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Executive Summary

The purpose of this deliverable is to provide a comprehensive understanding of rural development dynamics and the emergence of successful business models. This includes identifying causal processes, describing relationships, and creating models for an interactive learning environment. To achieve these goals, various analyses were conducted.

Analytical Approaches

1. **Natural Language Processing (NLP):** Case studies from Project Result 1 were analyzed using NLP algorithms to uncover insights into the successes and failures of rural organizations.
2. **Literature Review:** A thorough scientific literature review explored how Systems Thinking and System Dynamics have been applied to address rural entrepreneurship challenges. It revealed gaps in research related to the impact of different business models on rural development.
3. **Data Compilation:** A new knowledge database was developed, incorporating data from partner countries and organizations. NLP and clustering algorithms were applied to extract valuable insights.
4. **Group Model Building:** Several Group Model Building Sessions were organized to use System Dynamics to identify key causal relationships within the rural development system.

Key Findings

From the Literature Review:

1. Research often focuses on agricultural production processes, neglecting the influence of diverse business models on rural entrepreneurship.
2. Limited attention has been given to the entrepreneurial aspect of rural development compared to food security.
3. Research has primarily concentrated on developing or under-developed regions, resulting in a bias towards certain agricultural products.
4. Recent research has explored diversification in rural entrepreneurship, such as agro-tourism, but less attention has been given to the energy-agriculture interface and technological aspects.

From Natural Language Processing and Data Clustering:

1. Mediterranean countries prioritize innovation and technology to drive rural development.
2. Northern countries emphasize organic agriculture and the entire food supply chain, with

a focus on rural enterprise associations.
3. Resource scarcity is a common obstacle in both northern and southern countries, irrespective of their economic development levels.

From the Development of Causal Loop Diagrams:

1. Rural entrepreneurs must carefully balance agriculture, energy, and tourism to achieve positive outcomes while avoiding unintended consequences.
2. Pollution poses a significant threat to the rural economy, leading to a decline in local production.
3. Negative feedback loops in workforce structures underscore the vulnerability of agricultural entrepreneurship to market forces, particularly when infrastructure is inadequate.
4. The workforce structures and their inherent delays can also affect the level and quality of production with ramifications to the sustainability of the enterprise.
5. Innovation is seen as a positive force for both income (even if the positive effect occurs after the initial costs to innovate) and climate change.

Knowledge Database

In addition to these analyses, a knowledge database was established, documenting reasons for the success and challenges of various rural enterprises, along with broader regional data. This valuable resource is freely accessible on the project's website.

This deliverable contributes to a holistic understanding of rural development dynamics, offering insights into successful business models, causal relationships, and potential challenges. It serves as a valuable resource for researchers, policymakers, and rural entrepreneurs seeking to enhance rural development strategies.

Introduction

The purpose of Project Result 2 as stated in the proposal document is:

"*Main focus will be on those dynamics especially emerging in community-based business models. In this way, result 2 will provide a holistic understanding of rural development dynamics working out the process underpinning the emergence of successful business models. Specific elements of result 2 are:*
- the identification of mechanisms for the elicitation of potential causal processes present in textual descriptions of case studies identified in result 1,
- the description of causal relationships and supporting evidence for modeling and confidence building,
- the models (mathematical/operational and simulation/strategic) which will be implemented in the interactive learning environment(result 3)"

To achieve the objective of the current project result, several tasks have been defined. The following table illustrates the tasks and where they can be found in the document.

Table 1 Tasks and where they addressed in the current document.

Project Task	**Pages**
Task 1: Investigating the socio-political dynamics of community-based rural business models	7-79
Task 2: Analysis and socialization of results	80-89
Task 3: Group Model Building	72-80, 89-106

Methodology

To investigate and identify the socio-political dynamics of community-based rural models, a multi-dimensional approach was used with the purpose of obtaining several relevant data sources:

(1) Scientific databases were searched (Google Scholar, Scopus) using the keywords: "rural", "agriculture", 'Rural tourism", "Rural energy", "community-based" "System Dynamics". These keywords were combined among them. A very large initial pool of papers emerged from that and subsequently, the list was scanned (by reading the abstract) and only those papers that made a specific "rural" mention were choses. This step was necessary because System Dynamics has a very expanded literature on energy issues for example. In addition, from these papers a few representative ones were chosen that while not strictly connected with rurality they could offer important insights for the OREN project. Finally, because the purpose of the deliverable was not to perform a comprehensive literature review but to identify the most relevant socio-political dynamics of community-based rural models, the focus was (whenever possible) on the last 10 years; the final number of papers that will be analyzed is 20.

One important aspect that emerged during the literature search was that there are no models specifically focused on "community-based" business models. Thus, this gap will be addressed by the OREN project and its project results. The final list of papers that will be presented in the following pages, separated by subject matter is presented on Table 2 below:

Table 2 Papers that will be presented in the current deliverable.

Subject Matter	Papers
Agriculture	(Jagustović, et al., 2021)
	(Stephens, et al., 2012)
	(German, Bonanno, Foster, & Cotula, 2020)
	(Chung, 2018)
	(Hakim & Deli, 2020)
Tourism	(Mai & Smith, 2018)
	(Randelli & Tortora, 2014)
	(Žibert, Rozman, Škraba, & Prevolšek, 2020)
	(Sedarati, Santos, & Pintassilgo, 2019)
Energy	(Riva & Colombo, 2020)
	(Riva, 2020)
	(Xiaohua, Yunrong, Xiaqing, & Yuedong, 2006)
	(Dyner, Alvarez, & Cherni, 2005)
	(Tonini, Sanvito, Colombelli, & Colombo, 2022)
	(Xiaojing & Ren'an, 2017)
	(Hartvigsson, Ehnberg, Ahlgren, & Molander, 2016)

	(Teufel, Miller, Genoese, & Fichtner, 2013)
	(Goh, et al., 2014)
	(Ahmad, Tahar, Muhammad-Sukki, Munir, & Rahim, 2016)

2) The case studies from Project Result 1 were re-evaluated to elicit important factors (Data 1). The data were gathered in a CSV file and then machine learning algorithms were applied in python to cluster the various organizations that were presented in the data (Pedregosa, et al., 2011). Table 3 below presents the data that were gathered from the case studies of PR1.

Table 3 Case studies from Project Result 1

Country	Name	Sector	Aim	Challenges	Good practices
Bulgaria	Biofish Trading Ltd	Agriculture	1) Connect producers to customers 2) Small food supply chain 3) Maximum benefit from waste	N/A	1) Preservation and teaching of know-how to next generation 2) Pay attention to the behavior of animals 3) Digitization
Bulgaria	Gorunaka Complex	Agriculture	Hotel-Restaurant-Farm	1) Lack of infrastructure 2) Legislation	Knowledge in a) economics b) management c) engineering
Bulgaria	Grikam LtD	Agriculture	Franchising for Mushrooms	1) Lack of people with technological knowledge 2) Lack of training programs	Growing mushrooms according to the conditions in the area
Belgium	Linked.Farm	Agriculture	Sales and distribution digital platform for local Farm2Fork products	1) Limited access to public tenders 2) Every farmer can invest only money they have	1) Shortening the food chain 2) Diverse stakeholders-resilience
Belgium	Ma Ferme	General for rurality	Facilitator and incubator for rural enterprises	1) Low profit margin 2) Capital-intensive activities 3) Environmental	1) Solidarity 2) Exchange of Knowledge 3) Complementarity 4) Focus on emerging sectors

				threats	
Belgium	Cocoricoop	Agriculture	Trading products for local and environmentally friendly farms	1) The work of volunteers is essential 2) Imbalance between workload and personal life	1) Specific guidelines to respect and promote local production 2) Synergies betwee farmers and customers 3) Producers are asked to be beneficial to the environment 4) High quality of products 5) Fair, inclusive and cooperative business model
Germany	Bioland e.V	Agriculture	Association to support the independence of the agricultural sector	N/A	1) Biodiversity 2) Closed production cycle
Germany	Markgesellschaft der Naturland Bauern	Agriculture	Organic Producers association	N/A	Committed to local producers
Germany	Innovative Landwirtschaft Reber	Agriculture	Family-run farm	Lack of funds and economic incentives	Regenerative farming and carbon farming
Greece	Development Agency of Karditsa (ANKA)	General for rurality	Assist in management of natural resources, innovation, support for collective actions	Legislation, limited opportunities for public funding	Knowledge of legislation, use of EU programs, Collaboration with research institutes and universities
Greece	ThesGi	Agriculture	Promote the cooperation among its members to achieve economic, social and cultural development	1) Increasing cost of energy and supplies 2)Scaling up is difficult 3) Limited access to R&D 4) Political and financial context	Organizational structure, focus on local community, involvement in all aspects of agricultural production
Greece	Amyntaion wine	Tourism, Agriculture	Cooperative to provide support,	1) Increasing cost of energy	1) Use of technology and modern wine

		, Cultural Heritage	resources conservation and utilization of technology in wine production	and supplies 2)Scaling up is difficult 3) Limited access to R&D 4) Political and financial context	techniques 2) Employment of enologists 3) Consumers feel safe about the product
Spain	Movilex	Circular Economy	integrated management of dangerous and non-dangerous waste	To implement all the different processes that the organization is (or wishes to be) involved is a challenge of itself as it requires engagement of different entities and the society, and sometimes some entities can be resilient to change.	1) a renewed production model of circular economy while at the same time opening up new ways of doing business, creating jobs and generating wealth, especially in the natural environment 2) without neglecting its contribution to the necessary innovation in the application of technology at the service of this philosophy in business action 3) correct use of data and its analytics for learning and continuous improvement.
Spain	BioAgro	Agriculture	a company that uses technology at the service of agriculture, sending the necessary information to help farmers in their decision-making. In this way, it contributes to increasing productivity and improving the environmental	no rapid implementation by most farmers	1) agricutural digitization 2) committed to intelligent irrigation, with a new product already on the market that allows "optimising every liter of water used in the field"

			control of their crops.		
Spain	Bodegas José Pariente	Agriculture	wine production family company	1) Local and National Competition 2) International markets and competitions	1) The investments in R&D and innovation 2) integrated corporate social responsibility 3) quality 4) commitment to preserve the environment

(2) New variables/parameters of interest were identified based on the literature review and the partners of the OREN project were asked to gather data on several aspects of rurality that could prove useful for the development of the simulation models. The data were grouped into two categories:

1. General Data on the area of interest of the partner's country
2. Specific data on rural organizations in the area of interest.

A pre-defined list of variables of interest were provided to the partners. Moreover, each variable was accompanied by an explanation and finally, the partners were asked to provide a reference, whether the datapoint was numerical or not. If no data were found, the field could be left blank.
The tables below illustrate the data that were gathered for the areas of interest, along with details and their source.

Table 4 General Data for Greece

Data/Factor	Value	Description	Reference
Country/Region	Greece (Thessaly)	*Please select a region for which you will collect data. For example, IDS will focus on the Region of Thessaly rather on whole of Greece*	
Number of Rural Entrepreneurs Focused on Agriculture (including livestock, agriculture, fisheries) of the region	520108 (66000)	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.statistics.gr/en/statistics/-/publication/SBR01/-
Number of Rural Entrepreneurs focused on Energy	No statistics available	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Number of rural entrepreneurs focused on Agrotourism	No statistics available	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Number of rural cooperatives in the region that are focused on agriculture (including agriculture, livestock, fisheries)	1398 (120)	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.minagric.gr/for-farmer-2/sillogikes-agrotikes-organoseis
Number of cooperatives in the region that are focused on Energy	No statistics available	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you

		leave blank	cannot find a source, leave blank
Number of cooperatives in the region that are focused on Agrotourigm	No statistics available	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Environmental Factors in the area: CO2 emissions	81029.7 tonnes	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.statistics.gr/en/statistics/-/publication/SOP08/-
Environmental Factors in the area:% of CO2 emissions from transport	22698 tonnes	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.statistics.gr/en/statistics/-/publication/SOP08/-
Environmental Factors in the area:% of CO2 emissions from agriculture	691 tonnes	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.statistics.gr/en/statistics/-/publication/SOP08/-
Environmental Factors in the area: Water Scarcity	High		https://www.wri.org/data/aqueduct-30-country-rankings
Environmental Factors in the area: Other	Greece has a variety of climates, leading to different environmental factors affecting rural businesses.	*Please provide any other environmental factor that you might think it is important*	Please provide a report, or a paper or a government document that describes the situation of the specific environmental factor
Social Factors in the area: Population density/Population	79.1/km2	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://elstat-outsourcers.statistics.gr/census_results_2022_en.pdf
Social Factors in the area: Average birth	8 births per 1000 inhabitants	*If no specific number can be found, please*	https://ec.europa.eu/eurostat/databrowser/vie

rate		*provide an estimate. If an estimate is also impossible, please leave blank*	w/tps00204/default/table?lang=en
Social Factors in the area: Number of people at working age	4771600 people at working age	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.statistics.gr/el/statistics/-/publication/SJO01/-
Social factors in the area: Number of women working in the rural sector	993100 women working in the rural sector	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://ec.europa.eu/eurostat/databrowser/view/URT_LFP3POP__custom_4334390/default/table?lang=en
Social Factors in the area: Population of the area	10432481 inhabitants	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://elstat-outsourcers.statistics.gr/census_results_2022_en.pdf
Social Factors in the area: Other	28,8% of the Greek population is at risk of poverty/social exclusion	*Please provide any other social factor that you might think it is important*	https://ec.europa.eu/eurostat/databrowser/view/ilc_peps01/default/table?lang=en
Economic factors in the area: GDP of the area	208030000000 euros (8000000000)	*Please provide the GDP of the area. If not available, please indicate with the values: poor area, similar to the country, rich area*	https://www.statistics.gr/en/statistics/-/publication/SEL15/2021

Table 5 General data for Germany

Data/Factor	**Value**	**Description**	**Reference**
Country/Region	Lower Saxony (Germany)	*Lower Saxony is a state (Land) in northwestern Germany that encompasses both mountainous and maritime areas and whose capital city is Hanover.*	*www.niedersachsen.de/startseite/*
Number of Rural	*34609*	*In 2020 there were 34609 rural*	*https://www.statistik.niedersachsen.d*

Entrepreneurs Focused on Agriculture (including livestock, agriculture, fisheries) of the region		*entrepreneurs that focus on agriculture, livestock and fisheries.*	*e/landwirtschaft_forstwirtschaft_fischerei/landwirtschaft_in_niedersachsen/landwirtschaftszaehlung_2020/ergebnisse-der-landwirtschaftszahlung-niedersachsen-2020-200649.html*
Number of Rural Entrepreneurs focused on Energy	*9036*	*In 2020 there were 9036 enterprises that focus on energy supply in Lower Saxony.*	*www.statistik.niedersachsen.de/download/172857*
Number of rural entrepreneurs focused on Agrotourism	*22336*	*In 2020 there were 22336 enterprises that focus on tourism, but it is difficult to estimate how many of those are active in agrotourism.*	*www.statistik.niedersachsen.de/download/172857*
Number of rural cooperatives in the region that are focused on agriculture (including agriculture, livestock, fisheries)			
Number of cooperatives in the region that are focused on Energy	*70*	*70 cooperatives in the energy field are active in Lower Saxony.*	*www.lee-nds-hb.de/verband/ www.gvweser-ems.de/DE/Mitglieder/energiegenossenschaften/*
Number of cooperatives in the region that are focused on Agrotourism	250	*There are approximately 250 cooperatives that focus on agrotourism.*	*Association for companies in Agrotourism www.bauernhofferien.de/mitglied-werden*
Environmental Factors in the area: CO_2 emissions	*80,6 million tonnes of CO_2*	*Lower Saxony emitted a total of 80,6 million tonnes of CO_2 equivalents in 2018, mainly consisting of carbon dioxide, nitrous oxide and methane. Lower Saxony's share of nationwide emissions is thus around 9,6 %.*	*Niedersächsische Klimaschutzstrategie 2021*
Environmental Factors in the area:% of CO_2 emissions from transport		*The share of the transport sector in the total emissions in Lower Saxony is about 20.3 % (2017), which equates to approximately 17 million tonnes of CO_2.*	*Niedersächsische Klimaschutzstrategie 2021*
Environmental Factors in the area:% of CO_2 emissions from agriculture		*The greenhouse gas emissions caused directly by Lower Saxony's agriculture in 2017 amounted to a total of approximately 14,17 million tonnes of CO_2 equivalents (nitrous*	*Niedersächsische Klimaschutzstrategie 2021*

		oxide and methane). Agriculture accounted for 16% of total GHG emissions in Lower Saxony, while nationwide it's only 8%. This is explained by the fact that Lower Saxony is the number one agricultural state in Germany: 60% of the land is used for agriculture and about ¾ of all farms keep animals.	
Environmental Factors in the area: Water Scarcity	Choose among: High, Medium, Low	*Waterworks in northwestern Lower Saxony are discharging 85 million cubic meters of drinking water per year. That was actually the forecast for the year 2028 (medium).*	www.topagrar.com/acker/news/wasser-wird-in-niedersachsen-knapp-reserve-angezapft-13144082.html
Environmental Factors in the area: Other		*Compared to the emissions generated in 1990, these emissions in the waste management sector in Lower Saxony have fallen sharply by approx. 80%. The main reason for this is reduced methane emissions due to the ban on landfilling untreated, organically degradable municipal waste since 2005.*	*Niedersächsische Klimaschutzstrategie 2021*
Social Factors in the area: Population density/Population	(Either population or population density, whichever is easier to find)	*As of December 2021, the total population in Lower Saxony amounted to 8027031, with a population density of 170/km²*	*de.statista.com/statistik/daten/studie/155154/umfrage/entwicklung-der-bevoelkerung-von-niedersachsen-seit-1961/*
Social Factors in the area: Average birth rate		*In 2020 74119 babies were born in Lower Saxony, while there had been 73286 in 2019.*	*www.statistik.niedersachsen.de/startseite/themen/bevoelkerung/geburten-sterbefaelle-lebenserwartung-niedersachsen/geburten-in-niedersachsen-199441.html*
Social Factors in the area: Number of people at working age		*In 2021, there were around 4,12 million employed people with their place of work in Lower Saxony.*	*de.statista.com/statistik/daten/studie/253221/umfrage/erwerbstaetige-in-niedersachsen-nach-dem-inlandskonzept/*
Social factors in the area: Number of women working in the rural sector		*Only 11% of German farms are managed by women, while the share of women in farm succession is around 18%; this puts Germany at the bottom*	www.thuenen.de/de/newsroom/presse/aktuelle-pressemitteilungen/detailansicht/default-efe8e3a862

		of the European league table.	
Social Factors in the area: Population of the area		*As of December 2021, the total population in Lower Saxony amounted to 8027031, with a population density of 170/km²*	*de.statista.com/statistik/daten/studie/155154/umfrage/entwicklung-der-bevoelkerung-von-niedersachsen-seit-1961/*
Social Factors in the area: Other			
Economic factors in the area: GDP of the area		*The value of goods and services produced in Lower Saxony (GDP) increased by 1,7% in real terms in 2021 compared with the previous year. In nominal terms, i.e. not adjusted for price, Lower Saxony's GDP rose by 4,9% to around EUR 316 billion.*	www.statistik.niedersachsen.de/startseite/

Table 6 General Data for Bulgaria

Data/Factor	**Value**	**Description**	**Reference**
Country/Region	Bulgaria/Plovdiv : Around 132 633 agriculture enterprises in Bulgaria 2020	*Please select a region for which you will collect data. For example, IDS will focus on the Region of Thessaly rather on whole of Greece*	https://www.mzh.government.bg/media/filer_public/2022/12/13/406_bg_publicationcensus2020_shortresults_bg.pdf
Number of Rural Entrepreneurs Focused on Agriculture (including livestock, agriculture, fisheries) of the region	10.2% of 132,633 Or approximately 32,000 farms 37% - individuals - 11,000-12,000 Total number of registered farmers in the Plovdiv region for the economic year 2020/2021 is 7419	*If no specific number can be found, please provide an estimate. *If an estimate is also impossible, please leave blank*	https://www.mzh.government.bg/media/filer_public/2021/05/05/census2020_publicationpreliminarydata.pdf https://www.mzh.government.bg/media/filer_public/2022/12/13/406_bg_publicationcensus2020_shortresults_bg.pdf https://www.mzh.government.bg/odz-plovdiv/Libraries/%d0%94%d0%be%d0%ba

