context of value chain assemblage and information on the spatial context for all 23 chains in terms of MRL, MRR, country, and international context.

Table 2: Overview of value chains and spatial context (In order by country name)

	VC abbreviation[3]	VC focal Product	AVC Product[4]	MRL name (and area km²)	MRR name (and area km²)	Country name	Int. context
1	Weiz Lamb	Lamb	*Dairy (curd cheese)*	Weiz Bergland (836)	Styria (56,521)	Austria	EU
2	Western Stara Planina High Nature Value (HNV)	HNV Farming	*No data*	Western Stara Planina (1,660)	Stara Planina (26,869)	Bulgaria	EU
3	Sumava Beef	Beef	*Tourism*	Strazny, Lenora, Horni Vltavice (125)	Sumava (13,044)	Czech Republic	EU
4	Corsican Chestnut Flour	Chestnut flour	*No data*	Bucugnà, Ghisoni and Nuceta (358)	Corsica (8,725)	France	EU
5	Drome Lamb	Lamb	*Conventional lamb & sheep meat*	Drome Valley (378)	Pre-Alps (54,305)	France	EU
6	Rethymno Carob Flour	Carob flour	*Animal feed*	Central Rethymno (394)	Crete (8,284)	Greece	EU
7	Transdanubian A-E Knowledge	Agro-ecological knowledge	*Rural tourism*	Barnag, Pecsely (32)	Transdanubian Mountains (6,564)	Hungary	EU
8	Alto Molise Cheese	Spun paste cheese	*Beef*	Alto Molise (276)	Central Apennines (39,824)	Italy	EU
9	Trento Wine	DOC Wine	*Grappa*	Trento (158)	Eastern Alps (39,929)	Italy	EU
10	Tuscan Chestnut Flour	Chestnut flour	*Chestnut honey*	Stazzema, Seravezza (120)	Tuscany (22,007)	Italy	EU
11	Maleshevski Tourism	Rural tourism	*No data*	Berovo, Pehchevo (806)	Maleshevski Mountains (6,899)	North Macedonia	Non-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

[4] Some regional partners identified more than one AVC product (see Blackstock et al, 2022). For this report, the first additional value chain product identified (AVC1) is referred to in the value chain assemblage.

12	Serra da Estrela Cheese	PDO Cheese	*Lamb*	Serra da Estrela (305)	Cordilheira Central (29,328)	Portugal	EU
13	Alto Douro Wine	Wine	*Cultural tourism*	Vila Nova de Foz Coa (90)	Alto Douro (15,917)	Portugal	EU
14	Brasov Certified Ecotourism	Certified Ecotourism	*Rural tourism*	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 Cheese*	Sjenica (2,541)	Dinaric Mountains (92,967)	Serbia	EU
16	Carpathian Bio-Honey	Bio-honey	*Pollen based health products*	Polomka, Bacuch, Bravacovo (161)	Slovak Carpathian Mountains (29,287)	Slovakia	EU
17	Betic Organic Olive Oil	Organic Olive Oil	*Compost*	Carcabuey, Priego de Cordoba, Zuheros (410)	Betic Systems (57,021)	Spain	EU
18	Huesca Wine	Wine	*Other products using the HUESCA-limentaria Quality seal e.g., almonds*	Ayerbe and Loarre (138)	Huesca (36,805)	Spain	EU
19	Sierra Morena Ham	Iberian ham (PDO)	*Pigs (non PDO ham)*	Villanueva de Cordoba, Pozoblanco, Cardeña (1,273)	Sierra Morena (18,416)	Spain	EU
20	Grisons Grain	Grain	*Animal products (beef, milk, manure)*	Grisons (7,104)	Swiss Alps (25,735)	Switzerland	Non-EU

21	Tête de Moine PDO[5] Cheese	Cheese	*Gruyere PDO*	Jura, Berne (753)	Swiss Jura (2,826)	Switzerland	Non-EU
22	Elmali Tomatoes	Tomatoes	*Peppers*	Elmali (1,433)	Beydaglari (not available)	Turkey	Non-EU
23	Speyside Whisky	Scotch Whisky	*Food and drink tourism*	West Moray, Badenoch & Strathspey (3,414)	Highlands and Islands (33,417)	UK (Scotland)	Non-EU

Assemblages (FVC + AVC) studied in MOVING illustrate a wide range of possible value chain connections (Table 2). These include assemblages based on multiple food/drink products (e.g., lamb and cheese), food/drink assembled with service-based products (e.g., wine and tourism), and combinations of multiple service-based products (e.g., knowledge production and tourism). Some assemblages represent products that are closely interlinked in terms of actors producing them (e.g., grain & animal products) or are based on use of 'by-products' and/or come from the same resource (e.g., wine/grappa, lamb/cheese, oil/compost, honey/pollen), some that are variations on the same product (PDO vs non-PDO products, eco/rural tourism), and others when combined represent shared cultural and territorial capital (e.g., whisky/tourism). The culmination of these value chain assemblages, which represent a snapshot of the value chain connections found in the context of mountain territories, help to illustrate interconnectedness within regions including places, actors, strategies, and potential for upgrading and development.

In previous deliverables (Moretti et al., 2021b, Blackstock and Flanigan, 2021, Blackstock et al., 2022, Zagata et al., 2023) the focal VCs have been summarised in terms of types of VCs illustrated in Table 3. In nearly all cases, the commodity (e.g., milk, olives, grapes) produced in the mountains is further processed as meat, cheese, flour, oils, or alcoholic drinks. D4.3 (Blackstock et al., 2022) discusses the rationales for allocation of these types, including placement of processed crop products (e.g., flour) with unprocessed products (e.g., tomatoes), and the separation of honey, which is arguably also derived from plants. We continue to utilise these types to support analysis here and to provide continuity with previous deliverables. Many of the additional value chain (AVC) products that make up the VC-A also fall within these types.

[5] Please note, other FVCs are also based on PDO products (see D4.3).

Table 3: Value chain product types

Type	Value chain (and country)
Meat-based	• Weiz Lamb (Austria) • Sumava Beef (Czech Republic) • Drome Lamb (France) • Sjenica Lamb (Serbia) • Sierra Morena Ham (Spain)
Crop-based	• 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)

4 Insights from the Literature

This section provides a short and non-exhaustive overview of different approaches to upgrading strategies with the Value Chain (VC) and Territorial development (including rural and mountain) literatures. These insights are used to build the themes addressed in the analyses that generated the findings reported in section 7.

4.1 Value Chain Upgrading Strategies

This section summarises the main advice on value chain upgrading strategies in the literature. An upgrading strategy is the process of a firm or economy to move to a more profitable or advanced niche within the value chain (Gereffi, 1999, Pipkin and Fuentes, 2017). In other words, upgrading describes deliberate strategies undertaken by the value chain actors across the production,

processing, distribution & marketing or consumption stages of the value chain to improve different dimensions of how the valorisation process works and how value is accrued.

Most of the literature reviewed focussed on global value chains where firms compete on international markets and seek ways to improve their competitiveness. These are predominantly economic upgrading strategies (see section 4.1.1) but there are also examples of social upgrading strategies (see section 4.1.2) where competitive advantage is gained through a focus on Environmental and Social responsibility (Camilleri, 2017). The final section (section 4.1.4) highlights insights from specific mountain VC upgrading literatures.

The review suggests that the VC concept has evolved through time away from a neo-classical focus on profit and competitiveness to a broader set of objectives that encompass not only private benefits for economic sectors and firms, but a wider set of sustainability objectives that consider how VCs can protect, restore, and promote public goods. However, this evolution raises the question about the overall objectives of VC upgrading and the roles and responsibilities of the VC actors to upgrade – an upgrading strategy to increase economic efficiency might look very different to a strategy to reduce poverty (Mitchell et al., 2009).

4.1.1 Economic

Much of the literature is focussed on helping firms in developing countries 'move up the technological ladder' within global economic trading systems (Humphrey, 2004) through national or sectoral development 'upgrading' strategies. The idea is to improve the economic competitiveness and retain more of the economic benefits within the developing country.

Main types of upgrading are described as: (Humphrey and Schmitz, 2002)

- Process – firms make their production, processing or distribution practices more efficient through technological innovations or changing their practices
- Product – firms move from lower value to higher value products within the market (e.g. 'relationship' coffee, (Vicol et al., 2018)
- Function – firms take on new roles across the VC such taking on their own marketing or distribution activities
- Inter-Chain – firms move into new but related industries.

Upgrading is about endogenous (improving capabilities) and exogenous (gaining access to markets) whilst avoiding dependencies and a 'race to the bottom' (attracting unskilled labour is not improving capabilities (Humphrey and Schmitz, 2002).

The above strategies (process, product, function and inter-chain) involve decisions made by individual firms working alone. However, often upgrading becomes a collaborative endeavour with interactions, or even partnerships, forming between firms. Mitchell et al., (2009) among others draw attention to attention to relationships and building skills across the VC that requires action at local, national and international scales. Mitchell adds further upgrading strategies that draw out these ideas of inter-chain relationships:

- Horizontal coordination – coordination or cooperation within the stage of the VC. For example, producer cooperatives to get better premiums through collective bargaining.
- Vertical coordination – where the upgrading is based on improving the relationships across stages of the value chain. For example, producers work closely with marketing or distribution firms in long-term partnerships.

These economic strategies can be enacted by the seller (supply side) or the buyer (demand side) of the product. These authors recognise that upgrading, particularly in the Global South, often needs State help to develop skills, underpin investment, provide transport and digital infrastructure, and assist with coordinated territorial marketing.

4.1.2 Social Upgrading Strategies

Social upgrading is defined as improving the rights of worker and quality of employment (Barrientos et al., 2011) and has been further developed by other authors (Gereffi and Lee, 2016). Firms recognise that they need to consider social, environmental and human right concerns into the business practices to build supply and demand loyalties. The above economic upgrading (process, product, function and/or inter-chain) strategies can be supplemented in this way to valorise consumer demand for more ethical products. These approaches are also essential to ensure that skilled and reliable labour is retained in the supply chain.

Relevant types of social upgrading for MOVING includes:

- Market (type of product upgrading based on advertising their progressive values to their prospective consumers)
- Corporate Social Responsibility (CSR) (focused on demonstrating compliance with voluntary codes of conduct relevant for the vertical chain or horizontal sector)

These upgrading strategies can be practiced by individual firms or wider sectoral or territorial groups; and can be initiated through demand from downstream retailers or from the labour employed in the VC production or processing stages. Social upgrading strategies are often implemented using voluntary private governance mechanisms like certification or more informal ways using social media to make relationships with consumers to achieve economic uplift through product upgrading (Vicol et al., 2018).

In the brief review, it was less apparent how the symbolic and cultural capitals were valorised and protected through social upgrading strategies; however these values are often central to product upgrading using geographical quality certification schemes or voluntary labelling schemes. Increasingly, environmental certification schemes now include social criteria like fair work (Jena et al., 2022).

The literature highlights that these strategies are not always available to all firms or employees and could, inadvertently, lead to negative unintended consequences for women, youth etc. (Gereffi and Lee, 2016). Economic upgrading can create social downgrading, or vice versa, and that upgrading strategies therefore must manage trade-offs as the objectives for value chain upgrading expand (Pegler, 2015).

4.1.3 Environmental Upgrading Strategies

As with social upgrading strategies, attention to the environmental impacts of VC activities has become more pronounced, particularly as environmental concerns underpin a potential 5th industrial revolution (MacClay and Sellare, 2022). Attention to the environment is not recent – concerns over protecting natural resources in the mountains emerged in the 19th Century and many debates on how to manage land used for agriculture continues. However, explicit attention to environmental upgrading strategies in the VC literature is more recent – over a decade ago a manifesto was set out to consider environment as much as social issues in VC for development (Bolwig et al., 2010, Riisgaard et al., 2010). Paying attention to materiality of VCs and the assets on which they are built is very important (Jones et al., 2019). The integrated or advanced approach posited by (Deans et al., 2018) also prioritises positive valorisation of natural capital. Certainly, many certification schemes, often used as a form of upgrading, are premised on environmental criteria as well as social issues (Mutersbaugh et al., 2005) and there are also voluntary quality labels also promoting good stewardship of the environment (Viteri, 2017).

A VC lens considers the environmental management at the level of the producer and their farm but also links it to the life cycle of resource use through the processing, distribution and consumption phases, as reported in literature on life cycle analysis and food supply chains (Krishnan et al., 2020, Munasinghe et al., 2019). These analyses call for attention to carbon and energy footprints; use of blue and green water; and fertilisers; and strategies to reduce inputs whilst safeguarding productivity and other outcomes such as employment. The literature tends to focus on actions by individual firms, sometimes coordinating or cooperating at the landscape scale, which is important given that much of rural livestock management involves common pool dilemmas (Bombaj et al., 2018).

In many cases, the analyses overlap with social upgrading strategies, particularly with attention to equity and responsibility for safeguarding territorial capital and distributing the costs as well as the benefits within the global value chain (Piñero et al., 2019). However, trade-offs between environmental and economic concerns still continue (Purnomo et al., 2020). For example, technological innovations to improve environmental impacts can benefit price premiums reduce costs and open up new market opportunities but may also displace other VC actors (MacClay and Sellare, 2022). Finally, there is increasing attention to the geographical nature of upgrading strategies, including whether local or globalised production are 'better' for sustainability (Schmitt et al., 2016).

4.1.4 Mountain value chain upgrading strategies.

There was a limited set of literature explicitly identified as assessing upgrading strategies for mountain value chains, and most of these were based on VC originating in the Global South, a feature also found in agricultural value chain literature (Trienekens, 2011). These examples highlighted the importance of upskilling and training of labour (Adhikari et al., 2018) and of working together to improve productivity and premiums (Choudhary et al., 2013, Choudhary et al., 2015). The social dimensions of relationships to enable working together was strongly emphasised in

the European setting, where trust and conflict resolution was highlighted (Pachoud et al., 2020). The institutional governance of these VCs was important with the need to manage risk through potential buy-back schemes and help with marketing, also the regulation of local auctions. These mountain VCs were also recognising and responding to climate change by changing their products to those more resilient to water and temperature stress (Baig et al., 2020). Of particular relevance to MOVING was the findings around Jordanian olive VC where there seems to be some tension between local/traditional modes of production and certification that might promote intensification due to the administration of the quality mark (Cook, 2019). However, more general literature on geographic impacts of VC upgrading are extremely useful for our analyses (Crescenzi et al., 2022).

4.1.5 Summary

Overall, the VC upgrading literature pays increasing attention to governance and dynamics within VCs. This is evident not only in Global VC (Gereffi and Fernandez-Stark, 2011) but also more locally (Abbey et al., 2016). Increasingly, the concern that economic or environmental upgrading may create social divisions (Tobin et al., 2016) has led to more focus on Upgrading for whom? (Vicol et al., 2018) with increasingly sociological analyses paying attention to who benefits from upgrading (Allouche et al., 2015). The literature provides some useful ideas for our MOVING community of practice, however, the literature is focussed on the unit of the firm or the national sector, rather than VC assemblages in the context of sub-national territorial development. Therefore, to provide a suitable framework for upgrading strategies in MOVING, we need to complement these VC focussed strategies with insights from territorial development literature to identify strategies that could be used to ensure VCs contribute to sustainable and resilient mountain development. This focus on territorial development and governance is important as there are complex networks within VCs that can be both complementary and conflictual. Therefore, attention to the enabling environment is crucial – how does it enable or constrain the upgrading strategies by VC actors? (Mitchell et al., 2009).

4.2 Territorial Development Literatures

This section summarises the main themes of literature on mountain sustainable development and on rural sustainable development. These literatures provide an alternative, place-based approach, that complements the VC literature focus on the different stages of the value chain that can occur across the globe.

4.2.1 Mountain Development

As highlighted in the Sila Smart Mountains declaration (Euromontana, 2022) mountains face particular challenges e.g., poor infrastructure; lack of employment; population decline and inappropriate development that can/has damaged fragile natural environments (Price, 2015). Mountains will need to be resilient to climate change and threats to food, water and energy security in the future (Drexler et al., 2016). However, the declaration also highlights the mountains

are places of opportunities (see also Euromontana, 2020). In particular, mountains provide public goods such as diverse sources of food, biodiversity, carbon sinks, community ties, traditions, and opportunities for recreation (O'Rourke et al., 2016). Mountain territories should therefore be valued and remunerated for their role in natural risk management processes and provision of ecosystem services.

In terms of telecoupling, the role of mountains in producing public goods including ecosystem services makes them valuable to all society, whether or not non-mountain citizens visit the mountains or not and their importance in national quality of life should be better recognised (Drexler et al., 2016). The public provision therefore shifts the focus for policies away from immediate local environmental protection to the attention to the tele-coupled nature of mountains and lowlands, recognising mountains as sentinels and refugia for climate change for example (Dax, 2020). However, mountains also face several gaps in climate adaptation, requiring more resources and collaborative planning processes (McDowell et al., 2021). Therefore, mountain policies should be designed to integrate provision of public and private goods and services (O'Rourke et al., 2016) and mountain policies should pay particular attention to protection of nature and nature-friendly land management regimes.

These literatures suggest that mountain areas need place-based development that exploits the particular “uniqueness” provided by their topography, natural resources and resulting cultural features, which differentiate them from other, more densely populated regions (Dax, 2020, ibid; Euromontana, 2022 ibid). These place-based assets underpin rural development opportunities. There is a strong tele-coupled element here, recognising and building on function urban-rural interactions for mutual benefit. However, it is also important to share good practice and knowledge between mountain settings to build capacity and self-reliance; and ensure resilience strategies are well suited to the particular conditions of mountain areas (Dax, 2020, Euromontana, 2020).

Mountain development should look beyond the traditional primary sector to embrace opportunities provided by diversification into manufacturing and service sectors; whilst valuing and protecting the landscapes and ecosystems provided by agricultural and forestry management. Such diversified economies in attractive cultural and ecological landscapes help retain young people and attract new residents through amenity driven migration. This highlights the need for place-based development that focusses on the territory not individual economic sectors. Such place-based development should specifically consider how to attract and keep families through provision of education, childcare and housing, and facilitate ways to use ‘abandoned’ land without recourse to land sales that might exclude local residents (Euromontana, 2023)

Such resilience requires a combination of endogenous action and exogenous support. For example, functional urban-rural linkages require strong transport and digital infrastructure to reduce physical distance to markets, to consumers and to knowledge. However, resilient mountain communities also need to be participatory and practice social innovation, utilising tradition and cultural heritage to develop dynamic solutions rather than blocking change. Provision of infrastructure and technology without the ability to use it is not useful – provision of support, upskilling and education accessible to mountain residents is also required (Euromontana, 2023).

Whilst development should be community led, innovation tends to develop through extra local networks exchanging good practice and new ideas (Dax, 2020, ibid, Euromontana, 2022, ibid). Certification, valorising mountain production, is identified as an important mechanism to reward social innovation and provision of public goods.

4.2.2 Rural Development

Many of the themes in section 4.2.1 are also found within the wider rural development literature. The European Long-Term Vision for Rural Areas (European Commission, 2021, SHERPA, 2020) recognises the challenges facing rural areas, such as depopulation and land abandonment, lack of infrastructure and amenities, over-use of common pool goods and decline in biodiversity (Augere-Granier and McEldowney, 2021).

The responses to these challenges are also share common themes (Veitners et al., 2022). Rural development is generally considered to be a form of neo-endogenous development that requires attention to territorial specificities but also an understanding that place-based development is influenced by extra-local influences (Navarro and Cejudo, 2020). In other words, rural (or mountains) is a relational category that makes sense when contrasted with its antonym (urban) but is constituted through its interaction with urban settings. Although rural development has been traditionally defined through its setting, land use and physical resources, increasingly new rural paradigms draw attention to the role that rural settings play in a transition to a green growth economy focussed on valorising nature for amenity, quality of life, health and social capital (Dax and Fischer, 2018). The recent attention to the climate crisis has accelerated this focus and made rural areas part of the discussion on a just transition to a post-carbon economy. The digital revolution also brings new opportunities (Brunori et al., 2021)

Assemblage, (particularly agriculture, local food and tourism) provides a way to develop these amenity-based economies and also makes a strong and material connection to local urban areas (Galeano-Barrera et al., 2022a). Family farms, tradition and culture are sustained through multi-functional and diversified agricultural holdings. These diversified producers require strong support from value chain businesses and from policy to ensure that social innovations are supported through technological innovation and suitable infrastructure. Therefore, investment is needed across all territorial capital including human, social and cultural capital to build capacity for transition.

The focus is strongly territorial, about integration and not economic sectors, responding to the complexity inherent in taking a landscape scale and spatial planning approach (Ros-Tonen et al., 2018, Ros-Tonen et al., 2015). This raises many challenges about how to balance multiple objectives and deal with power asymmetries and requires strong participatory processes that bridge administrations, interests and roles through a strong shared vision for the rural territory. Central to these bridging processes is knowledge exchange and knowledge brokerage such that territories are adaptively managed through collection, analysis and interpretation of monitoring data to consider how and if change is required (Galeano-Barrera et al., 2022a).

Social relationships are central to innovation, and rural development requires active, creative and dynamic individuals supported by appropriate institutions (Navarro and Cejudo, 2020). Formal institutions matter, as these can help to reduce transaction costs and bureaucracy and foster inter-rural and rural-urban exchanges. However, informal institutions, personal networks and trust are also vital for territorial cooperation and conflict resolution. Such discussions illustrate that economic development is not the same as poverty reduction, and it is important to clarify the shared objectives for the territorial development processes; as well as the roles and responsibilities of actors involved.

Change is not aways welcomed and the complex trade-offs discussed by Ros-Tonen et al. (ibid) can result in those worried that they might lose their livelihoods or status. Therefore, rural development strategies need to pay attention to those excluded by change and to recognise that any 'just transition' requires attention to building new capacities and capabilities within the rural population. Such upskilling and support is additional to provision of capital expenditure on infrastructure and may require either funding for local support workers or extra-local support that can be tailored to the specific context.

4.2.3 Summary

Both the mountain and rural development literature share common themes regarding the importance of both social innovation and the material need for infrastructure and technologies. The fragile nature of mountain environments explains the importance of protecting nature in the mountain literature, but the need to protect the landscape and its ecosystem functions is also important in rural development, given the primacy of the climate and biodiversity crises in current thinking. Development must be context specific, inclusive and participatory. However, rural or mountain territories are not autonomous and exist in a globalised world, whereby any endogenous strategies are conditioned by exogenous policies, structures, power relations and social norms.

