

Agrofood sustainability in the Mediterranean area

code of conduct



Projet cofinancé par le Fonds Européen
de Développement Régional (FEDER)
Project cofinanced by the European Regional
Development Fund (ERDF)



The paper is co-funded by the European Commission (project PACMAN).
The authors alone are responsible for the views expressed in the document.

Agrofood sustainability in the Mediterranean area - Code of conduct

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The realization of the eBook was coordinated by Paola Maccani (ERVET), Gianandrea Esposito (ERVET), Francesco Trapani (ERVET), Antonella Samoggia (University of Bologna - Expert for ERVET). In addition, we thank all the working group and in particular the project partners: Adral, Critt, Cut, Ervet, Info Murcia, Ivace, Kilkis CCI, Praxi Help-Forward, Provincia di Modena, Provincia di Parma.

Graphic design: www.musicanti.eu

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ISBN 978-88-908954-0-1

Agrofood sustainability in the Mediterranean area

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01

Sustainability

meaning and strategies

What is sustainability?

Agrofood sustainability has been analysed considering four main dimensions: environment, economy, education, ethics.

These dimensions can be complementary or in conflict and they are related to the issues concerning companies management and the context in which they operate, such as: innovative products and processes, optimization of logistics, waste management, product quality and safety, responsible marketing, training, efficiency of business processes, etc.

Sustainability of organizations

“Sustainability in the corporate sector encompasses strategies and practices that aim to meet the needs of stakeholders today while seeking to protect, support and enhance the human and natural resources that will be needed in the future” (The Consumers Goods Forum, 2011).

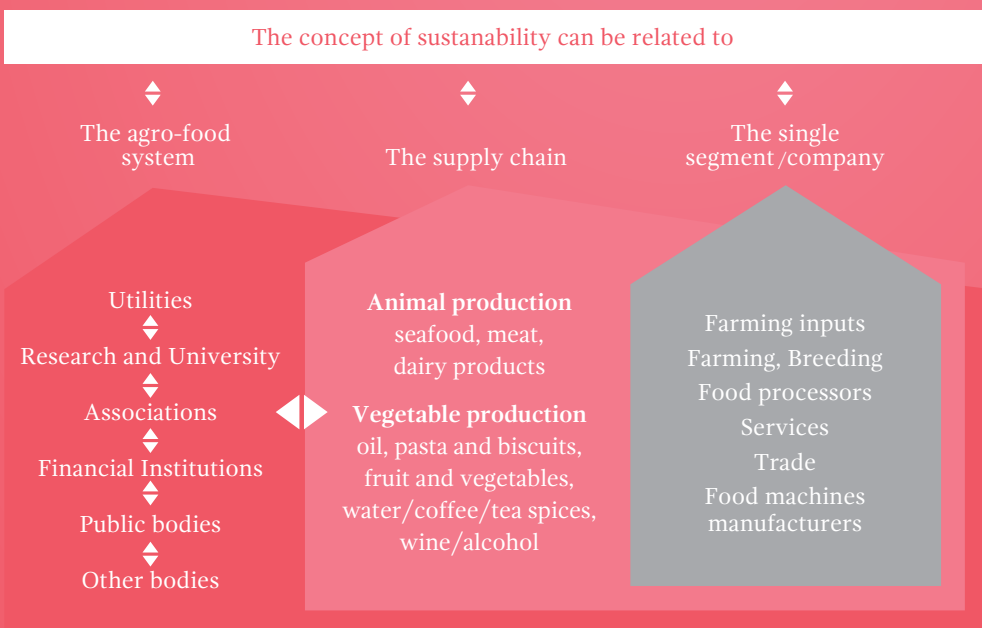
Code of conduct methodology

The project partners collected information for the Code of Conduct following the common template:

- Criticalities concerning sustainability in the agro-food sector
- Laws and regulations
- Policies supporting sustainability in the Mediterranean Area
- Qualitative and Quantitative Indicators
- Life Cycle Assessment (LCA)
- Certification schemes
- Education and training
- Research and Development (R&D)
- Case studies on sustainable and innovative agro-food companies
- Literature review

To address Sustainable Development it is important to introduce the “Life Cycle Thinking”.

The concept of sustainability can be related to: the whole agro-food system, the supply chain, the single segment/company.



02

Supply chain

integrated supply chain solutions, logistics and management systems

Recommendations

Horizontal cooperation may be better able to cope with the limited power showed by primary producers, so as to receive an improved share of the value-added

*e.g. producer organizations and associations,
farmers cooperatives or consortiums.*

The competitiveness of the entire food supply chain depends on efficient coordination in the relations intra-chain and among the food players and the enabling environment

*e.g. written agreements represent a way
to reorganize processes for an integrated supply chain.*

The rationalization of transport and logistics aims at reducing transport costs and at ensuring higher margins for the chain actors, granting products quality and reducing transport externalities. Logistics represent a strategic issue to improve efficiency of the chain by reducing stock and waste.

Policies and regulatory framework

“Code of conduct” for the regional agro-food supply chains and in particular for the retailers, listing principles about: Product quality, Environmental protection, Protection of health and the rights of workers, Written contracts.

Criteria to recognize the Interprofessional Organizations.

Supporting the capacity of aggregation of companies.

Food Safety Information System.

Criticalities identified

Fragmentation and lack of coordination inside the segment (horizontal fragmentation).

Unbalanced relationships along the supply chain (vertical fragmentation).

Lack of integration within the agro-food system.

Case studies

Producer organization in the tomato production and processing.

Vertical integration of the chain in the production of dairy products.

System of reusable and recyclable boxes, with collapsible sides, for the fruit and vegetables sector, integrated with services ensuring the optimization of logistics (reverse logistics included).

Related outputs of the PACMAN project

Mapping of the agro-food supply chain.

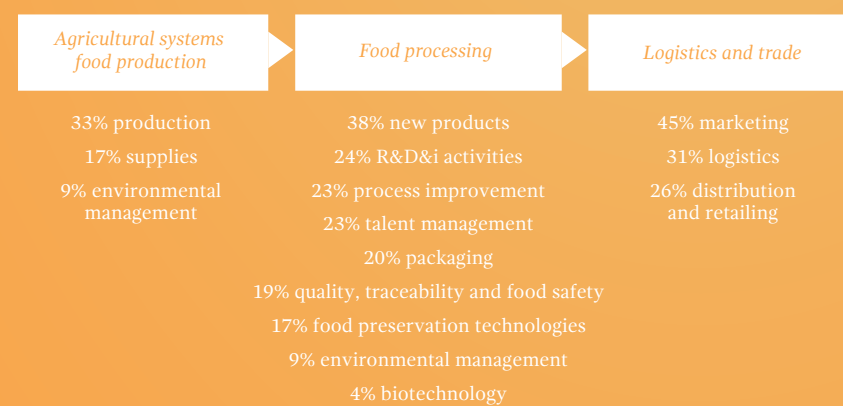
Database of agro-food organizations in the MED area.

Pilot action: “Model of governance of Med agro-food supply chain”.

Global report on “Company survey for in-depth analysis of selected agro-food segment”, section on “Cooperation & Networking Participation of the company in intercluster activities”.

Value chain activities for business cooperation

Percentages come up from the 2012 PACMAN survey involving 600 agro-food companies in the MED Area.



03

Innovation

innovative technology, innovation in products, processes and services

Recommendations

Providing technology transfer tools to improve collaboration and exploitation of research results and their uptake by companies.

Providing of lifelong education and training of professionals that is a precondition for successful innovation policies.

Fostering collaborative research at transnational level through collaboration between transnational economic actors, public authorities and the research community engaged in innovation issues.

Providing smart and user friendly tools to facilitate agro-food SMEs match with the right research counterpart and get the right research support (e.g. online database of organizations).

Laboratories

25 laboratories have been identified by the project partnership starting from the segments of the food chain on which every partner has focused on. Details on the activities carried out are available on the extended version of the Code of Conduct.

Training institutes

Training courses related to sustainability have been organized in the following thematic areas: Context concerning sustainability, Agro-food, Agriculture, Packaging, Quality/Certifications.

Literature review

Green economy (including also agro-food) and technological scenarios; Innovation capacities for sustainable development; Applications of environmental impact assessment; Adoption of knowledge and research results from the agro-food Industry.

Criticalities identified

Limited interconnection between production and research.

Difficulties at the launch of innovative products/processes.

Small investments in R&D.

Policies supporting innovation

Communication and information among scientific and market sector.

Management of future research needs, general interest research, dissemination of results.

Working groups to provide support and new ideas.

Adoption of new products, processes and technologies.

Related outputs of the PACMAN project

E-Book on PACMAN agro-food clusters with a focus on innovation.

PACMAN online DB including laboratories in the MED area.

E-guide for operators.

Pilot action: "Catalogue of Innovative Technologies in the Agro-food Sector".

Global report on "Company survey for in-depth analysis of selected agro-food segment", section on innovation.

04

Resource management

lifecycle thinking, environmental footprint, waste management, sustainable packaging, human resources

Recommendations

Optimizing of raw materials and resources uptake

Selection of raw materials produced in a sustainable manner; food chain integration to share resources or to develop more efficient and sustainable activities; control of inputs through contractual arrangements structured in quality assurance systems and enforced through third party audits.

Lowering the agrofood environmental footprint

Find more sustainable pathways that increase crop production, while greatly reducing unsustainable use of water, nutrients and agricultural chemicals; LCA-based tools are key instruments to quantify the use of resources consumed.

Reducing food waste

Packaging makes a valuable contribution to economic, environmental and social sustainability through protecting products, preventing waste, enabling efficient business conduct, and by providing consumers with the benefits of the products it contains.

Why doing life cycle assessment (LCA)

It is a global analysis of the environmental impacts.

It is a decision support tool giving feedback to the designer.

It is crucial to achieve a life-cycle economy.

For studying market strategies, policies or regulations.

Literature review

Environmental impact assessment of agro-food productions and distribution; Models and analyses of sustainability.

Criticalities identified

Optimization of raw materials and resources.

Environmental impact.

Waste management.

Management of human resources.