			%d0%bb%d0%b0%d0%b4%d0%b8/%d0%93%d0%be%d0%b4%d0%b8%d1%88%d0%b5%d0%bd_%d0%b4%d0%be%d0%ba%d0%bb%d0%b0%d0%b4_%d0%bd%d0%b0_%d0%9e%d0%94%d0%97_%d0%9f%d0%bb%d0%be%d0%b2%d0%b4%d0%b8%d0%b2_2021_%d0%b3.sflb.ashx
Number of Rural Entrepreneurs focused on Energy	6 companies for photovoltaic solar systems in Plovdiv region Around 140 photovoltaic power plants in Plovdiv region	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	http://btcatalogue.bg/katalog-search.aspx?br=12&ddlPodrazdel=253&txtComp=&ddlGrad=&txtRak=&txtPr=&txtPart=&page=3 https://www.veiregistar.bg/
Number of rural entrepreneurs focused on Agrotourism	7 guest houses specialized in rural tourism; 2 guest houses in Plovdiv region. On the territory a total of 39 tour operators, 98 travel agencies, 76 companies that work as tour operators and travel agencies, 10 tourist information center and 1 cultural and information center	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://ntr.tourism.government.bg/CategoryzationAll.nsf/mn.xsp OSR_Tourizm_Pd_Strategy_2019-2027.pdf
Number of rural cooperatives in the	40% - commercial companies -12-13000;	*If no specific number can be found, please*	https://www.mzh.government.bg/media/filer_

region that are focused on agriculture (including agriculture, livestock, fisheries)	22% - cooperatives, associations, etc. – 7000 – for Bulgaria. approximately 17 cooperatives on the territory of Plovdiv region	*provide an estimate. If an estimate is also impossible, please leave blank*	public/2021/05/05/census2020_publicationpreliminarydata.pdf https://www.mzh.government.bg/media/filer_public/2022/12/13/406_bg_publicationcensus2020_shortresults_bg.pdf https://registarnakooperatsiite.com/%D0%BE%D0%B1%D0%BB%D0%B0%D1%81%D1%82-%D0%BF%D0%BB%D0%BE%D0%B2%D0%B4%D0%B8%D0%B2
Number of cooperatives in the region that are focused on Energy	The Association of Bulgarian Energy Agencies (ABEA); EVN Bulgaria; Energy Agency of Plovdiv (EAP)	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	http://new.abea-bg.org/?lng=EN https://www.evn.bg/ https://www.eap-save.eu/?m=18&lng=EN
Number of cooperatives in the region that are focused on Agrotourism	The America for Bulgaria Foundation will fund 20 projects for the development of rural tourism as part of its Developing Agritourism in Northern Bulgaria request for proposals (RFP). – in Northern Bulgaria, but they work all over the country.	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://us4bg.org/news/abf-to-fund-20-projects-for-agritourism-development-in-northern-bulgaria/ https://ntr.tourism.government.bg/TUnionsV2.nsf/tunion.xsp

	Association "Tourism Council - Plovdiv"		
Environmental Factors in the area: CO2 emissions	CO2 emissions in 2021 were 43.644 megatons – for the country 39.140 megatons – 2019 – for the country In the Plovdiv region, the maximum eight-hour average value during the day is not exceeded - 10 mg/m^3	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://countryeconomy.com/energy-and-environment/co2-emissions/bulgaria https://data.worldbank.org/indicator/EN.ATM.CO2E.KT?locations=BG https://plovdiv.riosv.com/files/godishni_dokladi/Godishen_doklad_2021.pdf
Environmental Factors in the area: % of CO2 emissions from transport	2014 - 19.5% - for the country 80% of CO^2 emissions in the city of Plovdiv come from transport	*If no specific number can be found, please provide an estimate. If an estimate is also +impossible, please leave blank*	https://data.worldbank.org/indicator/EN.CO2.TRAN.ZS?locations=BG&most_recent_value_desc=false&view=map http://ecomonitoring.plovdiv.bg/plovdiv/uploaded_files/file/Kachestvo_na_atmosvernia_vazduh.pdf
Environmental Factors in the area:% of CO2 emissions from agriculture	15.63% to the total of Bulgaria's greenhouse gas – **for the country**	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://eea.government.bg/bg/dokladi/BG_NIR_15April_2022.pdf
Environmental Factors in the area: Water Scarcity	Low		https://earbd.bg/files/File/PURB/PURB%202016-2021%20FINAL/Razdeli_pdf/PART%2001.p

			df https://maritsa.meteo.bg/apache2-default/maritsa/static/aboutBG.php https://pd.government.bg/?page_id=51
Environmental Factors in the area: Other		*Please provide any other environmental factor that you might think it is important*	Please provide a report, or a paper or a government document that describes the situation of the specific environmental factor
Social Factors in the area: Population density/Population	666 398 – population for Plovdiv region	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.nsi.bg/bg/content/11420/%D0%BE%D0%B1%D0%BB%D0%B0%D1%81%D1%82-%D0%BF%D0%BB%D0%BE%D0%B2%D0%B4%D0%B8%D0%B2
Social Factors in the area: Average birth rate	In 2020, 6,096 children were born in the Plovdiv region, of which 6,062, or 99.4%, are live births. Compared to the previous year, the number of live births decreased by 138 children. The birth rate is 9.1‰[2]	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.nsi.bg/tsb/wp-content/uploads/2021/04/Population_Pdv_2020.pdf
Social Factors in the area: Number of people at working age	The number of people of working age at the end of 2020 is 402,178 people or 60.3% of the entire population of	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please*	https://www.nsi.bg/tsb/wp-content/uploads/2021/04/Population_Pdv_2020.pdf

	the Plovdiv district.	*leave blank*	
Social factors in the area: Number of women working in the rural sector	58.5 thousand - for Bulgaria in 2021	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.nsi.bg/bg/content/4009/%D0%B7%D0%B0%D0%B5%D1%82%D0%B8-%D0%BB%D0%B8%D1%86%D0%B0-%D0%B8-%D0%BA%D0%BE%D0%B5%D1%84%D0%B8%D1%86%D0%B8%D0%B5%D0%BD%D1%82%D0%B8-%D0%BD%D0%B0-%D0%B7%D0%B0%D0%B5%D1%82%D0%BE%D1%81%D1%82-%D0%BD%D0%B0%D1%86%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%BE-%D0%BD%D0%B8%D0%B2%D0%BE-%D1%81%D1%82%D0%B0%D1%82%D0%B8%D1%81%D1%82%D0%B8%D1%87%D0%B5%D1%81%D0%BA%D0%B8-%D1%80%D0%B0%D0%B9%D0%BE%D0%BD%D0%B8-%D0%BE%D0%B1%D0%BB%D0%B0%D1%81%D1%82%D0%B8
Social Factors in the area: Population of the area	The population density by municipality varies from 7.90 people per sq. km. for the municipality of Laki	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please*	https://trafficnews.bg/plovdiv/kolko-dushi-zhiveiat-obshtinite-plovdiv-oblast-rodopi-258324/

	up to 3,135.75 people per sq. km. in the municipality of Plovdiv.	*leave blank*	
Social Factors in the area: Other	Population decline is one of the main unfavorable factors for the future development of the Plovdiv region in terms of reproduction potential. This, in turn, will lead to a limitation of the workforce, and hence to a reduction in economic potential. The district is characterized by the trend of the side of increasing the relative share of the urban population and decreasing the the rural. 507,407 people, or 74.3%, live in cities, and 175,620 live in villages people, or 25.7% of the district's population.	*Please provide any other social factor that you might think it is important*	https://pd.government.bg/wp-content/uploads/files/planove/OSR_Plovdiv_2014-2020.pdf
Economic factors in the area: GDP of the area	for the period 2010-2018, the GDP of the Plovdiv Region represents a little over 7.6% of the economy of the Republic of Bulgaria, which makes Plovdiv the second largest city in terms of revenue after the capital of Bulgaria - the city of Sofia.	*Please provide the GDP of the area. If not available, please indicate with the values: poor area, similar to the country, rich area*	http://www.visitplovdiv.com/bg/node/158

Table 7 General Data for Spain

Data/Factor	Value	Description	Reference
Country/Region	Spain	Extremadura	
Number of Rural Entrepreneurs Focused on Agriculture (including livestock, agriculture, fisheries) of the region	2507		https://www.extremaduraempresarial.es/wp-content/uploads/2022/06/20220527-Plan-Empresa-Competitiva-firmado.pdf
Number of Rural Entrepreneurs focused on Energy	31	Number of energy distributors in the area	https://www.informa.es/directorio-empresas/3513_DISTRIBUCION-ENERGIA-ELECTRICA/Comunidad_EXTREMADURA/Empresas-2.html#empresa
Number of rural entrepreneurs focused on Agrotourism	Around 160		https://empresite.eleconomista.es/Actividad/TURISMO-RURAL/provincia/BADAJOZ/
Number of rural cooperatives in the region that are focused on agriculture (including agriculture, livestock, fisheries)	583		http://gobiernoabierto.juntaex.es/recurso/?ds=listado-de-sociedades-cooperativas-en-extremadura&id=f39cae3b-1bce-4a92-9632-67427f77b51b
Number of cooperatives in the region that are focused on Energy			
Number of cooperatives in the region that are focused on Agrotourigm			
Environmental Factors in the area:	191.679,3 kt CO2 eq	CO2 emissions in Extremadura in 2021	https://www.miteco.gob.es/es/calidad-y-

CO2 emissions			evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/avance-gei-2021_tcm30-542338.pdf
Environmental Factors in the area:% of CO2 emissions from transport	83.627,9 kt CO2 eq	CO2 emissions from transport in Extremadura in 2021	https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/avance-gei-2021_tcm30-542338.pdf
Environmental Factors in the area:% of CO2 emissions from agriculture	622,1 kt CO2 eq	CO2 emissions from agriculture in Extremadura 2021	https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/avance-gei-2021_tcm30-542338.pdf
Environmental Factors in the area: Water Scarcity	High	Level of Water Scarcity in Extremadura	https://www.elsaltodiario.com/extremadura-/donde-esta-el-agua-de-extremadura#:~:text=Tenemos%20un%208%25%20menos%20de,agua%20embalsada%20en%20toda%20Extremadura!&text=Fotograf%C3%ADa%3A%20RTVE.&text=Productor%20e%20investigador%20agroecol%C3%B3gico.
Social Factors in the area: Population density/Population	1.059.501	Population of Extremadura	https://www.ine.es/jaxiT3/Datos.htm?t=2915#!tabs-tabla
Social Factors in the area: Average birth rate	6,86%	Birth rate in Extremadura, Born/1000 habitants	https://datosmacro.expansion.com/demografia/natalidad/espana-comunidades-

			autonomas/extremadura
Social Factors in the area: Number of people at working age	664.147	People at working age in Extremadura	https://ugeo.urbistat.com/AdminStat/en/es/demografia/eta/extremadura/11/2
Social factors in the area: Number of women working in the rural sector			
Social Factors in the area: Population of the area	1.059.501	Population of Extremadura	https://www.ine.es/jaxiT3/Datos.htm?t=2915#!tabs-tabla
Social Factors in the area: Average mortality rate	11.29%	Mortality rate in Extremadura, Deaths/1000 habitants	https://datosmacro.expansion.com/demografia/mortalidad/espana-comunidades-autonomas/extremadura
Economic factors in the area: GDP of the area	19.386 million euros	GDP in Extremadura in 2020	https://datosmacro.expansion.com/pib/espana-comunidades-autonomas/extremadura

Table 8 General Data for Belgium

Data/Factor	**Value**	**Description**	**Reference**
Country/Region	Wallonia Region - Belgium		
Number of Rural Entrepreneurs Focused on Agriculture (including livestock, agriculture, fisheries) of the region	21.947 (2020) -(0,6% of GDP – 1% of employment)	*-Diminution of 50% since 1990.* *-more than half of this number work part-time* *-+ 4.516 occasional workers*	https://etat-agriculture.wallonie.be/contents/indicatorsheets/EAW-A_II_b_2.html
Number of Rural Entrepreneurs focused on Energy	3% of GDP – 1% of employment		http://etat.environnement.wallonie.be/files/Infographie_2021/L'environnement%20wallon%20en%2010%20infographies.pdf

Number of rural entrepreneurs focused on Agrotourism	385 agricultural holdings	21% of the 1837 agricultural holdings doing para-agricultural activities in Wallonia are offering agrotourism activities	https://www.olln.be/fr/ma-ville/services-techniques/environnement/avis-denvironnement/projet-de-plan-strategique-pac-pour-la-wallonie-2023-2027/ep-2022-0004-pac-projet-d2019analyse-swot-pour-la.pdf https://accueilchampetre-pro.be/wp-content/uploads/2019/04/Colloque-ACW-2019-Dossier-de-presse-190326.pdf
Number of rural cooperatives in the region that are focused on agriculture (including agriculture, livestock, fisheries)	120 cooperatives in agriculture	*-120 in Wallonia out of the 191 in Belgium (63%)*	file:///C:/Users/NicolasJamar/Downloads/Lenoir_96061400_2019%20(1).pdf
Number of cooperatives in the region that are focused on Energy	At least 20 cooperatives (regrouping 15.000 people)	*Part of REScoop (organisation that federates cooperatives in Wallonia – received the highest score in Greenpeace energy supplier list)*	https://champsdenergie.be/federations/
Number of cooperatives in the region that are focused on Agrotourism			
Environmental Factors in the area: CO2 emissions	37 070 KT of CO2 emissions (2019)	*84% in the form of CO2 and the balance in the form of CH4 (7%), N2O (7%) and fluorinated gases (2%). In 2019, Walloon emissions represented 32% of Belgian GHG emissions.*	http://etat.environnement.wallonie.be/contents/indicatorsheets/AIR%201.html#
Environmental Factors in the area:% of CO2 emissions from	24,1 % of total		http://etat.environnement.wallonie.be/contents/indicatorsheets/AIR%201.ht

transport			ml#
Environmental Factors in the area:% of CO2 emissions from agriculture	12,2 % of total		http://etat.environnement.wallonie.be/contents/indicatorsheets/AIR%201.html#
Environmental Factors in the area: Water Scarcity	Low	*Between 2014 and 2018, withdrawals amounted to almost 1,800 million m³/year. On average, 1,409 million m³ (79% of total withdrawals) were taken from surface water each year, mainly used for cooling thermal power plants (nuclear power plants, natural gas power plants, etc.) and mostly returned to rivers after use. Groundwater withdrawals amounted to 374 million m³/year (21% of total withdrawals), mainly for the production and distribution of drinking water. In Wallonia, water resources are not threatened from a quantitative point of view. However, the seasonal droughts observed in recent years are the subject of particular concern and management measures.*	This page of the Wallonia Government explains the state-of-art of water in the region: http://etat.environnement.wallonie.be/home/Infographies/eau.html
Environmental Factors in the area: Agricultural land use	733.715 ha in 2019 (40% of total regional surface)	*More than 40% of the Walloon surface area is dedicated to agricultural activities, with small interannual variations. The agricultural sector therefore plays an important role in shaping the landscape, managing*	Data on the agricultural land use: http://etat.environnement.wallonie.be/contents/indicatorsheets/AGRI%201.eew-sheet.html

		natural resources and the quality of the environment.	
Social Factors in the area: Population density/Population	216,7 inhabitants/km²	*On 1 January 2022, Wallonia had 3,662,495 inhabitants (31.6% of the population of Belgium) in a territory of 16,901 km², which corresponds to a population density of 216.7 inhabitants per km². Wallonia is the least dense region in Belgium.*	https://www.iweps.be/indicateur-statistique/densite-de-population/
Social Factors in the area: Average birth rate	10,0/1000 inhabitants	*Average among the 4 provinces: Hainaut (9,9), Brabant Wallon (9,4), Namur (10), Luxembourg (10,5) and Liège (10,1)*	https://walstat.iweps.be/walstat-catalogue.php?niveau_agre=P&theme_id=2&indicateur_id=202700&sel_niveau_catalogue=C&ordre=0
Social Factors in the area: Number of people at working age	1.900.705 people between 25-64 years old	*Hainaut (700.716 inh), Brabant Wallon (209.333 inh), Namur (260.418 inh), Luxembourg (152.559 inh) and Liège (577.679)*	https://walstat.iweps.be/walstat-catalogue.php?niveau_agre=P&theme_id=2&indicateur_id=244310&sel_niveau_catalogue=C&ordre=15
Social factors in the area: Number of women working in the rural sector	5.786 (in 2016)	*In 2016, women represented 30% of the regular agricultural workforce in Wallonia, 5.786 women against 13.577 men. In 2016, gender disparities are still quite marked. The role of women remains predominantly that of spouse. When they are heads of farms, they are often on smaller farms. The female agricultural workforce is older and enters agriculture later than their male*	Report about women in agriculture in Wallonia: https://www.uniondesagricultriceswallonnes.be/actu-uaw/la-place-des-femmes-dans-la-main-doeuvre-agricole-wallonne

		counterparts.	
Social Factors in the area: Population of the area	On 1 January 2022, Wallonia had 3,662,495 inhabitants		https://www.iweps.be/indicateur-statistique/densite-de-population/
Social Factors in the area: Other		*Please provide any other social factor that you might think it is important*	Please provide a report, or a paper or a government document that describes the situation of the specific social factor
Economic factors in the area: GDP of the area	17.949 €/inh		https://walstat.iweps.be/walstat-catalogue.php?indicateur_id=831101&ordre=2&periode=Ann%C3%A9e%202019&niveau_agre=P&sel_niveau_catalogue=C

Table 9 General Data for Italy

Data/Factor	Value	Description	Reference
Italy/Lazio Region		Lazio or Latium is one of the 20 administrative regions of Italy. Situated in the central peninsular section of the country, it has 5,714,882 inhabitants – making it the second-most populated region of Italy (after Lombardy and just ahead of Campania)[1] – and its GDP of more than €197 billion per year means that it has the nation's second largest regional economy. The capital of Lazio is Rome, which is also the capital and largest city of Italy.	https://www.regione.lazio.it/la-regione
Number of Rural Entrepreneurs Focused on	68 295*		Sources: ISTAT http://dati.istat.it/Index.aspx?DataSetCode=DCSP_SPA)

Agriculture (including livestock, agriculture, fisheries) of the region			(*data of sep 2022)
Number of Rural Entrepreneurs focused on Energy			
Number of rural entrepreneurs focused on Agrotourism		514 (accommodation) 90 (only food services) 218 (food services + agroproducts tasting) 428 (other ancillary services) TOT: 1250	Year of ref. : 2020 Source: ISTAT http://dati.istat.it/index.aspx?queryid=29005
Number of rural collectives in the region that are focused on agriculture (including agriculture, livestock, fisheries)		At the reference date of the Census (22 October 2000) 214,665 agricultural, zootechnical and forestry holdings were recorded in Lazio, with a total surface area of 1,070,474 hectares, of which 724,325 of utilised agricultural area (UAA). Compared to the 1990 Census, the number of holdings decreased by 23,604 units (-9.9%), against a reduction in the total surface area of 175,404 hectares (-14.1%), of which 109,826 hectares of UAA (-13.2%). The aforementioned decreases in farm areas, which were more noticeable than the reduction in the number of farms, were reflected in the average areas of farms located in Lazio, with decreases compared to the values observed in the previous census of 0.25 hectares in the total area (from 5.24 to 4.99 hectares) and 0.12 hectares in the UAA (from 3.52 to 3.40 hectares). At the same time, as a result of the greater contraction in the total area than in the UAA, the UAA as a percentage of the total area	https://www.ansa.it/agroalimentarelazio/web/static/dati.pdf

		increased slightly from 67% to 67.7%. The distribution of farms by class of utilised agricultural area (UAA) shows how the agricultural sector in Lazio is still characterised by the massive presence of micro-farms. In fact, not considering farms without UAA, which account for 0.7% of the total number surveyed, there are a good 119,955 farms (about 56% of the total) that have less than 1 hectare of UAA, with a coverage degree of only 7.2% for both the total surface area and the total UAA surveyed in the region. If we consider all holdings with less than 10 hectares, the share rises to 95.5% of the regional total, corresponding to shares of 35.8% of the total area and 38.8% of the UAA. Holdings with more than 100 hectares of UAA number 712 and, although they represent only 0.3% of the total, they cover 37.9% of the total area and 31% of the UAA.	
Number of collectives in the region that are focused on Energy			
Number of collectives in the region that are focused on Agrotourism			
Environmental Factors in the area: CO2 emissions		The gas emissions of a citizen of Lazio in 2015 were equal to 6.6 tons of CO2 equivalent compared to a national average value of 7.14.	Source: ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale/ Higher Institute for Protection and Environmental Research) https://www.isprambiente.gov.it/it/banche-dati/banche-dati-folder/aria/emissioni-in-atmosfera Data : 2015