5 Types of Upgrading Strategies by Sustainability Theme

This deliverable is designed to synthesise the information gathered in the first half of the H2020 MOVING project and identify common challenges and strategies to resolve these challenges. As highlighted in section 4, there are a range of strategies that are suggested from the value chain and territorial development literature. To answer the research questions in section 7, these strategies need to be brigaded into a structure to allow us to compare and contrast the strategies across the 23 MOVING cases in way that highlights insights for sustainability and resilience.

To maximise the utility of these findings for further aspects of MOVING, strategies to upgrade vulnerable VC-As and protect resilient VC-As are categorised into the five clusters that will be used in WP5 to further analyse strategic options to ensure the sustainability of mountain value chains (Table 4).

Table 4: WP5 Clusters and Descriptions

Cluster Name	Short Description
Social and Demographic (S)	General trends towards depopulation and young people questioning the attractiveness of rural and mountain areas (versus in-migration by other groups) provide the context for this cluster, which considers VC related opportunities that might deepen and widen the social fabric of such areas. Research questions will consider: the extent and quality of employment opportunities in case study areas; how networks and social wellbeing might be strengthened; the conditions (including conducive enabling environment) upon which opportunities and benefits might be provided; and integration of age, gender and other social groups to the VCs.
Innovation and Infrastructure (I)	Challenges relating to remoteness, difficult terrain and modest local populations provide the context for this cluster in terms of underpinning 'spirit of innovation' and provision of supporting infrastructure for economic activities and communities. Research questions will focus on the presence and influence of innovation in VC performance; availability, quality and influence of infrastructure on VC performance and ability to innovate; structural characteristics that challenge upgrading and investment; the models of innovation that might support transition to green economy; and the skills and tools required.
Governance, Cooperation and Territoriality (G)	Where many actors and institutions come together, opportunities for cooperation and conflict arise. Many of the special qualities that characterise mountainous rural areas also attract tourism visitors, posing challenges and opportunities for governance that are explored in this cluster. Research questions will consider ways that VCs and assemblages (VC-As) relate to tourism in the context of mountain landscapes; how VC-As and regions utilise and support skills and expertise; the ways that VC-As enhance qualities and values of mountain regions; and ways that tourism and related value chains promote collaboration and investment that support rural mountain areas and communities.
Nature and Ecosystem Services (N)	Important territorial capital, natural resources, and ecosystems characterise mountain regions, that are utilised in the context of VCs. In the context of global climate change (CC), this cluster considers interactions between actors and the natural environment including research questions that focus on: the impacts of CC on territorial capital and implications for VCs; HNV farming in the context of CC; ways that local actors balance land use, conservation, production and consumption of natural assets; and vulnerability of actors' role in public good provisioning.
Value and Quality Products (V)	Definition and protection of quality in agro-food products provides the context for this cluster, including schemes focusing on geographic indications, organic products, and other specific aspects that relate to mountain products or protected areas. Research questions addressed in this cluster focus on the

	extent that VCs are based on local territorial capital; the extent that VCs contribute employment and business opportunities to local people; the role and impact of innovation and climate change on product development, quality and market potential; and the impact of bureaucracy and affordability on certification and uptake.

The main objective of WP5 is "to develop critical benchmarking of cross-regional groups of value chains (VCs) against vulnerability, sustainability and resilience criteria, with a focus on the trade-offs between the provision of public and private goods in the mountain areas." These clusters were derived from inductive themes arising from the analyses of the 23 mountain VC-As combined with the STEEPV framework used to cluster rural territories in recent rural development analyses (Polirural, 2021). The policy and institutional issues will be addressed by WP7 and become a sixth cross-cutting theme for this analysis.

The WP5 clusters map nicely onto the territorial and VC literature types of strategies as shown in Table 5 below:

Table 5: Categories of Upgrading Strategies

	WP5 Cluster short name	Description	Connection to VC literature	Connection to Territorial Development literature
S	Social	Attention to demographics; social cohesion; quality of work; gender, age, ethnicity	Social upgrading: Employment rights; Employment related welfare; skills; attention to social consequences of VC configurations, can be an aspect of product upgrading	Provision and quality of employment and income; creating or sustaining diverse and dynamic communities and plural cultures
I	Innovation	Attention to infrastructure, technologies and innovations including knowledge that support the VC-A	Technical or social innovations to improve the VC processes or VC functions	Role of improved infrastructure and digitisation and other social or technical innovations to address challenges and provide services e.g., Smart villages; smart mountains; provides support for adaptive management
G	Governance	Attention to cooperation within and between VCs and territories to improve opportunities and resolve conflicts	Inter-sectoral alliances; inter-chain strategies; trust and conflict resolution between producers and across geographies in global value chains (GVCs)	Diversification e.g., agri-tourism, territorial governance institutions, intersectoral partnerships; community-led or place-based initiatives; also rural-urban interactions
N	Nature	Attention to how VCs produce public goods and how they valorize	Process and Product upgrading to reduce use of natural resources, protect natural capital and restore	Restorative agriculture and combining production or processing with restoring biodiversity and mitigating climate change;

		ecosystem services; also adaptation to climate change and protection of natural assets	biodiversity and ecosystem function	protection of mountains as source of public goods for lowlands
V	Value	Attention to how VCs use formal or informal processes to valorize cultural or place identity	Product or process upgrading and inter-chain or sectoral alliances; potentially VC function upgrading through marketing and branding/certification	Protecting and leveraging cultural traditions and place identities to create territorial advantage; place-based marketing; formalization through certification processes
P	Policy	Attention to the role of public and private policies in enabling VC upgrading	Public policy is external to VC processes as part of the enabling environment but has important supportive (or constraining) role to play	Attention to neo-endogenous development; how local actors respond to externally derived regulations, incentives and procedures and how they may try to territorialize their implementation.

As with all categorisation processes, there were some fuzzy boundaries and difficulties about where to place the strategies identified in the literatures. For example, place-identity could fit in S or V, but has been put into V for our analysis. Likewise, knowledge has a social dimension, is a key component of innovation; is part of what makes governance institutions function; is essential to managing natural resources and part of how value is added. For our analysis, knowledge and skill have been brigaded with innovation. Finally, the initial focus of VC analysis was competitiveness and profitability for individual firms, and it is not immediately obvious where economic strategies to improve revenues or competitiveness might fit. Wages and incomes fit well in the social cluster, and innovation and governance explain how competitiveness can be improved. However, for our analysis, we have brigaded these issues into the Value cluster. We will use these categories to help report RQ2 in section 7.2, particularly in ways that can be further exploited in WP5 clustering analyses.

To summarise, the VC upgrading lens is focused on the proactive business decisions made by the actors along the connections within the VC (production, processing, distribution & marketing and consumption) and associated assemblages. This is complemented by the territorial development literature that primarily highlights the interactions and assemblages within places; however the neo-endogenous development also calls attention to tele-coupled interdependencies between places through space.

6 Information from the MRLs

6.1 Resource System Vulnerabilities & Solutions (D3.2)

Previous analyses (reported in D3.2 (González-Moreno et al., 2022)) focussed on the vulnerability and sensitivity of natural resource systems underpinning their value chains identified in D4.2 (Blackstock and Flanigan, 2021) and described in D4.3 (Blackstock et al., 2022). Maps and indicators of several drivers and pressures on the natural resource system were discussed with members of the multi-actor platforms. These included:

- Climate change induced changes in precipitation
- Climate change induced changes temperature
- Climate change induced changes in extreme events (floods, droughts, storms, heatwaves, hail, forests or blizzards)
- Climate change induced changes in wildfires
- Changes in land-cover and land use.
- Soil physical degradation
- Over-exploitation of resources
- Pests, diseases, and invasive species
- Pollution
- Demographic changes

The analyses illustrated where the 23 MRL resource systems were sensitive and therefore vulnerable to the effects of climate, other environmental pressures, and depopulation. Participants in each MRL perceived the most important drivers of vulnerability to be climate-related drivers, especially rainfall and temperature. Non-climatic drivers showed great variability, especially regarding overexploitation of natural resources, land use and land cover change. All drivers were perceived to have increased in magnitude over the last 20 years as in, with climate factors generally showing a greater increase in magnitude than other types of pressures. In response to these increasing pressures, a total of 160 adaptation mechanisms were identified across all MRLs. They were assessed in terms of their feasibility and uptake. The types of approaches being used; or being sought, to respond to these pressures on the natural resource systems forms part of the material re-analysed for upgrading strategies.

6.2 Youth Engagement (D1.5 in development)

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).

6.3 VC-A Valorisation and outcomes (D4.3)

D4.3 addressed 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.

6.4 VC-A Vulnerability and Resilience (D4.5)

This work evaluated the vulnerability and resilience of the value chain assemblage to climate and other changes within the Mountain Reference Landscape (MRL) by assessing responses to drivers in the past and up to the present day. The empirical study enabled the most important threats to mountain value chains to be identified from the perspective of stakeholders. These threats include environmental, socio-economic and political and institutional threats. All threats were evaluated and ranked by stakeholders with respect to their importance and existing adverse effects. Findings of the study suggest that all categories of threats – environmental, socio-economic, institutional and political – are considered relevant in mountain areas from the perspective of stakeholders. Participatory workshops with stakeholders in mountain regions enabled multiple preconditions to be identified for building an adaptive capacity for mitigating these adverse effects. All preconditions were classified according to their linkage to mountain value chains. Findings suggest that stakeholders in the local landscapes feel capable of mobilising resources for adaptation to environmental threats (namely drought or extreme weather events, to mention the most important threats). Even though these threats are considered as the most important, where they affect processes that stakeholders are probably able to control it is possible to create an adaptation strategy. On the other hand, the threats from the socio-economic, institutional and political areas make mountain regions vulnerable in a sense that they impact VC-As on a larger scale (e.g., changes in subsidy schemes).

7 Upgrading Findings

This section provides the answers to the research questions outlined in section 1 (Introduction) by summarising whether our 23 VC-As actually need upgrading (section 7.1); and the types of upgrading strategies being sought, or in use, according to our WP5 and WP7 themes (section 7.2). Some further synthetic discussion of the implications for which actors are involved (section 7.3) and the implication of VC-A upgrading for tele-coupling (section 7.4) and finally a summary of the main interactions (section 7.5).

7.1 What requires upgrading?

This section focuses on the main issues, vulnerabilities and threats identified across the 23 case studies in MOVING, including patterns based on the seven value chain types illustrated in Table 3. Table 6 provides an overview of some of the key issues by case and an indication of where potential upgrading strategies might be applied based on the sustainability clusters identified for WP5 – and where threats identified might be aligned with policy change (relevant to WP7).

Table 6: Summary of vulnerabilities/threats by sustainability themes for upgrading

	VC *(-A)* abbreviation	Key issues (vulnerabilities/threats)	Potential Sustainability Themes					Policy
			S	I	G	N	V	
1	Weiz Lamb *(Dairy)*	• Demographic change • Increase in wolf presence (predation) • Climatic issues (extremes, wildfires, temperature increase, precipitation/droughts) • Soil degradation • Impact of precipitation on forage yield • Incentives & subsidies	X			X		X
2	Western Stara Planina HNV *(no assemblage)*	• Depopulation (esp. young = aging population) • Changes in traditional practices • Uncertainty of HNV – especially for Young Farmers (YF) • Land abandonment • Drought & temperature increase • Biodiversity impacts • Legislation, incentive, & subsidy changes • Inflation, energy prices	X	X		X		X
3	Sumava Beef *(Tourism)*	• Demographic change • Lack of suitable employees (issues relating to generational transfer)	X		X	X		X

		• Disengagement of local municipalities (ties to agriculture negligible) • High costs of entry (farming)/low access to land • Low levels of trust & sharing • Conflict between farmers and tourists • Climate-related (precipitation, temperature, extreme events) • Conservation/use of natural resources • Impact of regulations (National Park, Nature Protected Areas • Reliance on subsidies						
4	Corsican Chestnut Flour *(no assemblage)*	• Demographic changes • Pessimism about climate change impacts on farming • Digitalisation • Land use change • Climate-related (extreme events, temperature increase, drought) • Pests/invasive species • Animal stray • Aging & poorly maintained forest/orchards • Energy prices	X	X	X	X		
5	Drome Lamb *(Conventional lamb)*	• Fear of land abandonment & loss of know-how • Conflict between farmers and tourists • Land ownership and access for farming • Vulnerability to Climate Change (precipitation, temperature) – impact on availability of water • Predation (wolves) • Strong dependence on common agricultural policy (CAP) • Incentive/subsidy changes • Consumer demand changes	X		X	X	X	X
6	Rethymno Carob Flour *(Animal feed)*	• Demographic changes (depopulation, aging population) • Development issues (e.g., infrastructure and services) • Lack of training/support for young farmers (YF) • Uncertainty regarding contribution of carob to economic development • Difficulties with collaboration (and impacts) • Land abandonment & change of use • Lack of support from agricultural directorates	X	X	X	X		X

		• Climate change (extreme events, spring drought) • Low credit support & high taxation on capital • Legislation changes • Dependence on EU subsidies • Energy prices						
7	Transdanubian Agro-Ecological Knowledge *(Rural tourism)*	• Gentrification • Seasonality of employment • Lack of affordable housing • Mass tourism/associated infrastructure • High costs of entry (farming, consumption) • Potential urbanization • Climate related (precipitation, temperature) • Erosion • Land degradation • Competition for resources	X	X	X	X		
8	Alto Molise Cheese *(Beef)*	• Aging population/population decline • Young people pessimistic re future of area (‘dead’) • Progressive reduction of essential services • Remoteness to institutions • Lack of understanding of mountain communities • Climate (drought, temperature, late frost) • Wild animals and fire threats • Competition for resources • Critical massification (affects reputation of product in area) • Incentive/subsidy changes • Products aimed at social elite • Risk of trivializing heritage & tradition • Energy prices	X	X	X	X	X	X
9	Trento Wine *(Grappa)*	• Demographic changes (workforce scarcity) • Gendering & misbalance of age in staffing • High costs of entry (farming)/low access to land • Issues relating to climate change (altitudinal shift, water use, new diseases) • Extreme events (spring frosts, heavy rainfall) – and resulting soil erosion, compaction. • Drought • Pollution • Invasive species • Soil quality • Limitations on marketing & promotion capacity	X		X	X	X	

10	Tuscan Chestnut Flour *(Chestnut honey)*	• Depopulation/loss of knowledge & practices/grove abandonment • Lack of physical and digital infrastructure • Lack of interest from local representatives/ politicians • Climate change (drought, impact on varieties) • Biodiversity loss • Wild animals (and conflict with environmentalists) • Mismanagement of incentives/subsidies	X	X	X	X		X
11	Maleshevski Tourism *(no assemblage)*	• Lack of employment opportunities, investment in infrastructure, cultural opportunities (particularly for young people) • Demographic changes (aging population/youth depopulation) • Support required to ensure economic returns accrue to local people • Inappropriate water management • Pine pests • Climate related (temperature change, precipitation/drought, wildfires)	X	X	X	X		
12	Serra da Estrela Cheese *(Lamb)*	• Demographic changes (aging population/youth depopulation) = impact on number of producers • Low levels of trust & sharing • Permanent pastures vulnerable to land abandonment & wildfires • Decreasing grazing intensity/shrub encroachment • Summer drought & fires = threat to land use systems (LUS) • No clear differentiation between PDO & Non-PDO	X		X	X	X	
13	Alto Douro Wine *(Cultural tourism)*	• Demographic change (depopulation) • Seasonality of employment • Profits recorded outside of area (company HQs) • High costs of entry (farming, processing)/low access to land • Climate related (drought, increasing temperature, extremes) • Soil fertility • Overexploitation of resources • Pests • Impact of inflation & energy prices	X		X	X		
14	Brasov Certified	• Depopulation/emigration • Limited employment opportunities/wages	X	X	X	X		

	Ecotourism *(Rural tourism)*	• Lack of infrastructure (essential, leisure, digital) • Issues relating to second home ownership, non-traditional development, and tourism impacts (inc. pressures on water). • Low cooperation and trust • Weak governance • Forest overexploitation • Pollution (water, soil, air) • Drought (impacting landscape & biodiversity)						
15	Sjenica Lamb *(Cheese)*	• Demographic changes • Young people leaving area (negative image of area) = aging population & impact on rural way of life • Climate related (extreme events, increased temperatures, drought) • Pollution • Soil quality > impact on pasture > impact on product • Ecosystem services not fully valorised through certification & marketing • Insufficient promotion of product origins • Lack of support through subsidies/investment measures • Slow reaction of policy makers • Inflexibility in bringing product to market (whole or half animal)	X		X	X	X	X
16	Carpathian Bio-Honey *(Pollen health products)*	• Depopulation from rural mountain areas • Uncertain/insufficient as main income • Low levels of cooperation and sharing between beekeepers - trust & sharing • Conflict with neighbours (beehives) due to insufficient protection for beekeepers' rights • Decreasing biodiversity (impact on honeybee health and honey production) • Declining agricultural land (particularly afforestation of mountain pastures and meadows) • Increasing population of bears (predators) • Climate related (drought, temperature fluctuation & extremes) • Uncertain consumers demand (inflation, information about fake honey) • Too strict national rules for "bio" designation	X		X	X		X

17	Betic Organic Olive Oil *(Compost)*	• Need to generate jobs/fair remuneration • Reduction in labour market • Depopulation/aging population (leading to land use change) • Potential crisis re olive sector (youth pessimism) • High costs of entry (particularly for processing) • Climate (drought, temperature, extreme events, impact on pests/disease & soil) • Insufficient subsides and price differentials for organic production • Reliance on subsidies	X		X	X	X	X
18	Huesca Wine *(Quality seal)*	• Negative demographic trends (impact on labour) • Lack of social infrastructure/essential services • Concentration of farm/land ownership • High barriers to entry • Sector dominated by large businesses • Climate change anxiety • Increasing temperatures • Pests & diseases • Climate-related (extreme events, drought, increasing air temperature) • Pollution & soil degradation	X	X	X	X		
19	Sierra Morena Ham *(Non-PDO ham)*	• Demographic changes (depopulation, lack of generational replacement) • High barriers to entry for YF • Climate related (drought, temperature & extreme events) – direct impact on acorns and pigs' ability to feed = fewer product available • Overexploitation (livestock carrying capacity) • Pests • Soil degradation • Reliance on subsidies/lack of	X		X	X		X
20	Grisons Grain *(Animal products)*	• Second home ownership • Limited access to land • Lack of communication between actors • Potential loss of summer grazing traditions • Tourism impacts (e.g., pollution) • Climate related (precipitation/water, extreme events) • Weeds • Increasing rules/requirements for agricultural products		X	X	X		X

		• Challenges associated with small volumes • Complex system for accessing capital						
21	Tête de Moine PDO Cheese *(Gruyere)*	• Demographic changes (generational turnover) • Poor governance • Climate (extreme events, temperature, decreasing precipitation) • Maintenance of woodland pastures & fodder production • Over exploitation & pollution • Reliance on subsidies	X		X	X		X
22	Elmali Tomatoes *(Peppers)*	• Immigration • Difficulties in finding suitable land • Misuse of natural resources (issues for future) – overextraction of ground water • Increasing agricultural waste • Climate-related (water scarcity, temperature rise, flooding) • Pollution • Soil degradation • Competition for resources • Pests, invasive species & disease • Dependence on international markets (e.g., Russia & Ukraine) • High inputs costs/dependency on inputs from outside region	X	X	X	X		
23	Speyside Whisky *(Food & drink tourism)*	• Lack of affordable housing • Seasonal/poorly paid jobs • Competition for staff • Transport • Land tenure • Tourism impacts • High costs of entry (farming, processing) • Climate related (extreme events, temperature (air & water), drought) • Over-exploitation of water resources • Water quantity/temperature • Air quality • Questions of reifying tradition	X	X	X	X	X	

7.1.1 Key vulnerabilities by Focal VC types

In every case, a range of vulnerabilities or threats to the value chain, assemblage, or resource system have been identified (Table 6). A number of key themes can be identified across this range of issues, including climate change related impacts and threats (e.g., drought, extreme events, temperature changes), environmental concerns (biodiversity loss, predation, pests and disease), demographic issues (depopulation, aging populations), land use changes (including abandonment), social issues (relating to employment, housing, services), governance concerns (access to resources, cooperation between actors), conflicts between actors (local and/or visitors), and access/reliance on policy support and/or subsidies. The following sections explores this range of threats by FVC type (Table 3).

7.1.1.1 Meat-based

Environmental issues are key – in particular relating to climate change vulnerabilities and the resulting impacts on the resources that products are dependent, which is relevant in all cases. Reliance on (or lack of) subsidies needed to support production was also identified in all cases. Other issues arising that were particularly relevant to this group of cases include predation by wolves, which was highlighted as a key concern in two of the lamb case studies (Weiz, Drome), conflict between farmers and tourists (Sumava, Drome), and issues relating to soil degradation (Weiz, Sjenica, Sierra Morena) which can ultimately impact on the quality or quantity of animal products being produced. High barriers to entry were also identified in several cases, in terms of access to land (Drome) – particularly for young farmers (Sierra Morena. Issues relating to shifting between generations and loss of know how were also identified as a concern (Sumava, Drome, Sjenica, Sierra Morena), linking strongly to ideas relating to opportunities and infrastructure to support young people staying in mountainous/rural areas.

7.1.1.2 Crop-based

Climate change related issues were also identified as a key concern across the range of cases in this FVC type. Other key concerns affecting the crop-based value chains studied includes occurrence of pests and/or invasive species that affect crop production (Corsica, Tuscany, Grisons, Elmali), issues relating to land access or land use change (Corsica, Rethymno, Tuscany, Grisons, Elmali) – in a number of cases this was directly associated with depopulation or other demographic changes (Rethymno, Tuscany, Betic). Difficulties associated with collaboration and/or local governance were also identified in a number of cases in this category (Rethymno, Tuscany, Grisons). Feelings of pessimism, scepticism or crisis also arose in relation to continued production of traditional crops such as chestnut flour, carob flour and olives (Corsica, Rethymno Betic) – particularly among young people.

7.1.1.3 Cheese

Concerns relating to climate change (drought, temperature change, extreme events, wildfires) and demographic change (aging population, population decline) concerns were felt across all the cases with this type of VC. Contrasting land degradation issues were identified in Tete de Moine and Serra da Estrela, whereby the concern in the Swiss case relates to over exploitation of land

and the Portuguese case relates to decreasing grazing intensity and resulting in loss of grazing land through shrub encroachment and soil degradation from summer fires. Issues relating to governance were also identified across this category, in terms of remoteness to key institutions in Alto Molise), low levels of trust and sharing in Serra da Estrela, and poor governance described in Tete de Moine. As with many of the cases across the project, vulnerabilities were identified relating to incentives and/or subsidies (Alto Molise, Tete de Moine).