Policies and regulatory framework

Waste Management

Specific targets for the recycling and recovery percentages for packaging; introduction of the Extended Producer Responsibility principle; incentives for efficient management of waste; valorisation of the agricultural plastic waste streams.

Environmental footprint

Designation of NVZ zones in which the risk of nitrate pollution is high, as a result of intensive agricultural activity; support to producers as a result of the reduction in their income, due to the reduced use of pesticides; method for drawing up the national reduction program for emissions; specific targets regarding environmental footprint.

Other

Biodiversity conservation and management; food quality and safety; animal wellbeing; corporate social responsibility (CSR).

Related outputs of the PACMAN project

Report for a sustainable innovative model of MED agrofood cluster: code of conduct.

Pilot action: "Hand-ebook on food green packaging in the MED Area".

05

Trade and export

international trade, distribution and logistics, trade agreements and standards

Recommendations

Enhancing of the management capabilities of the companies

The benefits of new markets, that can be exploited by the internationalization processes, require management capabilities of the companies.

Introducing fair trade agreements and standards

Private standards may confer competitive advantage due to improved control and increased efficiency generated by the quality management systems adopted.

Developing efficient and effective transport and logistics services

Getting a deeper understanding on the support offered by the enabling environment

There is a need for better awareness of the role played by the public organizations and sectoral associations in supporting agro-food companies.

Grouping of companies for joint internationalization activities

Grouping of producers to improve strategic supplies of raw materials

Internationalization and sustainability

“Environmental sustainability” has been considered as a strength by 40% of the companies (PACMAN survey on 600 companies) confirming that sustainability issues can support the competitiveness of the sector rather than limit it. As concerns the other factors, product identity emerges as a main distinctive feature, followed by food safety and nutritional, dietetic and/or organoleptic characteristics of products.

Literature review

Market opportunities for organic products; Strategies to promote sustainable products and processes.

Criticalities identified

Difficulties to gain access to foreign markets

e.g. poor visibility of local products, new markets not explored yet, commodities price volatility, weak institutional support for internationalization.

Distribution as a bottleneck

e.g. growing attention on private labels by retailers also poses additional demands on producers and processors to satisfy high and uniform quality standards and delivery requirements.

Surplus production

e.g. perishable products management.

Policies and regulatory framework

Support the capacity of aggregation of companies.

Criteria to recognize the Interprofessional Organizations (IO): common rules on production, models of interprofessional agreements to be used among members, collective actions for product promotion, common services aimed at improving product quality.

Promote “contracting agriculture” between primary sector and food processing.

Related outputs of the PACMAN project

Global report on “Company survey for in-depth analysis of selected agro-food segment”, section on innovation.

Pilot Action: “Establishing a trans-national marketing cluster based on the Authentic Mediterranean concept”.

Maps to promote agro-food in the MED area.

E-Book on PACMAN agro-food clusters.

E-guide for operators.

Pilot Action: “Model of governance of Med agro-food supply chain”.

06

Quality and consumers *food safety and quality, healthy lifestyles, consumer information and consumer choice*

Recommendations

The challenge of sustainability means shifting the focus from the products to the processes through which they are obtained, and their quality with respect to the environment and the social issues. The MED agrofood systems have to face the challenges concerning food quality, safety and health.

By improving the communication actions

Implementation of product labeling, according to the new European Regulation No. 1169/2011. It protects consumer health by establishing common rules on food information.

By improving transport and logistics efficiency

The changing consumer preferences pose new challenges for agro-food logistics. The increasing variety of products on offer requires innovative logistics solutions.

By promoting Mediterranean diet

The Mediterranean diet may represent the right path to increase agrofood sustainability, according to the facts and figures that link food to its environmental impact. The Mediterranean diet can also represent an opportunity to link promotion of local products with activities that mix tourism with education.

Certifications in MED area

Certifications and private standards directly or indirectly related to sustainability have been identified, with a focus on food quality and safety, while specifying objectives and agro-food segments interested.

Literature review

Organic farming and sustainable development; Quality of (traditional) local products.

Criticalities identified

Awareness of consumers about quality and sustainability of products

e.g. awareness about official labelling and benefits of ecologic products; investments in sustainable packaging are not always valued by the consumers, particularly if they result in an increase of the sales price.

Strategic role of certifications

e.g. harmonisation of European regulations concerning EU and non EU product labelling; certification perceived as unnecessary by packaging companies' customers.

Laws and regulations

National Quality System with reference to Integrated pest management (IPM).

Information system on food security.

Related outputs of the PACMAN project

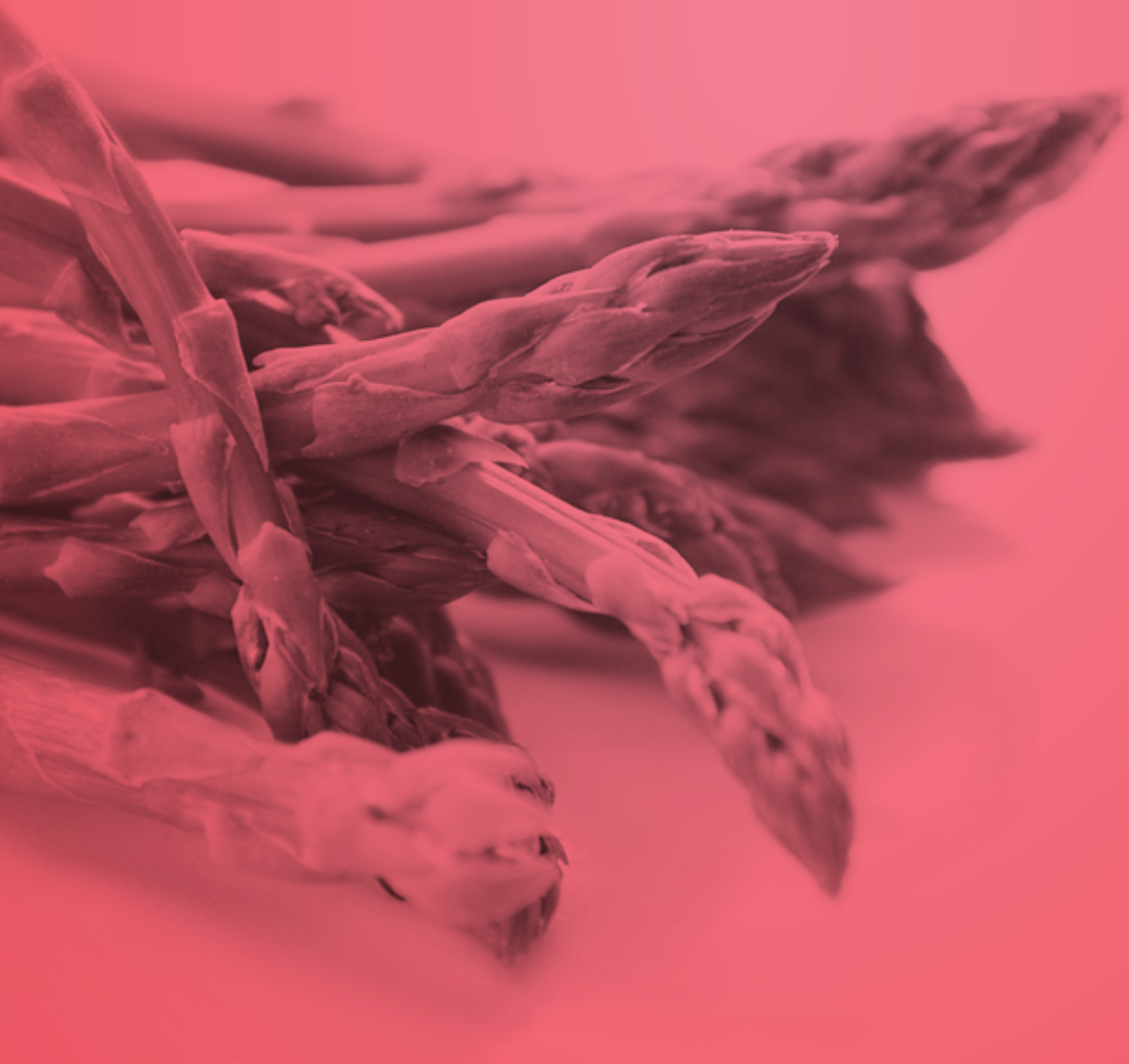
Pilot Action: "Establishing a trans-national marketing cluster based on the Authentic Mediterranean concept".

E-Book on PACMAN agro-food clusters.

E-guide for operators.

01

Sustainability
meaning and strategies



1.1 The concept of sustainability

DEFINITIONS OF SUSTAINABILITY

A shared definition of sustainable development has to agree on: What is to be sustained? For how long? What is to be developed? See Figure 1.1.

Figure 1.1

Definitions of sustainable development

What is to be sustained?		What is to be developed?
Nature Earth Biodiversity Ecosystems	For how long? 25 years "Now and in the future" Forever	People Child survival Life expectancy Education Equity Equal opportunity
Life support Ecosystem services Resources Environment	Linked by Only Mostly But And Or	Economy Wealth Productive sectors Consumption
Community Cultures Groups Places		Society Institutions Social capital States Regions

Fonte: U.S. National Research Council, Policy Division, Board on Sustainable Development, Our Common Journey: A Transition Toward Sustainability (Washington, DC: National Academy Press, 1999)

The most widely used definition of sustainability and sustainable development is the one of the Brundtland Commission of the United Nations on March 20th, 1987:

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”¹

This definition is mainly focused on inter-generational equity but can lead to many different interpretations.

The 2002 World Summit on Sustainable Development introduced the widely used three pillars of sustainable development: economic, social and environmental. We find these pillars also in the following FAO and OECD definitions.