Environmental Factors in the area: Water Scarcity	High	Analysing the context in which we are moving, alarm signals had already emerged in January for the irrigation season, due to the absence of significant winter precipitation in the north-west of Italy, both in the form of rain and snow. The ISAC (Institute of Atmospheric Sciences and Climate)/CNR data then confirmed, for 2022, rainfall halved compared to the averages for the period, with a deficit of 47% nationwide. The drought phenomenon, which first affected northern Italy, and in particular the Po River hydrographic district, gradually spread to the centre and south of the country, mainly due to record temperatures. Additional interesting info: As of 2023, the risk management system in agriculture will be able to avail itself of an important innovation: a basic mutualistic coverage (Fondo Mutualistico Nazionale Agri-CAT), a sort of compulsory baseline, for all farms receiving direct payments against damage to production caused by adverse events of a catastrophic nature (Frost and Hoarfrost, Drought, Flood). The new risk management system envisages, in fact a first basic level (Agri-CAT Fund) that protects over 700,000 farms throughout the country, to which is added the second level of optional insurance and mutual coverage, both financed by nationally managed rural development resources; this is completed by a third level, managed mainly at the regional level, which includes systemic actions with prevention and active defence interventions, business consultancy and innovation on risk management	Source: https://www.politicheagricole.it/informativa_patuanelli_stato_crisi_siccita (year of ref. 2022)

		and ex-post interventions. The experimentation: In order to verify the entire operating cycle of the Fund and thus enable the start-up, in 2023, of the full-scale activity of the Agri-CAT Fund, an experimentation phase involving 13 provinces (Lazio: Province of Latina) and 12 test products was envisaged. The current players in the Italian system (Insurance Companies, Defence Consortia, Professional Agricultural Organisations, Mutualisation Funds) will thus find themselves, from 2023, operating in a context in which it will be necessary to progressively integrate their respective fields of operation to guarantee the protection of operators and the market.	
Environmental Factors in the area: Other	seismic risk	Mapping areas: The entire territory of the Lazio Region with the last reclassification of 2009 (DGR 387/09), modified by minor updates in recent years, has been declared seismic. The strongest tremors and therefore the Seismic Perilousness are concentrated in the areas of the Rieti Apennines, the Frusinate Apennines linked to the tectonic evolution of the Apennines, and the Colli Albani area, where they are linked to the volcano-tectonic evolution of the Castelli Romani area.	https://www.enea.it/it/seguici/news/enea-contribuisce-alla-mappatura-del-rischio-sismico-nel-lazio
Social Factors in the area: Population density/Population		Surface: 17.231,68 Population (2020) (N.) 5.730.399 habitans Population density: 332	Source: Fonte Elaborazioni UrbiStat su dati ISTAT https://ugeo.urbistat.com/adminstat/it/it/demografia/dati-sintesi/lazio/12/2

		(habitans/km)	
Social Factors in the area: Average birth rate		Lazio's birth rates in 2020 is 6.6 per thousand.	https://www.regione.lazio.it/sites/default/files/2021-09/Rapporto-nascite-lazio-2019-2020.pdf
Social Factors in the area: Number of people at working age		Total population: (2021) : 5.730.399 Age from 15-64 (people at working age 3.688.832	https://www.regione.lazio.it/notizie/lavoro/on-line-rapporto-mercato-lavoro-lazio-2018-2020 https://www.tuttitalia.it/lazio/statistiche/indici-demografici-struttura-popolazione/
Social Factors in the area: Other		Poverty trend. According to ISTAT data, 600 thousand people live in poverty in Lazio, with a trend that, from 2014 to today, has registered an increase of + 30.9%. These are not only people without work or who have lost it in recent years, but also employees whose gross wages are often below the relative poverty line, which for a single-member family is € 634.	https://www.regione.lazio.it/cittadini/sociale-famiglie/contrasto-alla-poverta

As it can be observed, the data collection resulted in a wide and deep database that contains both numerical and text data. Similar to the results of PR1, within this table Machine Learning algorithms were used to gain results and insights.
In addition, apart from data on countries/regions, the partners were asked to collect data on specific rural organizations in those areas. The tables below illustrate the organizations and the data.

Table 10 Data on rural organizations in Greece

Data/Factor	Value	Description	Reference
Name of cooperative	Amydeon Oenos		
Website	http://amyndeonoenos.gr/index.php?lang=en		
Product or service	Wine and tourism services		
Size of cooperative in terms of people (or revenues)	Information not available	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	
Population of the area that the cooperative is located	14331 inhabitants in the municipality	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	https://elstat-outsourcers.statistics.gr/Census2022_GR.pdf
GDP of the area that the cooperative is located	Information not available	*Please provide the GDP of the area. If not available,*	

		please indicate with the values: poor area, similar to the country, rich area. If the cooperative is located in the area that that was described in the table above please indicate	
Number of members in the cooperative	10 businesses		
Number of employees working at the cooperative	Information not available		
Number of volunteers working at the cooperative	Information not available		
Number of women employed in or affilliated with the cooperative	Information not available	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	
Amount of product/service produced by the cooperative	Information not available	*If no specific number can be found, please provide an estimate. If an estimate*	

		is also impossible, please leave blank	
Demand for the product or service that cooperative is providing	Information not available	*If for example, it is an agricultural cooperative please porvide the demand for the product that the cooperative is selling. In case of an renewable energy cooperative please provide the electricity consumption of the area that the cooperative is based. If no number can be found, please provide an estimate. Otherwise leave blanck*	
Market that the product or service is sold to	Locally, Nationally, and Internationally	*Locally, Nationally, Internationa lly (or any combination of the above)*	
Does the country of the cooperative	Yes, $63 million in 2021 of wine imports	*If no specific number can*	https://trendeconomy.com/data/h2/Greece/22

import from other countries products or services like those produced by the cooperative? If yes how much?		*be found, please provide an estimate. If an estimate is also impossible, please leave blank*	04
Factors of success	family members are employed, and seasonal staff (among them migrants) are used to cover needs Modern wine techniques and use of technology Employment of enologists The distribution of the products relies on personal contacts and private networks Consumers feel safe about the product	*Please provide any factor that you might think has lead to the success of the particular cooperative. For example, organization structure critical to success, etc.*	
Factors of failure	trong competition, both on national and international level lobal warming/climate change alters ıe weather conditions and thus new hniques/varieties of grapes will need to be adopted	*Please provide any factor that you might think has lead to the failure of the particular cooperative. For example, low penetration to local communities has lead to failure*	

Data/Factor	Value	Description	Reference
Name of cooperative	Gaia Bio		
Website	https://gaiabio.gr/		
Product or service	Organic agricultural products (fruits, vegetables, meat and animal products, grains, legumes), as well as processed items (olive oil, juices, alcohol, frozen foods, soaps)	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://gaiabio.gr/
Size of cooperative in terms of people (or revenues)	Information not available	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	
Population of the area that the cooperative is located	155443 inhabitants in the region of Chania	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	https://elstat-outsourcers.statistics.gr/Census2022_GR.pdf
GDP of the area that the cooperative is located	Information not available	*Please provide the GDP of the area. If not available, please indicate with the values: poor area, similar to the country, rich area. If the cooperative is located in the area that that was described in the table above please indicate*	
Number of members in the cooperative	Over 220		https://gaiabio.gr/about/
Number of employees working at the	Information not available		

cooperative			
Number of volunteers working at the cooperative	Information not available		
Number of women employed in or affilliated with the cooperative	Information not available	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	
Amount of product/service produced by the cooperative	Information not available	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	
Demand for the product or service that cooperative is providing	Information not available	*If for example, it is an agricultural cooperative please porvide the demand for the product that the cooperative is selling. In case of an renewable energy cooperative please provide the electricity consumption of the area that the cooperative is based. If no number can be found, please provide an estimate. Otherwise leave blanck*	
Market that the product or service is sold to	Locally	*Locally, Nationally, Internationally (or any combination of the above)*	
Does the country of the cooperative import from other countries products or services like those produced by the cooperative? If yes	Yes, although an estimate is hard to provide, as the cooperative produces many different types of products	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	

how much?			
Factors of success	Strong implantation in the local community Diversity of products provided allows for mitigation of weather effects Demand for organic products is growing	*Please provide any factor that you might think has lead to the success of the particular cooperative. For example, organization structure critical to success, etc.*	
Factors of failure	Factors that may lead to failure: Strong competition, both on national and international level	*Please provide any factor that you might think has lead to the failure of the particular cooperative. For example, low penetration to local communities has lead to failure*	

Table 11 Data on rural organizations in Germany

Data/Factor	**Value**	**Description**	**Reference**
Name of organization	Arbeitgeberverband Agrar, Genossenschaften, Ernährung Niedersachsen e. V.		
Website	www.age-niedersachsen.de/		
Product or service		*They advise their clients (over 500 companies) in all matters relating to labor law, works constitution law and social law.*	www.age-niedersachsen.de/index.php
Size of cooperative in terms of people (or revenues)	>500	*Over 500 companies make up the association.*	www.age-niedersachsen.de/
Population of the area that the cooperative is located	171.555	*171.555 (population of the city of Oldenburg as of 2021)*	www.oldenburg.de/startseite/politik/verwaltung-finanzen/statistik/einwohnerprognose.html

GDP of the area that the cooperative is located	8.3 billion	*The gross domestic product (GDP) of the city of Oldenburg amounted to around 8.3 billion euros in 2020.*	de.statista.com/statistik/daten/studie/1209513/umfrage/bruttoinlandsprodukt-oldenburg/reference/source.
Number of members in the cooperative	>500	*Over 500 members.*	www.age-niedersachsen.de/
Number of employees working at the cooperative		*Information not available.*	
Number of volunteers working at the cooperative		*Information not available.*	
Number of women employed in or affilliated with the cooperative		*Information not available.*	
Amount of product/service produced by the cooperative		*Information not available.*	
Demand for the product or service that cooperative is providing		*Information not available.*	
Market that the product or service is sold to		*Nationwide in Germany*	
Does the country of the cooperative import from other countries products or services like those produced by the cooperative? If yes how much?		*Information not available.*	
Factors of success		*They offer several opportunities for high-school and university students, such as internships and job offers. They provide many seminars and training options to their line and staff managers. They have both small-medium enterprises as well as big companies as their clients.*	
Factors of failure			

Data/Factor	Value	Description	Reference
Name of Organization	Kulturland Genossenschaft eG		
Website	www.kulturland.de/de		
Product or service		*They acquire farmland, meadows, pastures, hedgerows and biotopes and make the land available to regionally integrated farms that market organic food locally, offer guided tours, engage in nature conservation and landscape management, provide social care or work with school classes in an experiential education setting*	www.kulturland.de/de
Size of cooperative in terms of people (or revenues)	from €3,4 million to €4,7 million	*In November, they cracked the 1000-member threshold and had 1039 members at the end of the year. Total business deposits rose from €3,4 million to €4,7 million.*	www.kulturland.de/de/articles/jahresbericht-2021
Population of the area that the cooperative is located	48.472	*48.472 (population of the district of Lüchow-Dannenberg, where the city of Hitzacker is located, as of 2021)*	www.oldenburg.de/startseite/politik/verwaltung-finanzen/statistik/einwohnerprognose.html
GDP of the area that the cooperative is located	€ 1,076 million	*The gross domestic product (GDP) in the Lüchow-Dannenberg district amounts to € 1,076 million.*	de.statista.com/statistik/daten/studie/1209513/umfrage/bruttoinlandsprodukt-oldenburg/reference/source.
Number of members in the cooperative	1325 members, 30 partner companies	*In 2021 the cooperative was able to further expand its activities. 20% more members, 38% more cooperative shares, 27% more areas and 25% more farms are the impressive external "growth figures". In 2023 stands on the website that they have 1325 members and 30 partner companies.*	www.kulturland.de/de/articles/jahresbericht-2021 www.kulturland.de/de
Number of employees working at the cooperative	11	*11 employees*	www.kulturland.de/de/team www.kulturland.de/de/

			infopaket
Number of volunteers working at the cooperative	7	*7 voluntary in the Supervisory Board*	www.kulturland.de/de/team www.kulturland.de/de/infopaket
Number of women employed in or affilliated with the cooperative	7	*7 women contributing to the cooperative activities or working for it. 3 of them are part of the Supervisory Board.*	www.kulturland.de/de/team www.kulturland.de/de/infopaket
Amount of product/service produced by the cooperative	420 hectares of land	*The cooperative has a size of 420 hectares of land.*	
Demand for the product or service that cooperative is providing		*Information not available.*	
Market that the product or service is sold to		*Nationwide in Germany*	
Does the country of the cooperative import from other countries products or services like those produced by the cooperative? If yes how much?		*No.*	
Factors of success		*They are very well connected with other organizations on a regional, national and European level. 14 of their 27 farms are fully funded or overfunded as of Dec. 31, 2021. Overfunded means that more investments have been given to a farm than were actually necessary for the land purchase. For future land purchases with the respective farm, a portion has therefore already been pre-funded. In every German Bundesland there is an overwhelming majority of members that are completely (54%) or rather (40%) satisfied with the performance of the cooperative. 3% even stated that the organization*	

		exceeded their expectations. Variety of harvest and social interactions are also success factors for the Genossenschaft.	
Factors of failure		*A limitation factor could be the target group: members have to agree with the statutes of the cooperative and respect the criteria of being a "regionally integrated organic agriculture/farm.*	www.kulturland.de/de/passt-mein-betrieb-zur-kulturland-eg

Table 12 Data on rural organizations in Bulgaria

Data/Factor	**Value**	**Description**	**Reference**
Name of cooperative	Good for you, good for the farm	*Support "BULGARIAN" by shopping clean, real and delicious food, with proven origin and quality from selected Bulgarian farms, participants in the "Good for you, good for the farm" campaign.*	
Website	https://xn--80abbjhk1cbrx.xn--90ae/%d0%b7%d0%b0-%d0%bd%d0%b0%d1%81/	*https://www.facebook.com/DobroZaTebDobroZaFermata*	
Product or service	The campaign "Good for you, good for the farm" is looking for Bulgarian producers of clean, real and delicious food, grown with care and attention to the land, people and animals. We personally check each farm and its	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://xn--80abbjhk1cbrx.xn--90ae/faq/

	products before adding them to the Bakalnitsa store assortment. This is the promise we make to our customers because we believe they deserve more. The campaign supports small and medium-sized Bulgarian producers who take care of preserving the biodiversity and fertility of the land.		
Size of cooperative in terms of people (or revenues)	277 + Number of Employees	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	https://xn--80abbjhk1cbrx.xn--90ae/
Population of the area that the cooperative is located	666 398 – population for Plovdiv region	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	https://www.nsi.bg/bg/content/11420/%D0%BE%D0%B1%D0%BB%D0%B0%D1%81%D1%82-%D0%BF%D0%BB%D0%BE%D0%B2%D0%B4%D0%B8%D0%B2
GDP of the area that the cooperative is located	BGN 9,765 million for Plovdiv region	*Please provide the GDP of the area. If not available, please indicate with the values: poor area, similar to the country, rich area. If the cooperative is located in the area that that was described in the table above please*	https://www.nsi.bg/bg/content/2215/%D0%B1%D0%B2%D0%BF-%D1%80%D0%B5%D0%B3%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%BE-%D0%BD%D0%B8%D0%B2%D0%BE

		indicate	
Number of members in the cooperative	62 + Manufacturers; 3+ companies		https://xn--80abbjhk1cbrx.xn--90ae/
Number of employees working at the cooperative	277 + Number of Employees		https://xn--80abbjhk1cbrx.xn--90ae/
Number of volunteers working at the cooperative			
Number of women employed in or affilliated with the cooperative		*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Amount of product/service produced by the cooperative	503 + Products	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://xn--80abbjhk1cbrx.xn--90ae/ https://xn--80abbjhk1cbrx.xn--90ae/%d0%b1%d0%b0%d0%ba%d0%b0%d0%bb%d0%bd%d0%b8%d1%86%d0%b0/
Demand for the product or service that cooperative is providing	High demand for healthy and organic products	*If for example, it is an agricultural cooperative please porvide the demand for the product that the cooperative is selling. In case of an renewable energy cooperative please provide the electricity consumption of the area that the cooperative is based. If no number can be found, please provide an estimate. Otherwise*	

		leave blanck	
Market that the product or service is sold to	Locally, Nationally, Internationally	*Locally, Nationally, Internationally (or any combination of the above)*	
Does the country of the cooperative import from other countries products or services like those produced by the cooperative? If yes how much?		*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Factors of success	We farmers, want to preserve the fertility of the Bulgarian land and continue to care with dedication for the plants and animals we grow. With our labor we feed our families and preserve the most valuable of the past and present to pass on to the next generations. We produce with respect for traditions and Bulgarian recipes, prepared with delicious and favorite products, in the comfort of your home. If you are from Karlovo, you can take advantage of free home delivery. Online shopping.	*Please provide any factor that you might think has lead to the success of the particular cooperative. For example, organization structure critical to success, etc.*	
Factors of failure		*Please provide any factor that you might think has lead to the failure of the particular cooperative. For example, low*	

		penetration to local communities has lead to failure	

Data/Factor	Value	Description	Reference
Name of cooperative	ZK "New Life 92" / ZK „Nov zhivot 92“		
Website	none		
Product or service	wheat	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	the information was taken through a personal interview from the cooperative
Size of cooperative in terms of people (or revenues)	220 people from the village of Belovitsa	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	the information was taken through a personal interview from the cooperative
Population of the area that the cooperative is located	666 398 – population for Plovdiv region	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	https://www.nsi.bg/bg/content/11420/%D0%BE%D0%B1%D0%BB%D0%B0%D1%81%D1%82-%D0%BF%D0%BB%D0%BE%D0%B2%D0%B4%D0%B8%D0%B2
GDP of the area that the cooperative is located	BGN 9,765 million for Plovdiv region	*Please provide the GDP of the area. If not available, please indicate with the values: poor area, similar to the country, rich area. If the cooperative is located in the area that that was described in the table above please indicate*	https://www.nsi.bg/bg/content/2215/%D0%B1%D0%B2%D0%BF-%D1%80%D0%B5%D0%B3%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%BE-%D0%BD%D0%B8%D0%B2%D0%BE
Number of members	300		the information was

in the cooperative			taken through a personal interview from the cooperative
Number of employees working at the cooperative	7		the information was taken through a personal interview from the cooperative
Number of volunteers working at the cooperative	5-10		the information was taken through a personal interview from the cooperative
Number of women employed in or affilliated with the cooperative	3 women in the administration	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	the information was taken through a personal interview from the cooperative
Amount of product/service produced by the cooperative	the cooperative cultivates 3000 decares of land, from which about 300-400kg/decare of wheat is harvested	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	the information was taken through a personal interview from the cooperative
Demand for the product or service that cooperative is providing	High demand for the product	*If for example, it is an agricultural cooperative please porvide the demand for the product that the cooperative is selling. In case of an renewable energy cooperative please provide the electricity consumption of the area that the cooperative is based. If no number can be found, please provide an estimate. Otherwise leave blanck*	
Market that the product or service is sold to	Locally	*Locally, Nationally, Internationally (or any combination of the above)*	

Does the country of the cooperative import from other countries products or services like those produced by the cooperative? If yes how much?	Yes, Bulgaria imports wheat. For the period 2020/21 July - March, 21,647 tons of wheat were imported into Bulgaria.	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	https://www.mzh.government.bg/media/filer_public/2021/07/26/spa_pshenitsa_echemik_i_rapitsa_-_iuli_2021.pdf
Factors of success	Private land of the owners, which they manage in the cooperative themselves, have a management board and the members themselves participate in the management of their land. The appointed people are people from the village - the local economy is encouraged by providing jobs. Fast and timely volunteer assistance in natural disasters.	*Please provide any factor that you might think has lead to the success of the particular cooperative. For example, organization structure critical to success, etc.*	
Factors of failure	Weak impact on the market due to the small volume of production. Slow decision-making for the introduction of innovations and technical improvements due to the cooperative's pyramidal structure - manager-council-members, where the management council must make every single decision for the future development of the cooperative. Due to the lower yield	*Please provide any factor that you might think has lead to the failure of the particular cooperative. For example, low penetration to local communities has lead to failure*	

	from agricultural land rents, many owner-members sell their land to the big players in the market and the cooperative loses part of its land every year and this hinders its future development.		