7.1.1.4 Bio-Honey

Key issues identified relating to bio-honey production in the Carpathians case study include several of those identified in other types (climate change, demographic change, land-related concerns, competition for resources, low levels of trust/sharing) but also environmental and governance issues. These issues include: decreasing biodiversity and afforestation of mountain pastures and meadows – which impacts directly on honeybee health and consequently on honey production, conflict with neighbours (due to presence of hives), low levels of willingness for cooperation between beekeepers (partly due to adverse attitudes towards cooperatives that were obligatory during the past political regime and partly due to possible disease spread when sharing equipment and space with other beekeepers), insufficient protections for beekeepers' rights whilst excessive rules for "bio" designation. Additionally, the consumers demand for real honey may be impacted by inflation or by a lack of information about possible adulterated honey sold in supermarkets at a low price.

7.1.1.5 Alcoholic Drinks

This FVC type includes three wine case studies and one whisky. Again, climate-related concerns were felt across the board. In this type of VC, issues relating to employment were particularly prevalent – including workforce scarcity and competition for staff resulting from negative demographic trends (Trento, Huesca, Speyside), seasonality and quality of employment (Alto Douro, Speyside), and gendering and age-related concerns (Trento). Barriers to entry to the sector were also identified across all value chains of this type, including issues such as access to land and concentration of land ownership, and sectoral domination by large businesses (often outside the MRL area). Over exploitation of resources was also identified as a concern (Alto Douro, Speyside), as was issues relating to infrastructure and services necessary to support life in the case study areas (Huesca, Speyside).

7.1.1.6 Tourism

Only two tourism focal value chains were included in the project (Maleshevski, Brasov), though several others referred to tourism in the context of assemblage (Sumava, Transdanubian, Alto Douro, Speyside). Again, climate-related concerns were identified by both FVCs, in terms of the same concerns as many other areas (temperature change, precipitation/drought, wildfires), but also in terms of its impact on the landscape and biodiversity that underpins tourism. Like the alcohol type, which links strongly to tourism, issues relating to employment and infrastructure were identified in terms of their impact on (and being impacted by) the presence (or lack of) young

people. To that end, concerns relating to demographic changes (aging population, emigration, and youth depopulation) were identified in both cases.

7.1.1.7 Public Goods

Of all the FVC types, this is probably the one that exhibits the biggest range of difference between its two cases, although the characteristic concerns relating to climate change and demographic issues persist in both. Uncertainty regarding the future of each value chain stems from cultural changes, but for Western Stara Planina issues relating to inflation, energy price and policy were identified as important, whereas issues relating to infrastructure and competition for resources came to the fore in the Transdanubian case.

7.1.2 Vulnerabilities specific to mountain areas

Mountain areas share many of the same vulnerabilities of rural areas more generally, whereby factors such as remoteness appear to hold the greatest weight in terms of distance from institutions (Alto Molise), and investment in digital and physical infrastructure and services (healthcare, education) – resulting in a poorer quality of offering and impacts on available workforce (Brasov). In the context of rural areas more generally, remoteness as a characteristic of mountain areas is suggested to magnify any given problem (Sumava).

Depopulation, coupled with land abandonment, is another example of how issues in mountainous areas become exacerbated. The core mountain areas, of medium and high altitude are more affected while lowland areas can prosper – people move into lowlands where accessibility and life quality are higher. Indeed, disconnection between value chains and core mountain territory, such as by shepherds, is believed to amplify problems relating to climate change, as shrub encroachment and lack of maintenance of landscape mosaic can increase the risk of wildfires, as well as reducing pasture biodiversity, water quality, and the attractiveness of mountain landscapes to residents and tourists (Serra da Estrela, Slovak Carpathians). Mountain areas also tend to have higher presence of wild animals like wolfs and bears. Peculiarities of mountain terrain and difficulties relating to altitude are also suggested to be particularly problematic, whereby areas uninhibited by these characteristics are more likely to prosper where alternatives are available.

The effects of drought are also resulting in drastic reduction in mountain olive crops, consequently impacting on socio-economic factors that combine to severely affect the sustainability of the sector (Betic). Conversely, extensive cattle farms in altitudes above 800 metres, were not seen as sensitive to these climate changes (Sumava).

At the consumption end of the spectrum, expectations of the way that mountain landscapes look are important in the context of tourism (Sumava) – though the impact of climate change in this regard is predicted to benefit mountain tourism (Corsica). However, with cohabitation of agriculture and tourism in mountain areas conflicts arise, with tourism stated as a factor in fears relating to land abandonment and loss of know how in mountain areas (Drome). Vulnerability has also been associated with lack of understanding of mountain communities by urban citizens (Alton Molise) and issues relating to affordable housing in popular tourism areas poses particular challenges for the workforce in such areas (Speyside).

7.1.3 Examples of benefits and positive outcomes

While it has been the purpose of this section to focus on threats and vulnerabilities, it is important to acknowledge examples of where climate and other changes in mountain regions and socio-ecological systems may be positive for our VCs. In Trento, for example, gradual shifting of viticulture (and new PDO zones) to higher altitudes becomes attractive compared to temperature stress in the lower valleys; and increasing temperature is also associated with improvements to growing conditions in Grisons. Similarly, planting projects at higher altitudes has been suggested in Corsica, taking advantage of the mountainous character of the island. The meat and/or cheese VC-A might benefit from increasing temperatures if this translates to longer grazing periods that decrease the need to supplement feed (e.g., Sjenica Region). These positive outcomes set the scene for the discussion of upgrading strategies to improve conditions in mountain areas in the next section.

7.2 What kind of strategies might be suitable?

This question will consider what strategies could help those VC-As reporting vulnerabilities, drawing on strategies from the literature and the suggestions collected in prior deliverables. It will also consider those strategies already in use that make mountain VC-A resilient to threats, drawing from the adaptive capacities that have already been identified by the local MAPs.

7.2.1 Social and Demographic (S)

All our VC cases identified the need for VC-A upgrading strategies to address social and demographic issues in some shape or form. There is a strong desire to upgrade the living conditions for mountain communities and producers and therefore it is important to consider what types of social VC upgrading strategies might be relevant. Many connected issues regarding territorial governance, support for new entrants and investment in regional infrastructure are covered in section 7.2.3, and 7.2.2.1 accordingly. There was more information about the threats to social and demographic territorial capitals than social upgrading strategies, suggesting an area to focus on more explicitly in the WP5 cluster. Conversely, there was a strong push to consider how VCs can have a positive impact on the social fabric, particularly the valorisation of culture and tradition, that was less evidenced in the social upgrading strategies due to their sectoral, rather than territorial, perspective.

7.2.1.1 Demographic change

Depopulation and loss of producers or workers in the primary sector was threatening many of the MOVING value chains; and many highlighted that these threats were hard to adapt to or manage without external support. Depopulation creates a negative cycle that impacts on VC upgrading strategies, as less people often leads to less interactions, less trust, and less capacity to activate process, product, functional, inter-chain, horizontal or vertical upgrading strategies. In many cases, there was a general push to invest in the rural social and physical infrastructure to keep people in the area, which would benefit the full suite of VC-As in the region rather than being a specific upgrading strategy for any one area. Mountain VCs, particularly those associated with

tourism and knowledge production, harness the general amenity traits that attract people to the mountains – for example Tuscan students saw mountains a place for relaxing, recharging, good food and therefore a land of opportunities. This highlights the potential for horizontal territorial coordination between businesses within a VC-A to collectively promote their area not only to consumers but also potential workers (see also section 7.2.5.3). It also suggests that an upgrading strategy to increase the supply of skilled labour belongs not only with the territory but through embedding wider national awareness and opportunities of mountains as places to live and work into the school curriculum (as suggested within Maleshevski, Rethymno, Speyside regions). This link with education and awareness raising/valorisation of mountain livelihoods (see 7.2.5.4) was not evident in the social upgrading VC literature.

In some of our cases, the success of the focal VC or the VC-A had helped to reverse depopulation in that area (e.g. Elmali greenhouse development) through providing more jobs and upgrading the agricultural production to a more lucrative business model. In other cases, diversification, described in the VC upgrading literature as 'inter-chain' upgrading, was highlighted as current, or potential, strategy to maintain economic viability of mountain farms and retain young people in the mountain areas (e.g. Transdanubian VC-A; Alto Molise VC-A; Rethymno VC-A, Trento VC-A). The focus using the VC lens is to ensure that diversification is complementary, jointly valorises the mountain territorial capital and capturing economic and social added value within the mountain territory. Therefore, it is important to note the cases where diversification also creates social tensions e.g. conflicting interests between visitors and local people (Sumava), and the risk of trivialising heritage and traditions (Alto Molise). Negative social impacts of tourism were reported in some areas (e.g. Sumava, Speyside, Brasov) – therefore using 'inter-chain' upgrading strategies need to pay careful attention to the social implications; and should be combined with social upgrading strategies.

In several cases, the territorial actors were seeking revitalisation of areas through new entrants to farming (e.g. Weiz; Western Stara Planina) and to processing (e.g. Alto Douro; Speyside). These were both those who would own businesses, but also workers (see section 7.2.1.3 on quality of work). New entrants to the VC-A and territory can create a critical mass of human capital necessary for innovations associated with process and product upgrading strategies. The ability to attract and keep immigrants to the territory and ensure that they contributed to a positive VC-A within the mountains was often linked to State aid, including provision of infrastructure but also the suggestion of using tax breaks and housing policy to make it easier for new working families to live and work in the mountains (see also section 7.2.2).

There were some examples where the VC-A wanted explicit support to help local people and incomers access land to reverse depopulation and land abandonment. Smaller alpine farms and orchards were sometimes no longer actively managed, yet a combination of land values and inheritance meant that these assets were not released to those who want to use them. Some VC-A wanted regional governance institutions (like a municipality) to help secure fair access to land or to at least facilitate the transparent identification of ownership and use rights on a land register to enable negotiations between private businesses to take place.

However, some cases reported tensions between established communities and newcomers to mountain areas (e.g., Grison, Weiz and Huesca). These tensions were related to whether the new entrants to the VC-A were respectful of local traditions and cultures; and their ability to manage in the often harsh physical and social conditions of the mountains. Finally, there were also some MRLs facing pressures from gentrification and retiree immigration which created difficulties for the VC-A through crowding out the housing stock and creating competition for the existing working age population (Speyside, Transdanubian).

Social capital and social cohesion therefore become important aspects of VC-A upgrading. Often, local tradition and social networks can enable or impede how VC-As function (e.g. see the importance of the 'master of the mountain' managing (or not) local animals in their alpine grazing herds). Process, functional or product upgrading, particularly where it requires horizontal cooperation does not work without strong social networks in the locality (see also 7.2.2.3). However, these upgrading strategies rely on the social networks and capital enabling innovation (as illustrated in the Elmali case) rather than allowing social conservatism and fear of risk impeding innovation (as hinted at within the Betic case study).

There were very few examples of social upgrading strategies that explicitly addressed issues of gender or young people in terms of labour practices within the data. However, there were some cases where more attention to the voices of young people were seen as one solution to depopulation of the area (e.g., within the Brasov, Speyside, Sierra Morena and Maleshevski MRLs); and some VC-As highlighted the importance of having young people as assets to their businesses e.g., for rural and adventure tourism.

7.2.1.2 Gender and family

Although gender imbalance was highlighted in D4.3 at the processing and production stages; the review of the WP4 data found very few examples of positive gender action – exception was the ongoing project on cheese production in Serra da Estrela; the cheese production in Sjenica VC-A and also the desire to see support for female organic farming in Maleshevski. These activities may reflect traditional division of labour (cheese making in the home compared to livestock processing in slaughterhouses).

More prominent in the data were references to the importance of families in the resilience of mountain VC-A, with these assemblages often part of a rural family pluriactivity to ensure a sustainable livelihood. Often VC-A were interchain upgrading strategies that made the most of different roles for different family members. These strategies were also about economic resilience. For example, carob cultivation, bio-honey and agro-tourism were all seen as important sources of additional income for farming families, and therefore examples of using 'inter-chain' upgrading strategies not solely to increase the competitiveness of the VC but also to provide a sustainable mountain livelihood. Not only were mountains seen as attractive for workers, but under the right conditions, mountains were seen as particularly attractive for families and children (e.g., Sumava, Transdanubian).

Family businesses were often invoked as a form of small enterprises within the mountain VC-A

that would be the main actors involved in upgrading. Often, small family farms with a history and culture of pluriactivity were seen as most likely and most able to adapt (process upgrading strategies); for example, the ability to mix livestock farming with cultivation of vines, olive trees, carob trees or nut trees (see section 7.2.2.2 on technology and innovations; and section 7.2.4 on strategies to protect ecosystem services). Therefore, there needs to be attention to supporting farm succession as well as new entrants as part of a horizontal cooperation upgrading strategy. It is less clear how the current VC upgrading strategies build on these family dynamics, yet our MOVING cases suggest that mountain families are often stewards of traditional mountain practices being valorised in our mountain VC-As. These findings help to explain the fear of young people of areas like Alto Douro becoming an economically successful region devoid of local people.

The importance of small to medium-sized enterprises (SMEs) and families in many of the VC-As draw attention to the need for upgrading strategies to tackle high entrance costs of some VC assets and the need to ensure that external investment to upgrade VC-As do not displace local people. There were some suggestions that policy (see section 7.2.2) specifically address access to land and VC opportunities by small holders and families. Cooperation between VC actors could be identified as one such opportunity for value to be generated from previously abandoned land, such as in the Huesca wine VC-A where increased flows and competition were seen to benefit the MRL area.

7.2.1.3 Quality of work

There were more examples of how our MOVING VC-A cases were considering or using social VC upgrading strategies to improve or protect quality of work and livelihoods. Some VC-A were using national regulations to increase wages, regulate the hours worked and ensure holidays were provided to attract and retain staff, although this type of upgrading strategy is more common in large corporations rather than self-employed farmers. Selling premium products was another strategy to enable higher wages to be paid (product upgrading) and some cases (e.g., Elmali and Maleshevski) were seeking different types of contracts to improve prices and wages using vertical coordination to negotiate for market or CSR social upgrading strategies). Vertical coordination strategies along the VC were also highlighted as ways to improve the diversity of skilled work available to mountain residents, such as moving more sales and marketing jobs in mountains, a form of functional upgrading. This however would require investment in skills and training or attracting ‘digital nomads’. One interesting strategy, related to process upgrading, was to de-mechanise mountain production and harvesting to increase demand for workers (suggested by the Trento youth engagement). Many cases wanted to see additional weight put on employing and training local people (e.g., Brasov, Speyside, Corsica; Grisons; Alto Douro) and VC upgrading strategies would suggest that this could be enabled through using market or CSR upgrading that linked local labour employment with how the product was marketed or through use of voluntary codes of practice in the supply chain.

There is a strong link to the enabling environment and role of the State here. Although stable and year-round employment is a goal for many of our VC-As, there are times where seasonal workers

are needed and it would be useful to ensure the VC-A businesses can pay well for short seasonal contracts without implications for their social benefits over the rest of the year; and to help attract students and retirees to help out at these peak times (e.g., harvest, festivals and events). This also relates to requests to better support new (and young) entrants to the VC-A beyond agricultural or industry subsidies, but to ensure that other aspects like health insurance, social security payments, pension contributions and so forth are explained and where necessary subsidised.

These strategies need to work with strategies to increase the reputation and status of production and processing work within the mountain communities and general public, so a further upgrading strategy could be around how to dignify and upgrade perceptions of employment in mountain primary sector (see section 7.2.5.3 on value and awareness). Innovations and technologies can help improve working conditions and reduce drudgery where possible (see section 7.2.2.2).

7.2.1.4 Summary

Quality of life is important to our MOVING MRL MAP participants and this quality is underpinned by addressing depopulation, supporting families, and providing good quality working conditions. Whilst there is a strong interest in protecting social values in the MRL, most of the strategies were associated with wider territorial development and diversification and there was not much evidence of explicit 'fair work' 'and alternative employment bargaining techniques that is highlighted in the social upgrading literature. Much of the upgrading is linked to collective/cooperative action and will be further addressed in section 7.2.3 on Governance.

7.2.2 Innovation and Infrastructure (I)

This thematic cluster strongly aligns with the economic and environmental upgrading strategies in terms of process upgrading, particularly using innovations and technologies to address impacts on the environment. However, it also links to the Social and demographic (S) thematic cluster through the focus on territorial infrastructure that can attract and keep workers and local consumers, and to the cluster on Value (V) particularly regarding combining innovation with tradition. The section is set out through discussing the importance of infrastructure upgrading (section 7.2.2.1), technological upgrading (section 7.2.2.2), further types of innovations (section 7.2.2.3), and finally the role of education and training (section 7.2.2.4).

7.2.2.1 Infrastructure

Many cases highlighted how upgrading their products, processes, functions or enabling better horizontal or vertical coordination required improved infrastructure. For example, some cases noted that to improve the capture of values within the MRL, later VC stage practices around Processing, Distribution/Marketing and Consumption should be moved to the MRL or MRR areas. To do this successfully requires the following types of infrastructure: transport, health and education, housing, waste, energy, water and digital services.

Improving road and transport links would help in many ways. It would allow better horizontal coordination and collective solutions by allowing producers to move about – for example, planting

crops at higher altitudes or better grazing management is facilitated if the producers can move around the territory; and it helps with inter-chain upgrading by increasing access by tourists. It also helps with social upgrading by allowing local people to attend non-local training and professional development or facilitate visiting experts to share innovations. Transport infrastructure should be developed to enable public transport – this is good for climate mitigation in the movement of goods in and out of mountains; to promote low carbon tourism and to support young people who may not afford to drive a car. Some cases also drew attention to how tourism development has already stimulated improved road transport links (e.g., Transdanubian MRL). The infrastructure should include attention to paths and track as well as roads and rail which improves the recreational offer to both tourists and local residents. Therefore, territorial development can also upgrade the product experience for tourism VC-A. For example, traditional livestock paths and altitude shelters are being revalorised for tourism experiences in Brasov, Serra de Estrela and Maleshevski. However, infrastructure can also impede the management of land use systems such as common pastures (e.g., the proposed highway in Sjenica).

Other forms of territorial infrastructure that underpins the ability of a VC-A to function well and retain skilled staff include the need for modern and accessible health services, and the importance of a high quality education provision from nursery to adulthood. Indeed, the presence of schools were often seen as vital to keep residents (and therefore workers and local consumers of the VC-A products) within the territory. The availability of housing including competition between residents and second homeowners was highlighted in a few cases, with the Speyside VC-A 'tied' housing was traditionally provided for workers. Leisure facilities in the region are good for tourism but also retain families and young people. Examples given by young MAP stakeholders to increase the attractiveness of mountain areas as places of opportunity to live and places to bring up family include access to the types of physical (housing) and institutional (healthcare, education) infrastructures described, but also quality of life indicators relating to social events, leisure facilities, nature-based connections, and feelings of safety. However, it is also recognised that mutually reinforceable processes of change may be required in some areas for such viability and vitality to be introduced into areas for young people where demographic trends are leaning in the opposite direction (section 7.2.1.1).

Some MRLs require stronger waste disposal infrastructure, for example in Crete there is still a need for better sewerage provision; and the special qualities of the soils and topography can make it more difficult to dispose of agricultural waste in mountain areas. The need for recycling facilities was also highlighted by some cases. This could be a traditional function of the State but product and CSR upgrading strategies, particularly through environmental certification, could also provide a complementary push for businesses to invest in such infrastructure. For example, corporate sustainability policies are becoming the norm among whisky producers in Speyside.

With the ongoing energy security and climate crisis, many VC-A were addressing reducing their energy demands or finding alternative sources as a form of process upgrading. In most cases, energy provision requires territorial infrastructure to transport energy inputs (e.g., biomass) to the energy generator or to transport the energy from the generator to the consumers (business or

residential). Cases were exploring the potential of renewables (water mills, solar, wind, wood, biomass, and methane) at production and processing units, to reduce costs, reliance on expensive inputs and to become more carbon neutral. The former are examples of upgrading through process efficiency; but the latter is an example of potential product upgrading if additional value can be accrued through marketing as a lower carbon product. Energy infrastructure is also linked to a form of inter-chain upgrading, where some MRLs (e.g., Weiz) were considering energy (e.g., agro photovoltaics (PV)) as a form of diversification as an additional income source, land use, and protection for soil and animals. In some cases, benefits such as improved environmental compliance are already being achieved through PV installation on the roof of dairy buildings (e.g., Tete de Moine). A few cases linked transport infrastructure to energy infrastructure, seeking lower carbon methods not only for production and processing but also for distribution (e.g., move to electric vehicles) which also require infrastructure. Finally, in some cases, prior process efficiency upgrading has had benefits for the wider territory, e.g., Speyside malt whisky where the industry paid to extend mains gas pipeline to processing plants, and this provided access for local villages along the route.

Provision of infrastructure to better store and distribute water was an important process upgrading strategy for many VC-As, particularly as so many VC-As were threatened by drought (and irrigation bans). VC-A associated with all the value chain clusters were seeking to build or improve water storage in the landscape and associated infrastructure (sprinklers, troughs etc). Sometimes these were engineered (e.g., Drome, Transdanubian), other times they were more nature-based solutions such as natural water retention basins (e.g., Speyside). Further process upgrading strategies related to resilience to drought are discussed in section 7.2.4. Infrastructure to reduce or treat issues associated with water quality were also raised in some cases (e.g., Maleshevski, Speyside). In some cases, governance is needed to ensure that access to water is fairly distributed between users (e.g., agriculture, processing, and local residents). This is an example of where VC upgrading strategies need to be put in a wider territorial development context to properly address trade-offs and common pool resource dilemmas. Attention to modernised water infrastructure is important to ensure that drought resilience does not come at the cost of increased energy use. Only a few cases (e.g., Huesca wine, Trento wine, Elmali tomatoes) made direct reference to ‘smart’ irrigation, metering water use or wastewater reuse and recovery, which might be considered conventional process upgrading to respond to drought.