FAO: “Sustainable development is the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner to ensure the attainment and continued satisfaction of human needs for present and future generations.”²

OECD: The concept of «sustainable development» can be similar to «green growth» as showed by the OECD - definition of Green Growth Strategy: “OECD’s Green Growth Strategy (...) seeks to define an economic development path that is consistent with long-run environmental protection, using natural resources within their carrying capacity, while providing acceptable living stan-

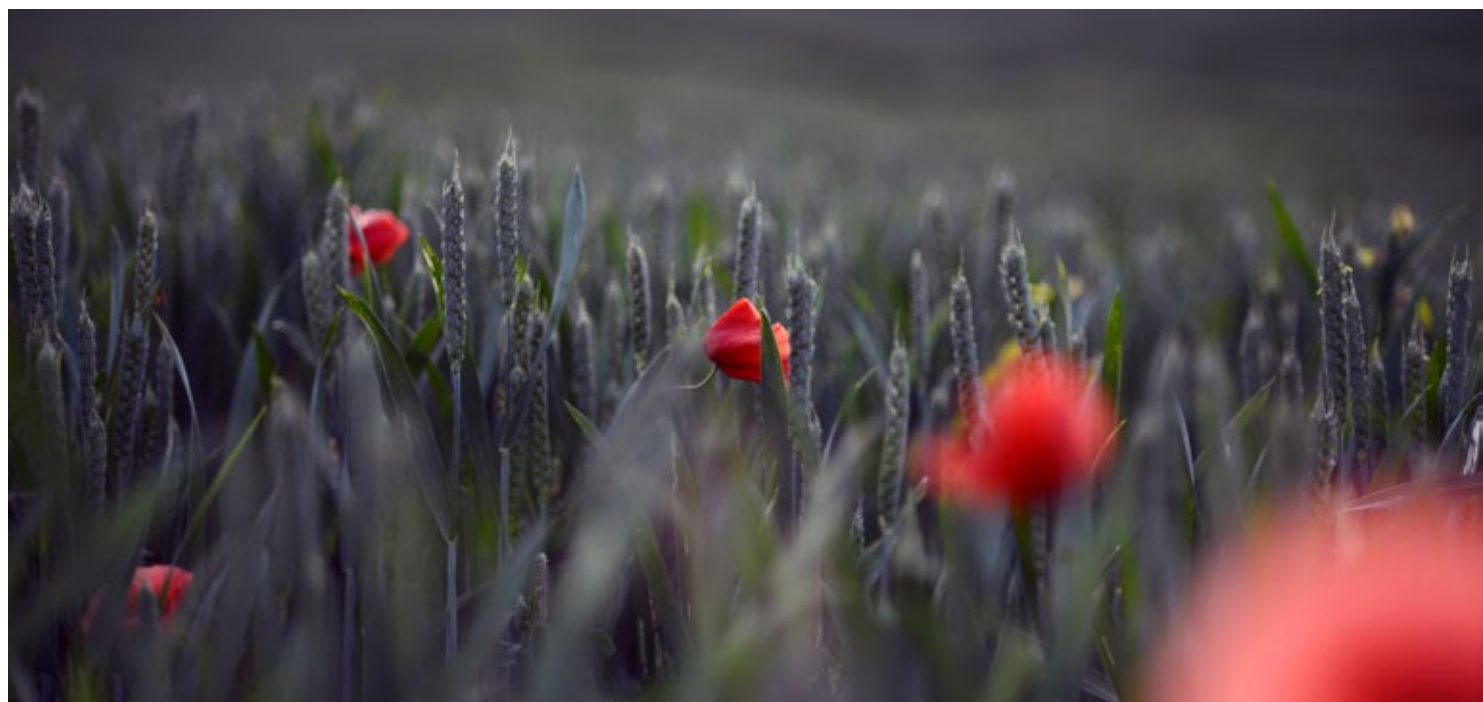
dards and poverty reduction in all countries. The need for a green growth arises because a “business as usual” path does not fully account for environmental limits and social concerns”.³

A further point of view concerns the “Sustainability of organizations”: “Sustainability in the corporate sector encompasses strategies and practices that aim to meet the needs of stakeholders today while seeking to protect, support and enhance the human and natural resources that will be needed in the future.”⁴

FOUR DIMENSIONS OF SUSTAINABILITY ADOPTED BY PACMAN PROJECT

The conceptual framework to analyse sustainability in the agro-food sector adopted by the PACMAN project considers four dimensions of sustainability:

- Environment
- Economy
- Education
- Ethics.



The «social dimension» is split in two thematic sub-areas: ethics and education.⁵

There are also other ways to represent sustainability⁷.

Different dimensions of sustainability can be complementary or in conflict. Table 1.1 developed by OECD shows an example concerning green growth in agriculture⁸:

TYPES OF COMPANIES

Firms may identify one or more of the sustainability dimensions as critical for their success. The commitment level can be characterized by three leadership categories: reactor, contributor and innovator⁹.

- **Reactor.** Firms comply with laws and regulations associated with all sustainability dimensions but rarely will such firms proactively make sustainability investments beyond the compliance minimum.
- **Contributor.** Leadership approach recognize the strategic importance of firm and supply chain sustainability and as such apply more proactive initiatives. Such firms focus heavily on their own supply chain.
- **Innovator.** Leadership approach establish sustainability as a strategic priority. Such firms seek not just to have a visible sustainability platform, but they apply sustainability to change and positively benefit their stakeholders, industries and communities.

1.2 Themes concerning sustainability in the agro-food system

After having shared the previous methodological framework, in order to analyse the four dimensions of sustainability adopted by PACMAN in the agro-food system¹⁰, the project partners agreed to identify the elements listed in the following list.

ELEMENTS OF SUSTAINABILITY IDENTIFIED IN PARTNERS AGRO-FOOD SYSTEM

1. Literature review on sustainability in the agro-food chain in each country/region of the PACMAN project.
2. Description of the type of companies.
3. Criticalities concerning sustainability in the agro-food sector.
4. Identification and selection of Qualitative and Quantitative Indicators of the level of sustainability in its four dimensions.
5. Context about LCA (Life Cycle Assessment).
6. Identification of organizations performing LCA by the PACMAN partnerships.
7. Laws and regulations concerning sustainability in the agro-food system.
8. Identification of certifications directly or indirectly related to sustainability in the agro-food in each region.
9. Drawing up of a list of contacts of organizations performing certifications in each region.

10. Education and training.
11. Identification of training courses that can support sustainability in the agro-food sector specifying skills and objectives of the course.
12. Policies supporting sustainability in the Mediterranean Area.
13. Identification of incentives and other policies that support sustainability in the agro-food in each region.
14. Drawing up of a List of laboratories that work on areas related to agro-food sustainability for each country.
15. Identification of sustainable and innovative agro-food companies in your region.

Every partner identified elements of sustainability in the agro-food system focusing on the agro-food segments selected for the PACMAN project (see also Map of the selected segments)

http://www.pacmanproject.eu/page/project-documents/doc-2012/01/MA%202_SEGMENTS_FINAL.pdf

Once all the information were collected and analysed, the following main themes were identified concerning sustainability in the agro-food sector. See Table 1.1.

Table 1.1 - Main themes identified concerning sustainability

<i>Supply chain</i>	Integrated supply chain solutions, logistics and management systems
<i>Innovation</i>	Innovative technology; innovation in products, processes and services
<i>Resource management</i>	Lifecycle thinking, environmental footprint, waste management, sustainable packaging, human resources
<i>Trade and export</i>	International trade, distribution and logistics, trade agreements and standards
<i>Quality and consumers</i>	Food safety and quality, healthy lifestyles, consumer information and consumer choice

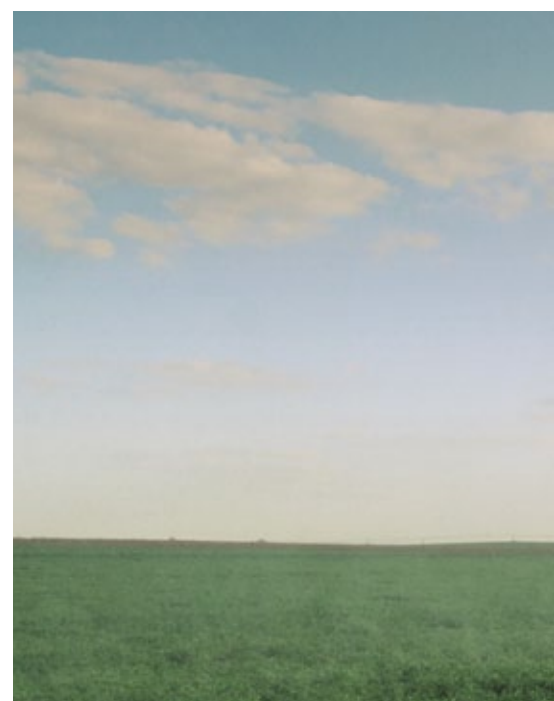


Figure 1.2 - Four dimensions of sustainability adopted by PACMAN: examples of aspects concerned⁶

<i>Environmental</i>	<i>Economic</i>	<i>Education</i>	<i>Ethics</i>
Conservation Energy Water Nature	Internal management Strategic sourcing Continuous improvement Transportation optimization	Employee relations Workplace safety Work life balance Healthy lifestyle	Employee relations Code of conduct Volunteerism
Usage reduction Waste/Recycling Greenhouse gases End of life management	External management Waste/Recycling Greenhouse gases End of life management	Business practices Supplier training Business continuity Sustainable workforce	Community involvement Avoiding child/forced labour Disaster relief Reducing hunger, poverty and disease
Business practices Packaging Facility construction Sustainable sourcing		Talent development Diversity and inclusion Training	Business practices Product safety Responsible marketing Product traceability

Figure 1.3 - Agriculture and green growth

Agriculture and green growth: illustrative examples of complementarities (+) and differences (-)

	Economic contribution of agriculture to green growth	Environmental contribution of agriculture to green growth	Social contribution of agriculture to green growth
Economic contribution of green growth to agriculture	Agriculture as a driver of economic development while Green Growth can improve agricultural performance (+).	Green labels and payments for eco-services can contribute to economic returns in agriculture (+).	Higher skilled jobs and activities can diversify and contribute to rural development (+).
Environmental contribution of green growth to agriculture	Environmental measures may slow agricultural growth in the short-term and may result in... (-)	Green Growth will yield environmental co-benefits in agriculture through resource conservation and sustainable use (+)	Reform of support to relieve environmental stress and payments for ecosystem services can enhance farm incomes in rural areas (+).
Social contribution of green growth to agriculture	Green Growth may detract from efforts to improve food security in the short-term (-).	Green Growth will necessitate structural adjustment measures in transition periods (-).	Food security, poverty reduction and rural development will be enhanced in the long-run through Green Growth (+).