Table 13 Data on rural organizations in Spain

Data/Factor	Value	Description	Reference
Name of cooperative	VIÑAOLIVA		
Website			https://vinaoliva.com/
Product or service	Wine Olive Oil Olives Mosto Alcohol	Products produced by the cooperative	https://vinaoliva.com/secciones/
Size of cooperative in terms of people (or revenues)	Big Enterprise	The company is considered a big enterprise in terms of its revenues	https://app.einforma.com/servlet/app/prod/DATOS_DE/EMPRESA_NORM/vinaoliva-l?producto_redireccionado_por_login=PRODUCTO_REDIRECCION_ENTORNOS&empresa_norm=vinaoliva-l
Population of the area that the cooperative is located	1.059.501	Population of Extremadura in 2022	https://www.ine.es/jaxiT3/Datos.htm?t=2915#!tabs-tabla
GDP of the area that the cooperative is located	19.386 million euros	GDP of Extremadura in 2020	https://datosmacro.expansion.com/pib/espana-comunidades-autonomas/extremadura
Number of members in the cooperative	25	There are 25 cooperatives associated to Viñaoliva	https://vinaoliva.com/
Number of employees working at the cooperative	26	Members in the administrative structure	https://app.einforma.com/servlet/app/prod/DATOS_DE/EMPRESA_

			NORM/vinaoliva-l?producto_redireccionado_por_login=PRODUCTO_REDIRECCION_ENTORNOS&empresa_norm=vinaoliva-l
Number of volunteers working at the cooperative			
Number of women employed in or affilliated with the cooperative	There are no women in the administrative structure		https://app.einforma.com/servlet/app/prod/DATOS_DE/EMPRESA_NORM/vinaoliva-l?producto_redireccionado_por_login=PRODUCTO_REDIRECCION_ENTORNOS&empresa_norm=vinaoliva-l
Amount of product/service produced by the cooperative	Around 10 Products	The cooperative produces around 10 products, those being: Wine, Olive Oil, Olives, Mosto, Products that originate from alcohol	https://vinaoliva.com/secciones/#:~:text=El%20grupo%20Vi%C3%B1aoliva%20controla%20un,la%20producci%C3%B3n%20total%20de%20Espa%C3%B1a.
Demand for the product or service that cooperative is providing	9.19 euros/person	Wine consumption in euros in 2021	https://www.statista.com/statistics/1171173/communities-autonomous-with-more-spending-per-capita-in-came-spain/
Demand for the product or service that cooperative is providing	6,04 kg/ person	Olive oil consumption in kilograms in 2021	https://es.statista.com/estadisticas/499309/consumo-por-persona-de-aceite-de-oliva-en-espana-por-tipo-y-comunidad-autonoma/
Market that the product or service is sold to	Locally, Nationally, Internationally.	The cooperative sells locally, nationally and internationally	https://extremadura21.com/tag/vinaoliva/ https://vinaoliva.com/
Does the country of the cooperative	Import of wine in 2021: 238,6 million	Import of wine and olive oil in Spain in	https://www.oemv.es/importaciones-

import from other countries products or services like those produced by the cooperative? If yes how much?	euros Import of olive oil in 2021: 543,53 million euros	2021	espanolas-de-vino-ano-2021 https://es.statista.com/estadisticas/499387/valor-de-las-importaciones-de-aceite-oliva-espana/
Factors of success		Diversification of the line of production, the offer of different products sold by the cooperative is a factor of success as they are able to take advantage of their production and utilize it in a diverse way.	
Factors of failure			

Data/Factor	**Value**	**Description**	**Reference**
Name of cooperative	S.C. APIHURDES		
Website			https://www.productosagricolasmielpolen.es/es/
Product or service	Honey Pollen Wax	Products produced by the cooperative	https://www.productosagricolasmielpolen.es/es/productos/
Size of cooperative in terms of people (or revenues)	Small Enterprise	The cooperative is considered a small enterprise in terms of its revenues	https://www.einforma.com/informacion-empresa/sociedad-cooperativa-apihurdes
Population of the area that the cooperative is located	1.059.501	Population of Extremadura in 2022	https://www.ine.es/jaxiT3/Datos.htm?t=2915#!tabs-tabla
GDP of the area that the cooperative is located	19.386 million euros	GDP of extremadura in 2020	https://datosmacro.expansion.com/pib/espana-comunidades-autonomas/extremadura
Number of members			

in the cooperative			
Number of employees working at the cooperative	7	Number of employees in the cooperative in 2021	https://empresite.eleconomista.es/SOCIEDAD-COOPERATIVA-APIHURDES.html
Number of volunteers working at the cooperative			
Number of women employed in or affiliated with the cooperative	There are no women in the administrative structure		https://www.einforma.com/informacion-empresa/sociedad-cooperativa-apihurdes
Amount of product/service produced by the cooperative	3	The cooperative produces three products, those being: Honey, Pollen and Wax	https://www.productosagricolasmielpolen.es/es/productos/
Demand for the product or service that cooperative is providing	800g/person	The consumption of honey in Spain was 800g per person in 2020	https://www.mapa.gob.es/es/ganaderia/temas/produccion-y-mercados-ganaderos/indicadoreseconomicossectorapicola2020_tcm30-576093.pdf
Market that the product or service is sold to	Locally, Nationally, Internationally	The cooperative sells locally, nationally and internationally	https://exportadores.cesce.es/exportaciones-apihurdes
Does the country of the cooperative import from other countries products or services like those produced by the cooperative? If yes how much?	83,421,885.63$	Import in dollars of honey in Spain in 2021.	https://trendeconomy.com/data/h2/Spain/0409
Factors of success		The collaboration between professional beekeepers and the diversification of the offered products are factors of success of this cooperative.	
Factors of failure		Some issues that can be	

		listed as factors of failure in the cooperative is the fact that the cooperative doesn't have a strong web presence and also doesn't have an online shop that can directly connect clients to their products from their website.	

Table 14 Data on rural organizations in Belgium

Data/Factor	Value	Description	Reference
Name of cooperative	CocoriCoop		
Website	https://cocoricoop.be/		
Product or service	It trades products from local, peasant and environmentally friendly agriculture.	*If no specific number can be found, please provide an estimate. If an estimate is also impossible, please leave blank*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Size of cooperative in terms of people (or revenues)	7 employees and 20 founders	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Population of the area that the cooperative is located	City of Ciney with 19.000 inhabitants	*If no specific number can be found, please provide an estimate (for example, small, medium, large). If an estimate is also impossible, please leave blank*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
GDP of the area that the cooperative is located	102.5 per inhabitant in the province of Namur, where Ciney is located.	*Please provide the GDP of the area. If not available, please indicate with the values: poor area, similar to the country, rich area. If the*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank

		cooperative is located in the area that that was described in the table above please indicate	
Number of members in the cooperative	220 including 35 producers		
Number of employees working at the cooperative	5 employees + 2 people hired in the framework of a subsidy national programme		
Number of volunteers working at the cooperative	more than 200 among the 8 relay points, the shop, the order preparation		
Number of women employed in or affilliated with the cooperative	3 employees	*but a lot among the volunteers (big majority, I would say 2/3 at least)*	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Amount of product/service produced by the cooperative	Reply from the cooperative: "I don't have the figures easily on the products sold, but several thousand"		If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Demand for the product or service that cooperative is providing		*If for example, it is an agricultural cooperative please porvide the demand for the product that the cooperative is selling. In case of an renewable energy cooperative please provide the electricity consumption of the area that the cooperative is based. If no number can be found, please provide an estimate. Otherwise leave blanck*	
Market that the product or service is sold to	Locally	*Locally, Nationally, Internationally (or any combination of the above)*	

Does the country of the cooperative import from other countries products or services like those produced by the cooperative? If yes how much?		Belgium imports fruits and vegetables but it's difficult to compare since Cocoricoop sells only organic and local food.	If you can find a value, please provide the reference/source. The same applies for the estimation. If you cannot find a source, leave blank
Factors of success	- Quality of products; - Involvement of producers - Transparent communication - Community-based	*Please provide any factor that you might think has lead to the success of the particular cooperative. For example, organization structure critical to success, etc.*	
Factors of failure	- Fragile economic model - Need of subsides - Heavy workload - Difficulties in balancing personal with professional life	*Please provide any factor that you might think has lead to the failure of the particular cooperative. For example, low penetration to local communities has lead to failure*	

Data/Factor	**Value**	**Description**	**Reference**
Name of cooperative	Maferme	facilitator and incubator for rural entrepreneurships based in Wallonia region	
Website	https://www.maferme.be/		
Product or service	-vegetables/fruit -goat breeding -other product : beer, bread -artisants and artists -carpenting -alternative learning		https://www.maferme.be/

	experience – alternative schooling -shop to sell products -processing plant for the products		
Size of cooperative in terms of people (or revenues)	-1200 cooperators		
Population of the area that the cooperative is located	-3.662.545 inhabitants on the 1st of January 2022 (Wallonia)		https://www.iweps.be/indicateur-statistique/densite-de-population/
GDP of the area that the cooperative is located	106 billion (23% of the Belgian GDP)		https://www.iweps.be/indicateur-statistique/taux-de-croissance-pib-volume/
Number of members in the cooperative	1200 members		
Number of employees working at the	-15		https://docs.google.com/document/d/1ENUKJQWcb_CF72TXVEP29qJ_UximQquLp0yAOh3CPZ8/edit

cooperative			
Number of volunteers working at the cooperative			
Number of women employed in or affilliated with the cooperative			
Amount of product/service produced by the cooperative			
Demand for the product or service that cooperative is providing			
Market that the produc	Local - national		

t or service is sold to			
Does the country of the cooperative import from other countries products or services like those produced by the cooperative? If yes how much?	Yes – for the farming part	*-import of Belgium for agricultural goods amounted to 22 billion euros in 2019*	https://www.fellah-trade.com/fr/export/atlas-agro/belgique/echanger
Factors of success	-flexible infrastructure + offers synergies to all acotrs/organisations /worer/cooperative in the sector -diversification of activities (farming, breeding, para-agricultural activiuties, acquisition of one big farm,…)		https://docs.google.com/document/d/1ENUKJQWcb_CF72TXVEP29qJ_UximQquLp0yAOh3CPZ8/edit

	- Growing sectors ; - A strong, multidisciplinary team; - An already large community of co-operators; - Diversity of activities and therefore diversity of risks; - Substantial equity capital;		
Factors of failure	-Low profit margin ; - Very capital-intensive activities - Sectors with high psychological barriers to entry	*Please provide any factor that you might think has lead to the failure of the particular cooperative. For example, low penetration to local communities has lead to failure*	https://docs.google.com/document/d/1ENUKJQWcb_CF72TXVEP29qJ_UximQquLp0yAOh3CPZ8/edit

Table 15 Data on rural organizations in Italy

Data/Factor	Value	Description	Reference
AZIENDA AGRICOLA MACCARESE		The Maccarese S.p.A farm covers an area of 3200 hectares in a single body and is considered one of the largest farms in Italy. 2400 of usable area where cereals, protein crops, fodder and vegetables are cultivated. A super-intensive almond orchard with a surface area of 120 hectares has recently been planted, making the company the leader in Italy for this type of crop. Almost the entire surface area is irrigated using the most	

		diverse irrigation systems on the market. In addition to the agricultural activity, there is the largest dairy cow farm in Italy with 3,600 head present that produce 57,000 litres of high quality milk per day, satisfying 15 % of the Romans' daily consumption. The zootechnical centre covers an area of 17 hectares and uses the most advanced software to monitor milk quality, milking efficiency, reproduction and analytical control of feed consumption with the aim of guaranteeing food safety and animal welfare. Milk production is also flanked by the fattening of male calves born on the farm, which are sold on the Roman catering and large-scale retail market. Finally, to complete the cycle of sustainable agriculture that goes in the direction of a circular economy, in 2010 two biogas plants were built for the production of electricity using livestock manure and silage produced on the farm as feed, and in 2021 a 300 KW photovoltaic system was installed on the roof of a barn, allowing the entire farm to be self-sufficient in energy during the day.	

https://www.maccaresespa.com/azienda-agricola-maccarese/			
Product or service		Seasonal Agriculture product and farming	
Number of members in the collective	< 10		
Number of employees working at the collective	40-50 ca (with ebven seasonal emplyoement treatment)		
Amount of product/service produced by the collective	**3,600 head of cattle** **18 million litres produced annually**	Within the Maccarese S.p.A. Zootechnical Centre, which covers an area of 17 hectares, there is a herd of **3.600 head of cattle** with a dual production orientation: milk and meat. Milk production represents the company's core business and with its **18 million litres produced annually, it covers 15% of the milk requirements of Rome Capital.**	
Factors of success	• animal welfare • PLM (precision livestock farming) • staff training • employment of advanced technologies = high quality reputation among market and consumers community	The high productions recorded at Maccarese are the result of a path focused on several fundamental aspects: animal welfare, PLM (precision livestock farming) and staff training. From the point of view of animal welfare, the dairy cows are housed in modern facilities with equipment and ample space available (20 square metres per head) that allow the animals to maximise their welfare conditions (as certified by CreNBA, the national centre	

		for animal welfare). The dairy herd is divided according to the physiological phase of lactation (calving cows, high production, dry cows, calves, heifers) with particular emphasis placed on the calving cows, which are equipped with a modern facility capable of handling the 1.800 deliveries per year. Particular attention is paid to cattle feeding, as it covers more than 50% of the production cost of a litre of milk. With the 3.200 hectares available, 72% of the cattle's feed needs are met, with the remainder purchased from the external market. In recent years, the company has invested heavily in the purchase of the most advanced technologies that have allowed for an improvement in the quality of work, a more rigorous and precise control of the production process phases, with the aim of maximising production/reproduction performance.	

Data/Factor	Value	Description	Reference
AGRICOLTURA NUOVA Integrated Social Coollective		Founded in 1977 to create employment and protect a vast agricultural area from wild construction. with two main objectives:1. To create employment in agriculture; 2. To prevent the building of a vast area of high environmental	

		value. Over the years it has become an important productive reality in the quadrant south-east of Rome, and is engaged in the breeding and biodynamic production of vegetables, fruit, meat, milk, yoghurt, honey, flours and derivatives. Both in the historic headquarters on the Pontina and in the Castel di Leva one, you will find a shop to buy the products (also present at the Tor de Cenci Market). The battle to save the "Tre Decime" from cement won the agricultural return of the area through the inclusion in the 'safeguard' variant and the perimeter of the Decima Malafede regional park (about 6,000 hectares). The Cooperative was granted a concession for the cultivated land in 1996, overcoming an almost 20-year squatting period.	
www.agricolturanuova.it			
Product or service		257 ha employed in cereals, vegetables and fruit, natural manure production, cheese production	
Number of members in the collective	< 10		
Number of employees working at the collective	< 20 + volunteers		
Amount of product/service produced by the collective		No info	
Factors of success		Production: organic farming that simultaneously safeguards the health of consumers and producers. In 1996, the cooperative joined the Italian Association for Organic Agriculture (AIAB). Conversion of the farm to biodynamic agriculture	

		-initiative to counter wild urbanisation on the outskirts of rome	

Similar to the previous cases, the table contains both numerical and text data and machine learning algorithms were used to gain insights by clustering the organizations that share similar characteristics.
Finally, the entire Knowledge repository will be available in the project's website in an excel form so that it can be easily downloaded by potential users.

(3) An expanded questionnaire was developed in addition to the survey of Project Result 1 and disseminated on the project's network. The questionnaire is the following:

Dear respondent,
We kindly invite you to participate in the research conducted as part of the OREN project, which is co-funded by the European Commission under the framework of Erasmus+ Programme.
The main objective of this questionnaire is to generate knowledge of successful examples in the rural development industry, and understand the key drivers of these successes, in order to enrich the OREN's project observatory of good practices, and help rural entrepreneurs throughout Europe thrive. It will explore both helping and hindering factors to the development of businesses, as well as what can be done to best support it.
Please mind that the information collected will not be shared in a way that allows for the identification of respondents, and that all collected information will be used only for the research purposes of the OREN project.
We thank you in advance for your participation!

Rural entrepreneurship *refers to the creation and running of businesses providing products and/or services in rural areas.*

Personal information *(optional)*
Name:
Surname:
Email address:
I wish to subscribe to the OREN project's newsletter. (Box to tick)

1. ***What is your gender?*** *(drop down menu)*

Man
Non-binary
Woman
Other (please specify)
Prefer not to say

2. ***What is your level of education?***

Less than primary
Primary education
Secondary education
Tertiary education
Bachelor's or equivalent
Master's or equivalent
Doctorate or equivalent
Adult Education/Continuing Education
Other

3. ***How old are you?***

18-25
26-35
36-45
46-60

60+

4. What is your professional experience in the rural sector?

Less than 1 year
From 1 year to 5 years
From 5 years to 10 years
Over 10 years

5. Please of indicate your area of expertise

Tourism
Agriculture
Livestock farming
Fishing and fish farming
Food processing
Forestry
Renewable energy
Circular economy
Cultural heritage
Other_____

6. Please indicate what position you hold in the rural business:

Entrepreneur
Manager
Stakeholder
Employee

7. How big is the business you work in (in terms of personnel)?

Micro (up to 9 employees)
Small (between 10 and 49 employees)
Medium (between 50 and 249 employees)
Large (250+ employees)
Not applicable

8. What is the population of the place where the business is located?

Below 10.000 people
Between 10.000 and 50.000 people
Over 50.000 people

9. Do you consider the area that the business is located in to be:

Poor
Neither poor nor rich
Rich

10. Where do you mainly sell the products or services that you provide?

Local markets only
Local markets and limited sales at a national level
National Level
National Level and limited sales at international level
International level only

Local, national and international markets

11. ***Does your country import (from other countries) products or services similar to the ones that your rural enterprise is providing?***

Yes
No
I don't know

12. ***You decided to become a rural entrepreneur because:***

It is a family business
It was the only available job for me
I see great entrepreneurship opportunities
Other (please specify)

13. ***In your opinion, which are the main emerging and promising sectors of rural entrepreneurship?***

Tourism
Agriculture
Livestock farming
Fishing and fish farming
Food processing
Forestry
Renewable energy
Circular economy
Cultural heritage
*Other*_____

14. ***Which are the main driving factors for rural businesses' success?***

Innovation
Financial capacity
Proper entrepreneurial skills
Experience in the industry
Connection with a diverse network of stakeholders
Qualified/skilled workers
Knowledge of legislation
Marketing skills
Proximity to decision/policy-making centers
Other: Please Specify: _____

15. ***What typical challenges and hurdles do you see for potential entrepreneurs when it comes to entrepreneurship skills?***

Lack of human capital expertise
Poor socio-economic background
Knowledge gaps
Lack of access to technology
Other (Please specify): _____

16. ***On a scale of 1 (not important) to 5 (very important) how would you rate the importance of the listed main obstacles for the establishment of successful rural businesses?***

	1	2	3	4	5
Ageing of the rural population					
Stagnation of the workforce					
Skills shortage					
Fewer educational opportunities					
Difficulty to access to funds					
Lack of vision					
Lack of adequate public infrastructure					
Environmental changes					
Energy prices					
High taxation rates					
Resources scarcity (for example water scarcity)					

17. ***How much do you agree or disagree with the following statement according to the situation in your region? "Due to the increasing complexity of the rural sector, rural professionals must become more and more business-oriented"***

Strongly Disagree *Disagree* *Neither Agree nor Disagree* *Agree* *Strongly Agree*

18. ***In your opinion, which are the most important skills that should be included in specific training courses for rural entrepreneurs? (Select up to three of the following listed skills):***

Technical skills
Networking Skills
Communication skills
Management skills
Skills needed to innovate
Technological know-how
Planning and Business Strategy skills (Developing and Evaluating a business strategy)
Opportunity spotting (recognizing and analyzing business opportunities)
Other (please specify):

19. ***Please briefly explain the reasons for your selections:***

_____
_____
_____

20. ***What would be the ideal form of training, in your opinion:***

Online asynchronous course (MOOC)
Online classes
In-person training
One-on-one coaching

21. ***In your opinion, how could potential rural entrepreneurs be supported to recognize, realize, and start business opportunities?***

Through good knowledge of legislation
Through continuous learning and training
Through proper networking
Through increase of personal motivation

Through exchange of expertise and experience
Through better access to ICT and technological infrastructure
Through facilitated access to funding
Other (please specify):

22. ***In your opinion, the main factors limiting the development of successful business models are linked to:***

Economic background
Social background
Political background
Environmental changes
Other: _____

23. ***Please briefly explain your response*** *(Open question).*

24. ***What (good) practices can you recommend for overcoming these barriers related to this? Please elaborate.*** *(Open question)*

25. ***In your opinion what factors would contribute most to successful rural businesses?*** *(Open question)*

26. ***How can rural business benefit local communities? If applicable, briefly explain how your organisation/business involves the local communities in its daily activities.*** *(Open question)*

(4) Finally, PR2 was focused on gathering experts and developing a Causal Loop Diagram of the various models that will be developed in PR3. This process is generally known in the System Dynamics Literature as Group Model Building (GMB). For the purposes of the OREN project, the Group Model Building process was separated into 2 distinct phases:
(a) The OREN partners were asked to identify the most important variables in three rural business models: agriculture, tourism and energy. In addition, the partners were asked to identify whether a causal relationship existed between two variables and if that relationship was positive (similar directions of behavioral change) or negative (different directions of behavioral change). This process was conducted with the development of a Delphi Questionnaire that was sent to the partners. The questionnaire is presented in Table 16 below.