There was quite a limited set of upgrading strategies related to digital infrastructure although the need to access ICT was clear for all cases. ICT is needed not only for marketing and promotion of the products but also helps with territorial employment diversification, supports immigration by digital nomads and to retain residents. Having strong ICT infrastructure is a prerequisite for product upgrading strategies (e.g., online marketing of local goods) and process efficiency to allow smart and real time monitoring of production and processing and to support logistics infrastructure for direct sales. Examples of digital infrastructure include online booking platforms and e-commerce, digital tracing schemes for livestock, and meteorological recordings for crop-based VCs, digital hiking and biking maps, digital financial accounting software, online selling platform technologies (and websites), stock control software, and social media.

Finally, there were a number of examples where VC-As were upgrading their physical infrastructure in terms of their production or processing to improve their efficiency and ensure resilience to changes (e.g., in fodder availability and cost). In some cases, animal stabling is being built or adapted to protect livestock from heat stress; in others barns to store and dry hay are being developed. This was particularly highlighted by the livestock systems, but less so in the crop or alcohol systems – here the focus was more on adopting other infrastructure such as netting or fencing. VC-As were also seeking to improve local processing capacity through new plants, particularly in the crop and alcohol types. This is a form of process upgrading, often with environmental benefits. However, infrastructure is also strongly linked to section 7.2.3 on governance (e.g., cooperative processing infrastructure) and section 7.2.6 on policy as infrastructure needs to be planned and regulated for the good of the territory not just the economic VC interests.

7.2.2.2 Technologies

There were lots of examples of technical innovations related to process upgrading at the production stage. Much of the data came from adaptation strategies to deal with the threats of climate change by breeding selection - using locally adapted plants, seeds and breeds to support both crop and livestock (meat and cheese) VC-As. Our MOVING cases were exploring new grass mixes, different grafting combinations and new local varieties of vines, nut trees and olive trees, as well as native sheep and cattle breeds. For example, the Alto Molise livestock farmers are interested in cattle breeds that produce both dairy and meat products, to allow them to increase revenue through participating in both markets.

By using locally adapted resources, the resource systems on which the VC-A depend are more resilient to extreme events, drought, pests, and diseases. Having more appropriate pasture and tree species can also guard against soil erosion and maintain water retention in the soil. These technologies are often reclaiming past local or traditional breeds – this not only provides the private benefits of protecting the asset for the VC firms, but public goods associated with culture, tradition, and genetic diversity. Whilst valorisation of local varieties is a sound process upgrading strategy, it can conflict with product upgrading strategies, as consumers associate premium products with better known varietals (e.g., in the wine VCs). Finally, not all technologies or innovations are good upgrading strategies – for example members of the Rethymno youth argued that because many shepherds changed their breed of sheep, the VC is now more reliant on expensive external commercial feed.

There are many other examples of process efficiency at the production stage that combine private benefits and public goods. Most of the pasture-based VC types (meat and cheese) were experimenting with changes to mowing or harvesting technologies and regimes to protect biodiversity and respond to changing climate. The crop and alcohol VCs were also using technologies to enable precision farming with smart irrigation and minimum tillage machinery. Innovations associated with access to water are also highlighted in the infrastructure section 7.2.2.1 above. There were also examples where VC producers were changing their management of pests and diseases to use more biological controls to reduce input costs but also respond to

consumer or supplier demand (see market or CSR upgrading responses). The Swiss Jura VC-A noted that some producers were experimenting with milking robots. However, some of the cases highlighted the need for appropriate and small-scale machinery to protect the fragile soil and even a return to human power to create more artisanal jobs. Again, these can be captured by product upgrading if such practices are rewarded by premium prices.

There were fewer examples of process upgrading at the processing stage but there were innovations in water and energy efficiencies being implemented, most strongly in the alcohol type; and moves to adopt climate control technologies in the cheese processing and storage VC practices (e.g., in Swiss Jura). Finally, one of the focal VC is strongly conditioned by technology at the consumption phase, as the Tete de Moine cheese depends on the use of the girolle to generate the characteristic rosette pattern in which the cheese is served. This is a past example of product upgrading, whereby the cheese became distinctive from other competitors in part due to this technological invention used in marketing promotions. Speyside whisky and Rethymno carob production are also seeing product upgrading although these are less reliant on technology and more focused around altering consumer perceptions – from drinking neat whisky to having cocktails, and from animal fodder to a health product due its natural sweetness and gluten free properties.

There were some cases where technologies were in tension with the emphasis on traditional production and processing practices that provided past product upgrading strategies. Furthermore, many of these technologies, particularly SMART approaches rely on the territorial digital and physical infrastructure being available. Finally, technologies are available but small mountain producers and processors, already at a territorial disadvantage, need financing and skills to take advantage of these approaches to upgrading.

7.2.2.3 Innovation

This section summarises other innovations, particularly social innovations. There is therefore a strong connection with both governance and knowledge, which are discussed in other sections (7.2.3 and 7.2.2.4). These innovations are sometimes a form of process upgrading – seeking alternative ways of producing a commodity that lowers input costs and increases outputs. Good examples of this type of innovation are the rediscovery of old pluriactive practices of agro-forestry. This takes two forms: livestock pastures where trees are not the main commodity but provide shade, moisture, and soil protection for the pasture fodder; and livestock grazing cropped landscapes, where the trees/vines provide the main commodity and livestock provide fertiliser and weed control. This can require inter-chain cooperation, including examples that may be handled within one business. Similar social processes include sharing livestock with other farming systems to manage land (e.g., scrub control). Finally, there are examples of cropping VC-A moving up the hill (chestnuts, vines, grains) to exploit refuge from heat and water stress. Often these processes are associated with reducing external reliance on inputs and technologies, something that could have been stimulated by the recent shocks of the covid pandemic, inflation, and energy insecurity. In these cases, these are innovations by which the VC-A is adapting to climate and other pressures whilst seeking ways to enhance the values accruing to the value

chain. Innovations associated with regenerative farming are discussed in section 7.2.4; and other forms of upgrading using certification innovations are discussed in section 7.2.5.

Many cases used 'inter-chain' or diversification as a form of upgrading innovation. It spreads risk and valorises territorial capital in more than one market. Forms of diversification range from commodity production to livestock breeding (particularly for indigenous breeds), bio-energy, tourism, education and social care. Other within-chain innovations include multiple sub-value chains. The carob value chain has evolved to engage in multiple sectors of the economy, including bakery and confectionary businesses and animal feed as a form of product upgrading to spread risk and increase market penetration. However, some cases tried to diversify into alternative products such as using wool for fertiliser or insulation; or reuse of crop residues as fertilisers and feed, but ran into difficulties regarding cost of the product, reduced production volume, lack of a market, or lack of processing infrastructure. Furthermore, pluriactive firms may not be able to focus on any single VC effectively, running the risk of sub-optimum management.

There were some innovations associated with distribution practices, seeking process efficiency at these later parts of the VC. For example, businesses are considering using more direct sales techniques (consumer cooperatives, community supported consumer groups) and increasing local food markets. Here social media and other new marketing channels were being used to upgrade the prices paid as well as access new markets. Finally, there were a few attempts to de-seasonalise consumption of products to have a more year-round income. These innovations are strongly related to consumer awareness (also see section 7.2.5.3). Overall, there were far less innovations associated with these latter stages of the VC than with production or processing in the MRL.

There were some fiscal innovations suggested to help fund upgrading, such as supplementing public subsidies with tourism taxes to upgrade infrastructure and processing or using agricultural insurance to help protect against extreme events. In the Speyside example, the growing interest in carbon credits from peat restoration and an emerging market in restoration credits was also driving innovations to protect the natural assets. These are examples of where the private beneficiaries (tourism entrepreneurs, green investors) who depend on landscape ecosystem services could fund upgrading themselves. However, in these cases, the innovations were not yet widely implemented.

7.2.2.4 Education, Training and Knowledge

The data included many references to the need for, and value of, education and training as part of making all types of VC-A more resilient. This topic also relates to social upgrading strategies when done in the spirit of building human and social capacity, and it can also be a form of process upgrading as skilled labour means more effective and efficient production.

Firstly, there was a strong need for training and upskilling in sustainable production to ensure that the technologies and innovations in production and processing discussed above, particularly to protect the natural assets (section 7.2.4), are properly implemented across the MRL. Training and upskilling are also an excellent way to retain young people in the mountains (important in the

context of demographic upgrading, discussed in section 7.2.1.1). The training should be appropriate for mountain environments, such as addressing interest in agro-forestry or management of common grazings. Training should also be mindful of helping those with traditional local knowledge adapt practices to the changing climate and other external pressures such as pollution, pests and diseases or tourist behaviours, to enable ongoing process efficiency or inter-chain upgrading strategies. Education alongside effective regulation is also the key to prevent illegal overuse of natural assets, as highlighted in some cases. This requires the mountain areas to have strong Agricultural Knowledge and Information Systems (AKIS) that build on social networks and social capital to translate abstract science to knowledge-in-use. Part of these processes should be focussed on recovering lost local knowledge and skills, as well as local breeds.

Furthermore, the VC perspectives highlight that knowledge and upskilling is not restricted to production or even processing, as case study participants also wanted training and skills in terms of business analytics, e-commerce, marketing, consumer preferences, quality management systems and social media use. Many VC-A actors are sole owners or family SMEs and would like more support on how to access and administer public or private finances and how to efficiently navigate State bureaucracy. Provision of training was not sufficient – where mountain communities are isolated, attention should be given to raising *awareness* of training and skills and providing help to let them attend courses, particularly if travel away from their village or enterprise is required.

These findings highlight the crucial importance of knowledge brokers for VC-A upgrading. Although knowledge underpins all forms of VC upgrading strategies, the role of a broker is more implied than explicit in many of the VC sources read for this report. Many VC-A put their success down to the trusted intermediaries that helped set up and sustain horizontal and vertical cooperative relationships across the value chain. Peer to peer learning and sharing between mountain VC-A actors is appreciated, as was the use of mentoring by innovators, for example in the use of restorative farming techniques.

It seems clear from our cases that innovation and experimentation is perhaps best provided through research centres and universities funded to do such practices, but these knowledge production practices have to be adapted and validated in mountain conditions to ensure the information is suitable. It is not only a case of adjusting data for decision support models and tools; but also spending time in the mountains to understand the needs of the users and to build confidence that the knowledge is useful. Thus non-mountain advisors and researchers need to run pilots in mountain areas.

Even better is to have more vocational training courses run within the mountains. Many cases spoke about making stronger partnerships between schools and VC-A actors at all stages of the VC; to raise awareness and promote the importance of VC practices and celebrate the role that VC-A play in the sustainable development of the MRLs. This can also reach parents and increase the respect of local residents not involved in the VC-A. Education is not just formal or for school children but can be lifelong and informal. Furthermore, education about mountains is not just for

mountain residents, as bringing people from the lowlands to mountains can help provide future skilled workers and reverse depopulation.

An important innovation in many cases is the need for adaptive management to better manage their VC-A (a form of process upgrading). For example, monitoring pests, disease, water use, pasture quality, soil erosion or pollution loads. The monitoring can be high-tech using real-life technological recording, or low-tech sharing observations, but requires not only information collection but also making sense of the data and acting on the findings. Our cases were keen to get more support for adaptive management as an important way to sustain their resilience to ongoing change. Some were seeking quality management systems, but others preferred collective knowledge sharing without formal systems for example the 'report a pied' strategy in the Drome Valley.

There are a number of ongoing research projects in the MRLs that are all contributing to the VC-A upgrading by helping with process upgrading (making processes more efficient and climate resilient) but also some around product upgrading through exploring marketing and territorial valorisation. There were also some projects focused on youth or female empowerment (e.g., the Queijeiras Project in Portugal), that would correspond with social upgrading strategies. However, there could be more industry lead research and development in the mountains to support these VC-A upgrading efforts.

7.2.3 Governance, Territoriality and Cooperation (G)

We know that governance matters from the VC and territorial literature and information from D4.3 suggested that these governance structures had a mainly positive effect on the performance of the VCs, citing the potential to enable greater innovation, better performance, collaboration, and maintaining stable prices. However, in a few cases a lack of cooperation was mentioned as a reason for poor VC performance and territorial development experiences illustrate that multi-actor and multi-level cooperation and governance can be challenging.

7.2.3.1 Cooperatives and cooperation

One of the main ways that our VC-As practiced both product and process upgrading was through horizontal cooperation in the form of cooperatives. In several cases, producer cooperatives were able to ensure higher than standard commodity prices (e.g. Weiz, Tete de Moine, Grison Grains). Cooperatives also were used to pool knowledge and better manage the territorial capital; and these collective producer associations were often credited with not only improving private benefits but also helping to protect and sustain public goods through wider landscape management. Perhaps for these reasons, other value chains such as Serra da Estrela, Rethymno, and Sjenica were seeking to build cooperative institutions to improve their value chain profitability and connect agricultural households with the market. The formation of public-private partnerships between all actors and the establishment of a collective trading company that would assist in market positioning seems a logical strategy for these regions.

Many of these cooperatives were focussed on cooperation around commodity production but some (e.g., Trento wine production and Weiz lamb) also included cooperation for processing and

marketing. Similarly, Elmali VC-A actors were seeking to work with consumer cooperatives to generate long term supply contracts. This may suggest cooperatives should not only focus on the production stage but include the full vertical value chain.

However, even where some cooperatives exist, not all VC-A actors are members, for example Sierra Morena has 20 firms making PDO product. Most firms, but not all, are associated with the cooperative that processes and markets the product. This could create issues of competition and potential free riding regarding the public good produced. In some cases where cooperatives exist, they are not necessarily dynamic and forward thinking and need active management to have positive results. However, in other cases, the cooperatives were credited for increasing both trust and economic outcomes in the MRL (e.g., Weiz, Tuscany). There are also associations set up to protect certification standards as part of product upgrading strategies, that ensure the product premium is protected from competition and standards are maintained, which are discussed in section 7.2.5.

There are also other forms of collective action that were extremely important in terms of VC-A resilience and sustainable development of mountain territories. In particular, the management of common pool resources. Many of the MOVING VC-A depend on common pool resources such as common grazing pasture lands, access to freshwater, or landscape management to protect against fire or disease. These not only require environmental upgrading strategies but also governance strategies to help with the multi-actor coordination. In some cases, it was not only important to know more about the condition and use of these common pool resources (e.g., mapping and monitoring grazing pastures, water levels) but also to agree rules about how to adaptively manage access to the resource, particularly in times of stress. Existing cooperatives or local institutions (e.g., Federation Departementale Ovine (FDO) in Drome, France) were recommended as means of managing these processes. Often issues arose over change in formal or tacit property rights, so that traditional shared practices have been individualised to better fit with agricultural policies. In these cases, the VC-A were seeking clarity in ownership and use rights, as well as potential to re-collectivise such as through municipality ownership or using the conditions of these payments to improve collective management outcomes.

7.2.3.2 Intra-VC cooperation or vertical chain upgrading

One way of upgrading a value chain is to improve the vertical connections along the chain; either through functional upgrading and actually participating in later stages or improving the power balance between supplier and buyer to avoid the producer being a price-taker. As already highlighted in the innovations section (7.2.2), some VCs or VC-As (e.g., Elmali tomato and pepper producers) are already using contracts to gain longer term and more secure contracts with buyers. In other cases, cooperatives not only helped with production upgrading but have (re)localised processing and distribution processes into the MRL (e.g., Weiz); an upgrading strategy currently being considered by other VC-A (e.g., Sumava). Where these processes are managed by farmers, they are better able to valorise their inputs as well as reduce costs, transport time, energy, and (where the consumption is also local) food miles. These examples were primarily found in livestock VCs, but not in all cases, suggesting the opportunity for sharing between

MOVING cases. Certainly, the outcomes of D4.3 suggest that if processing and distribution/marketing practices are localised in the MRL, these areas can make a major contribution to national economic performance. However, there was not much evidence of this being pursued in the cases now.

More often, product-based associations (e.g., Scotch Whisky Association) were used to link MRL and MRR VC-A with receiving or sending socio-ecological systems to improve the communication and solidarity along the chain. Having a sectoral strategy/vision to help orient and connect the VC actors were useful to enable this type of upgrading. The process of developing and agreeing on such strategies can build solidarity and help to avoid competition within VCs. However, it is naïve to think that VC-A will not continue to compete for customers and contracts. Cooperation along the value chain may be desired but it is not necessarily the normal situation, particularly when producers feel in a dependent position (see section 7.2.5).

7.2.3.3 Inter-VC cooperation

As already mentioned, inter-chain cooperation or diversification into a variety of VC-A has been identified as an important upgrading strategy for the MOVING cases. Agro-tourism was the most commonly cited example in our MRLs. The VCs are helping to preserve traditions through the additional value that tourism can provide when it is based on the natural and cultural heritage of the area. Tourism is important as it reduces the need for distribution of the product to other places, instead consumers come to the MRL to consume the food and drink products in situ. Bringing consumers to the area to purchase from local producers avoids the added value being lost to the lowland retailers. In many cases, VC-A did not want to see mass tourism developed, but authentic provision that builds on local traditions and festivals. This would provide a stronger and more differentiated product, and also links to strategies to stem depopulation through building a territorial sense of pride in place. It is important that tourism providers advocate and support work of farmers/land managers; and to do this they need awareness and understanding (see section 7.2.5.3). In some cases, tourism in the area doesn't really support the consumption of the focal value chain product due to a lack of interaction between local producers, business operators and local authorities. However, in other cases, the VC product was a premium product not consumed in local homes and restaurants but reserved for high end tourism consumers and affluent urban residents.

It is important to remember that mountain areas can also host other sectors. VC-A could be, and often are, enriched by the provision of other qualified jobs in the administrative, government and services sector. Therefore, the provision of infrastructure and services to stem depopulation are non-rival goods that enable multiple value chains at the same time by attracting skilled workers and making the MRL a desirable place to visit and to live. This is strongly highlighted in the territorial development literature but less clearly highlighted in the VC upgrading literature. Nevertheless, it could be interesting to see to what extent a VC would or could coordinate with other VCs in the MRL to collectively work together to improve the territorial attractiveness of the area, rather than only relying on the State.

Finally different food and drink-based VCs interact, as highlighted by MOVING's conceptualisation

of the VC-assemblage. This can be very positive as in the case of the livestock and cropping interaction through agro-forestry. In other cases, interdependent use of the same pastures for dairy and meat production and honey production, or water supply by different cropping VCs can require more active negotiation to avoid conflict. It is interesting that interdependence between meat and cheese production is a strategy for resilience, but competition between the interests of mountain livestock and mountain grain production is more problematic.

7.2.3.4 Regional governance

The VC upgrading literature talks about horizontal cooperation between sectors within the territory, and also strengthening vertical relationships, and such strategies are noted in sections 7.2.3.2 and 7.2.3.3 above. However, both the VC upgrading literature and the territorial development literature highlights the need for a supportive enabling environment. Therefore, it is useful to consider the role of regional governance institutions that can support the VC-A. The role for national and international policy is considered in section 7.2.6 below.

Cross-cutting upgrading strategies that cover management of infrastructure and cross-sectoral planning require territorial institutions with the mandate and authority to negotiate trade-offs and find solutions. Where such territorial cohesion entities exist, these can be extremely useful to help raise awareness of territorial challenges and find common solutions. As noted already, in some MRLs, cooperatives and producer associations can support or even fulfil the functions of territorial management. However, management is not governance, and it is important that governance institutions consider the three tenets of justice – representation, participation and distribution of costs and benefits. Eliding VC governance with territorial governance may overlook important interests that should be represented and privilege the rights of one particular sector or business model over other needs.

National or regional park authorities, municipalities, or Local Action Groups are needed to strategically plan provision of infrastructure and resolve common pool resource dilemmas using cooperation and social networks in complement with underlying regulations. Active municipalities seem to be part of the mix within our VC-A success stories, particularly where they are helping to link producers, civic society, and government in joint territorial development institutions. Many VC-A actors were seeking support and funding from their local authorities to kick start new intra-VC cooperation or inter-chain diversification. Active territorial institutions also generated local policy innovations (such as new housing policies or public procurement promoting local, climate friendly produce) that were part of an enabling environment for the VC-A upgrading strategies. However, any strategy or policy is only as good as its implementation and there were some cases where the ability to implement product, process, functional or inter-chain upgrading were constrained by uncontrolled or uncoordinated development processes or the failure to implement tourism or food and drink strategies. Furthermore, it is important to better connect territorial development (e.g., through community-led local development (CLLD) and LEADER) more closely to the environmental assets of the mountains.

Regional governance institutions can help foster community cohesion and a shared sense of purpose. Ideally, regional governance institutions are not a source of dependency but enable self-

reliance and an entrepreneurial spirit. This is strongly linked to providing spaces for territorial deliberation and mutual understanding, linked to improving local resident (not just consumer) awareness of mountain value chains and the territorial capitals on which they depend. Many current difficulties in VC-A around contested views of how to manage predators (section 7.2.4), different views on landscape management objectives (also section 7.2.4) or between long-term and newer local residents (see section 7.2.1) can be improved through this mediation and provision of a common space for discussion and mutual understanding. The sharing of different perspectives was greatly valued as part of territorial vitality in many of the MRLs. Whilst these conflict resolution institutions will benefit the VC-A and are implied by the focus on horizontal VC coordination, in our cases, the expectation was that these institutions were for public good and therefore supported through public institutions.

The attention to representation in regional governance was strongly expressed by young people who advocated for greater involvement in local, regional, and national governance. These actors felt they were rarely involved in decision making and their needs not respected in current decisions. However, some actors criticised the focus on voluntary involvement in territorial governance processes, arguing that their time and expertise should be recompensed otherwise only the retired or wealthy can afford to be involved in formal governance institutions.

Regional governance institutions were not only valued for the brokerage roles they could play between VCs and between economic sectors and local residents, but to help raise the interests of the territory more effectively in national and international policy making arenas. Therefore, regional governance institutions can be seen as complementary to a vertical VC upgrading strategy through asserting the specific needs of the mountain territory, as opposed to the mountain VC needs through space to decision making institutions in the urban centres of Europe.

Discussions of how VC-A can harness regional governance institutions also return us to the discussion of the appropriate geographic resolution for our analyses. Whilst our understanding of the VC-A was built at the level of the MRL, which is often quite small (e.g., only 32 hectares for Barnag in Hungary), many of the regional governance processes occur at the larger resolution of the MRR. For example, Rethymno MRL are seeking to upgrade their VC-A through making stronger and better connections with the rest of Crete, and Tuscan MRL would like a regional strategy to link the mountains and the coastal plains.