Source: OECD, 2011³



02

Supply Chain

*integrated supply chain solutions,
logistics and management systems*



2.1 Supply chain: definition shared in the PACMAN project

The agro-food system (Figure 2.1) includes companies and the enabling environment. The latter is an integral part of the agro-food system and plays a relevant role in supporting the competitiveness of the production chain by providing policies, services, incentives, utilities and representation.

Figure 2.2 represents the groupings of agro-food production (animal and vegetable), the chain functions and the supporting services providers. Segments have been defined by the Nace Codes Rev.2. This source is currently adopted by the European Commission.

2.2 Value chain approach and sustainability

To better define the concept of sustainability in the framework of the supply chain we have to consider the products in their whole life cycle and we need to specify the dimensions of sustainability from the companies' point of view.

Sustainability can be related to the agro-food chain at different levels, as shown by the Figure 2.3.

Making agro-food business more sustainable in terms of economic, environmental, ethical and educational performance, means impro-

ving the sustainability of the entire agro-food value chain and also its efficiency and profitability over the long run.

2.3 Criticalities concerning sustainability in supply chain

PACMAN partnerships identified the following criticalities concerning sustainability in the agro-food chain.

MAIN CRITICALITIES IDENTIFIED

Fragmentation and lack of coordination inside the same segment (horizontal fragmentation)

- **Valencia, olive oil.** Lack of comprehensive information about olive oils from Valencia (benefits, assets, availability, supply calendar, costs, etc.) among the different links of its food chain.
- **Alentejo, wine.** Lack of cooperation between producers (commercial area).
- **Murcia, processing and preserving of fruits and vegetables; manufacture of fruit and vegetable juice, food industry machinery.** Low level of collaboration at horizontal level.
- **Modena, dairy industries/Parmigiano Reggiano.** Control of surplus production.

Unbalanced relationships along the supply chain (vertical fragmentation)

- **Modena, dairy industries/Parmigiano Reggiano.** High fragmentation of the Parmigiano Reggiano chain.

- **Modena, dairy industries/Parmigiano Reggiano.** Chain traders have higher power than producers.
- **Valencia, table grapes.** Distribution chain is one of the main bottlenecks to overcome.
- **Murcia, processing and preserving of fruits and vegetables; manufacture of fruit and vegetable juice, food industry machinery.** The low collaboration at vertical level (strategic alliances and agreements of cooperation) between the companies of the different food-processing chains impedes to put in practice useful synergies, to share resources or to develop activities in a more sustainable way.

Lack of integration within the agro-food system

- **Emilia-Romagna, packaging.** Lack of coordination and integration among the regional players.
- **Emilia-Romagna, packaging.** Logistics organization of the regional chain.
- **Province of Modena, dairy industries/Parmigiano Reggiano.** More direct trade between producers and consumers.
- **CRITT, pasta and biscuits, oil and fats, fruit and vegetables.** The lack of relationship between food companies and stakeholders (ISO 26000 classification: Enterprises, Consumer, Representatives, Governments, NGO, other).
- **Kilkis, growing of cereals.** The sector of cereals in Greece presents a lot of development potentials, through the implementation (by

Figure 2.1 - Agro-food system

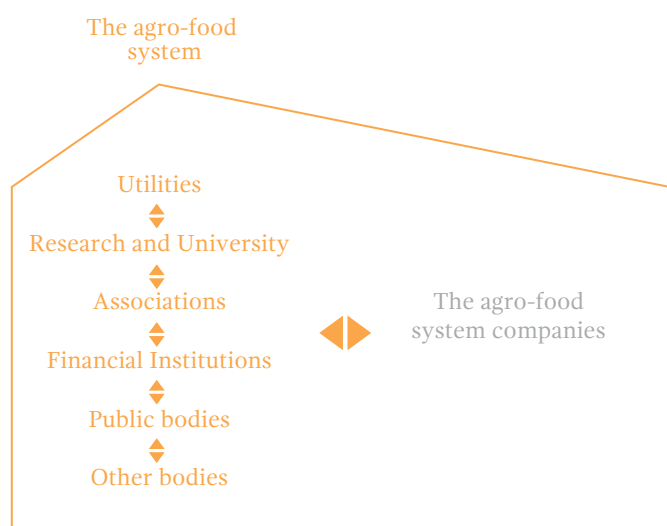
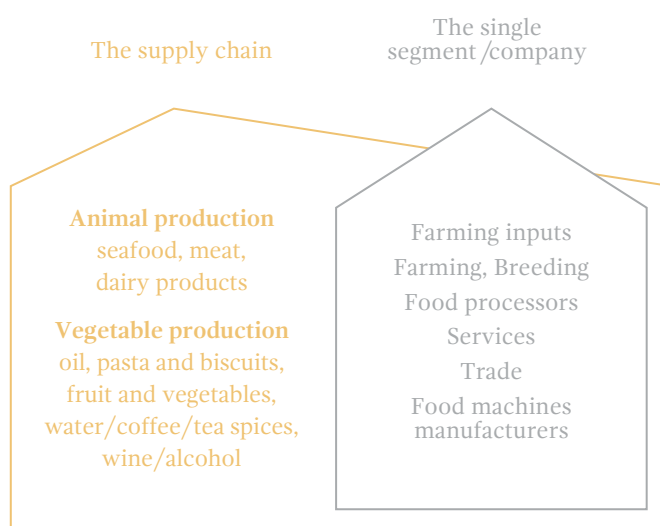


Figure 2.2 - Agro-food supply chain



central government) of the following policies: enhance the role of agricultural associations on production management and strengthen cooperative actions, promote team building among organic farmers and capacity building for their scientific support, promote 'contracting agriculture' between primary sector and manufacturing sector in order to produce specialized products (e.g. organic grains, pasta, etc.), creation of an inter-professional organization for each crop.

The aforementioned criticalities, identified in the segments chosen by PACMAN partners, are matched with the partners/territories in the Table 2.1.

2.4 Policy and regulatory framework

Table 2.2 contains the references identified by the PACMAN partners concerning sustainability in the supply chains.

LITERATURE REVIEW

Literature review on sustainable supply chains has been integrated in the following chapters of the document.

2.5 Case Studies of sustainable innovative agro-food companies

CPR (Italy)

- CPR System is a cooperative between the principal players in the agro-food chain, offering a system of reusable, recyclable

boxes, with collapsible sides, for the fruit and vegetables sector.

- These boxes are made of colored polypropylene with additives to resist ultraviolet rays and are totally recyclable. They can be used throughout the production chain, from the producer to a warehouse, from a general market to a retail store, and allow, with their collapsible sides, space, and cost savings when transported empty; in fact, 4 closed boxes occupy the space of one open box.
- By joining CPR System, producers and distributors have the opportunity to make use of these boxes, entrusting the logistics management to CPR, which guarantees the functioning of the entire system through the supply of services, by means of an I.T. system ensuring total control and cost transparency.

CANDIASOIL, FINE FOOD PRODUCTS

- CandiaSoil offers high quality olive oil produced on the island of Crete.
- The company produces authentic local products and sells its products to the European market. Its business is mainly offered electronically and its main headquarters are based in England.
- Its collaborating farmers, follow environmentally friendly processes and methods. The company shows special preference to "producer groups" and olive oil mills that have received the ELOT ISO 22000:2005 standard certification.

AINPO

- The organization is made by more than 300 farmers and the PO is member of two cooperatives working in the tomato processing sector.
- Anipo is the most interesting and open to innovation example of tomato processing chain in Northern Italy. In its history they have worked in the field of environmental sustainability at the farm level. They have been also partner of processing firms (mostly cooperative) in innovative process with reference to the reduction of water use in farming.
- Aspects of social and ethical sustainability are also important since clear and transparent contracting is one of the key issue for the PO and since the organization applies tools of mutualisation among members in case of financial problems.

KOUKAKIS FARM

- Since 1977, KOUKAKIS FARM operates as a standard unit of cows, and its rapid development led to vertical integration of production in 1999, adding modern pasteurization unit.
- In late 2003, a complete sheep unit with high standards of operation was created.
- Today, KOUKAKIS FARM produces a wide variety of dairy products (milk, chocolate milk, yoghurts, cheese, etc.) under the strictest European Union quality standards and in accordance with international certifications standards.