Table 16 Delphi Questionnaire

Name of Variable	**Should it be included in the model (Yes or No)**	**Explanation of the variable**
Population at working age		The number of people at the area that could work in agriculture
Available workforce		The number of people in the area that actually work in agriculture
Labor requirements for Product X		How many workers are necessary to produce 1 kg of

		the simulated product
Cost per Worker		How much does it cost to have a worker
Labor Productivity		How many kg of product each worker can gather
Product Yield		How many kg of Product X each m2 of land can produce
Adverse effects by climate change		A variable to represent the effects of climate change on land production
Price of product X		The price at which the product is sold
Energy cost to produce X		Cost of Energy for X
Fertilizers etc. cost		Cost for fertilizers
Labor Cost		Total labor cost
Family income		
Individual business		
Cooperative		Many farmers in the area collaborating
Part of a larger company		The farmer works for a large agricultural company
Demand for product X		
Total production of product X from other areas/Countries		How much of product X is produced by other countries/areas
Marketing efforts to increase demand for product X		Actions that can be taken to increase demand for product X
Cost of marketing		The cost of each marketing effort to increase demand for product X
Please write down any other variables that you might think are important for the model		
Technology and innovation		Digital transformation of the agricultural business

Variable A	**Variable B**	**Affected positively [if variable A increases (decreases), then variable**	**There is not relation between the variable**	**Affected negatively [If variable A increases (decreases) then variable**	**Explanation**

		B increases (decreases)]		**B decreases (increases)]**	
Population at working age	Available Workforce	Yes			The more population is at working age the higher the number of available workforce
Available workforce	Cost per Worker				
Cooperative	Cost per worker				
Individual business	Cost per worker				
Part of a larger company	Cost per worker				
Cooperative	Energy cost to produce X				
Individual business	Energy cost to produce X				
Part of a larger company	Energy cost to produce X				
Cooperative	Cost for fertilizers etc.				
Individual business	Cost for fertilizers etc.				
Part of a larger company	Cost for fertilizers etc.				
Cooperative	Cost of marketing				
Individual business	Cost of marketing				
Part of a larger company	Cost of marketing				
Cooperative	Marketing efforts to increase demand for product X				
Individual business	Marketing efforts to increase demand for				

	product X				
Part of a larger company	Marketing efforts to increase demand for product X				
Demand for Product X	Price of product X				
Marketing efforts to increase demand for product X	Demand of product X				
Marketing efforts to increase demand for product X	Price of Product X				
Any other variable that you can think of	Any other variable that you can think of				

Agro tourism

Name of Variable	**Should it be included in the model (Yes or No)**	**Explanation of the variable**
Population at working age		The number of people at the area that could work in agro-tourism
Available workforce		The number of people in the area that actually agro-tourism
Technology and innovation		Digital transformation of the agro-tourism business
Cooperative		Similar as before
Individual business		Similar as before
Part of a larger company		Similar as before
Investment to make agro-tourism infrastructure		Amount of money to develop an agro-tourism operation
Price per night		How much each tourist would pay per night
Demand for tourism activities		If there is demand for the agro-tourism operation of

		the area
Tourism infrastructure		Number of hotels etc.
Number of tourists		
Revenues from tourists		Total amount earned by the tourists
Money spent per tourist per day		Includes all the expenses that tourists will make except for hotel
Labor requirements for tourism		How many people are necessary to work in tourism
Cost of labor for tourism		
Energy cost for tourism infrastructure		
Income from tourism		
Technology and innovation		Digital transformation of the agro-tourism business
Any other variable that you might think it is important and should be included in the model		

Variable A	**Variable B**	**Affected positively [if variable A increases (decreases), then variable B increases (decreases)]**	**There is not relation between the variable**	**Affected negatively [If variable A increases (decreases) then variable B decreases (increases)]**	**Explanation**
Population at working age	Available Workforce	Yes			The more population is at working age the higher the number of available workforce
Available workforce	Cost per Worker				
Cooperative	Cost per worker				
Individual business	Cost per worker in tourism				
Part of a larger company	Cost per worker in				

	tourism				
Cooperative	Cost of marketing				
Individual business	Cost of marketing				
Part of a larger company	Cost of marketing				
Cooperative	Marketing efforts to increase demand for tourism				
Individual business	Marketing efforts to increase demand for tourism				
Part of a larger company	Marketing efforts to increase demand for tourism				
Demand for Product X (variable from agricultural models	Demand for tourism activities				
Labor requirements for tourism	Available Workforce (variable from agricultural model)				
Tourism infrastructure	Number of tourists visiting				
Number of tourists visiting	Labor requirements for tourism				
Number of tourists visiting	Revenues from tourism				
Energy cost to produce Product X	Energy cost for agro-tourism				

(from agricultural model)	operations				
relationship you might think is important. You can even use pairs of variables that were not covered in the tables. You can even use variables from the other tables					

Rural Energy

Name of Variable	Should it be included in the model (Yes or No)	Explanation of the variable
Land available for agriculture		How much land is available for agriculture
Land available for agro-tourism		How much land is available to develop a tourism infrastructure
Land available for energy infrastructure		How much land is available to develop a rural energy infrastructure
Investment for energy infrastructure		Amount to develop an energy infrastructure
Labor requirements for energy infrastructure		How many people are necessary for operating the energy infrastructure
Actual energy infrastructure		
Cooperative		Similar as before
Individual business		Similar as before
Part of a larger company		Similar as before
Energy costs to produce Product X		
Energy Costs for tourism infrastructure		
Operational cost of energy infrastructure		How much does it cost to operate

Income from infrastructure		
Amount of energy produced by infrastructure		
Price of energy produced		

Variable A	**Variable B**	**Affected positively [if variable A increases (decreases), then variable B increases (decreases)]**	**There is not relation between the variable**	**Affected negatively [If variable A increases (decreases) then variable B decreases (increases)]**	**Explanation**
Population at working age	Available Workforce	Yes			The more population is at working age the higher the number of available workforce
Available workforce	Cost per Worker				
Cooperative	Cost per worker in energy				
Individual business	Cost per worker in energy				
Part of a larger company	Cost per worker in energy				
Land available for agriculture	Land available for agro-tourism				
Land available for agro-tourism	Land available for agriculture				
Land available for energy infrastructure	Land available for agriculture				
Investment for energy infrastructure	Actual energy infrastructure				

Labor requirements for energy infrastructure	Available workforce (from previous model)				
Cooperative	Investment for energy infrastructure				
Individual business	Investment for energy infrastructure				
Part of a larger company	Investment for energy infrastructure				
Actual energy infrastructure	Energy costs to produce Product X				
Actual energy infrastructure	Energy Costs for tourism infrastructure				
Operational cost of energy infrastructure	Income from infrastructure				
Actual energy infrastructure	Amount of energy produced by infrastructure				
Price of energy produced	Income from rural energy infrastructure				
Any other relationship you might think is important. You can even use pairs of variables that were not covered in the tables. You can even use variables from the other tables.					

The Delphi questionnaire was sent via email to the project partners who were asked to fill the table with their opinion. Once the initial set of answers was received, an aggregate table was generated and points of disagreement were identified (meaning those variables or the relationships that different partners had different opinions about).
Further, the variables and relationships for which a disagreement was identified, were re-send to the project partners with the intention to justify their choices. In addition, an online meeting was held where the partners could elaborate on their choice. The process was finalized when the partners came to a common understanding and a final list of variables and relationships was established.
(b) A second step of the Group Model Building Session of the OREN project was the conduction of a workshop after the multiplier event that was held in Rome on July of 2023. During that workshop a number of experts assisted with the development of Causal Loop Diagrams for the project. The experts that participated in the Group Model Building Session of 2023 were the following:

Table 17 Experts participating in the GMB session

Surname	Name	Organization
Armenia	Stefano	SYDIC
Carlini	Camillo	Sydic
Ceselli	Cristiano	
Gorodetska	Nataliya	SYDIC
Ivanova	Magdalena	Euro Education BG
Karpninsky	Arkadiusz	FC Lazio
Kraus	Leo	SYMPLEXIS
Lisai	Serena	ACR+
Paganini	Matilde	Itkam
Popova	Maya	EEB
Redko	Vadym	CCISB
Scipinotti	Violetta	FC Lazio
Tsaples	George	IDS
Bortolotto	Chiara	

The experts were separated into two groups that were led by Georgios Tsaples (IDS) and Stefano Armenia (SYDIC) and both groups developed a CLD.

The following section is focused on presenting the results and insights that emerged from the

various activities that were performed in PR2.

Results

Literature Review

System Dynamics has a long tradition in modelling agricultural systems. This is not unexpected since the food value chain is characterized by deep uncertainty; in addition, climate change and an ascending world population means that agricultural systems will need to adapt in order to provide enough food for the world population and a viable income for the agricultural entrepreneurs.

The Food and Agriculture Organization estimates that in the next 3 decades, food production will have to increase by almost 50% to address the needs of the population (FAO., 2017a); (FAO, 2017b).

Such an increase in production will have multiple consequences: increased GHG emissions, degradation of the land etc. (Jagustović, et al., 2021). Hence, agricultural entrepreneurs will have to proceed with a business model that would be easily adapted to the changes of the climate and at the same time would not contribute to natural degradation without resulting in loss of income for the entrepreneurs themselves. Such type of agriculture has been named Climate-smart agriculture (CSA) (Lipper, et al., 2014) and system dynamics has been used to model its intricacies and complexities. For example, Jagustović et al. (2021) developed a model with the purpose of investigating the effects of a climate-smart village in northern Ghana. The authors focused on the production of maize, one of the main products of the area, and investigated how Climate-smart agricultural practices could positively or negatively affect the overall development. The main Causal Loop Diagram of the developed model is presented in the figure below.

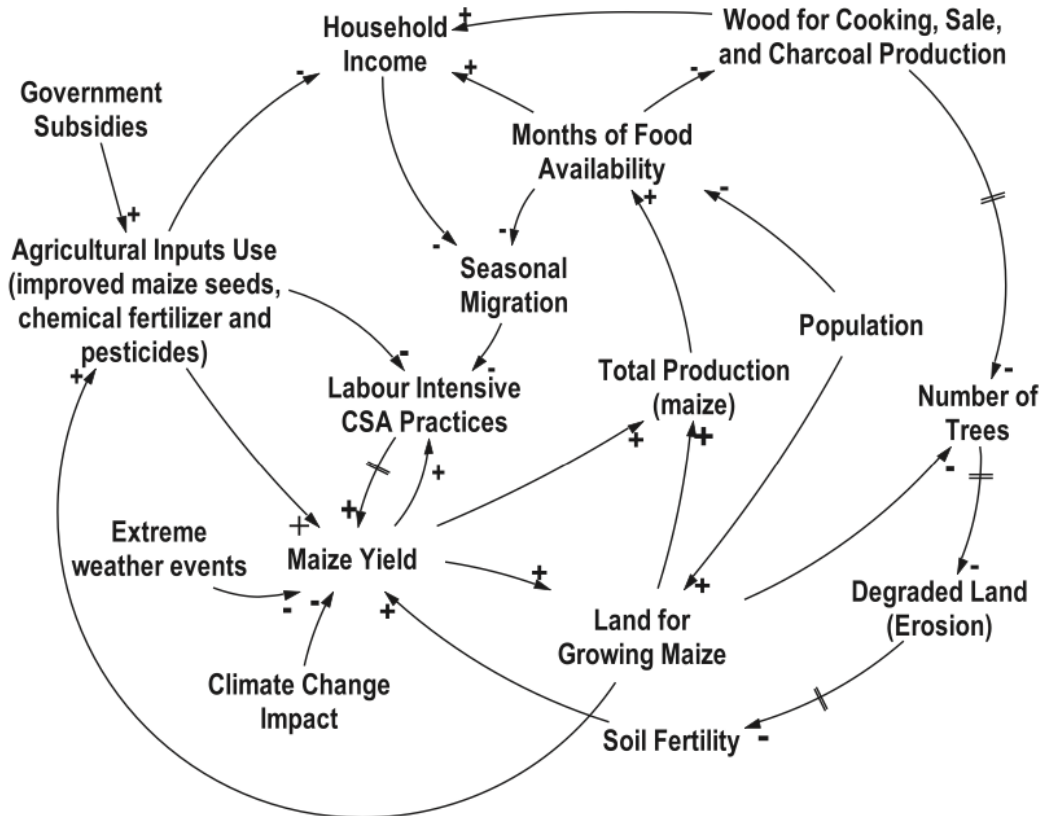

Figure 1 Causal Loop Diagram of the developed model by (Jagustović, et al., 2021)

Another paper that focused on the production of maize and the resource-based poverty trap and food security was the one by Stephens et al. (2012). The authors investigated these issues by developing a bio-economic model for small-holder farms in Kenya. Chung (2018) developed a System Dynamics model to illustrate the structure and decision-making processes along the rice value chain in Malaysia. The CLD of the developed model is presented on Figure 2 below.

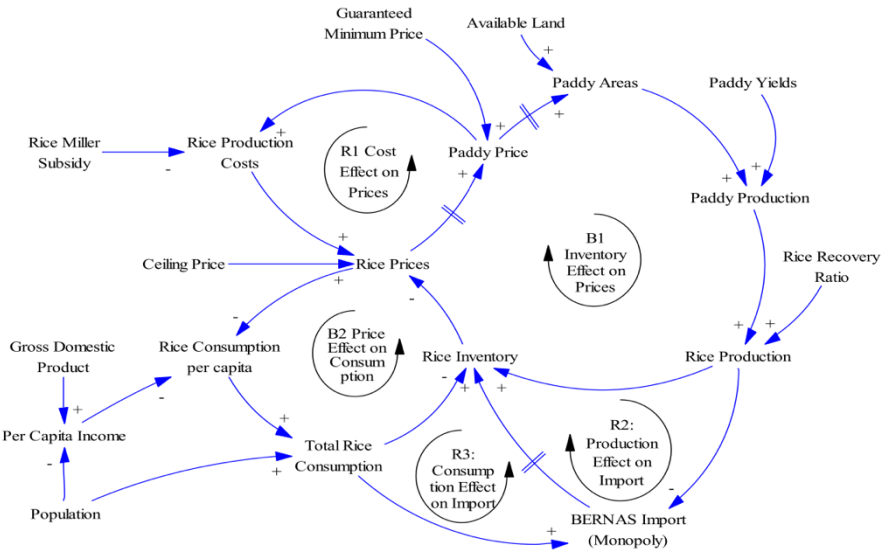

Figure 2 CLD of the Malaysian rice value chain by (Chung, 2018)

Finally, Hakim and Deli (2020) investigated the supply chain management of the Gayo Arabica coffee industry and analysed policies that would add value to small plantation owners. The CLD of the particular model is presented on Figure 3 below.

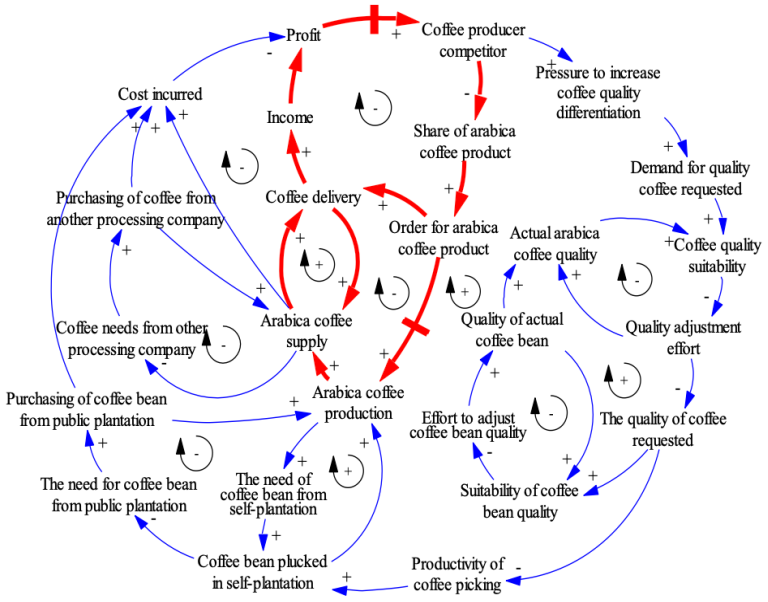

Figure 3 CLD of the Gayo Arabica coffee industry by (Hakim & Deli, 2020)

Similar to agriculture, System Dynamics has a deep tradition on modelling tourism. Sedarati

(2015) studied 369 papers that dealt with tourism either implicitly or explicitly. Another paper by the same author a few years later, illustrated that System Dynamics can be applied for both planning and development of the tourism industry (Sedarati, Santos, & Pintassilgo, 2019).
Apart from the general review papers, rural tourism has gained traction in the System Dynamics literature during the last years.
This is not unexpected since, rural tourism can be seen as an activity which complements agriculture, thus leading it towards multi-functionality (Randelli & Tortora, 2014). Randelli et al. (2014) view rural tourism as a major force of diversification in rural income, especially for small, family farms. In addition, it can add to the cultural exchange between urban and rural areas, enhance the traditional values of rural life (Cánoves, Villarino, Priestley, & Blanco, 2004) and equally important, this diversification can counteract emigration from rural areas. Hence, Randellli et al. (2014) use the notion of Evolutionary Economic Geography (Boschma & Martin, 2007), which is focused on the processes of path creation and dependence, notions that are inherent in System Dynamics by the presence of stocks and flows.
Thus, rural tourism on the island of Cat Ba (Vietnam) has been modelled in the paper by Mai and Smith (2018), while Zibert et al. (2020) developed a system dynamics model to analyse the diversification of agricultural holdings into rural tourism activities in Slovenia. The CLD of the developed model is presented on Figure 4 below.

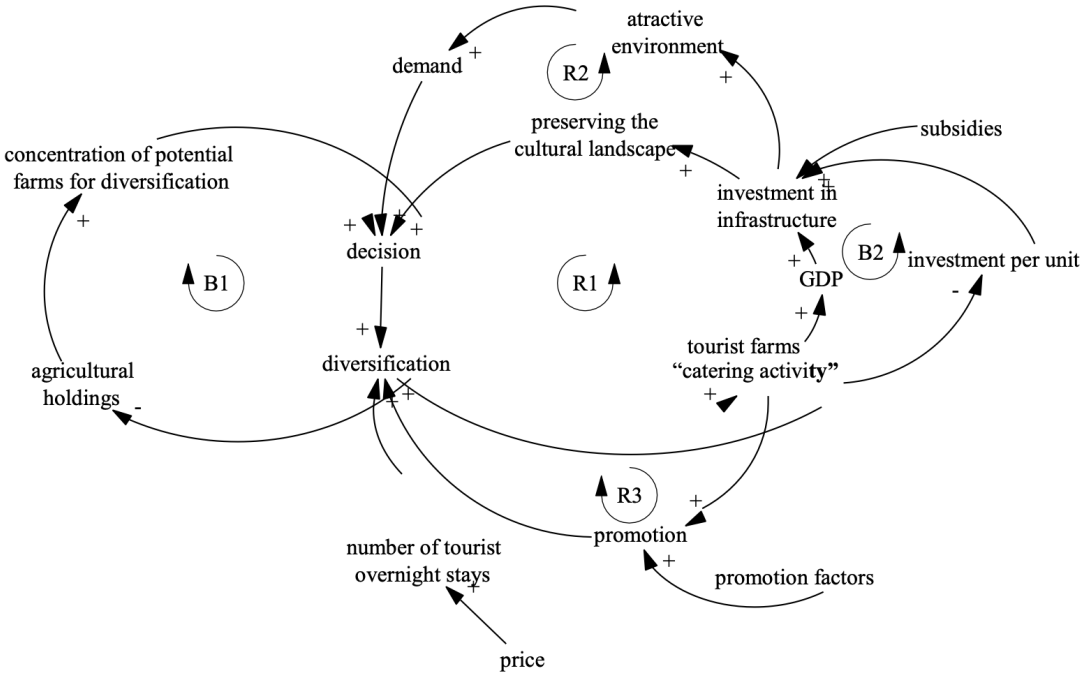

Figure 4 CLD of the developed model by (Žibert, Rozman, Škraba, & Prevolšek, 2020)

The authors base their work on Bontkes and van Keulen (2003) who define several factors that

affect the condition and development of rural areas such as low income, low demand, lack of skills etc.

Similar to the other application, System Dynamics has been extensively used in the context of energy. For example Teufel et al. (2013) performed a literature review on the use of System Dynamics in the electricity markets simulation. This review was followed by the one by Ahmad et al. (2016), where the authors made a classification of the papers based on their modelling of the electricity sector to:

Policy assessment models: A policy assessment model evaluates an intended or implemented policy in a country.

Generation capacity expansion models: Articles falling under this category comprise of models that were developed to address the generation capacity expansion problem in the electricity sector

Financial instrument models: Financial instruments category comprises of studies that modelled various mechanisms to promote investments in renewable generation capacity.