7.2.4 Nature and Ecosystem Services (N)

Mountains are indeed beautiful and peaceful, but they are also harsh environments as highlighted by our Serbian MRL, *"Pešter is characterised by its microclimate, which is particularly harsh in the winter months. Lowest temperatures during wintertime can go down to -35°C. Daily temperatures during summer have very wide amplitude – day temperatures can go up to 30°C, while night temperatures can be even around 0°C"*. Thin soils, steep slopes and geological characteristics mean many of the MOVING MRLs are water stressed even in areas of high winter precipitation. Ironically, the very qualities valorised in product branding and in tourism-based VC-A, or the reason why so many of our VCs occur within national or international nature designations

(Casares et al., 2023), also put primary producers at a competitive disadvantage due to these natural constraints.

7.2.4.1 Extensification

A strong process upgrading strategy seems to be extensification and nature-friendly farming to both reduce reliance on imported inputs and protect the fragile assets, particularly biodiversity, soil health and water retention capacities. Reducing stocking rates or switching from cattle to sheep, or even sheep to goats, were potential strategies in several silvo-pastoral and pastoral VC-As to protect the soil and enable biodiversity to flourish. Some VC-A explicitly promoted the need to practice restorative farming or permaculture as an adaptation to respect the specific needs of the mountain environment. Several value chains, both livestock and crop based, were exploring organic inputs such as fodder and fertiliser; and seeking more biological responses to pest and disease control. Organic farming becomes a strategy to protect the capital assets whilst upgrading products (see section 7.2.5).

However, these approaches remain at the experiential stage for most MRLs and were not widely practiced across the MRLs. These approaches combine well with the quest for a local circular economy where fodder and fertiliser management are collectively planned and shared to reduce transport and reliance on external inputs subject to price inflation; practices enabled by inter-VC cooperation (see section 7.2.3.3). These strategies are not only about adapting technologies and making use of innovations but managing how technology and innovations are implemented so that they protect the mountain natural capital and increase the provision of ecosystem services. As such these are strategies that try to deliver both private benefits and public goods.

The data within MOVING contains a strong narrative that farming produces public goods (environmental benefits) as a co-benefit of the production of the products they market (private goods). In a complementary fashion, many VC-A actors recognised that the environment is the asset on which VC depends. Therefore, the mountain environment is not only a private asset to be captured through product marketing processes but provides public goods such as an authentic sense of place. For example, MAP stakeholders in Speyside discussed the VC-A in the context of the physical MRL environment's contribution to local identity and the global malt whisky brands.

7.2.4.2 Protection of assets

The adaptation strategies of our VC-As in D4.5 often drew attention to the need to protect the quality and quantity of freshwater, air quality, terrestrial and aquatic habitats, mountain flora and fauna, soil health, and landscape character. These were all seen as assets on which the VC-A depended. For example, access to water was a constraint not just in production but also for processing in the MRL. Whilst most VC-As were perceived to be using the MRL natural resources at a sustainable rate at all stages, environmental valorisation was the least positive with a third of MOVING regional partners believing that their VCs or VC-As had not improved the environmental assets (as reported in D4.3).

There was a strong focus on soil health in most of the agricultural and public good VC-A cases. This encompasses protecting or restoring soil fertility, preventing erosion, and building water

storage capacity to help with drought resilience. On farm strategies such as minimum tillage technologies and using by-products to improve organic matter and increase moisture complement the need for large- and small-scale water storage infrastructure, as noted in section 7.2.2.1. Small scale water retention measures also have strong co-benefits for biodiversity. These are on-farm practices that combine well with harnessing bio- and genetic diversity to stem pest and diseases; and are popular and easy to implement environmental innovations. However, common pool resource dilemmas are more difficult to resolve.

Although producers tend to adopt technologies to adapt to drought, management of access to scarce water relies on territorial or VC governance institutions. Many VC-A cases wanted a resilience plan for floods and droughts, and some cases (e.g., Elmali and Brasov) suggested payments for water use to help ration abstraction. In some cases, solutions that help manage the pastures to protect a public good (ground water) can be in in conflict with private goods; for example, pastoralists get more grass when not shaded by trees, and successful VC-A producers will pay to import water or fodder rather than reduce grazing intensity. Different views on traditional burning practices were also important to resolve, to safeguard soil whilst preventing fire risk. Finally, mowing pastures to maximise fodder production often reduces access to flowering plants required for pollinators including honeybees (Slovak Bio-honey VC-A).

7.2.4.3 Environmental conflicts

Upgrading VC-As through attention to the environment highlights two further areas of conflict, or at least debate. Firstly, how to manage predator control. Some young people, residents and tourists want to see charismatic carnivores protected in mountain landscapes, but other VC actors wanted to 'regulate' bear, boar, and wolf populations to reduce predation on flocks, herds, and beehives. This requires careful negotiation and a neutral territorial governance institution to mediate (discussed in section 7.2.3). This conflict is not new, but such dilemmas are not addressed in the VC literature that tends to focus more on technological solutions to environmental emissions, rather than debates over how to manage nature.

Similar differences occur regarding how to manage cultural landscapes. Many VC-A actors agree that landscape character is central to the product upgrading strategies in use or in development. Although MRL landscapes are often marketed as wild, in fact they are carefully managed. Indeed, some VC-A actors wanted stronger management to improve the condition of forests, woodlands, and wetlands in the MRL. However, there were differences over what is a 'traditional' landscape. In some MRLs, wooded pastures were advocated as an environmental upgrading strategy that valorised tradition and culture whilst protecting natural assets. However, in other settings, the VC-A are rewarded for keeping the landscape free of forestry (e.g., Sumava). Some MAPs spoke of the need to manage the natural regeneration of small trees to maintain cultural landscape mosaics, biodiversity and reduce fire risk (e.g., Serra de Estrela). One strategy to maintain open landscapes is to increase the grazing pressure, which runs counter to the other livestock-based VC and VC-A strategies to extensify herds.

7.2.5 Value and Quality Products (V)

Signalling value and quality is the central tenet of a product upgrading strategy. Understanding strategies for capturing value is important for helping VC-As avoid being price takers and valorise the efforts they put into protecting public goods (ecosystem services, traditions and cultures) without sole reliance on public policy. It is one potential response to buffering against the shocks of inflation with increased opportunity to raise prices if the product is high quality, unique (and non-substitutable).

Many cases seek to use improved valorisation through premium products to improve wages. In turn, this can help reverse land or farming system abandonment. The decision to produce premium products was seen as the reason for increased economic values, although more value accrues to retailing actors than the producers. The data suggest that VC actors need to identify and specialise to where there are strong profit margins associated with being a visible and sought after premium product. In general, the data highlight the need not only for strong production and processing standards, but also for branding and marketing campaigns to enable authenticity, quality and provenance to be valorised by the domestic and export markets. For example, in Serra da Estrela, 'EstrelaCoop' started a local campaign offering cheese to certain restaurants, hotels and stores together with a leaflet urging consumers to demand PDO products in these establishments.

D4.3 has already shown us that regional and/or quality assurance certification schemes were associated with 18 of the case study value chains. Certified branding helps to distinguish from other cheaper substitutes. However, in some cases, VC-A actors reported that they were not receiving a premium price for the premium product; and consumers did not seem to be willing to pay for the upgraded product. Lack of a market was provided for reasons why some product innovations did not succeed in our VC-A cases (e.g., wool as insulation). 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 product upgrading strategies have to balance 'added value' with what is considered affordable in the retail market.

7.2.5.1 Protected Designation of Origin (PDO)

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, Sjenica Lamb, Sierra Morena Ham (Iberian Ham), Serra da Estrela Cheese and Trento Wine; whilst Huesca Wine, and Speyside Whisky have PGI certification. The PDO was also a strategy to foster inter-chain upgrading as often PDO designation covered not only the focal VC product but the additional VC products as well.

In many cases, the PDO or equivalent certification was seen to clearly signal a premium product and ensure higher returns than standard commodity prices, which has revitalised some VCs. For example, chestnut farming or organic olive oil. These increased economic returns help counteract some of the more restrictive conditions the PDO require. However, these premiums depend on whether consumers recognised and rewarded the PDO brand.

In many cases PDO regulations were seen as driving environmental sustainability and climate action in the production and processing stages. For example, the Serra da Estrela PDO has helped preserve native breeds. 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.

However, there were some criticisms of the implementation of the PDO system. In some cases, the PDO created higher returns but in others the PDO was seen to be encouraging intensification and oversupply, reducing prices or destroying the environmental assets in the MRL. Therefore, it is important that the PDO designation takes account of the particular character of the mountain landscapes and regions and better support environmental as well as quality and social threats, such as in Sierra Morena, where strict criteria relating to the raising pigs extensively in *Dehasa* according to local customs contribute to the unique product being produced. The designation also has to consider how to adapt with a changing climate, for example whether to allow irrigated as well as rain-fed horticulture; or accept technological innovations such as milking robots.

7.2.5.2 Other certification

Whilst PDO was the most institutionalised form of product valorisation, there were other certification processes used for product upgrading. These include specific territorial quality assurance or traceability schemes, although there were not many examples of our VC-A using the mountain quality mark. Some of the feedback was a desire to see more of these processes (particularly Brasov, Western Stara Planina, Drome and Sjenica). However, as with PDO certification, accessing and using a regional quality mark requires inter-VC and territorial cooperation (see also section 7.2.3.3) as well as ensuring that the mountain producers can market their products in a way that allows them to recoup premium prices.

A number of cases were seeking ways to valorise organic production which was seen as one form of environmental upgrading and also reducing exposure to imported inputs, therefore a form of process upgrading. Many wanted to see more policy support for organic farming. Despite the Farm to Fork objectives of 25% production to be organic, our VC-A actors did not see a clear market or price premium attached to their products. As with the PDO, a lot depends on how the organic certification is implemented to distinguish between being a positive enabling strategy, or a constraint that reduces the VC-A actors' ability to compete on the export or domestic market.

7.2.5.3 Consumer awareness

Much of the upgrading strategy is about ensuring a quality product and signalling this to the consumer. However, it is important that consumers are aware of and reward these efforts to develop and sustain the territorial capital embodied in the mountain products. Brand awareness and consumption patterns are dependent on whether the value chain produces an aspirational good or a commodity. The current cost of living crisis may threaten sales of high-quality regional products. Sales will decline unless demand is inelastic or substitute markets (e.g., affluent international consumers) are found.

An important aspect of education, for all consumers and young people, is about local food, food

quality and food provenance, including how to read labels and recognise certification. The EU wide push for public procurement in schools, care settings, and hospitals to valorise quality foods can help normalise these discussions about food quality. Agro-tourism is an inter-chain upgrading strategy that can help with product upgrading through exposing visitors to regional, mountain and PDO certifications. However, many VC-A discussions also wanted to promote a *local* food culture and ensure that production of premium products for export and tourism co-existed with year-round local food availability, potentially letting the export commodities cross-subsidise the production of local food staples at more affordable prices. Interest in low food miles is another reason to highlight awareness in the local consumer market.

Upgrading can be pushed but also pulled by increased consumer demand. Examples of consumer demand include the increase in demand for chestnut and carob flour due to gluten intolerance and global interest in health foods. There is a potential trade-off between innovation to local or climate adapted varietals and consumer recognition as local varieties create marketing difficulties and lack consumer recognition. VC upgrading strategies can help here through using direct sales, and relationships from producer to consumer, highlighting the cultural capital and discernment required to go beyond commodities to the unique and niche products. Again, education and interpretation between producer and consumer, either in person (e.g., through agro-tourism or other experiential processes) or via immersive social media campaigns, is a way to gain market share. However, the literature is less clear on how to overcome the lack of consumer willingness to pay for a premium product, particularly if the consumer is unaware of the reasons behind the different prices (e.g., pure honey or adulterated honey). Finally, changes in consumer demand can also be a threat to the VC-A, especially considering trends to reduction in meat and dairy eating.

7.2.5.4 Appreciation of Mountains

The upgrading approach ideas found within the 23 MOVING cases draw attention to the need to have a more general appreciation of mountains and their contribution to value chains. This awareness and appreciation, it is hoped, will lead to a willingness to pay for high quality mountain products, but this is not only an issue about price premiums (private goods) and distribution of profits but also about public support for provision of public goods. Indeed, the stakeholders from the Tete de Moine VC-A in Switzerland talked about ‘responsible marketing’ that engages civic society in learning about carbon friendly farming rather than solely promoting the product(s).

For example, there needs to be greater awareness of the *Dehesa* systems in Spain; or the contribution of sustainable sheep farming in France; or healthy peatlands and rivers in Scotland, so that the public understands why land (and water) management matters in the mountains – and why value chains should valorize but not exploit mountain assets. There were many references to the importance of raising awareness of these issues within the local mountain communities to build a stronger sustainability culture. Increased positive recognition for sustainable production and processing within the VC-A helps to provide social incentives to protect local territorial assets and reduces the need for exogenous regulations. This positive approach to mountain sustainability not only provides peer encouragement for producers and processors but also can

improve the image of mountain regions for the new entrants many MRLs are seeking to attract (see section 7.2.1.1).

Tourism associated VC-A was again suggested to help build this awareness and help non-mountain residents become more aware of the realities of mountain livelihoods. Therefore, tourism and recreation can become a means of knowledge exchange about mountains and their challenges and their opportunities; given that some of the findings from the youth workshops (see section 6.2) were that many young people did not really understand mountain value chains. Indeed, there were some cases that identified specific educational tourism (particularly around sustainable food) as an opportunity for their VC-A.

7.2.5.5 Culture and Tradition:

The role of culture and tradition was quite muted in the VC upgrading literature but a strong component of the territorial development literature. In many of our VC-A cases, the VC-A draws heavily on mountain traditions and cultures to distinguish their products in terms of unique or artisanal cultural production and often processing practices. Conversely, the success of commercially viable VCs has helped to stimulate dying traditional practices and generate cohesion and community within the producer and processors in the MRLs. It is strongly related to forms of retro-innovation, where innovation in the value chains has often been related to reconfiguring the use of past breeds, varieties, and techniques for modern VC-As.

Within tourism-based VC-As, the food and drink products often draw on local characteristics of the area shared with the tourism offer, including the natural environment and/or cultural heritage – such World Heritage sites in Alto Douro or Crete. In these cases, it is the assemblage that it is helping preserve or restore culture and tradition. The interest of international visitors can help support alternative ways of producing food and drink, provided the tourism offer remains authentic and valorises local produce (see also section 7.2.3.3). Furthermore, authentic tourism, around local events and festivals, can not only support our VC-As but help to attract and maintain residents in the MRL and MRRs by illustrating a vibrant and progressive cultural setting whilst maintaining jobs in the tourism sector.

However, such vibrancy is hard to sustain in areas of depopulation, where the young entrepreneurs emigrate to urban areas. It is also important to highlight that not all tradition is positive for the value chains. For example, the chestnut flour VCs highlighted that traditional practices may have disease and entrenched traditional attitudes had to be overcome to enable new plantings in new orchards. Global environmental changes mean that traditional knowledge will have to adapt to new threats, such as new pests affecting honeybee colonies (Slovak bio-honey).

At the heart of all upgrading strategies, but particularly product upgrading strategies, is an entrepreneurial mindset and a belief that change can and should be welcomed and harnessed for private and public benefit. These positive orientations were observed in some MRLs where, particularly the youth, were keen to foster more open minded and openness to new ideas, new actors, and new practices. However, there were some reports of even young people not being

interested in innovations to improve sustainability, preferring to continue to farm like their parents. Therefore, culture and tradition can enable or constrain VC upgrading strategies.

7.2.6 Public Policy

This section covers other aspects of the enabling environment not already touched upon on the above sections and will focus on national and international public policies. These cover provision of regulation, funding, and the hybrid instruments of provision of statutory conditions to qualify for funding. Finally, the role of EU and national steering strategies to set ambition, educate consumers, and show intention provides additional impetus for the adoption of VC upgrading strategies. Public policy can encourage, and should not impede, the adoption of private VC upgrading strategies, such as voluntary tourism taxes to supplement public funding sources.

7.2.6.1 Regulation

Many of the VC-As sit within special mountain areas that combine useful territorial brand values with protections and restrictions on land use, building, and land management. Whilst the brands enable product upgrading, the restrictions can prevent process upgrading through prohibition of some types of renewable energy (prohibition on wind or hydro power) or restrictions on land management or land use change (e.g., restrictions on reseeding permanent grasslands with new varieties or requirements to replant within a certain time). There were also several references to simplifying regulatory processes and reducing the costs of compliance. In some cases, however, stronger implementation of regulations and prohibitions were required. These help to ensure animal welfare (a strong part of product upgrading and certification) but also to protect natural (such as ground water) and cultural assets (such as vernacular architecture). In particular, the discussion of grazing control included both voluntary cooperation and the need for regulation by public authorities of grazing intensity and locations.

In some cases, mentioned most in Southern and Eastern Europe, illegal activities such as unlicenced harvesting of trees or unlicenced water abstraction were threatening the territorial capitals on which our VC-As were built. In other cases, the need to make a living whilst facing high costs was sometimes driving over-exploitation of natural resources and low wages for VC-A workers. However, the ability to regulate illegal or harmful activities is hampered in MRLs and MRRs with dwindling population, municipalities with a low revenue base, and large area to administer. This is why often these areas require not only public-private partnerships between residents and the local authorities (see section 7.2.3) but also the support of national agencies.

Regulation of production and processing standards enable product upgrading strategies, particularly around use of certification, to prosper. The influence of regulations is not only felt in the production and processing stages of the VC-A but also condition distribution, marketing and consumption – for example the public procurement requirement supporting organic production. However, it can also impede other upgrading strategies – for example, direct sales of honey from small producers without a cash register is allowed under current regulations, but not of other products like mead or royal jelly (Slovak Carpathians).

7.2.6.2 Funding

Despite concerns over dependence on national and EU subsidies, and examples whereby past payment schemes had undermined our MOVING VC-As by incentivising alternative production methods or commodities, public policy funding remain essential to our cases.

Public subsidies and incentives are common to support the VC-As in the production and processing stages. The agriculture-based VC-As (including meat, cheese, crops and wine) often relied on CAP payments[6], to the extent that a number of VC-As were concerned that the new CAP 2023-2027 may reduce their payments and jeopardise their VCs. Our VC-A actors were seeking better support for organic production, for example. However, as discussed further below, VC-As felt these payments could better reward the specific conditions of our mountain VC-A. For example, recognising the intersection between the requirements for organic production, and the constraints of working at altitude and on steep slopes with limited transport and processing infrastructures, and providing additional funding in such circumstances. This resonates with the request by several cases to use funding to reward innovation resulting in public good production and to pay for ecosystem services. Eco-schemes, if properly tailored, were seen as a useful funding mechanism. One area that was not well reflected in existing funding mechanisms, according to the data, was the desire by some to further develop agroforestry as an environmental and climate adaptation upgrading strategy. Existing funding schemes did not support the specific VC practices associated with carob, chestnut, *dehesa*, or wooded pastures.

As a response to depopulation, there was a strong push to increase the funding available for new entrants, particularly to attract new families to farm as opposed to large corporations. Whilst this was often promoted to attract and support young people, in some cases, actors argued that there should not be an age limit but a focus on attracting entrepreneurs willing to invest and support the specific mountain farming systems in use within the VC-As. In a few cases, this funding was also advocated to empower and encourage women into the sector. Often these arguments intersected with the need for more funded support for organic farming. The request was not only for subsidies but funding for training and support with innovation, and trialling new, appropriate, affordable smart technologies. It was not always easy to distinguish between the desire for funding for immigrants to the MRL and to enable existing residents to stay through supporting children or spouse of existing farmers to start new enterprises.

Support was not only needed for agricultural production but also to support diversification into tourism, energy, education, and care provision, often complementing food and drink-based VCs. Funding was required for capital investment in physical and digital infrastructure and also to enable ongoing maintenance of shared infrastructure, such as trails, signage, and marketing materials. Some VC-A actors also highlighted the ability to use fiscal tools to subsidise or incentivise diversification and new entrants to the VC-A in mountain areas through tax breaks for

[6] Non-EU countries were reliant on pre-accession or national subsidies rather than CAP but these programmes were still influential on the choices made within their VC-A.

small businesses or provision of land or housing to VC-A workers. Furthermore, most of the discussion of the need for training, skills, and knowledge brokering (see section 7.2.2.4) was relying on public funding for AKIS and not anticipating industry support for these initiatives. The exception was perhaps some of the cooperatives, where the collective action was not just collective bargaining over prices but also provision of information and sharing technologies.

As highlighted in D4.3, it is less common for our VC-A actors to access public support for activities further down the VC, but support, such as through rural development or territorial cohesion funding, would be extremely valuable to support product upgrading through marketing and distribution innovations or process upgrading through provision of infrastructure, training and technological innovations. VC-As were seeking support and skills in product development, logistics and consumer relationship management, not only in improved farm practices. State funding was also requested for wider territorial development in order to create and sustain wider social services and improve the rural infrastructure.

7.2.6.3 Conditions on funding

As highlighted above, CAP payments were extremely important for many agriculture-based VC-As. However, the conditionality of payments could better reflect the specifics of extensive mountain farming systems and use Pillar 2 instruments such as ANC and AECS payments to reward high nature value farming. There were many variations on how conditionality could better support mountain production, supporting small family farms, use of native breeds and varieties, rewarding lower stocking rates or provision of habitat for pollinators. This requires sufficient budget in Pillar 2, but also an improved process to monitor activity and reward outcomes such that public funding is paying for provision of public goods.

However, there were also VC-As that felt the shift from headage to area-based payments was leading to a loss of small farms and shifting grazing away from alpine meadows and seemed to be advocating for more voluntary coupled payments. In contrast, other VC-As felt existing payments already privileged larger farms and wanted public funding to avoid incentivising large corporations taking over smaller farms. This highlights the importance of tailoring the conditions attached to funding to ensure public policy enables VC-As that valorise and protect the full range of territorial capitals (natural, social, cultural) as well as just economic.

Conditionality is the mechanism by which the enabling public policies can help to valorise public good provision not rewarded by the market, whilst respecting the polluter pays principle, through ensuring payments are not provided to those generating negative externalities. Our cases recognised this but were not always convinced that the conditions were well implemented or monitored.

One noticeable gap in the data collected to date was the lack of focus on carbon sequestration through land use change, except for some of the arguments around increased wooded pastures. Many of the VC-As environmental upgrading strategies were seeking to adapt to climate change, and innovations considered lower carbon production, processing and distribution practices. However, the revised LULUCF targets for the agriculture and land-based sectors might encourage

even further destocking of livestock and increased forestry or wetland/peatland restoration in these mountain areas.