Figure 2.3 - Concept of sustainability related to agro-food system

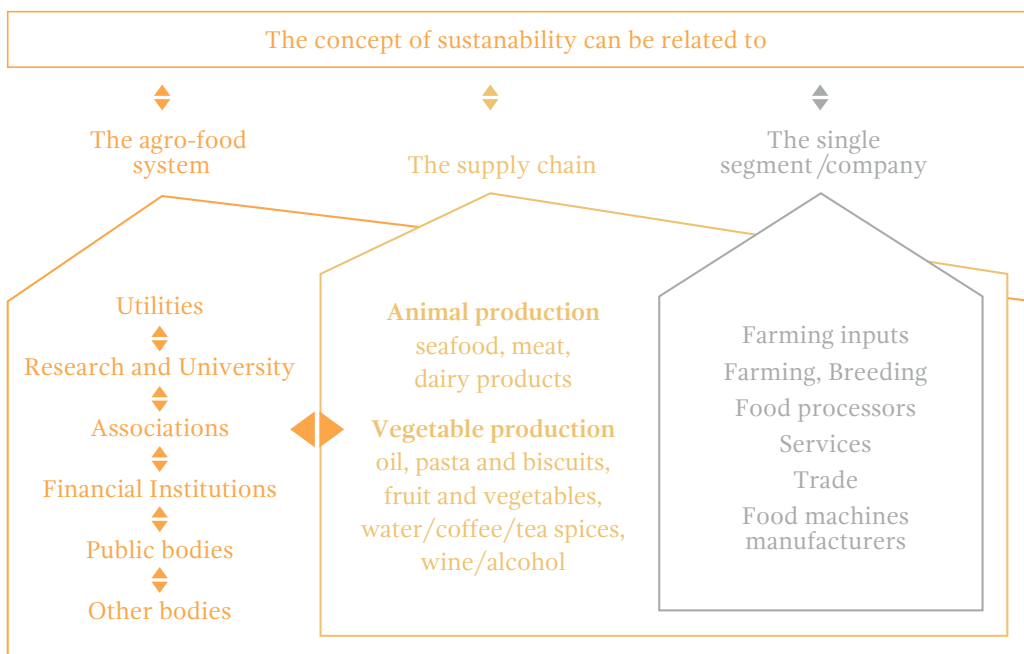


Table 2.2 - Policies identified by the PACMA partnership

Reference*	Institution/ Territorial level	Description
<p>“Code of Conduct for the regional agro-food supply chains and the corporate logo“</p> <p>Regional Council Decision Nr. 443 of April 4th, 2011</p>	<p>The Emilia-Romagna Regional Council</p> <p>Regional</p>	<p>The Regional Council Decision no. 443 of April 4th, 2011 identifies a “code of conduct” for the regional agro-food supply chains and in particular for the retailers, seeking to promote an agricultural system committed to a balanced and sustainable territorial development. A “voluntary code of good practices” would also help retailers to select suppliers. Adherence to the Code of Conduct is voluntary and it may concern either single segments or supply chains. Finally, it must be defined through an agreement or contract between farmers and traders. The code lists four principles which agro-food players should comply with:</p> <ol style="list-style-type: none"> 1. Product quality 2. Environmental protection 3. Protection of health and the rights of workers 4. Written contracts.
<p>“Criteria to recognize the regional agro-food producer groups and the Interprofessional Organizations (IO), in application of the Regional Law 24/2000”</p> <p>Regional Council Decision Nr. 339 of March 14th, 2011</p>	<p>The Emilia-Romagna Regional Council</p> <p>Regional</p>	<p>The Region has defined criteria to recognize the Interprofessional Organizations on a regional level for all the agro-food segments in application of the Regional Law 24/2000.</p> <p>The IO can develop common rules on production, models of interprofessional agreements to be used among members, organize databases for programming production, make collective actions to promote their products, develop common services aimed at improving product quality and social and environmental sustainability.</p>
<p>2007 - 2013 Emilia-Romagna Rural Development Plan</p> <p>- Measure 121</p> <p>- Measure 123</p>	<p>Emilia-Romagna Region</p> <p>Regional</p>	<p>Support the capacity of aggregation of companies active in the dairy sector towards supply chains, so as to make them stronger and more competitive in the market, in view of the European important deadline, e.g. the abolition of milk quotas in 2015 and the consequent liberalization of the market.</p>
<p>Resolution 72/2011 from 10th June. Information system for food security</p>	<p>Ministry of Health from Comunitat Valenciana</p> <p>Regional</p>	<p>The objective of the resolution is to provide a suitable tool so called Food Safety Information System (SISA in Spanish) for improvement the social sustainability of the Valencian food chains. That system has been created to identify the main food chain risks, to prevent those risks and to react in a more coordinated way in case of possible alimentary emergency. It is applicable to all steps of the Valencian food chain (from the production steps to final consumption of the food).</p>
<p>Supply chains policies</p>	<p>Greece central government</p> <p>National</p>	<p>The sector of cereals in Greece presents a lot of development potentials, through the implementation (by central government) of the following policies: enhance the role of agricultural associations on production management and strengthen cooperative actions, promote team building among organic farmers and capacity building for their scientific support, promote ‘contracting agriculture’ between primary sector and processors in order to produce specialized products (e.g. organic grains, pasta, etc.), creation of an inter-professional organization for each crop.</p>

* References about Supply Chain sustainability have been gathered by PACMA partners

Table 2.1 - Identification of main criticalities in the segments selected by partners

Selected segments	Territories						
	Emilia-Romagna	Modena	Valencia	Murcia	Alentejo	PACA region	Kilkis
Packaging	▲						
Food machinery							
Dairy Industry		●■▲					
Olive Oil / Oil and Fats			●			▲	
Table grapes			■				
Pasta & biscuits						▲	
Fruits and vegetables (manufacturing, processing and preserving)				●■		▲	
Wine					●		
Growing of Cereals							▲

● Fragmentation and lack of coordination inside the same segment (horizontal fragmentation).

■ Unbalanced relationships along the supply chain (vertical fragmentation).

▲ Lack of integration within the agro-food system.

- These are the main goals of the KOUKAKIS FARM: insistence on high quality products, in order to enrich daily the Greek dinner table with fully healthy products, the adherence to tradition, the sensitivity for the next generation, the attention to the Greek environment.
- In order to fulfil these goals, KOUKAKIS FARM milk is: completely fresh, directly from nature, 100% Greek, by Greek native animals, produced without using methods that reduces its authenticity or features which would make it of lower quality.

2.6 Opportunities

Opportunities for business cooperation and integration according to the PACMAN survey on about 600 agro-food companies in the MED area carried out in 2012.

2.7 Final remarks

Horizontal cooperation (e.g., in farmers cooperatives or consortiums) may be better able to cope with the limited power showed by primary producers, so as to receive an improved share of the value added.

Why follow this recommendation

Producer organizations and associations represent a valid strategy for increasing agricultural productivity, optimizing quality and managing surplus produce, due to the unbalanced relationships among producers, processors and traders which have been witnessed in Italy, Spain, and Greece.

Farmers associations are joining the downstream players through the development of Interprofessional Organizations (IO) in the processing tomato chain in Northern Italy, also focussing on the environmental sustainability at the farm level.

The internal organization of firms, their strategic behaviour and the organization of the supply chain have been affected by the Emilia-Romagna Regional Law 24/2000, which has defined criteria to recognize the Interprofessional Organizations on a regional level for all the agro-food segments.

Aspects of social and ethical sustainability are also important, since clear and transparent contracting is one of the key issue, as reported by the Province of Parma, Italy.

Support the capacity of aggregation of companies towards supply chain is also important for the dairy sector, by addressing the control of surplus production (Province of Modena).

Enhancing the role of agricultural associations on production management could help organic farmers in Greece, as stated by Kilkis.

Candiasoil in Crete shows special preference to “producer groups” and olive oil mills that have received the ISO 22000:2005 standard certification (Forth).

The competitiveness of the entire food supply chain depends on efficient coordination

in the intra-chain relations and among the food players and the enabling environment.

Why follow this recommendation

Written agreements represent a way to reorganize processes for an integrated supply chain.

All sectors and segments analysed are affected by fragmentation and lack of coordination inside the supply chain (low level of collaboration, horizontal/vertical fragmentation, etc).

The Emilia-Romagna Council Decision no. 443 of April 4th, 2011, by identifying a “code of conduct” for the regional agro-food supply chains, introduces an agreement or contract between farmers and traders, also seeking to promote an agricultural system committed to a balanced and sustainable territorial development (Ervet).

Some case studies on wine and olive oil show the importance of linking production to tourism (Adral).

In Greece promoting ‘contracting agriculture’ in the sector of cereals helps the production of specialized products (e.g. organic cereals, pasta, etc.), and creation of an inter-professional organization for each crop (Kilkis).

KOUKAKIS FARM in Greece led to vertical integration of production in 1999, adding modern pasteurization unit (Kilkis).



The rationalization of transport and logistics aims at reducing transport costs and at ensuring higher margins for the chain actors, granting products quality and reducing transport externalities.

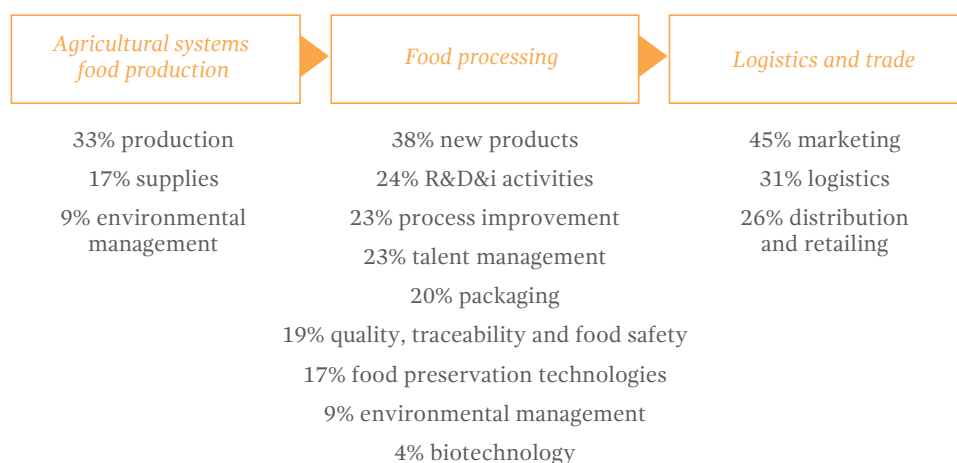
Why follow this recommendation

- The increasing variety of products on offer requires innovative logistics solutions, as reported by Ervet.
- Centroplast is a packaging company committed to reducing CO₂ emissions released into the environment by improving trans-

port logistics.

- Bestack members adopt a voluntary certification system that deals with dimension and performance of the packaging, ensuring high efficiency of logistics and recycle.
- CPR System is a cooperative between the main players in the agro-food chain, offering a system of reusable, recyclable boxes, with collapsible sides, for the fruit and vegetables sector that can be used from the production stage of the chain to the retail.

Figure 2.4 - Value chain activities for business cooperation



03

Innovation

*innovative technology, innovation in products,
processes and services*



3.1 Criticalities concerning sustainability in innovation

Innovation is strictly related to sustainability because it's an activity that allows different organizations to improve their environmental impact, their economic performance and also their social responsibility. Main criticalities identified by the PACMAN partnerships concerning this theme are listed below¹¹.

CONNECTION BETWEEN PRODUCTION AND RESEARCH

Limited interconnection between production and research means that the results cannot be properly exploited by the enterprises. Demand of the stakeholders not covered by research institutes. Poor quality of applied research results (Kilkis/general). Difficulty in translating R&D and skills to the companies (ER/Packaging).

NEW PRODUCTS/PROCESSES

Difficulties at the launch of innovative products/processes (Alentejo/Wine). Lacks of generational relief influence the adoption of new, more sustainable technologies, and

the professionalization of the sector (Murcia - processing and preserving of fruits and vegetables; manufacture of fruit and vegetable juice, food industry machinery). The resources spent for the promotion of traditional crops deprive the possibility of reinvestment in new modern dynamic kind of crops (Kilkis/growing of cereals).