Demand-side management models: This category includes models that focus on the demand-side management of the electricity supply chain

Apart from the general, review papers, researchers have dealt with specific aspects of energy. For example, Xiaohua et al. (2006) developed a model to investigate the relationship between rural energy and economic activity in the Shouyang county in China. Goh et al. (2014) used System Dynamics to analyze important criteria of project planning and development in a wind energy project in Malaysia. Hartvigsson et al. (2016) used System Dynamics to improve the load representation of a utility model.

Xiaojing and Ren'an (2017) investigated the biogas supply chain and more specifically how regulation parameters can affect its efficiency. Focusing on specific aspects of rural energy systems, Riva and Colombo (2020) formulated a system dynamics model to investigate the rural electricity- development nexus and more specifically how long-term electricity demand and local socio-economic improvement are affected. In a later paper, Riva (2020) expanded on the previous work to derive useful guidelines to support future electrification actions in sub-Saharan Africa. Finally, Tonini et al. (2022) investigated how energy project can become possible complementary activities.

In conclusion, the analysis of the literature offered several lessons and revealed important gaps. The most important are listed below:

(1) There are a lot of papers that focus on the production process of agricultural products, but not on how different business models could affect the development/income of rural entrepreneurs

(2) There has been an intensive focus on food security (whether global or local) but not much on the entrepreneurship aspect of rurality
(3) The focus of a lot of papers has been on developing or under-developed countries and/or regions. This had an effect on the type of agricultural product that has been modelled. For example, not a lot of research has been conducted on products like wineries, beekeeping etc.
(4) During the last few years, researchers have started focusing on the diversification in rural entrepreneurship by studying, for example, the effects of agro-tourism
(5) However, the same has not been observed with the interplay of energy-agriculture
(6) Finally, there has not been a lot of research focusing on the technological aspect of rural entrepreneurship or the skill acquisition of rural entrepreneurs and their impacts.

Analysis of Case Studies from PR1

Apart from the literature review, the case studies from project result 1 (Table 3) were analysed. For this analysis, the various sentences from each case study were converted to text that could be analysed with the Python Programming language[1]. More specifically, the data were cleaned, processed and all stopwords were removed. In addition, Principal Components Analysis was performed to transform the text into numerical values that could be easily manipulated. The new data were used in a K-Means clustering algorithm with 4 clusters to investigate which rural enterprises share similar characteristics. Finally, for each cluster, a function was created that revealed the most used/common words that appear in it.
The various steps of the process are summarized below:
Step 1: Input data from case studies
Step 2: Clean data
Step 3: Remove stopwords, punctuation etc.
Step 4: Principal Component Analysis
Step 5: Clustering
Step 6: Find the most common words per cluster.
The results are illustrated on Figure 5 below.

[1] https://www.python.org

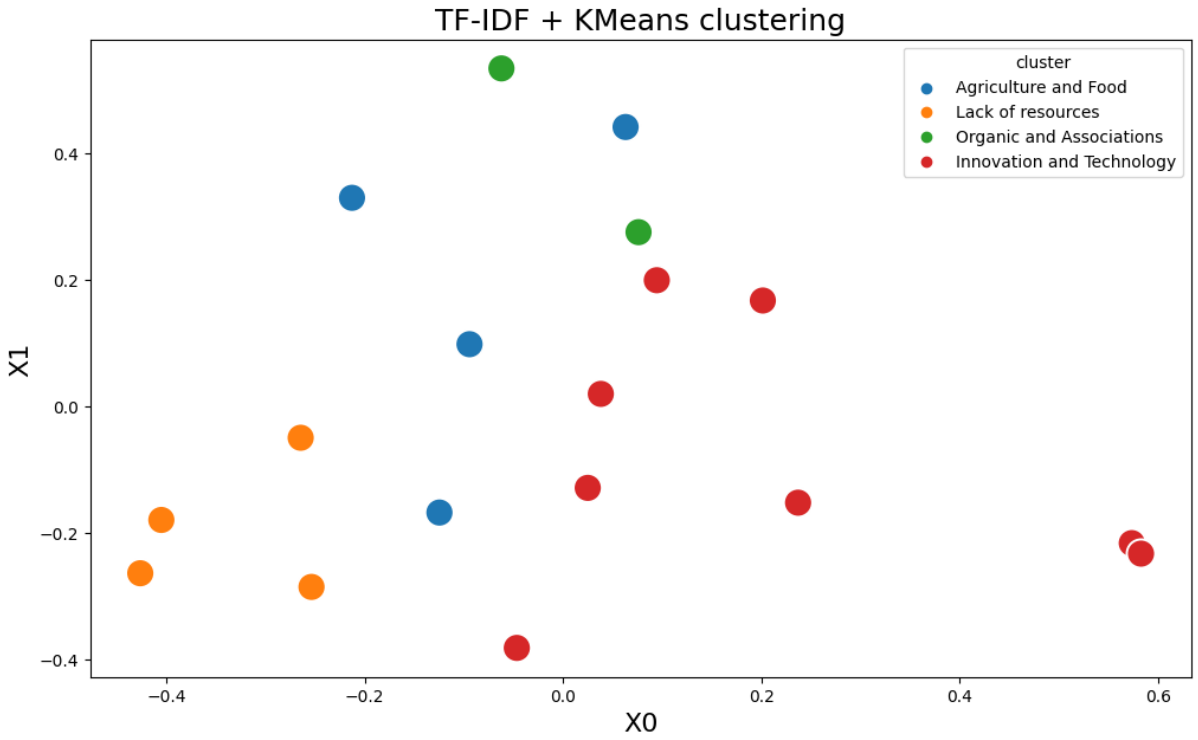

Figure 5 Clustering of the rural enterprises from Project Result 1

Table 18 below summarizes the case studies of the rural enterprises and the cluster that they belong.

Table 18 Case studies from PR1 and their cluster

Country	**Enterprise**	**Cluster**
Bulgaria	Biofish Trading Ltd	1
Bulgaria	Gorunaka Complex	3
Bulgaria	Grikam Ltd	3
Belgium	Linked.Farm	1
Belgium	Ma Ferme	1
Belgium	Cocoricoop	1
Germany	Bioland e.V	0
Germany	Markgesellschaft der Naturland Bauern	0
Germany	Innovative Landwirtschaft Reber	3
Greece	Development Agency of Karditsa (ANKA)	2
Greece	ThesGi	2
Greece	Amyntaion Wine	2
Spain	Movilex	2

Spain	Bioagro	2
Spain	Bodegas Jose Pariente	2
Italy	REC/Agrivoltaic farmer	3
Italy	Cooperativa Alicenova	2
Italy	Albergo Diffuso	2

As it can be observed, Cluster 0 (green points) contains two organizations from Germany and the focus is on the bio-organic aspect of rurality along with the importance of associations. Cluster 1 (Blue points) contains all the organizations from Belgium and one from Bulgaria and the focus is on the entire food supply chain. Cluster 2 (red points) is the largest one and contains all the organizations from Greece, Spain and most of Italy. Interestingly, all these countries have a long tradition in agriculture and rural entrepreneurship in general, and the case studies illustrate the importance of innovation and technology as the next step that could assist rural entrepreneurs. Finally, Cluster 3 (orange points) contains 2 organizations from Bulgaria, one from Germany and one from Italy, where the most common words are associated with a general lack of resources.
Consequently, the analysis illustrated several interesting facts:

(1) Mediterranean countries with a long tradition in rural entrepreneurship pay attention to innovation and technology as means to boost development
(2) Countries from the north focus on the organic aspect of agriculture and how the whole food chain is affected. In addition, associations of rural enterprises take center stage in these countries
(3) Finally, the lack of resources as an obstacle for rural enterprises appears in both the north and southern countries and irrespective of their level of economic development.

Analysis from Data of PR2

The same process was followed for the data that were collected on Project Result 2 for organizations from the partners countries where additional data was asked. The results are illustrated on Figure 6 below.

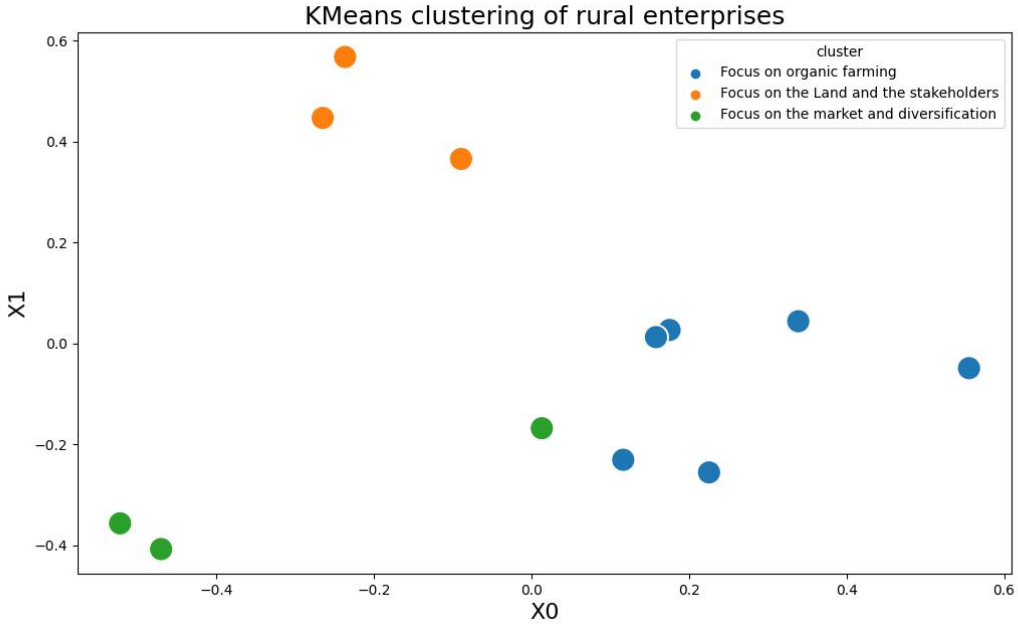

Figure 6 Data from rural enterprises from Project Result 2

The data from Project Result 2 illustrated that there are rural enterprises where there is a strong focus on organic farming (Blue points) and in general how the land is cultivated. This cluster includes the rural organizations from Greece, Italy and one from Belgium. Moreover, another cluster is focused on the land itself and the stakeholders that are associated with it (Orange points). This cluster contains the organizations from Bulgaria and one organization from Germany. Finally, the last cluster (Green points) is focused on aspects of market and diversification and it includes the organizations from Spain and one organization from Belgium.

Apart from data on enterprises, the OREN partners were asked to provide data for the areas that these enterprises are located in. Because this table contains both text and numerical data, 2 clustering processes were performed: one for the text (similar to the processes that were followed so far) and one only for the numerical data.

For the text data, 2 clusters were created that categorized the countries as shown in table 19 below:

Table 19 Clustering of the partner countries according to text data

Cluster	**Countries**	**Common words**
0	Germany, Spain, Belgium	Water scarcity, land
1	Greece, Bulgaria, Italy	Poverty, people

As it can be observed, for Germany, Spain and Belgium the most common words are associated with the land itself and important issue of water scarcity. For Greece, Italy and Bulgaria, rural poverty and general societal factors affect the development or not of rural entrepreneurship. Thus, societal ageing emerged as prevalent and restricting in the development of rural entrepreneurship making more robust the conclusions drawn from the literature and project result 1. This is also validated by the fact that Greece and Bulgaria are considered among the poorer countries in the EU (based on GDP).
Regarding the numerical data, the results are illustrated on Figure 7 below.

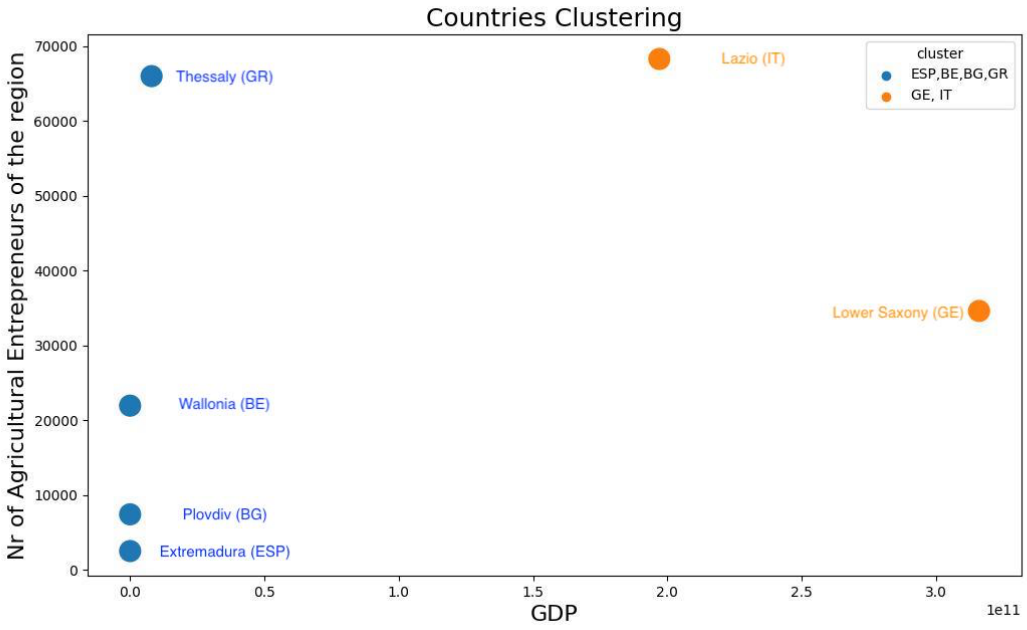

Figure 7 Clustering of countries based on numerical data

This time, the figure presents the position of the countries not based on the results of the Principal Component Analysis, but on two of the data points themselves: GDP and number of agricultural enterprises in the area under study. It can be observed that Lower Saxony (Germany) is in one cluster on its one, with the highest GDP among the partner countries. Among the other countries, they share lower GDP compared to Germany, but within this cluster, Thessaly (Greece) stands out as the country with the highest number of agricultural enterprises in the region.
In conclusion, the following important aspects have emerged by the analysis of all the data (PR1 and PR2):

(1) For Germany and German rural enterprises there is (a) a focus on the bio-organic aspect

of rurality, which steps from concerns on (b) resources, the land and water scarcity, while (c) there is a recognition of the importance of the stakeholders associated with rural enterprises

(2) For Belgium and Belgian rural enterprises there is (a) a large focus on the entirety of the food supply chain and (b) a general acknowledgement of the importance of land and water, which leads to thoughts of (c) production diversification

(3) For Bulgaria and Bulgarian rural enterprises there is (a) general lack of resources, (b) poverty associated with rurality (c) while there is a focus on the entirety of the food supply chain and the land itself

(4) For Greece and Greek rural enterprises (a) Innovation and technology are very important factors (b) despite the poverty that is associated with rurality

(5) For Spain and Spanish rural enterprises (a) Innovation and technology are very important factors and (b) so is diversification for enterprises in order to remain competitive in the market. (c) Finally, concerns over water scarcity play an important role in rural businesses

(6) Finally, for Italy and Italian enterprises (a) Innovation and technology are considered important factors maybe because (b) there is also a perception of lack of resources that hinders rural entrepreneurhisp and development and (c) and association of rurality and poverty.

Group Model Building Sessions

The first part of the Group Model Building involved the answer by the project partners of the Delphi questionnaire.

The results of that questionnaire are summarized in the tables below.

Agriculture Model

Name of Variable	**Should it be included in the model (Yes or No)**			**Explanation of the variable**
Population at working age	yes	Yes	Yes	The number of people at the area that could work in agriculture
Available workforce	yes	Yes	Yes	The number of people in the area that actually work in agriculture
Labor requirements for Product X	yes	Yes	No	How many workers are necessary to produce 1 kg of the

				simulated product
Cost per Worker	yes	Yes	Yes	How much does it cost to have a worker
Labor Productivity	yes	Yes	No	How many kg of product each worker can gather
Product Yield	yes	Yes	No	How many kg of Product X each m2 of land can produce
Adverse effects by climate change	yes	Yes	Yes	A variable to represent the effects of climate change on land production
Price of product X	yes	Yes	Yes	The price at which the product is sold
Energy cost to produce X	yes	Yes	Yes	Cost of Energy for X
Fertilizers etc. cost	yes	No	Yes	Cost for fertilizers
Labor Cost	yes	Yes	Yes	Total labor cost
Family income	yes	No	No	
Individual business	yes	Yes	No	
Cooperative	yes	Yes	Yes	Many farmers in the area collaborating
Part of a larger company	yes	Yes	Yes	The farmer works for a large agricultural company
Demand for product X	yes	Yes	Yes	
Total production of product X from other areas/Countries	yes	Yes	Yes	How much of product X is produced by other countries/areas
Marketing efforts to increase demand for product X	yes	Yes	No	Actions that can be taken to increase demand for product X
Cost of marketing	yes	Yes	No	The cost of each marketing effort to increase demand for product X
EDUCATIONAL DENSITY OF POPULATION IN THE AREA	yes			
Technology and	yes	Yes		Digital

innovation				transformation of the agricultural business

Variable A	**Variable B**	**Affected positively [if variable A increases (decreases), then variable B increases (decreases)]**	**There is not relation between the variable**	**Affected negatively [If variable A increases (decreases) then variable B decreases (increases)]**	**Explanation**
Population at working age	Available Workforce	Yes/Yes/Yes			The more population is at working age the higher the number of available workforce
Available workforce	Cost per Worker			Yes/Yes/Yes	
Cooperative	Cost per worker		Yes/Yes	Yes	
Individual business	Cost per worker	Yes	Yes/Yes		
Part of a larger company	Cost per worker	Yes	Yes	Yes	
Cooperative	Energy cost to produce X			Yes/Yes/Yes	
Individual business	Energy cost to produce X	Yes/Yes/Yes			
Part of a larger company	Energy cost to produce X	Yes		Yes/Yes	
Cooperative	Cost for fertilizers etc.			Yes/Yes/Yes	
Individual business	Cost for fertilizers etc.	Yes	Yes/Yes		
Part of a larger company	Cost for fertilizers etc.		Yes	Yes/Yes	
Cooperative	Cost of marketing			Yes/Yes/Yes	
Individual business	Cost of marketing	Yes/Yes	Yes		

Part of a larger company	Cost of marketing	Yes	Yes	Yes	
Cooperative	Marketing efforts to increase demand for product X	Yes/Yes		Yes	
Individual business	Marketing efforts to increase demand for product X	Yes/Yes	Yes		
Part of a larger company	Marketing efforts to increase demand for product X	Yes/Yes	Yes		
Demand for Product X	Price of product X	Yes/Yes/Yes			
Marketing efforts to increase demand for product X	Demand of product X	Yes/Yes/Yes			
Marketing efforts to increase demand for product X	Price of Product X	Yes/Yes/Yes			
EDUCATIONAL DENSITY OF POPULATION IN THE AREA	Cost per Worker			Yes	
EDUCATIONAL DENSITY OF POPULATION IN THE AREA	Available workforce	Yes			

Agro tourism

Name of Variable	**Should it be included in the model (Yes or No)**			**Explanation of the variable**
Population at working age	Yes/	Yes	Yes	The number of people at the area that could work in agro-tourism
Available workforce	Yes	Yes	Yes	The number of

				people in the area that actually agro-tourism
Technology and innovation	Yes	Yes	Yes	Digital transformation of the agro-tourism business
Cooperative	Yes	Yes	Yes	Similar as before
Individual business	Yes	Yes	Yes	Similar as before
Part of a larger company	Yes	Yes	Yes	Similar as before
Investment to make agro-tourism infrastructure	Yes	Yes	Yes	Amount of money to develop an agro-tourism operation
Price per night	Yes	Yes	Yes	How much each tourist would pay per night
Demand for tourism activities	Yes	Yes	Yes	If there is demand for the agro-tourism operation of the area
Tourism infrastructure	Yes	Yes	Yes	Number of hotels etc.
Number of tourists	Yes	Yes	Yes	
Revenues from tourists	Yes	No	Yes	Total amount earned by the tourists
Money spent per tourist per day	Yes	Yes	Yes	Includes all the expenses that tourists will make except for hotel
Labor requirements for tourism	Yes	Yes	Yes	How many people are necessary to work in tourism
Cost of labor for tourism	Yes	Yes	Yes	
Energy cost for tourism infrastructure	Yes	Yes	Yes	
Income from tourism	Yes	Yes	Yes	
Technology and innovation	Yes	Yes	Yes	Digital transformation of the agro-tourism business
EDUCATIONAL DENSITY OF POPULATION IN THE AREA	yes			