7.2.6.4 Visions and Plans

Visions, such as the EU Long Term Vision for Rural Areas, or strategies, such as the Farm to Fork strategy, were recognised as providing useful encouragement for forward and positive thinking and to offer ideas to focus horizontal chain cooperation or process upgrading strategies. However, many VC-A actors wanted to see a stronger link between these strategies and implementation through funding, regulations, and conditions that helped to bridge the gap between intent and capturing a premium price through enacting these ambitions. The objectives of the new CAP align well with MOVING's conceptual framework that takes an extended view of valorisation, seeking to improve not only viability of mountain businesses, but also protecting nature, culture, and community cohesion.

7.2.6.5 Summary

The findings here are that international and national policies can provide a useful enabling framework for the VC-As in our MRLs. However, these policies need to be adapted and tailored to specific mountain environments. Stronger representation of the mountain VC-A needs was highlighted as one way to raise national and EU policy makers awareness of these specific issues. Furthermore, exogenous policies should not become a crutch for local VC-A actors and displace endogenous entrepreneurship. In particular, the provision of public goods co-exists in some MRLs with the continued fragility, or even deterioration of natural capital, so public funding must be tied to good practice and not used to perpetuate existing practices maladapted to the changing socio-ecological conditions.VC upgrading strategies illustrate ways for economic sectors to capture private benefit and it is important that public support is used to correct market failure rather than become a substitute market for these VC-As. Finally, MOVING's attention to VC-A illustrates the need for policy coherence between fiscal, agricultural, environment, energy, tourism, housing, transport, and educational policies as highlighted in territorial development literature.

7.2.7 Summary of Upgrading Strategies

Sections 7.2.1-7.2.6 have discussed the social, innovative, governance, nature, quality, and policy-based strategies that our 23 MOVING VC-As are considering in order to protect themselves against the threats identified in section 7.1. The findings were extremely intertwined and difficult to attribute to the specific stages of a standard value chain (production, processing, distribution and marketing, and consumption). Instead, except for the Nature cluster, they were more of a territorial integrated approach that required working across the VC-A stages, which is a form of vertical upgrading strategy.

Table 7: Upgrading Strategies by Value Chain Stage

Upgrading strategy themes	**Upgrading Strategies**			
	Production	Processing	Distribution and Marketing	Consumption

Social and Demographic (S)	Support for new entrants & succession			
	Improved Infrastructure & amenities			
	Diversification & pluriactivity			
	Awareness & Education			
	Skills & training			
	Perception of work			
	Wages & conditions			
	Seasonal workers			
Innovation and Infrastructure (I)	Transport infrastructure Health, education and leisure facilities Energy, Waste disposal, Water supply Digital infrastructure			
	Fencing, stables, etc.	Mills, slaughterhouses, Processing etc.		
	Genetic diversity			
	Smart farming			
	Water and Energy saving technologies			
	Agro-forestry			
	Diversification			
	Education, skills and training			
Governance, Territoriality and Cooperation (G)	Cooperatives			
	Common grazing			
	Sectoral Strategies			
	Agro-tourism			
	Amenities & infrastructure			
	Agro-forestry			
	Regional governance institutions			
	Conflict resolution			
Nature and Ecosystem Services (N)	Extensification			
	Organic or restorative farming			

	On farm water and soils protection			
	Predator control			
	Preservation of landscape character			
Value and Quality Products (V)	Premium Products Standards			
			Marketing	
	PDO & PGI certifications Regional quality marks Organic certification			
	Education & awareness raising			
	Agro-tourism Direct sales and relationship consumption Retro-innovation Authenticity			
Policy (P)	Regulations			
	Funding			
	Conditionality			
	Visions and Plans			

7.3 Which actors are involved?

Section 7.2 has illustrated that all the VC-A have identified strategies that they would like to develop, or are developing, to respond to the vulnerabilities and threats identified in section 7.1, summarised in Table 7. This section relates these strategies to the main types of actors identified within our MOVING regional/MRL MAPs:

- Agri-businesses
- Brokers
- Civil Society
- LUS Managers
- NGOs
- Non-agri businesses
- Public sector
- Research
- Other

In some reports, it was not always clear which actors were responsible for the upgrading strategies, highlighting the importance of territorial governance and the need for clear roles and responsibilities for these upgrading strategies.

7.3.1 Agri-businesses

A value chain upgrading approach would suggest a strong focus on the role of businesses yet there was little direct reference to the role of agri-businesses beyond the primary production actors (LUS managers) except if these businesses were involved in processing or distribution within the MRL (e.g., Weiz lamb and cheese VC-A). There was very little attention to the workers within the VC-A except for issues identified in section 7.2.1, however, mitigation of lack of workers tended to be focussed on involving the public sector (section 7.3.4) rather than worker-driven actions discussed in the social upgrading literature. There were examples of interchain upgrading strategies driven by agri-businesses such as the need to support industries using by-products (e.g., Betic Olive oil VC-A) or combining wool and meat production (e.g., Weiz, Serra da Estrela). In the Weiz case, this was combined with horizontal intra-chain upgrading, as the cooperative is helping drive the upgrading strategies through provision of processing infrastructure. In other cases, the upgrading is more about vertical chain integration, using relationships with agri-businesses outside the MRL to revalorise organic or extensive mountain production (particularly within the cheese VC-A). These vertical integration processes also relate to using these links to lobby for mountain actors within policy debates. However, in some cases, the lack of intra- and inter-value chain interactions between agri-businesses and local farmers was seen as a challenge and there was a need to improve these interactions to reduce vulnerabilities e.g., in Brasov case the MAP identified the need to build short supply chains and use of local food in the tourism market. Furthermore, not all horizontal or vertical integration was positive – in some cases, agri-businesses were not helping mountain products achieve a premium (e.g., Alto Douro wine competing with cheaper wine form the lowlands) and there was distrust of large agribusinesses moving into mountain areas (e.g., Huesca case).

7.3.2 Brokers

As highlighted in section 7.2.2.4, sharing knowledge about mountain production, processing, distribution and marketing and consumer behaviour was highlighted as an extremely important component of all the main types of upgrading (process, product, function, inter-chain, horizontal and vertical integration). Indeed, the Transdanubian A-E Knowledge VC-A is premised on building a knowledge economy through monetary valorisation of knowledge brokerage around sustainable living. Most of the proposed brokerage related to the production process. For example, information on suitable pasture management and grass varieties for the meat and cheese-based VC-A; and appropriate mountain varieties for the crop and alcohol-based VC-A. However, it was stressed by a number of cases (e.g., Western Stara Planina) that the brokers must understand the mountain socio-ecological system in which they are working; and it must be a knowledge exchange whereby local knowledge is incorporated and local actors are empowered to adapt information for their particular business model. This need for locally appropriate brokerage needs funding and the findings in D4.3 suggest that many cases lacked local brokers within the MRL,

relying instead on regional or even international advisors. Some of the cases reported divisions between how scientists and brokers evaluated vulnerability and future climate related threats, suggesting that local brokers were less likely to identify environmental impacts from intensive land management (see also section 7.3.3). Finally, there was a very low provision of brokerage to support with later stages of the VC-A, around distribution, marketing and consumption practices. This was important to allow function upgrading (having more of these later stages in the MRL) which was identified as one of the main ways to retain value in the mountains.

7.3.3 Civil Society & Non-Governmental Organisations

There was very little direct discussion of how civil society actors could be involved in upgrading strategies, beyond the importance of having more general awareness of, and respect for, VC actors working in the mountains (see section 7.2.5.4). Civic society is both local residents/visitors and the wider non-resident public. Some cases reported that when they tried to involve local residents in their MAPs to evaluate vulnerability and resilience, these individuals found it difficult to respond, suggesting the need for wider public engagement in these discussions so they understand and can advocate about their future. Even if not directly involved in managing mountain resource systems, these residents will be affected by climate and other drivers of change and may be impacted by hazards such as drought, floods, fires and heat waves. In a few cases, (e.g., Corsican response to the gall wasp disease) local civic society was harnessed to respond to threats through citizen science and funding, showing that these actors can be an important resource in sustainability.

Visitor engagement and education, particularly among the tourism VC-A was also seen as a means for not only product upgrading (building demand for mountain products) but also raising awareness of mountain environments and their challenges. Non-resident general public were also seen as important to continue to support policies that protect and support mountains. The general public also often have folk memories of mountain values, like culture and tradition by writing and reading books about mountain areas, by valuing traditions, and by supporting maintenance of environmental quality and traditional life in mountains even if these people are not part of it. The public are also potential immigrants to revitalise areas affected by land abandonment. The tensions between incomers and existing residents mentioned several times in section 7.2 could be mitigated by the awareness raising processes such that incomers become part of shared territorial governance processes co-constructing a shared vision of a resilient MRL.

Many upgrading strategies rely on consumer practices. Consumers are not a category for the MAP typology but are central to product upgrading – consumer awareness and willingness to pay for sustainable mountain products is a prerequisite to valorise mountain territorial capital (see section 7.2.5). Our findings suggest that the role of different types of civic society actor needs further development to become active constituents of upgrading strategies for our mountain VC-A. There was no clear mention of the role of NGOs that were not associated with agri-businesses or brokers in our findings. However, these are often important representative bodies for civic values focused on environmental or social sustainability.

7.3.4 Land Use System Managers

Given that most of the upgrading strategies were focused upon, or relevant to, the production stage within the MRL (see Table 7), it is unsurprising that LUS managers were the most frequently identified actors in our analysis for this deliverable. The VC-A is dependent on the unique combinations of social, cultural, natural, built and human territorial capitals assembled through the practices of the actors. Even the whisky, honey, and tourism VC-A that do not directly involve producing crops or animals within the MRL rely on the landscape character and resource system for their products, making LUS managers important to all 23 of our cases. The LUS manager is also the actor that manages both public and private goods simultaneously, as their business practices, designed to generate an income for their family or company, also produce ecosystem services. However, as noted in section 7.2.4, when fragile mountain LUS are not managed appropriately, territorial capital can be degraded.

The process, product and functional upgrading strategies that require changes to how land is managed and relocalisation of processing, distribution, marketing and consumption require the energy and entrepreneurial spirit of the LUS managers to try new practices; and participate in horizontal and vertical as well as interchain integration. These strategies require new skills and capacities such as managing social groups, setting up cooperatives, dealing with conflict and applying for funding. These actors are already expected to manage resource systems but also contribute to other aspects of the production stage such as negotiating prices when selling to wholesalers or processors; employing workers if not a family farm and interacting with all the different policy processes identified in section 7.2.6. Many cases reported that these actors were struggling to make a sustainable livelihood and were seeking support to deal with the challenging physical (harsh weather, predators, thin soils); social (population decline, isolation); and economic (increased costs due to transport, energy and digital infrastructure issues) conditions in the mountains. Therefore, while they are essential actors in upgrading strategies, they can also be a blockage to upgrading strategies if they don't have the time, energy or aptitude for innovation. This explains why upgrading strategies can be associated with charismatic local leaders in the public sector or brokerage professions; or with incomers who have identified the MRL VC-A as an opportunity (and often bring with them additional economic and human capital to invest in the VC-A). LUS managers can be a critical actor in upgrading strategies, when and if they recognise that their socio-ecological system is vulnerable and they have the capacity and self-belief that they can make changes to improve their resilience.

7.3.5 Non-Agricultural Businesses

These actors were mainly discussed with regard to the tourism VC-A as these are central actors for all stages of the tourism VC-A stages (production: support and marketing; consumption; transportation, hospitality). These businesses are also essential actors in any tourism related inter-chain upgrading strategies, such as two MOVING cases that combine food or drink production with tourism (see Table 2). As with the LUS managers, these businesses are central to how the territorial capital is valorised and protected or damaged depending on their practices. There is lots of potential for these actors to engage in process or product upgrading to ensure

that tourism is authentic, valorises local mountain capitals and contributes to wider awareness regarding mountain vulnerabilities and the role of the consumer or visitor in supporting resilience. Other business mentioned in the data include insurance companies and investors that can support environmental upgrading strategies. Finally, implied more than explicitly mentioned, are the private businesses involved in the provision of technologies and infrastructure (see section 7.2.2) which have a huge role to play in product, process, function upgrading strategies. It was surprising that few cases overtly reported on working with retailers or wholesalers when considering product upgrading strategies. However, many of these businesses are not locally present in the mountains, suggesting that they would need to be aware of the particular needs of mountain actors also involved in the upgrading strategies.

7.3.6 Public Sector

After the LUS managers, the public sector was the next most frequent type of actor involved in the upgrading strategies. The public sector can be distinguished between local (municipality); regional; national and EU level administrations. The local and regional administrations can make policy, but often mainly implement decisions made at national or EU levels. The role of the public sector was to provide a range of different support to enable the other actors, particularly the LUS managers and brokers, to enact the upgrading strategies. This support included funding; provision of training and advice; and appropriate regulation. Funding covers EU agricultural support systems (including both farm income support and agri-environmental schemes); EU social or regional support and also funding from local or regional authorities (e.g., the canton in Switzerland). Provision of training and upskilling of LUS managers and agribusinesses was often seen as a state responsibility rather than being provided by the private sector or as part of the vertical value chain integration. The public sector, particularly the local and regional authorities, were also credited with brokering discussions and resolving conflicts such as around appropriate predator control or managing common grazings (see section 7.2.4). Public authorities were responsible for the design (at national and EU level) of regulations and funding conditions (see section 7.2.6) that govern the territory and the VC-A practices. Sometimes, these regulations and conditions were welcomed as they promoted the need for process upgrading and helped protect the territorial capitals on which the VC-A depend (e.g. licencing water use in Elmali tomatoes VC-A) but in many cases, the regulations were criticized as not being enforced, damaging territorial capital (e.g. Brasov eco-tourism) or not being suited to the particular mountain socio-ecological conditions (e.g. Slovakian bio-honey; or Western Stara Planina HNV farming). Finally, the public sector is often an owner and manager of mountain land (such as state forests, national parks) and therefore can be both a public sector actor and a LUS manager. Therefore, public authorities are essential to upgrading strategies, but as with other actors, need to understand the particular needs of mountain VC-A and enable a dialogue with mountain-based actors, including young people, to generate policies that support resilience. The reliance on the public sector in mountain areas could be a concern when these municipalities have a small population base and often limited financial and human resources, reinforcing the need for strong multi-level and polycentric governance processes to share good practices.

7.3.7 Research

The importance of knowledge, skills and education highlighted in section 7.2.2.4 related mainly to the technical innovations around plant varietals, animal breeding and environmental management, emphasising again the primacy of the resource system on which the mountain VC-A were based. However, the alcohol VC-A also highlighted the innovations around processing that were driving process upgrading (particularly to reduce water use and greenhouse gas (GHG) emissions). It was surprising how often the need for university research was mentioned as an important partner in these upgrading processes reliant on knowledge innovations, although this may reflect that scientists were part of the MAP identifying the potential ways to adapt to VC-A vulnerabilities. Further analysis suggests that research institutions were valued as having the resources (time, infrastructure, funding, ability to navigate regulations around breeding) to address mountain challenges in ways that are not possible for mountain value chain businesses or even brokers – the researchers provide the inputs to the Agricultural Knowledge and information systems (AKIS) that are then exchanged and elaborated in territorial deliberations. As with the brokers, it was important that the scientific actors were interested in, and connected to, mountain environments and able to tailor their research to these specific VC-As. Some cases reported finding it difficult to get the mountain specific research they required (see Grison Grains for example) and there were only a few cases with active research partners within the MRL and MRR. The importance of trust and mutual understanding is amplified given the reports of differing evaluations of vulnerabilities and threats (e.g., water stress) between scientists and LUS managers for example, as an AKIS will only work if knowledge is deemed relevant, credible and provided from a legitimate source. One suggestion that also responds to building awareness more generally (see section 7.2.5.4) is to run more fieldtrips in the MRLs, building on the VC-As, to educate high school and university students about the opportunities of working and living in the mountains.

7.3.8 Summary

Most of the upgrading strategies relate to the production stage of the VC-A although often rely on practices and actors across later VC-A stages (see Table 7). Therefore, the findings suggest that the LUS managers are central actors to taking up these upgrading strategies, but they do not always have the capacity or the desire to make changes, at least without support. This explains why the public sector actors were also very important to the implementation of the upgrading strategies, through provision of funding, skills, support and infrastructure required to enable process, product, functional, inter-chain and horizontal or vertical integration. However, whilst public sector support (both municipality and national or EU level) is integral to territorial development, a value chain perspective also highlights the agency of business actors across all four phases of the value chain. The data were much sparser regarding the role of agri- or other businesses in supporting upgrading strategies, except where they were already embedded in the MRL (such as producer-processor cooperatives). Finally, the role of civic society, as consumers, citizens, mountain residents and visitors is very important in upgrading strategies. Therefore, the upgrading strategies often require a public-private partnership involving multiple actors with

different roles and responsibilities.

7.4 Tele-coupled Upgrading Strategies

The CAF used within the H2020 MOVING project highlights how VC-A tele-couple different socio-ecological systems together. Most cases share the same focus on how the territorial capital underpins the production stage of the VC-A, whereby the MRL acts as a sending SES but for those VC-A involving tourism, the MRL is also the receiving SES for consumers coming from elsewhere. The tele-coupling can involve MRL to MRR (important for some cases such as the Serra de Estrela or Sierra Morena cases, where the larger region is important for the VC-A) but more commonly involves sending or receiving from the mountains to the lowlands and urban areas of the nation; or even internationally.

Almost all of the upgrading strategies involved some form of tele-coupling – even things seemingly under the control of local actors such as becoming pluri-active and diversification into tourism or bio-energy requires the interaction with non-mountain policies, infrastructure providers and consumers. As highlighted in the neo-endogenous development literature, mountain VC-A actors can act and be empowered to manage their mountain territories for resilience, but they will generally be doing this in conjunction with non-local structures, actors and practices. A few process upgrading strategies could be entirely endogenous such as some of the horizontal chain integration (e.g., cheese cooperatives, managing common grazings in the Drome valley); or production process upgrading through extensification, organic farming or natural water retention measures. However, where these practices rely on external expertise, technologies, or policy incentives, then the practices are tele-coupled with other systems.

Many of the process and product upgrading strategies, particularly around technologies and innovation to reduce environmental impact, have a strong tele-coupled character. These strategies rely on innovations developed nationally or internationally and adapted for the mountain environments. Process efficiencies to make mountains more sustainable were discussed in terms of ensuring that local gains were not at the expense of other territorial de-valorisation e.g., ensuring stabled livestock were not eating imported feed damaging the Brazilian Cerrado. This highlights two forms of tele-coupling for upgrading strategies evident in the findings – related to material flows and related to social or governance relationships.

In terms of material flows, the process and functional upgrading strategies required the MRLs to be receiving systems for workers or visitors, infrastructure, technologies for smart farming and efficient processing, new seeds or breeding stock, building materials for fencing, netting, storage and stabling, and in some cases, imported inputs such as barley for the whisky VC-A. In terms of social flows, the MRLs also tended to be receiving systems as expertise and knowledge were often imported from non-MRL research centres, although in areas where there was a strong local brokerage system (e.g. Swiss Jura, Drome Valley) this was very much appreciated by the LUS managers and was credited for supporting both product and process upgrading strategies. The product upgrading strategies reliant on certification and quality marks also receive standards and

procedures from external parties.

Upgrading strategies can also involve the MRLs becoming sending socio-ecological systems (SES) – for example product upgrading can require the MRL VC-A to send positive marketing messages to non-local consumers using social media, direct sales and through visitor education when assembled with tourism VCs. Although the provision of infrastructure, and appropriate mountain policies may originate from non-mountain SES, the findings illustrate that some mountain actors were actively sending messages about repairing a perceived democratic deficit, asking for more attention to be paid to the particular conditions of mountain areas, and for mountain young citizens to have a greater voice in regional and national governance.

As highlighted in section 7.3 above, many of the actors involved in the upgrading strategies are not resident in the mountains but require partnerships across space – such as the need for supportive EU policies enacted through national governments, supported by scientific advice from universities in national cities and driven by demand from discerning international and national consumers. Tele-coupling, and the integration across all four stages of the VC-A helps make these non-local value chain private actors more visible than a more place-based approach to territorial development; but the power, roles and responsibilities of non-mountain actors remains fairly muted in the findings, potentially due to the methodological approach (see section 8 for more information). The exception is the very visible role of public authorities and policy in supporting and enabling endogenous upgrading strategies, which will be further explored in WP7. The need to have appropriate rural development policies, that take account of the mountain specificities and help integrate different sectoral approaches to upgrading is central to the vision of the MOVING policy roadmap.

7.5 Intersecting Upgrading Strategies

The findings show how many of the strategies being implemented, or identified for implementation, to enhance or protect the resilience of mountain territories, are interlinked.

Starting with upgrading strategies to tackle **Social and Demographic** issues, demographic change (particularly land abandonment) has an influence on the natural capital of the territory; and a vibrant and growing population can provide the human and social capital required to manage mountain environments sustainably. However, this is only possible if the immigrants to mountain areas are stewards of the land and the cultural traditions associated with it – as there are concerns about gentrification of some lower altitudes of the MRLs that worsen the environmental condition of the mountain assets through inappropriate exploitation. Upgrading strategies to deal with social and demographic challenges also intersect with policy through the need for funding – particularly for improved infrastructure and better provision of services. Furthermore, these upgrading strategies intersect with governance through the need to enable collective action within vibrant communities and ensure mountain communities can contribute to the wider democratic debates about sustainability and climate action. Attention to different demographics, such as gender, age and race, are mainstays of social upgrading; and these also require appropriate policies, governance, innovations and infrastructure to work together to

address these challenges and valorise the human capital within the mountains. Finally, upgrading the quality of work can support immigration and economic development in mountain areas; but doing this requires supportive policies; provision of education and training; and digital/physical infrastructure.

There are several ways that **Innovation and Infrastructure** are enrolled in upgrading strategies. In addition to the findings above, digital and physical Infrastructure was confirmed as an essential enabling factor to facilitate firms and other actors to enact process, product, function or inter-chain upgrading processes. Infrastructure, technologies and innovations are all enrolled in the use of natural assets in the VC-A, particularly regarding water scarcity. However, whilst these can enable resilient VC-A, infrastructure, technologies and innovations have to be managed to ensure they are used to foster sustainability. Whilst irrigation might help make systems more resilient to summer droughts and increase the efficiency of water use, it can also enable utilisation beyond the carrying capacity of the local resource and tends to favour those producers able to afford smart technologies. Therefore, public policy can play a role in helping fund appropriate infrastructure and technologies. Territorial governance is part of social innovation that can help ensure progress is appropriate and inclusive of many interests within both the territory and the VC-A. Finally, knowledge was an issue that underpinned the use of all upgrading strategies with education and training required to help with social challenges particularly quality of work, protection of nature and ecosystem services, protecting or enhancing quality products, contributing to territorial governance and negotiating the multi-level policies that govern the mountain practices.