INVESTMENTS IN R&D

Poor quantity of research results (Kilkis/Agro-food); Limited profitability and capability to invest in R&D because of strategies based on low prices rather than on quality (ER/ Packaging), Small investments in R&D, small investments in energy efficiency (Murcia- processing and preserving of fruits and vegetables; manufacture of fruit and vegetable juice, food industry machinery).

The aforementioned criticalities, identified in the segments chosen by PACMAN partners, are matched with the partners/territories in the Table 3.1.

All the criticalities identified concern mostly the economic dimension of sustainability.

Anyway, innovation is strongly related also with the environmental dimension.

3.2 Innovation performance

In 2012, an in-depth analysis involving almost 600 agro-food companies has been carried out by the PACMAN project in each partner region.

According to the survey, R&D&i activities concern a significant share of PACMAN partner regions' agro-food operators, as the two thirds of respondents declared that they invested money in these activities. However, according to the aforementioned criticalities, only a few companies seem to have reached a strategic dimension concerning innovation, as shown in the Figure 3.1.

Three groups of agro-food segments can be distinguished according to the average share of annual turnover invested in R&D activities:

1. "Fruits and vegetables processing and preservation", "food industry machinery and services" and "manufacture of

Figure 3.1 - Average share of annual turnover invested in R&D and innovation

Source: interviews to 597 agro-food companies of the PACMAN regions, 2012

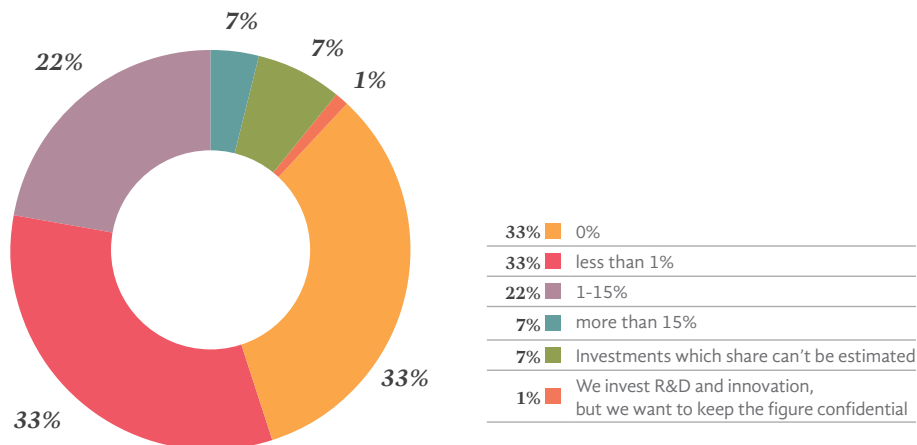


Table 3.1 - Identification of main criticalities

Selected segments	Territories			
	Emilia Romagna	Murcia	Alentejo	Kilkis
Agro-food				● ■
Packaging	● ■			
Fruits and vegetables (manufacturing, processing and preserving)		■ ▲		
Wine	▲			
Growing of cereals	▲			

● Connections between products and research
 ■ Investments in research and development
 ▲ New products/processes

wine and alcoholic drinks". More than three quarters of the companies have innovation expenditure and more than half have investments which exceed 1% of annual turnover. These segments are also those with the highest international profile, which raises the need of a better awareness of innovation in internationalization strategies. (see Chapter 5 Trade and Export).

2. **"Bread and pastry products", "horticulture", "manufacture of oils and fats"**. More than three quarters of the companies have innovation expenditure, but most of them do not spend more than 1% of their average annual turnover.
3. **"Operation of dairy cheese making", "animal raising and meat processing", "channels/demand"**. About half of operations or more do not invest in R&D activities and less than a quarter spend more than 1% of their average annual turnover.

As far as the thematic areas are concerned, the list below provides potential key issues to focus on, as part of future collaborations among project partners:

- quality, traceability and food safety (36% of respondents),
- development of new products (28%),
- process improvement (26%),
- packaging (23%).

According to global results, collaboration on R&D activities is a widespread formula between innovative companies: 70% of them (47% of the total respondents) declared having collaborated with other entities to carry out their R&D activities (Figure 3.2).

Science and technology entities emerge as the main partners for companies (46% of innovators, 30% of respondents), a result which can be viewed as an argument for cluster development. Suppliers and clients come next (respectively 26% and 22% of innovators).

A minority of respondents also indicated other types of collaborators such as external consultants or sectorial organizations, that raises the need of a better awareness of the roles of the public sector, organizations and associations of representatives in supporting food companies (see Chapter 5 - Trade and Export).

3.3 Laboratories in the MED Area to support sustainability in the PACMAN segments

25 laboratories have been identified by the project partnership starting from the segments of the food chain on which every partner focused on¹². Table 3.2 summarizes all the organizations identified, specifying the activities carried out related to the sustainability theme.

3.4 Training institutes

PACMAN partnership has identified several training courses related to sustainability that have been organized in the following thematic areas and segments concerned:

- Context concerning sustainability
- Agro-food
- Agriculture
- Packaging
- Quality/Certifications.

Figure 3.2 - Collaboration with other entities

Source: interviews to 597 agro-food companies of the PACMAN regions, 2012

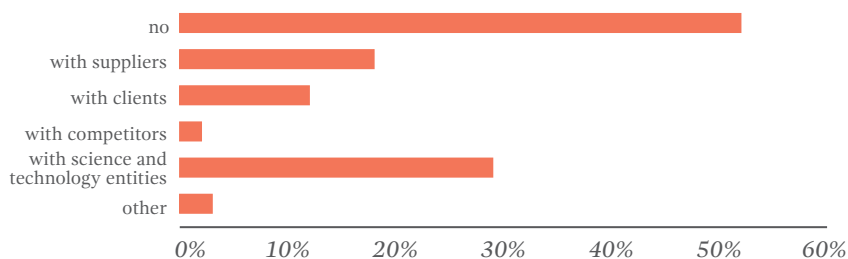


Table 3.2. - Laboratories identified by the PACMA partnerships

Where	Name of the Lab	Segment	Main fields concerning Sustainability
Emilia-Romagna	Biogest-Siteia	Dosing, wrapping, packaging	Green packaging ¹³ . Innovative packaging materials, food sensory evaluation for materials in contact with food, quality and hygiene standards for packaging, recovery and use of bioactive constituents from waste and vegetal by-products of agri-food industry; shelf-life and packaging studies, usage of modified and protective atmospheres. Food packaging environmental impacts, advanced plants for food and drug packaging.
	Cipack		
	Ciri Agri-Food		
	Siteia.Parma		
	Democenter Sipe		Innovation. (encourages interaction between businesses and the University, thus supporting the creation of relationships that will lead to research projects and contracts)
	CSQA	Certification	Certification. (certification fields are: quality, environment and safety, social responsibility and social communication)
	ENEA	General agro-food Vegetable productions	Multidisciplinary research on the main environmental and energetic-environmental themes (development and implementation of environmental management systems (EMS) and environmental product labels)
Other regions	University of Padova	Department of Environmental Agronomy and Crop Production	LCA for crop production
Cyprus	Agricultural Research Institute	Agriculture and livestock	Sustainable agricultural production systems and production of biofuels (Biomass and biofuels production; production of energy from olive oil cakes; sustainable waste systems in agriculture)
	Cyprus University of Technology	Dep. of agricultural sciences, biotechnology and food science	Sustainable development/Improved compositeness of Cyprus' agri-food sector Sustainable rural development with respect to natural and biological resources, socio-economic development of the rural population and preservation of the environmental and cultural characteristics of Cyprus' countryside
	Frederick Research Centre	Research projects	Environment, Education, Management and Economics and Social Sciences Consulting services to individuals, business, organisations and the government Coordination and participation in research projects. Collaborations with other national and international research Centers and universities for promoting research
Adral/Alentejo	CEBAL - Biotechnology Center	Agriculture and Agro-food	Biotechnology and agriculture. (Biomass Recovery; Waste Recovery Process Extraction of olive Oil; membrane technology; Genome sequencing; Removal of cytotoxic compounds from wastewater hospital; ecc.)
	CEPAAL	Olive Oil	New forms of inter-enterprise and network operation particularly in the areas of internationalization, marketing and distribution integrated Launch of innovative pilot actions, integrated support policy and support the expansion and reconversion of the area of olive production
	ATEVA - Technical Association of Winemakers of Alentejo	Wine	Research, information and promotion improve regional viticulture and training of its members Information on the guiding principles of the wine policy at national and international level Technical assistance to growers
	ICAAM - Institute of Agricultural and Environmental Mediterranean Sciences	Agriculture Wine Olives	<ul style="list-style-type: none"> • Sustainability of agriculture • Climate change and impacts on agriculture More specifically: <ul style="list-style-type: none"> • conservation of agriculture and direct seeding • microorganisms (bacteria) and potential fertilizer • innovative system for water savings in irrigation • Irrigation management in vineyards and olive-based systems integration • MCCA-Machine Continuous Olive Harvest • Pruning of olive groves and orchards mechanical • Development of consortium • alternative forms of application to confer aroma for wine; • technology vitro propagation of olive • detection and quantification of pesticide residues in olive oil. • Technological Procedure for sausages pork Alentejano • development of starter cultures for the production of sausages