Variable A	Variable B	Affected	There is not	Affected	Explanation

		positively [if variable A increases (decreases), then variable B increases (decreases)]	**relation between the variable**	**negatively [If variable A increases (decreases) then variable B decreases (increases)]**	
Population at working age	Available Workforce	Yes/Yes/Yes			The more population is at working age the higher the number of available workforce
Available workforce	Cost per Worker			Yes/Yes/Yes	
Cooperative	Cost per worker		Yes/Yes	Yes	
Individual business	Cost per worker in tourism	Yes	Yes/Yes		
Part of a larger company	Cost per worker in tourism		Yes/Yes	Yes	
Cooperative	Cost of marketing	Yes		Yes/Yes	
Individual business	Cost of marketing	Yes/Yes	Yes		
Part of a larger company	Cost of marketing	Yes	Yes	Yes	
Cooperative	Marketing efforts to increase demand for tourism	Yes		Yes/Yes	
Individual business	Marketing efforts to increase demand for tourism	Yes/Yes	Yes		
Part of a larger company	Marketing efforts to increase demand for	Yes	Yes	Yes	

	tourism				
Demand for Product X (variable from agricultural models	Demand for tourism activities	Yes	Yes/Yes		
Labor requirements for tourism	Available Workforce (variable from agricultural model)		Yes	Yes/Yes	
Tourism infrastructure	Number of tourists visiting	Yes/Yes/Yes			
Number of tourists visiting	Labor requirements for tourism	Yes/Yes/Yes			
Number of tourists visiting	Revenues from tourism	Yes/Yes/Yes			
Energy cost to produce Product X (from agricultural model)	Energy cost for agro-tourism operations	Yes/Yes	Yes		
relationship you might think is important. You can even use pairs of variables that were not covered in the tables. You can even use variables from the other tables					
EDUCATIONAL DENSITY OF POPULATION IN THE AREA	Cost per Worker			Yes	
EDUCATIONAL DENSITY OF POPULATION IN THE AREA	Available workforce	Yes			

Rural Energy

Name of Variable	Should it be included in the model (Yes or No)			Explanation of the variable
Land available for agriculture	Yes	No	Yes	How much land is available for agriculture
Land available for agro-tourism	Yes	No	Yes	How much land is available to develop a tourism infrastructure
Land available for energy infrastructure	Yes	Yes	Yes	How much land is available to develop a rural energy infrastructure
Investment for energy infrastructure	Yes	Yes	Yes	Amount to develop an energy infrastructure
Labor requirements for energy infrastructure	Yes	Yes	Yes	How many people are necessary for operating the energy infrastructure
Actual energy infrastructure	Yes	Yes	Yes	
Cooperative	Yes	Yes	Yes	Similar as before
Individual business	Yes	Yes	Yes	Similar as before
Part of a larger company	Yes	Yes	Yes	Similar as before
Energy costs to produce Product X	Yes	No	Yes	
Energy Costs for tourism infrastructure	Yes	No	No	
Operational cost of energy infrastructure	Yes	Yes	Yes	How much does it cost to operate
Income from infrastructure	Yes	Yes	Yes	
Amount of energy produced by infrastructure	Yes	Yes	Yes	
Price of energy produced	Yes	Yes	Yes	

Variable A	Variable B	Affected positively [if variable A increases (decreases), then variable B increases (decreases)]	There is not relation between the variable	Affected negatively [If variable A increases (decreases) then variable B decreases (increases)]	Explanation
Population at working age	Available Workforce	Yes/Yes/Yes			The more population is at working age the higher the number of available workforce
Available workforce	Cost per Worker			Yes/Yes/Yes	
Cooperative	Cost per worker in energy		Yes/Yes	Yes	
Individual business	Cost per worker in energy	Yes	Yes/Yes		
Part of a larger company	Cost per worker in energy		Yes/Yes	Yes	
Land available for agriculture	Land available for agro-tourism	Yes		Yes/Yes	
Land available for agro-tourism	Land available for agriculture	Yes		Yes/Yes	
Land available for energy infrastructure	Land available for agriculture			Yes/Yes/Yes	
Investment for energy infrastructure	Actual energy infrastructure	Yes/Yes		Yes	
Labor requirements for energy infrastructure	Available workforce (from previous model)	Yes/Yes		Yes	
Cooperative	Investment for energy		Yes/Yes	Yes	

	infrastructure				
Individual business	Investment for energy infrastructure	Yes/Yes	Yes		
Part of a larger company	Investment for energy infrastructure	Yes	Yes	Yes	
Actual energy infrastructure	Energy costs to produce Product X	Yes		Yes/Yes	
Actual energy infrastructure	Energy Costs for tourism infrastructure	Yes		Yes/Yes	
Operational cost of energy infrastructure	Income from infrastructure			Yes/Yes/Yes	
Actual energy infrastructure	Amount of energy produced by infrastructure	Yes/Yes		Yes	
Price of energy produced	Income from rural energy infrastructure	Yes/Yes		Yes	
Any other relationship you might think is important. You can even use pairs of variables that were not covered in the tables. You can even use variables from the other tables.					

As it can be observed, there were disagreements in the first round of the answers. These were focused not only on the inclusion or not of various variables but also on the type of relationships among them.

As it was mentioned in the methodology section, an online meeting was held, where the various

partners could elaborate on their choices and a compromise structure of the model was developed. This Causal Loop Diagram (CLD) is presented in the figure below.

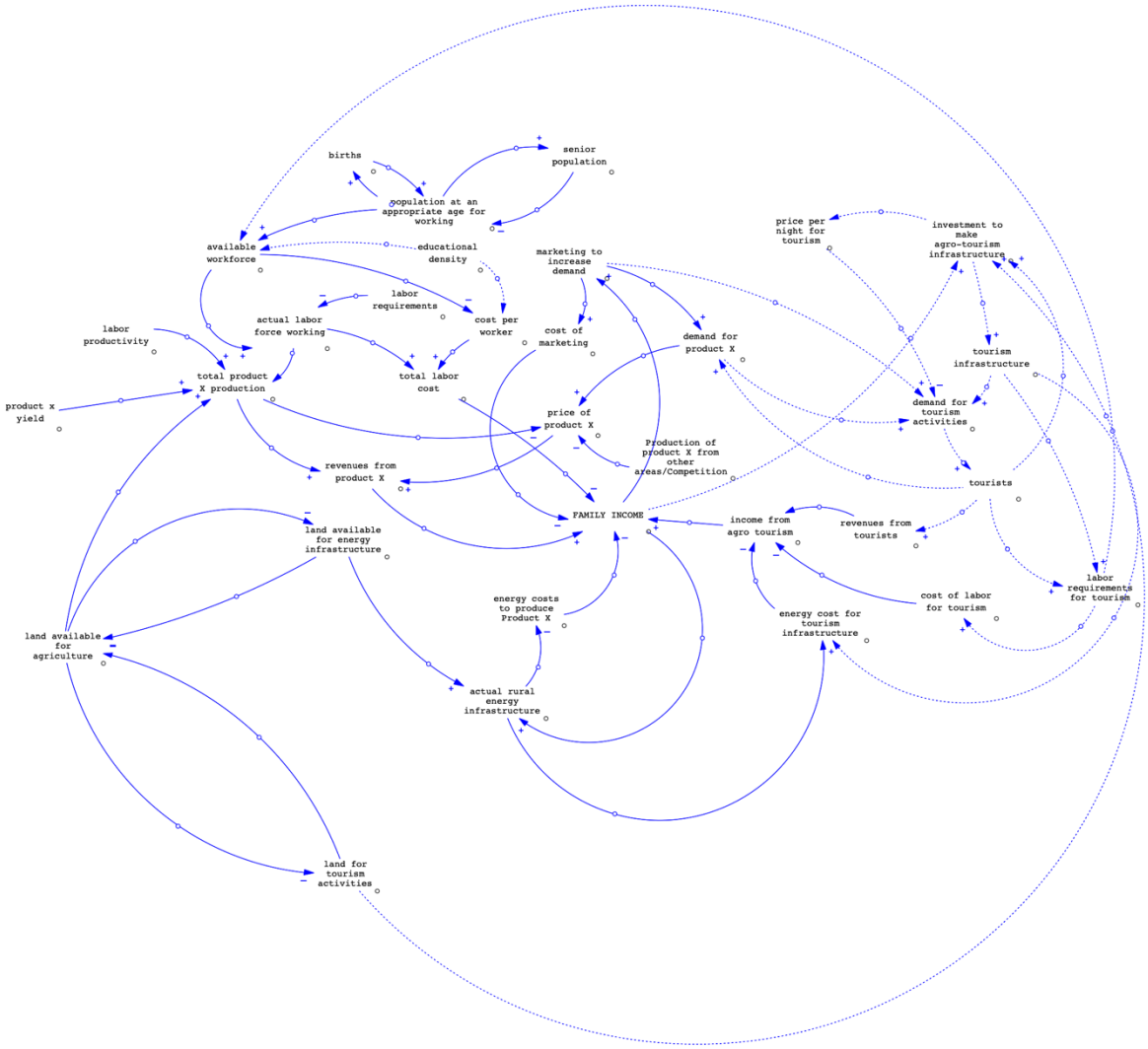

Figure 8 Causal Loop Diagram that originated from the Delphi Questionnaire

As it can be observed, the basic variables of the tables are included, however not all relationships are fully attributed with a negative or a positive sign. It was decided that the model could be expanded on the Group Model Building Session where all the partners would be together. Moreover, the major disagreements in the Delphi Questionnaire were focused on the effect that the business size had on the various variables. For that reason, they were completely omitted in the CLD.

Nonetheless, even with this basic CLD some interesting conclusions can be drawn. For example, even with its relatively smaller size, the CLD contains a plethora of relationships

among the various variables, illustrating the complexity of the rural system.
Firstly, starting with the agro-tourism part of the model, it can be observed that there are two feedback loops (one contained within the other) that showcase how the tourism infrastructure could affect the number of tourists that come into the area and vice versa. By observing the smaller, red dotted positive feedback loop: More investments in the agro-tourism infrastructure will expand that infrastructure which has the potential to increase the demand for tourist activities in the area. In turn this can increase the actual number of tourists which makes any investment to agro-tourism infrastructure more appealing.

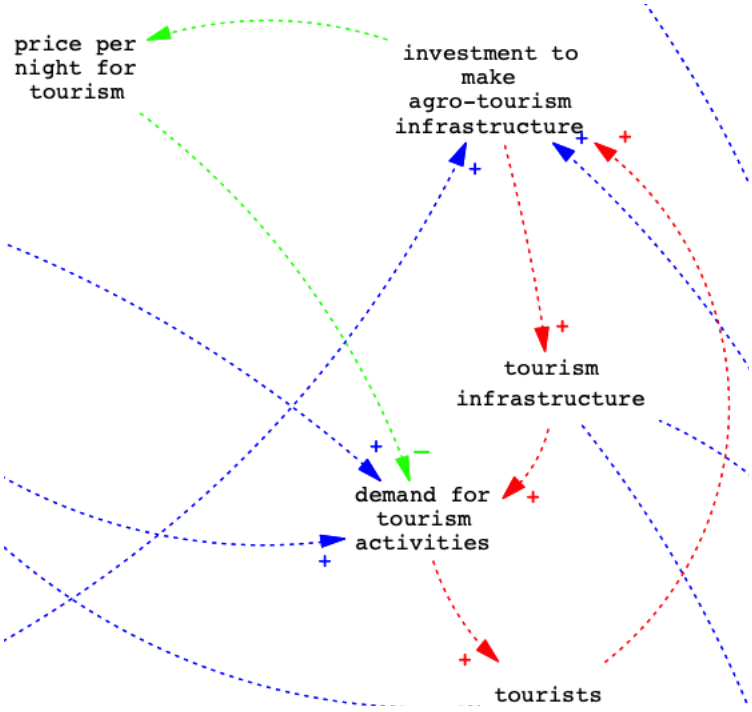

Figure 9 Two loops that affect the agro-tourism infrastrcucture

However, this feedback loop is entailed within a larger feedback loop (green dotted) for which a polarity sign is missing; it is not clear what is the inherent connection between the investment to expand agro-tourism infrastructure and the price per night. If that relationship is positive then there are two positive feedback loops that (when they follow an upward trajectory) could reinforce its other and re-invigorate the economy of the area. On the contrary, if the relationship is negative then the larger loop is forcing the sub-system towards an equilibrium. Consequently, that is one of the most important decisions that a entrepreneur should make.
Another important aspect of the CLD is the connection between the FAMILY INCOME (considered a Key Performance Indicator) with all potential investments:

- Red Loop Figure 10: Less Income means – in general – less investments in energy infrastructure which leads to increased costs for the agricultural production that further

decreases income

- Purple Loop Figure 10: Similarly, less income leads to fewer investments for agro-tourism, reducing the overall number of tourists and the subsequent revenues, hence further reducing the income
- Green Loop Figure 10: The Income KPI is connected also with any efforts towards marketing; Less income means less marketing which reduces costs and leads to more income. However, reduced marketing means that there might be a drop in demand for the agricultural product which could result in reduced family income, maybe even cancelling any savings that would have resulted from reduced marketing actions.

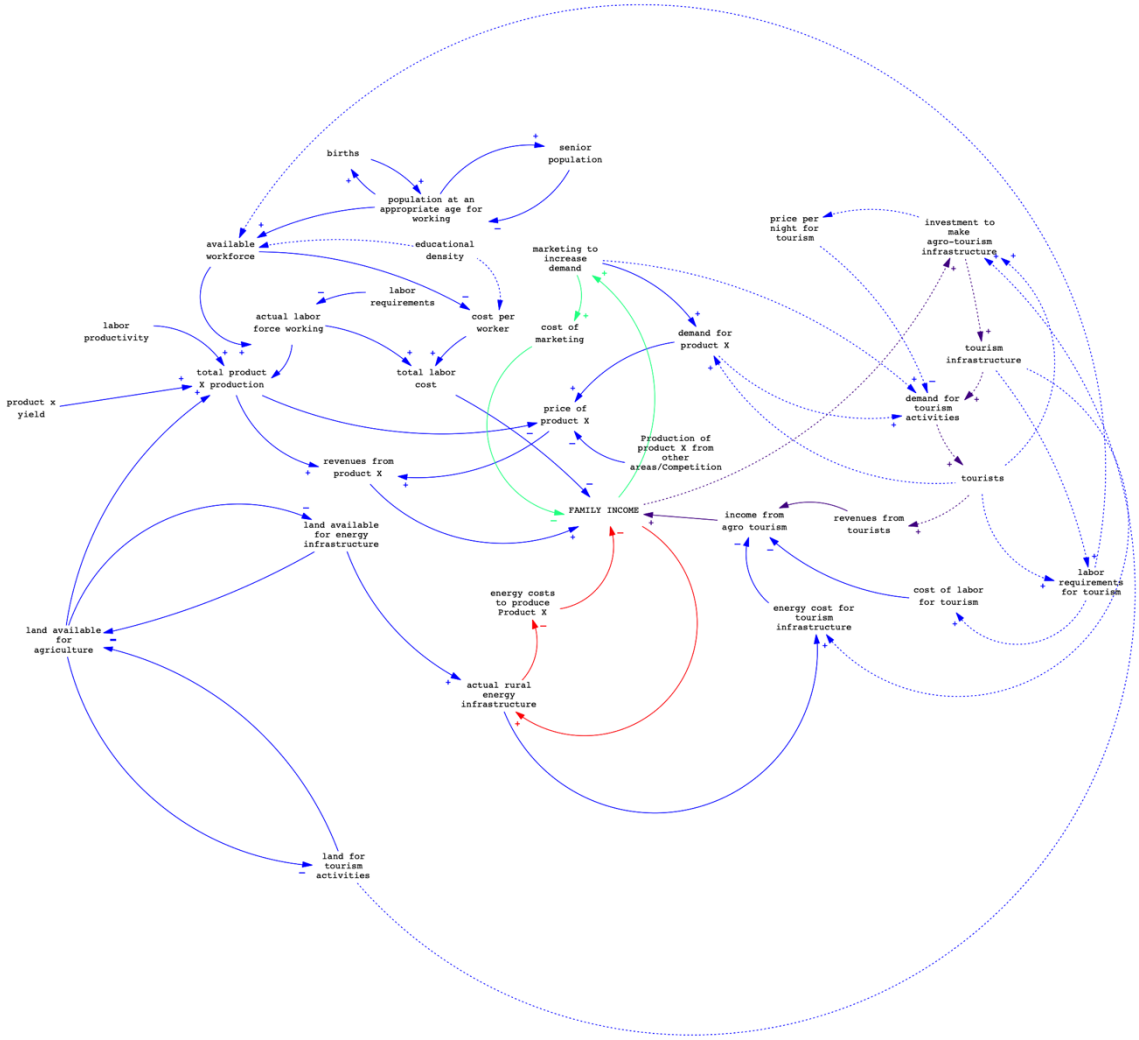

Figure 10 Connection of the Family Income KPIs with some of the major investments

Finally, the CLD contains a number of smaller loops that illustrate the balance that should be

stricken between resources for the various resources. For example, increased land for agriculture comes in detriment to available land for energy or agro-tourism infrastructure which further increases land for agriculture.
Consequently, the interconnection between agriculture, energy and tourism in a rural area is a balancing act where each entrepreneur must make important decisions in order to "activate" the loops that would drive the behavior towards a positive result without incurring unwanted consequences.

As mentioned in the methodology section, a second session of GMB was conducted during the Multiplier Event of the project. During the event, two groups were formed and two CLDs were developed. The following photographs illustrate the two final products. In the following paragraph, each CLD will be discussed in more detail.

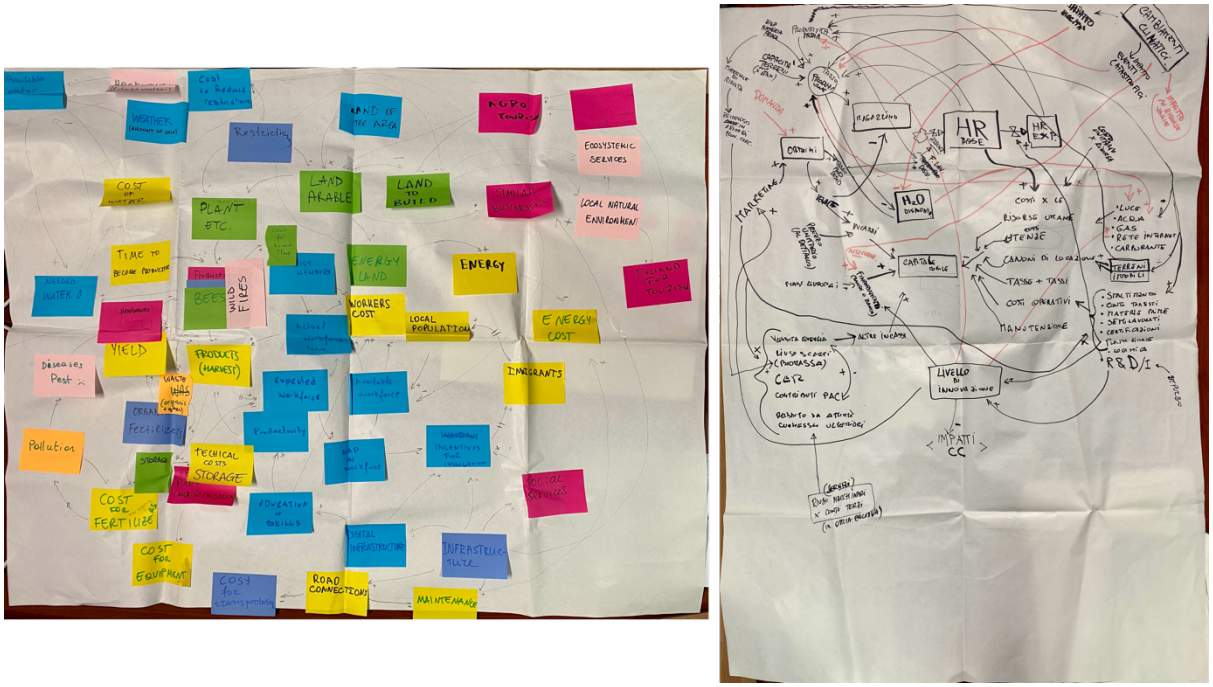

Figure 11 Photos of the CLDs developed during the GMB session

The first CLD that was developed (photo on the left) is depicted in Figure 12 below.