Governance, Territoriality and Cooperation underpin the upgrading strategies that involve collective action. In the MOVING cases, there is a strong drive to collective action as a response to social and demographic challenges, protection of nature, protecting quality products and developing or using technologies and innovation. Cooperation supported process upgrading strategies to protect natural assets, and involved sharing knowledge, technologies or infrastructure. Intra- and Inter-chain collaboration can be used to respond to support social, technical and quality product developments. These collective processes can be galvanised by public visions and plans, and often respond to regulations or conditions placed on agricultural payments. Finally governance as part of upgrading strategies can be directly supported through funding collective institutions (e.g., local action groups (LAGs)). The importance of public sector actors in upgrading strategies also highlights the centrality of multi-level governance to enable all types of upgrading strategies identified in this deliverable.

Nature and Ecosystem Services, and the upgrading strategies that responds to these issues, are fundamental to the sustainability of our VC-A and the actors that engage with them. As highlighted above, protecting and enhancing the ecosystem services from mountain nature requires wise use of technologies, innovations and infrastructures; governed by policies and addressed through a variety of governance institutions. Many of the product and process upgrading strategies address the need to protect the environment, and these efforts are captured through some of the value and quality product upgrading strategies. However, as with all the

above, the need for knowledge and adaptation to the specifics of the mountain environment are central to the successful integration of these concerns.

Value and Quality Products span beyond traditional product upgrading strategies to consider wider issues of societal perceptions and appreciation, which can help support the upgrading strategies tackling social issues (e.g., quality of work) and support strategies around education and awareness raising. The positive synergy between culture, tradition and innovation underpin several upgrading strategies; whilst horizontal and vertical relationships to enhance value and protect quality rely on strong governance institutions; and supportive policy environments. Knowledge plays a major role in the intersections here, as many cases highlight the need for skills and training to allow the adaptation of tradition to respond to the dynamics of tele-coupled socio-ecological systems and therefore support social innovation.

Finally **Policy** is central to all the upgrading processes. Regulation helps to spur innovation and change and provides a more level playing field to protect values and quality products than would be the case if it was a totally free market situation. Funding is essential to support mainly of the upgrading strategies; whilst conditions on funding, particularly EU CAP funding, helps protect ecosystem services, encourage new entrants to mountain production and foster social innovation. Visions and plans can help support the intersection between different upgrading strategies and provide the rationale for territorial and sectoral governance processes.

7.6 Summary of Upgrading Findings

The findings presented in this section illustrate that upgrading strategies have been identified for all the threats identified in Table 6 and that the upgrading strategies cover all the themes being addressed in the cluster analyses and policy road map (see Table 7). There were some threats (inflation, war) that did not fit well with the themes illustrated in Table 5, as these are shocks to the mountain socio-ecological systems, but even these shocks were responded to through upgrading strategies, particularly around product upgrading (to increase the premiums being paid and retain profit margins) and process upgrading (to reduce costs). The upgrading strategies are strongly interlinked, and cases generally used a repertoire of upgrading strategies to respond to the range of threats and ensure long term resilience.

Overall, there is evidence that all the potential upgrading strategies suggested by the VC literature (product, process, function, inter-chain, horizontal and vertical integration, social and environmental) were being considered, if not implemented, in our MOVING VC cases (see Table 8). Product, process and inter-chain strategies seem to be most common. However, the product upgrading strategies were mainly formalised through quality marks, but these did not always improve the situation for mountain VC-A when competing with lowland producers or when the consumers were not willing to pay for the additional quality provided. There were many examples of process upgrading to reduce costs, respond to increased environmental concerns and to protect fragile mountain natural assets, with environmental upgrading – particularly focussed on protecting natural capital not reducing waste – being a common strategy across most cases.

Although socio-cultural mountain assets were also identified, there were few examples of how process upgrading could be used to improve these. Inter-chain, particularly diversification from farming to tourism, bio-energy or working on non-land based sectors, was a common strategy across many cases.

Table 8: Types of upgrading strategies

Type of Upgrading Strategies	Case Study Examples
Product	Cretan Carob VC (Greece) stakeholders have swapped from animal feed to human health food products (carob flour as a gluten-free product) to get a better premium.
Process	Tete de Moine VC-A (Switzerland) producers are starting to install photo-voltaic infrastructure on their barn roofs to reduce their greenhouse gas emissions, increase energy security and reduce costs.
Function	The Weiz VC-A (Austria) sheep farmers came together to form a cooperative to run a slaughterhouse and process their lamb products to maintain a viable industry in their area – so they expanded from producers to processors to add value to the product.
Inter-chain	The Sumava beef VC (Czech Republic) works with rural tourism VC to diversify farm incomes, build consumer demand through supplying tourism venues and generate greater understanding of mountain farming through interactions with urban visitors.
Horizontal	Serra da Estrela VC-A (Portugal) shepherds are exploring the potential of a cooperative to increase the premium paid for their milk and to reduce the transaction costs accruing to the cheese processor through having one point of sale.
Vertical	Elmali Tomato and Pepper VC-A (Turkey) VC-A is working with wholesalers, particularly consumer cooperatives to set up long-term contracts to provide certainty for their production and processing practices

There were a few examples (mainly in the alcohol VC-A cases) of social upgrading through improved wages, conditions and taxation processes but there was much less obvious use of social upgrading strategies. There were also few examples of active functional upgrading strategies, although some cases aspired to learn more about marketing and distribution, suggesting an interest in doing more of these later stages themselves. There were examples of horizontal upgrading strategies such as cooperatives to improve the premium for meat or milk; and in some cases, these collective institutions were also functioning to develop wider territorial governance processes including conflict resolution. There were far fewer examples of vertical integration despite this being a central plank in economic value chain upgrading strategies. A few cases noted the importance of sustainable public procurement policies that connected mountain producers through the value chain with public sector consumers; and the Elmali case explicitly identified long term contracts with consumers as one of their upgrading strategies.

We found that these upgrading strategies are shared across VC clusters, but not all cases within a cluster are adopting the same upgrading strategies. This creates an important opportunity for

further diffusion and sharing of good practice between MOVING MRLs. The findings suggest a strong focus on protecting the specific mountain territorial assets vulnerable to threats, which are often public goods being utilised as part of private sector business models (e.g., ground water, landscape character, traditions). The main actors implied in the upgrading strategies were the LUS managers, consumers and the public sector, and these public-private partnerships were tele-coupled over space. Non-mountain private sector businesses involved in the enabling environment (infrastructure) and later stages of the VC were muted in the data; although the findings did highlight a role for civic society (beyond consumers) to valorise mountain communities and producers for their role in protecting mountain assets.

8 Concluding Discussion

The findings presented above are now summarised in section 8.1 and then supplemented by some methodological reflections in section 8.2. The discussion then considers what these findings mean in terms of the wider literature and the implications for policy and practice in section 8.3. The final section (8.4) considers how these findings can serve the remaining WPs in the H2020 MOVING project during the last 18 months.

8.1 Overall Summary of Findings

The deliverable highlights how a VC-A perspective helps to reconnect agriculture and other land uses with food systems in a territorially embedded relationship (Lamine, 2015). Section 7 introduces the synthesis of whether and how the MOVING VC-A cases are vulnerable to threats (section 7.1) and how these vulnerabilities might be addressed through economic, social or environmental upgrading strategies (section 7.2). All the cases identified multiple sources of potential vulnerability to their VC-A or the territorial capitals on which they depend, but the cases also identified several upgrading strategies to help their VC-A become more resilient to threats and contribute to the wider regional sustainability (see Table 9). These upgrading strategies included product upgrading, process upgrading, functional upgrading and inter-chain upgrading; either practiced by individual firms or within horizontal or vertical collaborative relationships within the value chain. These strategies are presented in terms of how they respond to six thematic aspects relevant to rural/mountain sustainable development – Social and Demographic issues (section 7.2.1); Innovation and Infrastructure (section 7.2.2); Governance, Territoriality and Cooperation (section 7.2.3); Nature and Ecosystem Services (section 7.2.4); Value and Quality Products (section 7.2.5) and Public Policy (section 7.2.6) as shown in Table **9**.

These findings are complemented by considering which types of actors are involved (section 7.3); whether the upgrading strategies require any tele-coupling (section 7.4) and how the upgrading strategies intersect (section 7.5). It is important to understand actors' roles, responsibilities and interactions as relationships are central to VC-A upgrading and create both opportunities and barriers (Mitchell, 2009). It is important to understand tele-coupling as it highlights the exogenous influence of non-mountain actors on both the VC-A and the territory itself (Crescenzi et al., 2022).

It is important to manage the dependencies, including understanding exogenous and endogenous interactions to avoid any unintended consequences (Vicol et al., 2018; Gereffi and Lee, 2016).

Table 9: Upgrading themes case study examples

Upgrading Themes	Case Study Examples
Social & Demographic	The Speyside Malt Whisky VC-A actors are working together to ensure above minimum wages are paid and using planning regulations to try to protect housing stocks for working families in the area.
Innovation & Infrastructure	The Grison grain VC actors are working to develop and breed grain varieties that are better adapted to the mountain conditions and can support the VC-A.
Governance, Territoriality & Cooperation	The Brasov tourism VC-A (Romania) case identified the need for greater integration between ecotourism, rural tourism, urban developers, and pasture managers to manage the cultural landscapes and generate vibrant rural communities.
Nature & Ecosystem Services	The Trento wine VC-A (Italy) are modernising the irrigation systems in the vineyards and working on water efficiency processes in the wineries to adapt to climate induced droughts.
Value & Quality Products	The Corsican chestnut VC uses the Protected Designation of Origin certification to gain a premium price for their chestnut flour.
Policy	The Betic organic olive oil VC-A (Spain) findings suggest that current policies do not fully support mountain organic production nor practices that combine livestock grazing with olive groves.

The upgrading strategies were used within all VC types with no marked differences between them. Any differences were related to the size of the firms and existing horizontal or vertical cooperation institutions, which made some upgrading strategies more viable. Where the VC-A shared common territorial capitals, particularly shared livestock or cropping VCs, the upgrading strategies were applied to the wider assemblage. Where the VC-A tended to be diversification beyond the sector such as agro-tourism, then often the innovations were focussed on the focal value product and process upgrading, but other upgrading strategies such horizontal or vertical coordination; functional or inter-chain upgrading were focussed on valorising the assemblage. The assemblage concept was intertwined with the need for strong territorial governance processes to support cooperation horizontally (within sectors at the value stages, but also between sectors for inter-chain upgrading). What was potentially more surprising was the need for governance, and skills, to negotiate the public policies that were extremely important in supporting product and process upgrading strategies, although similar themes were also seen in other recent reviews (Euromontana, 2023).

Building on the summaries provided in section 7, it seems clear that all types of upgrading strategies are in use within MOVING, but there is much less use of functional upgrading and vertical coordination strategies. The focus tended to be on upgrading strategies that mountain actors could implement or influence, and these actors tended to be involved in the production and processing stages of the VC-A only. Therefore, the strategies tended to focus on process upgrading and inter-chain upgrading, often using horizontal coordination strategies as these were strategies that could be implemented by the mountain actors. Product upgrading was developed in many cases, but often these cases relied more on external actors in tele-coupled systems to regulate certification schemes or change their consumption patterns. Although some cases had previously discussed wanting to reterritorialize later value chain stages in the MRL or MRR (Blackstock et al., 2022), this functional upgrading strategy did not emerge as a clear upgrading strategy in the data. Instead, the need to revitalise mountain communities, improve digital infrastructure and provide skills and training to support these later stages of the value chain can be seen a prerequisite to allow future consideration of functional upgrading within MRRs.

Therefore, tele-coupling becomes extremely important for the MOVING VC-A. There were not many data on how tele-coupled actors, particularly non-agricultural businesses, could support with upgrading to improve mountain territories. However, there was more focus on the role of tele-coupled consumers and citizens, particularly regarding upgrading strategies associated with Value and Quality Products. As already noted, there was a strong reliance of public policy to support upgrading strategies through funding and training (Martin-Prevel. A et al., 2023). However, there was very little data on private policies that may be driving product or process upgrading within our 23 VCs, beyond exceptions like the Créalait initiative within the Swiss dairy value chain. Standards from retailers or global certification standards, beyond those associated with PDO and PGIs, are highlighted within the VC literature but seemed lacking in our data. It would be possible for global value chains to invest in continuing professional development and deliver appropriate skills development for mountain VC actors. Furthermore, there was little explicit mention of private finance as a means of funding initiatives in the MRLs as part of upgrading strategies; or SER/CSR as drivers for upgrading strategies (Camilleri, 2017).

Non-mountain policy actors should be included but there is a need to overcome the lack of connection between the needs and wishes of local mountain producers and processors and the actions of national or EU level policy actors. This is not just an instrumental process but about generating a social and political census that supports the mountain agro-system and its integration with other mountain sectors. The data show that this consensus is affected by, and affects, the wider perception of mountains and mountain producers and processors by EU consumers and citizens. Conversely, there were sometimes clear differences in evaluation of the threats and solutions held by different actors, such as between non-mountain scientific researchers and mountain-based producers or knowledge brokers. Through deliberation, these different perspectives can be mutually enriching, with science helping to horizon scan and mountain actors illustrating where and how they can respond. Taking a VC-A can help highlight the need for tele-coupled expertise in transdisciplinary rural development (Moschitz et al., 2015, Galeano-Barrera et al., 2022b).

There were some controversies emerging in the data as well as some contradictions. The upgrading strategies imply a strong entrepreneurial mindset, however, the data also suggested that in some mountain communities there may be reluctance to change. The inertia may be due to the aging producer populations and the difficulties in ensuring continuing professional development when working long hours with limited digital infrastructure or ability to access courses outside the MRL. Conversely, it is possible to harness the independence and territorial identify of farmers and mountain producers and direct these assets in pursuit of upgrading strategies that will generate both public and private goods. However, the strong focus on public policy to underpin their stewardship, rather than seeking other VC-based payment for ecosystem services, suggests that many mountain actors still require public policy to support delivery of public goods, even when there are private benefits arising for the VC. It is important to develop a mindset open to exploring how marketise or monetise the practices being done within VC-A that protect public goods whilst producing private benefits. This is particularly important given the projected shortfall between environmental restoration needs and public finance for environmental restoration (Green Finance Institute et al., 2021).

There are some contradictions emerging about the desire to keep farms small; keep livestock on the mountains; and retain families when there is clear concern about drought, overgrazing and lack of viable businesses without large public subsidies. The concern over resource over use questions the narrative of all mountain actors producing ecosystem services. The data highlights the need for environmental upgrading strategies that support HNV farming practices; the lack of tailored support for positive extensive practices and negative sanctions for those promoting profit over planet. The VC environmental upgrading literature tends to focus on resource efficiency, but our findings suggest that the VC literature needs more attention to these CPR and public good dilemmas. Conversely, the territorial literature highlights the importance of these public goods and the need to protect them (Euromontana, 2022, (Drexler et al., 2016).

The VC literatures tend to be positive about opportunities, which provides a welcome entrepreneurial spirit in line with the European Long Term Vision for Rural Areas (European Commission, 2021) and recent perspectives on mountains (Euromontana, 2020) and rural development (Navarro and Cejudo, 2020). The concept of upgrading strategies can help to stimulate innovation and self-reliance. However, the tele-coupling focus, combined with insights from the neo-endogenous literature (Dax, 2020) illustrates that upgrading strategies need to take seriously conflict and competition particularly when mountain areas lack many competitive advantages due to distance and natural constraints on primary productivity. It is important to be realistic about the potential to implement the upgrading strategies when working in remote regions with limited territorial capitals. Recent reports highlight that not only are mountain areas facing exposure to climate and other drivers but there is also an important implementation gap, with fewer resources available than required to adapt to such changes (McDowell et al., 2021).

It is not just a question of increasing public or private support for upgrading. The strategies must be place-based and integrated across economic sectors (Dax, 2020, McDowell et al., 2021) to ensure that the strategies provide resilience and address sustainability. The concern over the

types of 'new' entrant highlighted in section 7.2.1.1 shows that it matters, at least to our MOVING regional MAPs, who is implementing the innovations, how innovations are implemented and who will benefit from upgrading. Our data suggests that upgrading should be seen to benefit the MRL actors, with concerns that the mountain territorial capitals are valorised but the social, economic and environmental value added are not accrued in the MRL or MRR. Implicit in these findings are the concepts of risk and distribution of these risks. Innovation and change require multiple adaptations by multiple actors, both within the mountain territories and beyond. Whilst trust and social networks are important (Pachoud et al., 2020, Pachoud et al., 2019), the VC-A highlights the complex and dynamic configurations of people and places, and these can result in conflict as well as cooperation (Tobin et al., 2016). Shared territory or dependence on a VC-A does not results in common vision for development nor automatic grounds for cooperation. Instead visions and collective action need to be managed, supported, and governed. Actors can resist value chain upgrading strategies if they feel out of control or threatened by change (Ros-Tonen et al., 2018).

The WP has adapted the value chains for development approach and drawn not only on European findings but those in the Global South and the Americas (Galeano-Barrera et al., 2022a) to ensure that all potential upgrading strategies are considered. The findings convey a sense of mountains being geographically and democratically distant from the urban centres that are also part of the VC-A. However, the VC upgrading approach, particularly one that promotes the tele-coupled relationships with consumers and policy makers, illustrates the need for all actors to contribute to these solutions. Not all farmers lack agency in global value chains (Cheshire and Woods, 2013) and some MAP members are either large organisations with expertise and resources (e.g. Speyside Malt Whisky), or have collectively organised to increase their influence on territorial and sectoral strategies (e.g. Drome Valley). The findings about governance, place and dependency highlights the need to bring in a focus on politics and power (Joltreau and Smith, 2020). Whilst provision of digital and other infrastructure is essential, it brings powerful multi-nationals into the configuration of mountain actors.

The MOVING project has highlighted the importance of managing natural capital, particularly permanent grasslands and forestry mosaics (Neyret et al., 2023). These are habitats under threat (Schils et al., 2022) yet essential not only to pastoral VC products (meat, cheese, honey) but also knowledge and tourism VC-A (Sgroi, 2020). We suggest that the combination of the territoriality perspective and an extended VC-A based on an Ostromian framework (Moretti et al., In Press) has helped highlight the importance of territorial assets. The findings arising from the data show that taking a long term and collective perspective to managing Nature and biodiversity was extremely important within the regional MAPs. This is evident in the extended or advanced VC approach ((Deans et al., 2018, Ros-Tonen et al., 2018) but not central to more conventional VC upgrading strategies, that tend to focus on resource use at the processing stage (Hasan et al., 2019). Indeed, the range and complexity of strategies summarised in Table 7: Upgrading Strategies by Value Chain StageTable 7 exceeds the original and elegant formulation of ways a firm can improve competitiveness (Gereffi, 1999).

8.2 Methodological Reflections

The analysis undertaken in for this deliverable was explicitly designed to reuse existing information already synthesised in project deliverables to bring a new lens to the volume of information already collected. This was to reduce the load on the regional partners, who were involved in tasks for WP6. It was also structured to coordinate with the clustering methodology being designed in WP5. Therefore there was a deliberate focus on valorising the existing insights and conclusions gained rather than undertaking further data collection and/or participatory evaluation of the data. We were able to adapt the existing NVIVO project database to analyse the data in terms of upgrading strategies, but still had to undertake recoding of these data to allow us to search the data in new ways.

The approach generated many findings with considerable detail from the 23 cases. However, it was reliant on the richness and accuracy of the material – if there was limited data provided in earlier work, this also limited how much we can say in the synthesis. There is undoubtably further material within the individual case studies that would deepen our understandings of how the upgrading strategies are being implemented or could be implemented in the MRLs. Therefore this high level synthesis has not been grounded as strongly in practices as case based research might suggest (Klein et al., 2022). The synthetic focus of this deliverable has aimed to highlight common good practice and opportunities rather than compare between MRLs or focus on the individual differences within MRLs. The focus on fewer cases within each cluster in WP5 will provide an opportunity to further develop the specifics of each case.

The findings that there is less material on vertical coordination along the value chain stages; and less functional upgrading, may reflect the interests and knowledge base of the MAP providing much of the data. These were territorially based actors, and whilst partners were encouraged to ensure all stages of the value chain were involved, most tended to be dominated by producers and processors within the MRL or MRR with few inputs from the actors involved in tele-coupled practices (such as distribution, marketing and consumption taking place outside the MRL/MRR). Also, many of the data were presented for the entire VC-A and not decomposed into the different VC stages, making it harder to analyse these aspects without cross-referencing and inference. It was sometimes difficult to disentangle the VC from VC-A when re-using summarised data. The VC approach prioritises linear coherence along a sectoral VC sequence of stages, but within MOVING this was overlain by a focus on horizontal coherence with other territorial development activities involving other sectors, and non-economic concerns.

The 23 VCs and their VC-A were explicitly chosen for their relationship with the land use systems (Blackstock and Flanigan, 2021) and reflect many traditional mountain food and drink products. However, this may have reduced attention to the opportunities available in these MRLs related to wider bio-economy sectors, including green energy. This is despite the importance of energy sources and local production to reduce GHG emissions and combat inflation within the data on Innovation and Infrastructure.

It was often unclear whether the upgrading strategy was currently being practiced or had been identified as relevant but not yet in use. Even where an example was given of a strategy being implemented, it was not clear, without further data collection, to know if this was common within the MRL or a particularly innovative example. Given there was data about barriers or challenges to implementing upgrading strategies throughout Section 7, including the reliance on public policy for funding and support, taking the position that these upgrading strategies should be reflected in the policy roadmap, rather than assuming that they are already business as usual, seems sensible.

Finally, it would have strengthened the findings to have presented our draft findings to the regional MAPs for their feedback. This was not done to avoid consultation fatigue but remains an option for individual regional partners to consider.

8.3 Insights for Policy and Practice

The above reflections provide some recommendations for supporting upgrading strategies that address sustainable mountain development. These have been grouped to cover some general points and then by sustainability theme (Social & Demographic, Innovation & Infrastructure, Governance, Territoriality & Cooperation, Nature & Ecosystem Services, Value & Quality Products, Policy).