Table 3.2 - Laboratories identified by PACMAN participant

<i>Where</i>	<i>Name of the Lab</i>	<i>Segment</i>	<i>Main fields concerning Sustainability</i>
Valencia	Ainia	Agro-food Packaging	<ul style="list-style-type: none"> Energetic valorisation of agro-industrial waste by biogas production, wastewater treatment, LCA applied to food processing, carbon footprint, food chain analysis, food clean production, environmental friendly packaging <p>More specifically:</p> <ul style="list-style-type: none"> Application of rapid and Non Destructive Techniques New production processes Application of advanced Information and Communication Technology solutions to the food chain in internal and external processes Bioassays laboratory Sensory and consumer research Development of new products
	IVIA	Agriculture	<p>Sustainable agriculture (Contamination of soil, Soil fertility, Agro watering)</p> <p>Moreover: citrus culturing and vegetal production, vegetal protection and biotechnology, genomics, post-harvesting</p>
	Plataforma per la Sobirania Alimentària	Social development, Fair food production, Sustainable agriculture, etc	Fair food production, Sustainable agriculture,
PACA region - CRIT	INRA	Agriculture	<p>High-quality/healthy foods</p> <p>Sustainable agriculture</p> <p>Preserved and valorised environment</p> <p>14 scientific divisions (high level of specialization):</p> <ul style="list-style-type: none"> Nutrition, Chemical Food Safety and Consumer Behaviour Plant Biology (in French) Science and Process Engineering of Agricultural Products Forest, Grassland and Freshwater Ecology (in French) Environment and Agronomy (in French) Animal Genetics Plant Breeding and Genetics (in French) Applied Mathematics and Informatics Microbiology and the Food Chain Animal Physiology and Livestock Systems Animal Health Plant Health and Environment (in French) Science for Action and Development Social Sciences, Agriculture and Food, Rural Development and Environment
Creta	MAICH - Mediterranean Agronomic Research of Chania	Agro-food	<p>Sustainable Agriculture</p> <p>Environmental Management</p> <p>Horticultural Genetics and Biotechnology</p> <p>Food Quality and Chemistry of Natural Products</p>
Kilkis	INA - Institute of agrobiotechnology	Agrobiotechnology	Production of improved seeds, solution of important cultivation, gene identification and exploitation food processing and agro-industrial problem, biotechnology applications in the food-beverage production and standardization, in agro-industrial by-product exploitation and new product development.
	AMERICAN FARM SCHOOL	Dairy, Poultry and Horticulture departments	Agricultural production, animal husbandry, agribusiness and natural resource management
Murcia	AENO Rlaboratorio.	Food products	<p>Certification/analysis</p> <p>Microbiological testing and physical chemicals in food and drinking water.</p>
	CTC - National Technology Centre Food and Canning	Food products	Testing in food products (e.g.: instrumental analysis, physic- chemical and physical analyses and quality control, Microbiology, GMOs analysis)
	IMIDA - Research and Agricultural Development and Food Institute of Murcia	Horticulture, crop, citrus and other food products	<p>Biotechnology and crop protection</p> <p>Horticulture</p> <p>Natural Resources</p> <p>Citrus</p>

CONTEXT CONCERNING SUSTAINABILITY

These courses identify general issues, shown in the Table 3.3, not specifically related to agro-food system and concerning mostly the environmental dimension of sustainability.

AGRO-FOOD

The courses, identified in Table 3.4, deal with several main subjects:

- management of the agro-food chain from economic and environmental point of view,
- technological innovation and training

along the value chain,

- sustainability of production processes and management of wastes (Lean Management),
- quality and safety in the food industry also related to social sustainability.

Table 3.3 - Training institutes identified by PACMAN concerning context

Partner	Name of Organization	Course	Sustainability dimension	Type
ERVET	University of Bologna - Faculty of Agriculture	Land and agro-forestry environment sciences	Environmental	University
ERVET	University of Bologna	Sustainable development and management of environmental systems	Environmental	Master
ERVET	University of Bologna, Faculty of Industrial Chemistry	Land and water conservation	Environmental	Master
ERVET	University of Bologna, Faculty of Engineering	Environmental and Territory Engineering	Environmental	University
ERVET	University of Ferrara, Faculty of Engineering	Civil and Environmental Engineering	Environmental	University

Table 3.4 - Training institutes identified by PACMAN concerning agro-food

Partner	Name of Organization	Course	Sustainability dimension	Type
ERVET	Università di Bologna Facoltà di Agricoltura	Marketing e Economia del sistema agro-industriale.	Economica	Università
ERVET	Università di Bologna Facoltà di Agricoltura	Tecnologia alimentare.	Ambientale/Economica	Università
IMPIVA	Plataforma per la Sobirania Alimentària dels Pobles del País Valencià	Corso online sulla sovranità alimentare.	Economica	Corso di formazione
ERVET e Provincia di Modena	ISCOM	Green Economy. Sostenibilità nei processi di produzione e efficacia della comunicazione. Tecnico commerciale marketing specializzato nella green economy.	Ambientale/Economica	Corso professionale
PARMA	Università Cattolica del Sacro Cuore - sede di Piacenza e Cremona	Laurea in Scienze agrarie e tecnologie alimentari. Attività di formazione per agricoltori e manager delle aziende alimentari.	Ambientale/Economica	Università
PARMA	Università di Parma	Laurea in tecnologie alimentari ed economia. Attività di formazione per agricoltori e manager nel settore alimentare e nella vendita al dettaglio.	Ambientale/Economica	Università
PARMA	AGRIFORM s.r.l. - Parma	Formazione nel settore primario e agroalimentare.	Ambientale/Economica	Corso di formazione
MURCIA	CTC - Centro Tecnológico Nacional de la Conserva y Alimentación	AleanMENTACION COURSE: Come applicare il lean management per ridurre drasticamente i costi dei processi produttivi nell'industria alimentare". L'obiettivo principale di questo strumento è di vedere i risultati simulati nelle varie fasi del Lean Management eliminando processi dispendiosi.	Ambientale/Economica	Centro tecnologico
MURCIA	CARM - Programma di formazione regionale e qualificazioni professionali agroalimentari del Ministero dell'Agricoltura e dell'Acqua della regione di Murcia	Formazione professionale di alto livello nei processi tecnologici e qualitativi dell'industria alimentare: Il programma prevede materie quali tecnologia alimentare, biotecnologia alimentare, analisi alimentare, conservazione degli alimenti, gestione della qualità ambientale nell'industria alimentare...	Sociale/ Economica/ Ambientale	Corso di formazione

AGRICULTURE

The courses identified in Table 3.5 deal with several main themes:

- conservation of natural resources,
- technological innovation in agriculture,
- sustainable farming,
- organic farming,
- general studies on agriculture and agronomy.

PACKAGING

This focus on packaging has been completed in the pilot action of the PACMAN project, aimed at improving the sustainability of agro-food packaging (for more info see the Handbook on Green Packaging).

The courses identified in Table 3.6 deal with several main themes, concerning mostly the

environmental and economic dimension of sustainability:

- packaging materials and innovative technologies,
- LCA – Life Cycle Assessment,
- eco-design and recycling,
- logistics optimization,
- safe packaging.

Table 3.5 - Training institutes identified by PACMAN concerning agriculture

Partner	Name of Organization	Course	Sustainability dimension	Type of organization
ERVET	University of Bologna - Faculty of Agriculture	Agricultural technology.	Economia/ Ambientale	Università
CUT	Cyprus University of Technology – Department of Agricultural Sciences, Biotechnology and Food Science	Sustainable Agriculture and Farming. The course deals with systems of Agriculture and Farming to ensure the conservation of natural resources. Analyses the current state of conventional methods and the implications of the system of intensive agriculture.	Ambientale	Università
CUT	Cyprus University of Technology – Department of Agricultural Sciences, Biotechnology and Food Science	Sustainable Agriculture and Farming.	Economia Ambientale	Università
ADRAL	University of Évora – Escola de Ciências e Tecnologia - Évora University - School of Science and Technology	Licenciatura Agronomia - Agronomy Degree.	Economia Ambientale	Università
ADRAL	IPP – Polytechnic Institute of Portalegre - School of Agriculture - Elvas	Mestrado – Agricultura Sustentável - Masters Degree - Sustainable Agriculture.	Economia Ambientale	Master
KILKIS	Aristotle University of Thessaloniki	Faculty of Agriculture.	Economia Ambientale	Università
MURCIA	CARM - Regional training program and professional qualifications agro-food of the Agriculture and Water Ministry of the Region of Murcia	Intermediate training cycle in Agroecological Production Technician. Fundamentals agronomic zootechnical grounds, early plant health, agricultural infrastructure and facilities, implementation of organic farming.	Economia Ambientale	Corso di Formazione



Table 3.6 - Training institutes identified by PACMAN concerning packaging

<i>Partner</i>	<i>Name of Organization</i>	<i>Course</i>	<i>Sustainability dimension</i>	<i>Segment</i>	<i>Type of organization</i>
ERVET	University of Parma	Master in Packaging.	Environmental/ Economic	Packaging	Master
ERVET	University of Bologna (Rimini)	Chemistry and technologies for the environment and materials.	Environmental/ Economic	Packaging	University
ERVET	University of Parma, Faculty of Mathematics, Physics and Natural Sciences	Industrial chemistry and packaging technology.	Environmental/ Economic	Packaging	University
ERVET	Ecipar	Mechanical Designer with specialization in agro-food production. Expert in the management of environmental issues for SMEs. Strategic Marketing and access to new markets in the agro-food sector. Efficiency in the production processes for the realization of wood industrial packaging. LCA – Analysis of the product life cycle from the environmental and ecological point of view. Optimization of internal and external logistics. Expert in recycle of “green” material.	Environmental/ Economic	Packaging	Training body
ERVET	Formart	Food Packaging.	Economic	Packaging	Training body
ERVET	Futura	Embedded systems developer.	Economic	Packaging	Training body
ERVET	Formindustria Emilia-Romagna	Development and Design of Agro-Food Products.	Environmental/ Economic	Packaging	Training body
ERVET	CISITA Parma	Safe packaging.	Social/ Economic	Packaging	Training body
ERVET	CE.SVI.P.	Green Logistics: logistics to support environmental development. Packaging: role, functions and types of packaging.	Environmental/ Economic	Packaging	Training body
ERVET	CESCOT	Packaging.	Environmental/ Economic	Packaging	Training body
ERVET	I.F.O.A.	Management Skills Food processing. Expert in sustainable logistics in the agro-food sector.	Environmental/ Economic	Packaging	Training body
ERVET	Cofimp, Aziende, Unindustria Bologna	Quick assessment of production-logistics processes.	Environmental/ Economic	Packaging	Training body
ERVET and Province of Modena	Centro Servizi P.M.I.	Environmental expert. Expert in planning of the integrated cycle of municipal waste. Process and product technician in mechanics. Lean and Green. The Environmental Declaration of Product (EPD).	Environmental/ Economic	Packaging	Training body
ERVET and Province of Modena	ISCOM	Innovations in the packaging.	Environmental/ Economic	Packaging	Professional course

OTHER SEGMENTS

Courses identified for other segments, listed in Table 3.7, refer mostly to the economic dimension of sustainability.