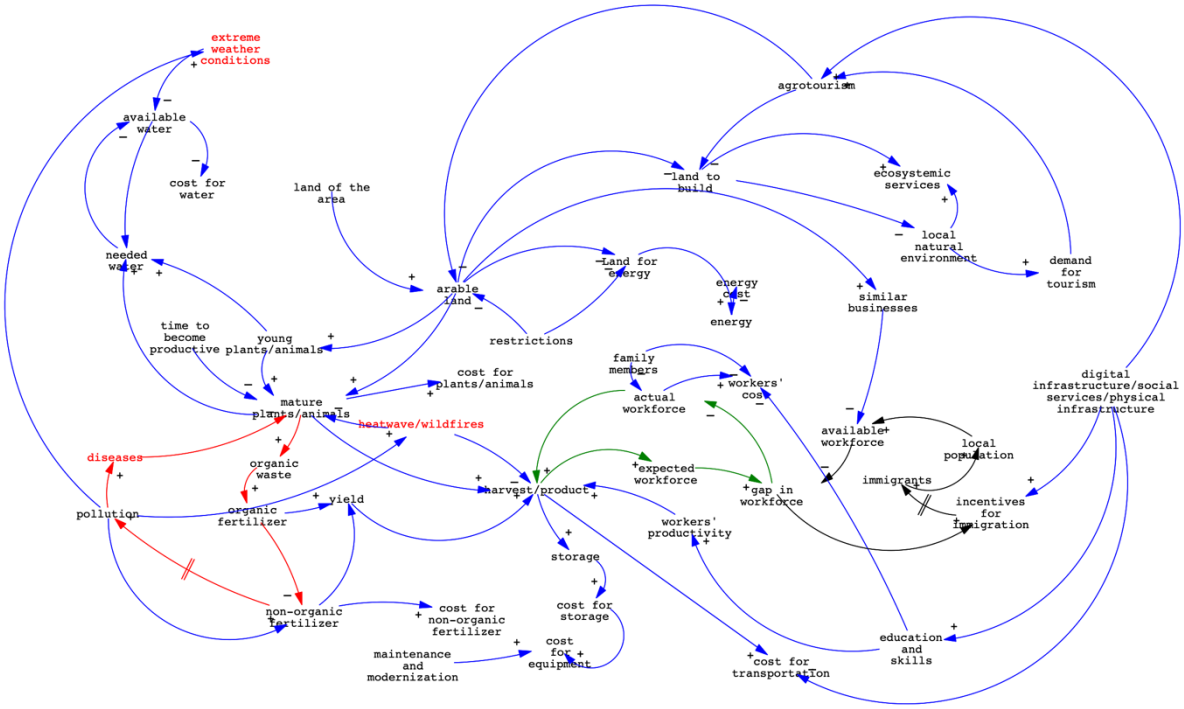

Figure 12 First CLD from the GMB session

The first thing that can be observed is that the CLD shares similarities with the one that was developed through the Delphi questionnaire (Figure 8). The focus is on the operational aspect of rural entrepreneurship and the interaction among agriculture, energy and agro-tourism. However, the GMB session provided the opportunity to include deeper details. For example, pollution is explicitly introduced in the model along with its potential effects (variables in red) and the interactions with the main variables. Moreover, the focus in this CLD is on costs and not income in general. In addition, there is a very detailed sub-structure related to workforce and how it could affect agriculture. Finally, the experts paid attention to the notion of infrastructure of the area under study (either digital, social and/or physical) and how this infrastructure could increase productivity, reduce costs and act as incentive for immigration in the area that could increase the available workforce.

Figure 13 below highlights a small set of the new feedback loops that were formed within this CLD.

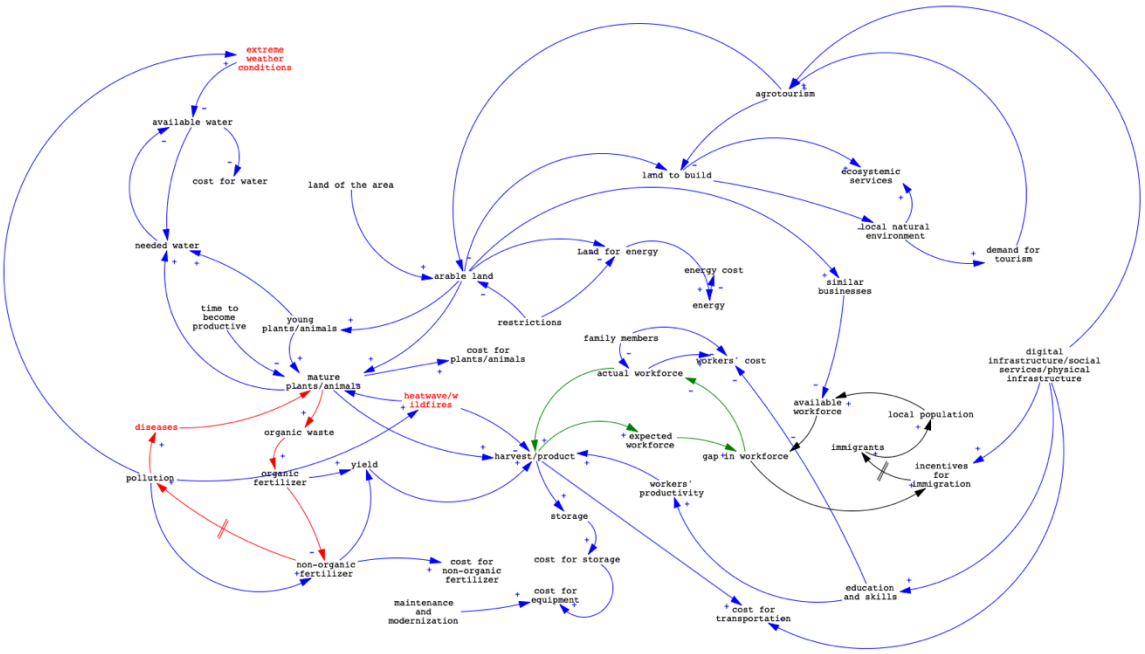

Figure 13 Highlighted loops from the first CLD of the GMB session

- Positive feedback loop (red): A positive feedback loop is formed when an increased number of plants/animals results in an increase in the amount of organic waste and thus in the available organic fertilizer. This has a consequence of a reduced need for non-organic fertilizer which acts positively to the environment and pollution becomes smaller. Smaller pollution means that there will be fewer diseases that increase the number of plants/animals. However, this positive feedback loop can result in a catastrophic decline if the situation is reversed: bigger pollution results in more diseases which decrease the available plants/animals. Consequently, more non-organic fertilizer is necessary which will further increase the pollution.
- Negative feedback loop (green): A negative feedback loop is formed when an increased production means that there is an increased need for workforce. This results in a larger gap between the available and desired workforce, which will decrease the actual workforce meaning that not all available production will be harvested/exploited.
- Negative feedback loop (black): A negative feedback loop is formed when an increased gap in the desired workforce means that there are incentives for immigration in the area. These incentives increase (after a delay) the number of people re-allocating in the area under study, increasing the local population and thus the available workforce. This

availability results in a smaller gap and thus less incentives for future immigration.

Even from these sub-set of feedback loops it is clear how important is the aspect of pollution to the rural economy as a bad situation results in an escalating decline of the local means of production. Moreover, the negative feedback loops in the workforce structure illustrate how sensitive agricultural entrepreneurship is to market forces. Especially, if the infrastructure (digital, social and/or physical) is not adequate then the incurring costs and the un-availability of workforce can result in the worsening of the local economic system.
The second CLD that was developed (photo on the right) is presented on figure 14 below.

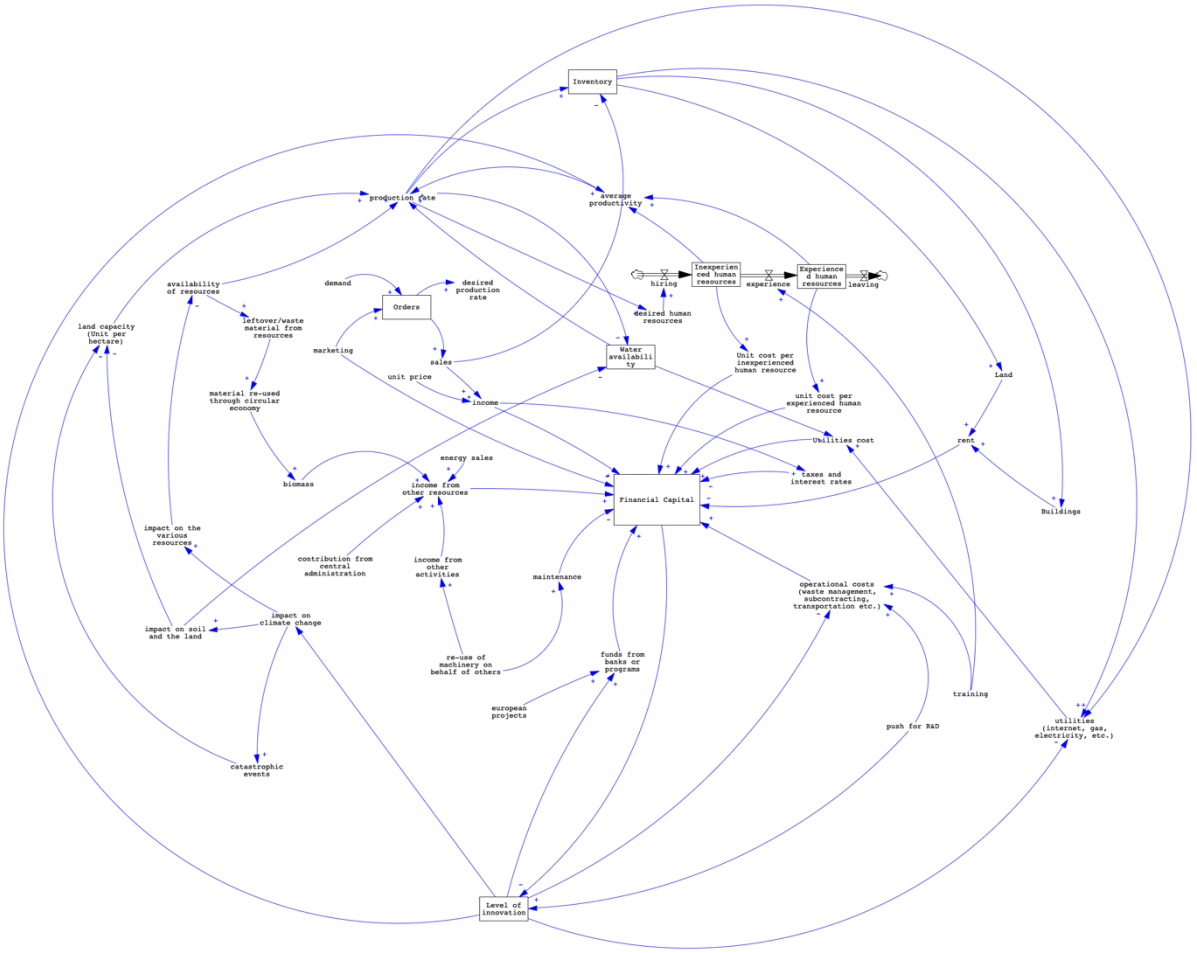

Figure 14 Second CLD from the GMB session

The first element that can be noticed is that the second CLD represents a rural entrepreneurship system from a higher point of view; this means that the focus is on the whole chain of rurality

including the production process (orders, inventory, capital etc.) how this is translated to products and by-products (positive and negative), how these products affect the overall aspect of climate change, in turn how climate change affects this production process and finally how all these elements can contribute to the financial capacity and means of rural entrepreneurs.
In addition, three of the more interesting feedback loops are represented and explained below.

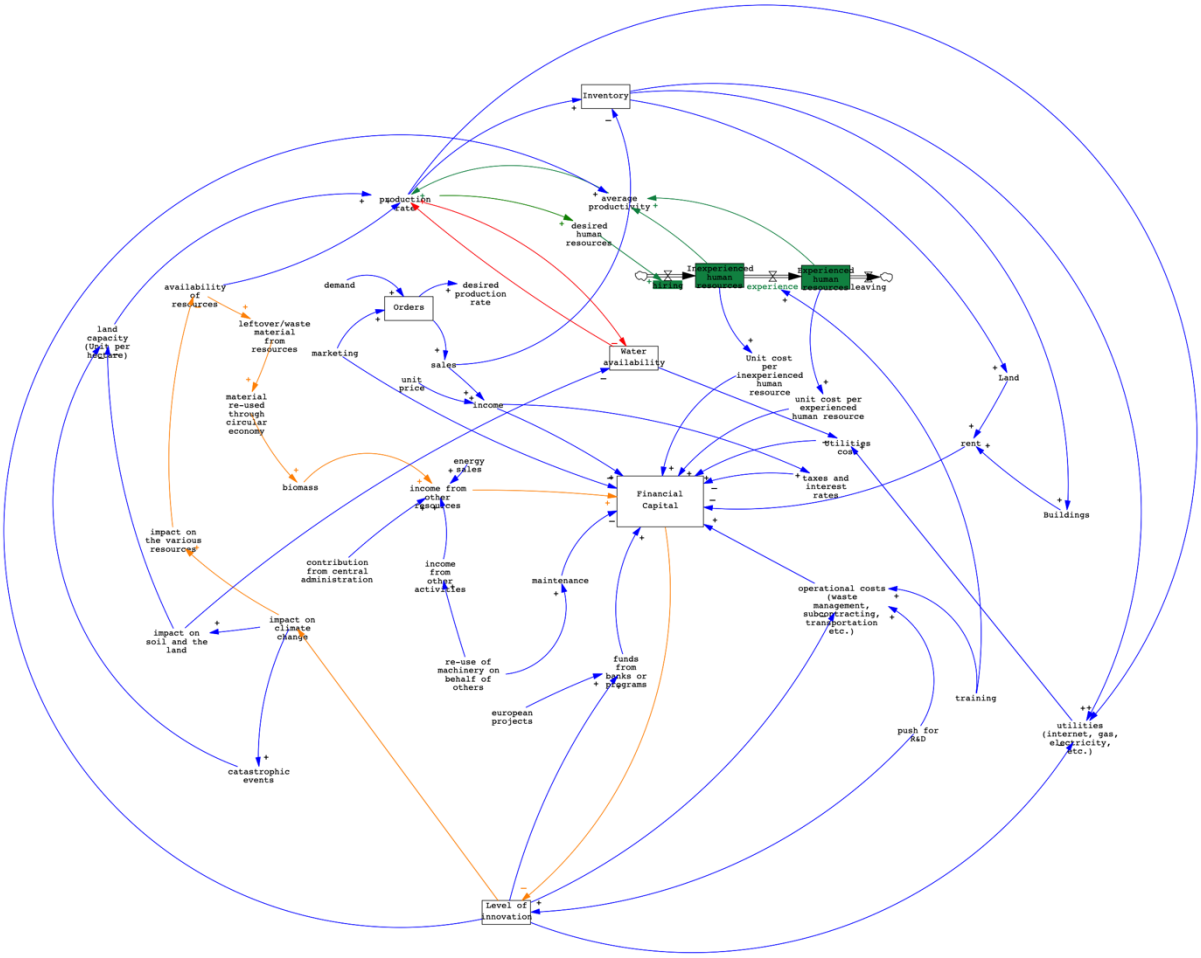

Figure 15 Important feedback loops from the second CLD

- Negative feedback loop (red): one of the many influential loops that are formed in the CLD is by the connection of the production rate and water availability. The larger the production rate the water availability decreases, which leads to a reduction in the overall production rate. Thus, this feedback loop acts in such a way in order to bring the system in equilibrium.

- Positive feedback loop (green): Another feedback loop is formed by the connection of the production rate with the human capital. The higher the production rate, the higher the desired human capital that is required. This will lead to more hirings of (inexperienced) employees (that will become experienced) which ill result in an increase of the average productivity. Thus, the positive loop, when it follows an upward trajectory, can lead to increased production. However, in a reverse situation a reduced production will lead to smaller human capital which will further reduce production. However, another detail that is not explicitly mentioned in the loop is what type of personnel will be hired: if the majority of new hirings is inexperienced then in the short-term there might be a decrease in the average productivity, affecting negatively the production rate.
- Positive feedback loop (orange): Finally, an interesting feedback loop is formed as such: the higher the level of innovation the smaller the effect on climate change. This will have a small effect on the various resources, which will increase their availability. As a result, more resources can be used and as by-product more material can be used through the principles of the circular economy. Thus, a rural entrepreneur can increase their income from sources like biomass etc. which further increases their financial capital offering the possibility for higher levels of innovation. Consequently, the experts in the session highlighted the importance of innovation as a mean not only to increase income for entrepreneurs but also to mitigate the negative effects of climate change.

Conclusions

The purpose of the current deliverable was to provide:
"a holistic understanding of rural development dynamics working out the process underpinning the emergence of successful business models. Specific elements of result 2 are:
- the identification of mechanisms for the elicitation of potential causal processes present in textual descriptions of case studies identified in result 1,
- the description of causal relationships and supporting evidence for modeling and confidence building,
- the models (mathematical/operational and simulation/strategic) which will be implemented in the interactive learning environment(result 3)"

For that reason, several types of analyses were performed. Firstly, the case studies from Project Result 1 were analyzed with Natural Language Processing (NLP) algorithms to gain insights into the success and failures of existing rural organizations. Moreover, a scientific literature review was performed on how Systems Thinking and System Dynamics has been used in the scientific community to identify and solve problems in rural entrepreneurship. In addition, a new knowledge database was developed with data from the partner countries and organizations that were also analyzed for insights with NLP and clustering algorithms. Finally, several Group Model Building Sessions were organized with the purpose of using System Dynamics to identify the main causal relationships in the rurality system.
The main lessons and conclusions that were drawn are summarized below:
From the literature review:

(1) There are a lot of papers that focus on the production process of agricultural products, but not on how different business models could affect the development/income of rural entrepreneurs
(2) There has been an intensive focus on food security (whether global or local) but not much on the entrepreneurship aspect of rurality
(3) The focus of a lot of papers has been on developing or under-developed countries and/or regions. This had an effect on the type of agricultural product that has been modelled. For example, not a lot of research has been conducted on products like wineries, beekeeping etc.
(4) During the last few years, researchers have started focusing on the diversification in rural entrepreneurship by studying, for example, the effects of agro-tourism
(5) However, the same has not been observed with the interplay of energy-agriculture
(6) Finally, there has not been a lot of research focusing on the technological aspect of rural entrepreneurship or the skill acquisition of rural entrepreneurs and their impacts.

From the Natural Language Processing and Clustering of Data:

(1) Mediterranean countries with a long tradition in rural entrepreneurship pay attention to innovation and technology as means to boost development
(2) Countries from the north focus on the organic aspect of agriculture and how the whole food chain is affected. In addition, associations of rural enterprises take center stage in these countries
(3) The lack of resources as an obstacle for rural enterprises appears in both the north and southern countries and irrespective of their level of economic development.
(4) For Germany and German rural enterprises there is (a) a focus on the bio-organic aspect of rurality, which steps from concerns on (b) resources, the land and water scarcity, while (c) there is a recognition of the importance of the stakeholders associated with rural enterprises
(5) For Belgium and Belgian rural enterprises there is (a) a large focus on the entirety of the food supply chain and (b) a general acknowledgement of the importance of land and water, which leads to thoughts of (c) production diversification
(6) For Bulgaria and Bulgarian rural enterprises there is (a) general lack of resources, (b) poverty associated with rurality (c) while there is a focus on the entirety of the food supply chain and the land itself
(7) For Greece and Greek rural enterprises (a) Innovation and technology are very important factors (b) despite the poverty that is associated with rurality
(8) For Spain and Spanish rural enterprises (a) Innovation and technology are very important factors and (b) so is diversification for enterprises in order to remain competitive in the market. (c) Finally, concerns over water scarcity play an important role in rural businesses
(9) Finally, for Italy and Italian enterprises (a) Innovation and technology are considered important factors maybe because (b) there is also a perception of lack of resources that hinders rural entrepreneurhisp and development and (c) and association of rurality and poverty.

From the Development of the Causal Loop Diagrams:

(1) the interconnection between agriculture, energy and tourism in a rural area is a balancing act where each entrepreneur must make important decisions in order to “activate” the loops that would drive the behavior towards a positive result without incurring unwanted consequences.
(2) The importance of pollution to the rural economy as a bad situation results in an escalating decline of the local means of production.
(3) Moreover, the negative feedback loops in the workforce structure illustrate how sensitive agricultural entrepreneurship is to market forces. Especially, if the

infrastructure (digital, social and/or physical) is not adequate then the incurring costs and the un-availability of workforce can result in the worsening of the local economic system.

(4) In addition, there should be a clear process on the human capital requirements with two important ramifications: there should be given time to inexperienced personnel if an increase in productivity should occur and secondly, a reduced production rate and thus a reduced personnel could further negatively impact the production process.

(5) Finally, innovation can act positively not only by increasing (medium-term) income of entrepreneurs, but can act as a deterrent to climate change which will further increase their financial capacity.

Equally important to the various analyses, is the development of a knowledge database on various rural enterprises stating different reasons of their success along with reasons for potential failures and difficulties. In addition, these reasons do not come in a vacuum; general areas' data are also incorporated in the database.
This repository is available for free at the project's website.

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