- It is important to consider upgrading from a variety of perspectives (economic, social, environmental) and to adapt the strategies to the local context.
- Recent shocks like inflation, interest rates, energy security, climate and biodiversity threats, and the Covid 19 pandemic provoked opportunities for change but also created anxiety.
- There is a recognition that generally it is best to use a repertoire of upgrading strategies and the repertoire will depend on what can be mobilised, by whom, and in whose interests.
- Assessing which upgrading strategies to pursue requires attention to all three pillars of justice: procedural, representational and distributive.
- Given the interactions of different upgrading strategies, it is important that selections of upgrading strategies manage potential trade-offs.

- Taking an extended VC-A approach is useful to bring together a focus on endogenous and tele-coupled exogenous actors can contribute to mountain sustainable development.
- It is useful to differentiate these actors and pay attention to the needs of youth, women, new entrants and older amenity migrants, who can all play roles in upgrading.

- A VC-A approach is well placed to cross spatial and sectoral silos to practice more integrated place-based development that leverage opportunities offered by global as well as local VC-A.

- A VC-A can link together different knowledge systems and innovations, ideally through lifelong education and professional development that is supported by an appropriate brokerage system and supported by downstream VC-A businesses.

- Achieving a collective vision for the VC-A and the territory requires appropriate governance institutions that can span sectors (particularly linking the primary and tertiary sectors) and territories to connect the disconnected.
- The different opinions within the MAPs about threats and upgrading solutions requires attention to problem framing, social learning and conflict resolution before solutions can be implemented.

- The potential of global or national value chains could be more strongly exploited but safeguards are needed to avoid dependencies and exploitation.
- VC-As based on mountain territorial capital need to safeguard natural and cultural capitals and address the intersection of public goods and private benefits through appropriate payment for ecosystem services.

- Policies (both public and voluntary private standards or certification) can play an essential role in VC-A upgrading but attention to implementation is essential.
- Policies need to be resourced but also coherent with the wider territorial and VC-A vision for future development, and adaptively managed to adjust to change.

8.4 Insights for further work in the Project

WP4 was designed to move from a broad understanding of many different value chains; to a deeper understanding of how 23 specific VC-A functioned and how they were resilient to current environmental, socio-economic and political threats. Through these tasks, a large volume of data was collected. These data are not only useful for the WP itself, but a resource for the remaining WPs in the last 18 months of the project.

The approach in section 7 was explicitly designed to provide a foundation for the clustering work in WP5. By analysing the approach to upgrading through the six thematic clusters (see Table 4), this can give the cluster teams some material for further analysis. Where there are upgrading strategies being undertaken by some cases but not all within the VC types, there is an opportunity for peer-to-peer learning (e.g., the use of cooperatives to increase milk prices between the Swiss Jura and Serra da Estrela or Alto Molise MAPs). Furthermore, the NVIVO project database can be shared with the cluster leads to provide relevant data for discussion. These qualitative insights can help frame the development of more quantitative metrics. The information can also be useful to focus the joint WP5 and WP6 discussions planned for the November 2023 Steering Committee meeting where stakeholders will want to focus on solutions for their sector or territory.

The development of this deliverable has run in parallel with the local foresight exercises in WP6. However, exchanges regarding the main literatures informing this deliverable and the approach to foresight occurred during the Steering Committee meeting in October 2022 and the online meeting in March 2023. The regional partners were already aware of these upgrading strategies as they provided the data for this deliverable, so will be using their own experiences within the local foresight discussions These findings building from all 23 cases, together with the local foresight results, can be used to structure the next stages of WP6, including the regional and EU foresight exercises. Certainly, the entrepreneurial spirit of VC upgrading literatures fits well with a future thinking orientation, as highlighted by the Cretan and Huesca regional partners.

The need to provide inputs to the WP7 policy road map has been explicitly considered in the structure and focus of the deliverable. As well as highlighting where the 23 VC-A related to public policy in section 7.2.6, there are references to the need to consider both public goods and private benefits through section 7. Some gaps, such as support for appropriate agro-forestry systems, have emerged but also some controversies about extensification and landscape character, have been identified. As noted in section 8.2, the focus is mainly on mountain territorial issues associated with production and processing stages of the VC-A, with less attention to polices relating to the later stages.

Finally, the material in this deliverable can be adapted into summary blogs or briefings and more visual outputs to convey the main messages to different audiences as part of WP1 DECO strategy (such as was done to support the youth engagement).

9 References

ABBEY, P., TOMLINSON, P. R. & BRANSTON, J. R. 2016. Perceptions of governance and social capital in Ghana's cocoa industry. *Journal of Rural Studies,* 44**,** 153-163.

ADHIKARI, L., SHRESTHA, A. J., DORJI, T., LEMKE, E. & SUBEDEE, B. R. 2018. Transforming the Lives of Mountain Women Through the Himalayan Nettle Value Chain: A Case Study From Darchula, Far West Nepal. *Mountain Research and Development,* 38**,** 4-13.

ALLOUCHE, J., MIDDLETON, C. & GYAWALI, D. 2015. Technical veil, hidden politics: Interrogating the power linkages behind the nexus. *Water Alternatives,* 8.

AUGERE-GRANIER, M. L. & MCELDOWNEY, J. 2021. EU rural development policy: Impact, challenges and outlook.

BAIG, S. M., KHAN, A. A., ALI, A., KHAN, M. Z., AHMED, S., SHAH, G. M. & ALI, G. 2020. Enhancing socioeconomic resilience and climate adaptation through value chain development of mountain products in Hindu Kush Himalayas. *Environment Development and Sustainability*.

BARRIENTOS, S., GEREFFI, G. & ROSSI, A. 2011. Economic and social upgrading in global production networks: A new paradigm for a changing world. *International Labour Review,* 150**,** 319-340.

BLACKSTOCK, K. & FLANIGAN, S. 2021. D4.2: List of selected value chains and relationship building. *MOVING WP4.2.* v1.4 ed.

BLACKSTOCK, K., FLANIGAN, S., CREANEY, R., MATTHEWS, K. B., HOPKINS, J., MILLER, D., AHMED, A., CHABDU, A., BACIGALUPO, A. & THOMPSON, C. 2022. D4.3: Participatory Value Chain Analysis.

BOLWIG, S., PONTE, S., DU TOIT, A., RIISGAARD, L. & HALBERG, N. 2010. Integrating Poverty and Environmental Concerns into Value-Chain Analysis: A Conceptual Framework. *Development Policy Review,* 28**,** 173-194.

BOMBAJ, F., BARJOLLE, D., CASABIANCA, F. & ANTHOPOULOU, T. 2018. Albanian municipalities facing decentralisation of pastures' management rules. *Food Systems,* 3**,** 31-59.

BRUNORI, G., NIETO, E., CASARES, B., DEBRUYNE, L., TISENKOPFS, T. & BRUNORI, A. 2021. Experts' Recommendations to boost sustainable digitalisation of Agriculture, Forestry and Rural Areas by 2040. Pisa, Italy.

CAMILLERI, M. A. 2017. Corporate sustainability and responsibility: creating value for business, society and the environment. *Asian Journal of Sustainability and Social Responsibility,* 2**,** 59-74.

CHESHIRE, L. & WOODS, M. 2013. Globally engaged farmers as transnational actors: Navigating the landscape of agri-food globalization. *Geoforum,* 44**,** 232-242.

CHOUDHARY, D., KALA, S. P., TODARIA, N. P., RAWAT, R. B. S., KUNWAR, M. S. & KOLLMAIR, M. 2013. Upgrading mountain people in medicinal and aromatic plants value chains: lessons for sustainable management and income generation from Uttarakhand, India. *International Journal of Sustainable Development and World Ecology,* 20**,** 45-53.

CHOUDHARY, D., KUNWAR, M. S. & RASUL, G. 2015. From Farmers to Entrepreneurs-Strengthening Malta Orange Value Chains Through Institutional Development in Uttarakhand, India. *Mountain Research and Development,* 35**,** 4-15.

COOK, B. 2019. Organic rural development: Barriers to value in the quest for qualities in Jordanian olive oil. *Journal of Rural Studies,* 69**,** 106-116.

CRESCENZI, R., DE FILIPPIS, F., GIUA, M. & VAQUERO-PIÑEIRO, C. 2022. Geographical Indications and local development: the strength of territorial embeddedness. *Regional Studies,* 56**,** 381-393.

DAX, T. 2020. Neoendogenous Rural Development in Mountain Areas. *In:* CEJUDO, E. & NAVARRO, A. (eds.) *Neoendogenous Development in European Rural Areas.* Springer.

DAX, T. & FISCHER, M. 2018. An alternative policy approach to rural development in regions facing population decline. *European Planning Studies,* 26**,** 297-315.

DEANS, H., ROS-TONEN, M. A. F. & DERKYI, M. 2018. Advanced Value Chain Collaboration in Ghana's Cocoa Sector: An Entry Point for Integrated Landscape Approaches? *Environmental Management,* 62**,** 143-156.

DREXLER, C., BRAUN, V., CHRISTIE, D., CLARAMUNT, B., DAX, T., JELEN, I., KANKA, R., KATSOULAKOS, N., LE ROUX, G. & PRICE, M. 2016. Mountains for Europe's Future–A strategic research agenda. *Bern, Switzerland: Mountain Research Initiative, Institute of Interdisciplinary Mountain Research*.

ENGLAND, M. & CREANEY, R. In Progress. D1.5 Youth Engagement Report.

EUROMONTANA 2020. Towards a Long-Term Vision for Mountains' Rural Areas. Brussels, Belgium: Euromontana.

EUROMONTANA 2022. Sila Declaration: Smart Mountains: Making our territories more attractive and resilient in the face of social, economic and environmental transitions. Brussels.

EUROMONTANA 2023. Booklet of good practices for the sustainable development of mountain areas. Brussels: Euromontana.

EUROPEAN COMMISSION 2021. A long-term Vision for the EU's Rural Areas - Towards stronger,connected, resilient and prosperous rural areas by 2040. *In:* COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, T. C., THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS (ed.). Brussels.

FABRE, P., DABAT, M. H. & ORLANDONI, O. 2021. Methodological Brief for Agri-based Value Chain Analyses. Frame and Tools: Key Features. *In:* COMMISSION, A. F. E. (ed.).

GALEANO-BARRERA, C. J., MENDOZA-GARCIA, E. M., MARTINEZ-AMARIZ, A. D. & ROMERO-RIANO, E. 2022a. Theoretical model of territorial agro-industrial development through multi-focus research analytics. *Journal of Rural Studies,* 94**,** 295-304.

GALEANO-BARRERA, C. J., MENDOZA-GARCÍA, E. M., MARTÍNEZ-AMARIZ, A. D. & ROMERO-RIAÑO, E. 2022b. Theoretical model of territorial agro-industrial development through multi-focus research analytics. *Journal of Rural Studies,* 94**,** 295-304.

GEREFFI, G. 1999. International trade and industrial upgrading in the apparel commodity chain. *Journal of International Economics,* 48**,** 37-70.

GEREFFI, G. & FERNANDEZ-STARK, K. 2011. Global value chain analysis: a primer. *Center on Globalization, Governance & Competitiveness (CGGC), Duke University, North Carolina, USA*.

GEREFFI, G. & LEE, J. 2016. Economic and Social Upgrading in Global Value Chains and Industrial Clusters: Why Governance Matters. *Journal of Business Ethics,* 133**,** 25-38.

GONZÁLEZ-MORENO, P., MORENO, J., PINTO-CORREIA, T., PIRES-MARQUES, É., PALACIOS, G., GUIOMAR, N. R. G. N., FARHAD, S. & DELGADO, M. D. M. 2022. D3.2: Land use system vulnerability matrixes and vulnerability maps for the 23 reference regions. *D3.2.* University of Córdoba, University of Évora.

GREEN FINANCE INSTITUTE, EFTEC & RAYMENT CONSULTING 2021. The Finance Gap for UK Nature.

HASAN, M. M., NEKMAHMUD, M., YAJUAN, L. & PATWARY, M. A. 2019. Green business value chain: a systematic review. *Sustainable Production and Consumption,* 20**,** 326-339.

HUMPHREY, J. 2004. Upgrading in global value chains. *Working Paper No 28.* Geneva, Switzerland: International Labour Office.

HUMPHREY, J. & SCHMITZ, H. 2002. How does insertion in global value chains affect upgrading in industrial clusters? *Regional Studies,* 36**,** 1017-1027.

JENA, P. R., LIPPE, R. S. & STELLMACHER, T. 2022. Editorial: Sustainable certification standards: Environmental and social impacts. *Frontiers in Sustainable Food Systems,* 6.

JOLTREAU, T. & SMITH, A. 2020. Short Versus Long Supply Chains in Agri-Food Sectors: Peaceful Coexistence or Political Domination? The Case of foie gras in South-West France. *Sociologia Ruralis,* 60**,** 680-697.

JONES, L., HELEY, J. & WOODS, M. 2019. Unravelling the Global Wool Assemblage: Researching Place and Production Networks in the Global Countryside. *Sociologia Ruralis,* 59**,** 137-158.

KLEIN, O., NIER, S. & TAMASY, C. 2022. Re-configuring rural economies-The interplay of institutions in three agri-food production systems. *Journal of Rural Studies,* 92**,** 132-142.

KRISHNAN, R., AGARWAL, R., BAJADA, C. & ARSHINDER, K. 2020. Redesigning a food supply chain for environmental sustainability – An analysis of resource use and recovery. *Journal of Cleaner Production,* 242**,** 118374.

LAMINE, C. 2015. Sustainability and Resilience in Agrifood Systems: Reconnecting Agriculture, Food and the Environment. *Sociologia Ruralis,* 55**,** 41-61.

MACCLAY, P. & SELLARE, J. 2022. Value Chain Transformations in the transition to a sustainable bio-economy. *ZEF Discussion Papers on Development Policy.* 2022: Center for Development Research.

MARTIN-PREVEL. A, BOSCH, N. M. & SWADE, K. 2023. Making Farmland Work for the Public Good. Ruralization Project.

MCDOWELL, G., STEVENS, M., LESNIKOWSKI, A., HUGGEL, C., HARDEN, A., DIBELLA, J., MORECROFT, M., KUMAR, P., JOE, E. T., BHATT, I. D. & THE GLOBAL ADAPTATION MAPPING INITIATIVE 2021. Closing the Adaptation Gap in Mountains. *Mountain Research and Development,* 41.

MITCHELL, J., COLES, C. & KEANE, J. 2009. Upgrading along Value Chains: Strategies for Poverty Reduction in Latin America. *COPLA briefing paper.*

MORETTI, M., BRUNORI, G., GRANDO, S., FELICI, F., SCOTTI, I., IEVOLI, C. & BELLIGGIANO, A. 2021a. MOVING Conceptual Framework (Draft).

MORETTI, M., FELICI, F., ALLALI, T., SCOTTI, I. & BRUNORI, G. 2021b. D4.1: Inventory of Mountain Value Chains. *MOVING: Mountain Valorisation Through Interconnectedness and Green Growth.* EU Horizon 2020.

MORETTI, M., LEVOLI, C., BELLIGGIANO, A., DELGADO-SERRANO, M., BLACKSTOCK, K. & BRUNORI, G. In Press. Characterizing value chains' contribution to resilient and sustainable development of Socio-Ecological Systems in European mountain areas. *Journal of Rural Studies*.

MOSCHITZ, H., ROEP, D., BRUNORI, G. & TISENKOPFS, T. 2015. Learning and Innovation Networks for Sustainable Agriculture: Processes of Co-evolution, Joint Reflection and Facilitation. *Journal of Agricultural Education & Extension,* 21**,** 1-11.

MUNASINGHE, M., JAYASINGHE, P., DERANIYAGALA, Y., MATLABA, V. J., SANTOS, J. F. D., MANESCHY, M. C. & MOTA, J. A. 2019. Value–Supply Chain Analysis (VSCA) of crude palm oil production in Brazil, focusing on economic, environmental and social sustainability. *Sustainable Production and Consumption,* 17**,** 161-175.

MUTERSBAUGH, T., KLOOSTER, D., RENARD, M.-C. & TAYLOR, P. 2005. Certifying rural spaces: Quality-Certified Products and Rural Governance. *Journal of Rural Studies,* 21**,** 381-388.

NAVARRO, F. & CEJUDO, E. 2020. Experiences and Shared Lessons. *In:* CEJUDO, E. & NAVARRO, F. (eds.) *Neoendogenous Development in European Rural Areas: Results and Lessons.* Cham: Springer International Publishing.

NEYRET, M., PETER, S., LE PROVOST, G., BOCH, S., BOESING, A. L., BULLOCK, J. M., HÖLZEL, N., KLAUS, V. H., KLEINEBECKER, T., KRAUSS, J., MÜLLER, J., MÜLLER, S., AMMER, C., BUSCOT, F., EHBRECHT, M., FISCHER, M., GOLDMANN, K., JUNG, K., MEHRING, M., MÜLLER, T., RENNER, S. C., SCHALL, P., SCHERER-LORENZEN, M., WESTPHAL, C., WUBET, T. & MANNING, P. 2023. Landscape management strategies for multifunctionality and social equity. *Nature Sustainability,* 6**,** 391-403.

O'ROURKE, E., CHARBONNEAU, M. & POINSOT, Y. 2016. High nature value mountain farming systems in Europe: Case studies from the Atlantic Pyrenees, France and the Kerry Uplands, Ireland. *Journal of Rural Studies,* 46**,** 47-59.

PACHOUD, C., DELAY, E., DA RE, R., RAMANZIN, M. & STURARO, E. 2020. A Relational Approach to Studying Collective Action in Dairy Cooperatives Producing Mountain Cheeses in the Alps: The Case of the Primiero Cooperative in the Eastern Italians Alps. *Sustainability,* 12.

PACHOUD, C., LABEYRIE, V. & POLGE, E. 2019. Collective action in Localized Agrifood Systems: An analysis by the social networks and the proximities. Study of a Serrano cheese producers' association in the Campos de Cima da Serra/Brazil. *Journal of Rural Studies,* 72**,** 58-74.

PEGLER, L. 2015. Peasant inclusion in global value chains: economic upgrading but social downgrading in labour processes? *The Journal of Peasant Studies,* 42**,** 929-956.

PIÑERO, P., BRUCKNER, M., WIELAND, H., PONGRÁCZ, E. & GILJUM, S. 2019. The raw material basis of global value chains: allocating environmental responsibility based on value generation. *Economic Systems Research,* 31**,** 206-227.

PIPKIN, S. & FUENTES, A. 2017. Spurred to Upgrade: A Review of Triggers and Consequences of Industrial Upgrading in the Global Value Chain Literature. *World Development,* 98**,** 536-554.

POLIRURAL 2021. A STEEPV Inventory of Drivers of Change. *In:* CREHAN, P. (ed.).

PRICE, M. 2015. *Mountains: A very short introduction*, OUP Oxford.

PURNOMO, H., OKARDA, B., DERMAWAN, A., ILHAM, Q. P., PACHECO, P., NURFATRIANI, F. & SUHENDANG, E. 2020. Reconciling oil palm economic development and environmental conservation in Indonesia: A value chain dynamic approach. *Forest Policy and Economics,* 111**,** 102089.

RIISGAARD, L., BOLWIG, S., PONTE, S., DU TOIT, A., HALBERG, N. & MATOSE, F. 2010. Integrating Poverty and Environmental Concerns into Value-Chain Analysis: A Strategic Framework and Practical Guide. *Development Policy Review,* 28**,** 195-216.

ROS-TONEN, M. A. F., REED, J. & SUNDERLAND, T. 2018. From Synergy to Complexity: The Trend Toward Integrated Value Chain and Landscape Governance. *Environmental Management,* 62**,** 1-14.

ROS-TONEN, M. A. F., VAN LEYNSEELE, Y. P. B., LAVEN, A. & SUNDERLAND, T. 2015. Landscapes of Social Inclusion: Inclusive Value-Chain Collaboration Through the Lenses of Food Sovereignty and Landscape Governance. *European Journal of Development Research,* 27**,** 523-540.

SCHILS, R. L. M., BUFE, C., RHYMER, C. M., FRANCKSEN, R. M., KLAUS, V. H., ABDALLA, M., MILAZZO, F., LELLEI-KOVÁCS, E., BERGE, H. T., BERTORA, C., CHODKIEWICZ, A., DĂMĂTÎRCĂ, C., FEIGENWINTER, I., FERNÁNDEZ-REBOLLO, P., GHIASI, S., HEJDUK, S., HIRON, M., JANICKA, M., PELLATON, R., SMITH, K. E., THORMAN, R., VANWALLEGHEM, T., WILLIAMS, J., ZAVATTARO, L., KAMPEN, J., DERKX, R., SMITH, P., WHITTINGHAM, M. J., BUCHMANN, N. & PRICE, J. P. N. 2022. Permanent grasslands in Europe: Land use change and intensification decrease their multifunctionality. *Agriculture, Ecosystems & Environment,* 330**,** 107891.

SCHMITT, E., KEECH, D., MAYE, D., BARJOLLE, D. & KIRWAN, J. 2016. Comparing the Sustainability of Local and Global Food Chains: A Case Study of Cheese Products in Switzerland and the UK. *Sustainability,* 8**,** 419.

SGROI, F. 2020. Forest resources and sustainable tourism, a combination for the resilience of the landscape and development of mountain areas. *Science of The Total Environment,* 736**,** 139539.

SHERPA 2020. Long Term Vision for Rural Areas. Brussels.

TOBIN, D., GLENNA, L. & DEVAUX, A. 2016. Pro-poor? Inclusion and exclusion in native potato value chains in the central highlands of Peru. *Journal of Rural Studies,* 46**,** 71-80.

TRIENEKENS, J. H. 2011. Agricultural Value Chains in Developing Countries A Framework for Analysis. *International Food and Agribusiness Management Review,* 14**,** 51-82.

VEITNERS, K., STEPANCUKS, A. & ABELE, L. 2022. D6.2 Regional Action Plans. Polirural.

VICOL, M., NEILSON, J., HARTATRI, D. F. S. & COOPER, P. 2018. Upgrading for whom? Relationship coffee, value chain interventions and rural development in Indonesia. *World Development,* 110**,** 26-37.

VITERI, G. 2017. Standards and labels for the promotion of biodiversity-friendly production and commercialization: An overview. Bonn: GIZ Deutsche Gesellschaft fur Internationale Zusammerabeit GmbH.

ZAGATA, L., SUROVÁ , D., HUSAK, J. & UHNAK, T. 2023. D4.5 Vulnerability and Resilience Performance.