QUALITY/CERTIFICATIONS

Quality and certification are also the subjects of several training courses, details are in Table 3.8. For more information on this issue see also Chapter 6.

Table 3.7 - Training institutes identified by PACMAN concerning other segments

Partner	Name of Organization	Course	Sustainability dimension	Segment	Type
IVACE	ACERTA	Specialization on auditing fruit and vegetables production.	Economica	Fruit and vegetables	Training body
ADRAL	Polytechnic Institute of Beja Agrarian School	Technological specialization course - Olive Growing and Viticulture.	Economica	Oil/ Olive/ Viticulture/	Higher education Institute
ADRAL	Polytechnic Institute of Beja Agrarian School	Food Engineering Degree.	Economica	Food processing	University
ADRAL	Polytechnic Institute of Beja Agrarian School	Technology Specialization Course - Enological Production.	Economica	Wine	Higher education Institute

Table 3.8 - Training institutes identified by PACMAN concerning quality/certifications

Partner	Name of Organization	Course	Sustainability dimension	Segment	Type
ERVET	CFP Cesta	Emas and Ecolabel.	Environmental	Quality/ Certification	Training body
FORTH	TUV HELLAS SA	Training seminars in all areas of Quality Assurance and Certification.	Environmental/ Economic	Quality/ Certification	Certification body
MURCIA	Centro Tecnológico Nacional de la Conserva y Alimentación (CTC).	Course of MICROBIOLOGY AND HYGIENE IN FOOD INDUSTRY. The course objective is to acquire theoretical and practical knowledge to identify microbiological hazards in food and apply different analytical techniques for quality assurance.	Social/ Economic	Quality/ Certification	Technology Centre
CRITT	Afnor certification	Not specified.		Training body	CRITT



3.5 Laws and regulations / Policies supporting innovation in the MED Area

Regulations of Table 3.9 have been identified by the PACMAN partnership and refer to innovation. Sustainability is not always explicitly mentioned.

Table 3.9 - Regolamentazioni in materia di sostenibilità e innovazione

Partner	Riferimenti/Istituzioni/Livelli territoriale	Descrizione		
VALENCIA	Resolution 72/2011 from 10th June. Information system for food security Institution: Ministry of Health from Comunitat Valenciana Territorial level: Regional	The objective of the resolution is to provide a suitable tool so called Food Safety Information System (SISA in Spanish) for improvement the social sustainability of the Valencian food chains. Among other missions the SISA programs aims to communicate the information among scientific and market sector		
CRITT	Education to the Environment and to the Sustainable development Institution: Region Provence-Alpes-Côte d'Azur Territorial level: Regional	In this domain, the Region Provence-Alpes-Côte d'Azur settled three objectives: <ul style="list-style-type: none"> • promote the appropriation of the issues in a sustainable development in region Provence-Alpes-Côte d'Azur, by the education, the raising awareness and the information of all the public, the inhabitants and the users of the regional territory, • stimulate changes of behaviour at all the ages and in all the aspects of the personal and professional life, • promote the emergence of individual and collective practices adapted to the territorial specificities. 		
CRITT	Support to companies (Contract of Project State-Region-Ademe) Institution: Region Provence-Alps Côte d'Azur and the ADEME Territorial level: Regional	Two calls for projects to help companies to set up an approach of control of the energy: <ul style="list-style-type: none"> • a call for projects energy efficiency in two parts: implement an energy management system and invest in effective equipment and techniques; • a call for projects on Innovative Services intended to support experiment of new control services of the energy for SMEs. 		
ERVET	Agrofood services plan development 2008-2013 (regional law Nr. 28/98) Institution: Emilia-Romagna Region Territorial level: Regional	<i>Measure</i>	<i>No. of projects</i>	<i>Incentives (EUR)</i>
		Pre-competitive research	18	600,000
		Management of future research needs, general interest research, dissemination of results	16	1,820,000
		Development of ongoing projects	n/a	2,445,000
ERVET	2007 - 2013 Emilia-Romagna Rural Development Plan Institution: Emilia-Romagna Region Territorial level: Regional	<i>Measure</i>	<i>No. of projects</i>	<i>Incentives (EUR)</i>
		Measure 124 - Cooperation for development of new products and processes and technologies	42	4,793,754
FORTH	Establishment of the Regional Innovation Council of Crete Institution: Region of Crete Territorial level: Regional	In 2011, the Region of Crete established the Regional Innovation Council of Crete (RIC). RIC operates as a think tank and advisory body to the Regional Council in innovation and development issues. RIC establishes ad hoc working groups to provide support and new ideas in different aspects of the local economy. The Working Group of Agro-food Sector operates since March 2011 and includes over 100 people from Academia, Business and Administration. The group is the main advisory body of the Vice Governor, responsible for the Primary Sector area.		
ADRAL	Programa PRODER - Programa de Desenvolvimento Rural Institution: Ministry of Agriculture, Sea, Environment and Territorial Planning Territorial level: National	The shaft 4 - Knowledge and Skills - integrates three measures. The measure "cooperation for innovation" promotes the adoption of new products, processes and technologies, the evolutionary adaptation of processes and technologies and testing the applicability. The beneficiaries are public or private institutions, since they establish between themselves a partnership agreement. Supports, repayable comprise between 25% to 75% of the eligible investment.		
MURCIA	Programs for technology transfer and agro-food sector rural Institution: Ministry of Agriculture and Water Territorial level: Regional	Order of June 11, 2010, the Ministry of Agriculture and Water, in which the call is made public for years 2010, promotes collaborative programs for technology transfer and agro-food sector rural.		

3.6 Literature review

In the literature review, 4 references have been identified concerning innovation and sustainability in the agro-food system in the MED area. Main issues are:

- Green economy (including also agro-food) and technological scenarios

- Innovation capacities for sustainable development (in Cyprus)
- Applications of environmental impact assessment
- Adoption of knowledge and research results from the agro-food Industry (RAF-REGIONS project)

Literature review

Title	Author/Date/Link	Description
Green Economy - Technological scenarios for Emilia-Romagna region	ASTER (High Technology Network in Emilia-Romagna), 2012 http://www.aster.it/tiki-index.php?page=Scenari#tab1	The document is not focused only on the agro-food industry but identifies the main pillars for the development of Green Economy in the region. "White biotechnology" is one of these pillars and it's related to agro-food. Indeed, it concerns the production of antifouling paints, varnishes and surface treatments for the preservation and packaging of food products. Though these processes the vegetal and animal productions and wastes can be turned in renewable material through biorefinery. This subject implies a supply chain approach and the valorisation of the wastes. Some quoted companies: Caviro (Faenza), Unigra (Conselice).
Mediterranean organization structure and strengthening of innovation capacities for sustainable development (MEDOSSIC)	Georgia Piligotsi, Loukis Tapakis, 2009 www.medossic.eu	<p>This report provides insights to the European and national environmental structures and the policies adopted in Cyprus towards the promotion of eco-innovation technologies and the adoption of environment friendly practices in the business sector.</p> <p>Although the report examines a broad range of industries, agrofood has been included in the research and a representative best practice from an organic winery SME is presented below.</p> <p>Some promising figures with regards to the growth of eco-innovation in the island, derived from an innovation survey of the Statistical Service of Cyprus and are relevant to the fact that: (a) 38% of the reviewed enterprises (that is 468 enterprises) introduced within the period 2004-2007 an innovation with a significant effect in reducing environmental impact or improving health and safety, (b) 20% of the reviewed enterprises (that is 246 enterprises) introduced an innovation with a significant effect in reducing materials and energy per unit output.</p> <p>However, policy support measures for (eco)innovation in Cyprus rely almost exclusively on European funds, since the majority of the relevant eco-innovation projects have been co-financed through the European programs (FP5, FP6, FP7, Energy Intelligent, MED, INTERREG, etc.). Despite the presence of business incubators, their latent activation affects further development of innovation in existent SMEs, while the environmental dimension is not visibly integrated in the Business Plan of the Technology Park.</p> <p>The main weaknesses of the Cyprus' eco-innovation system involve the following:</p> <ul style="list-style-type: none"> • The lack of communication channels between the demand side (enterprises) and the supply side (universities) for the eco-innovation system • The absence of an organised system for the support of eco-innovation and environmental technologies transfer • The relatively limited range
A review of studies applying environmental impact assessment methods on fruit production systems.	Alexandros Gasparatos, Mohamed El-Haram, Malcolm Horner, 2011 Giornale della gestione ambientale, Volume 92, Argomento 10, Pagine 2277-2286.	This paper reviews studies assessing the sustainability or environmental impacts of fruit production under different conditions and identifies aspects of fruit production that are of environmental importance. Four environmental assessment methods which may be applied to assess fruit production systems are evaluated, namely Life Cycle Assessment, Ecological Footprint Analysis, Emergy Analysis and Energy Balance. In the 22 peer-reviewed journal articles and two conference articles applying one of these methods in the fruit sector that were included in this review, a total of 26 applications of environmental impact assessment methods are described. These applications differ concerning e.g. overall objective, set of environmental issues considered, definition of system boundaries and calculation algorithms. Due to the relatively high variability in study cases and approaches, it was not possible to identify any one method as being better than the others. However, remarks on methodologies and suggestions for standardisation are given and the environmental burdens of fruit systems are highlighted.
RAF-REGIONS/ Analysis, Development and Implementation of Research Agendas of Regional Clusters, SWOT analysis of Regional AgroFood R&D capacity	Annamaria Fiore, Nikos Giannoulidis, Gergana Kaloyanova, Lubov Trenkova, 2009 n.d.	In this deliverable, the Region of Central Macedonia-GREECE expresses its regional RTD potential, suggesting measures for its enhancement. Towards this end, strengths and weaknesses, as well as opportunities and threats, concerning the development, transfer and adoption of knowledge and research results from the AgroFood Industry, are identified.
Sustainable fruit and vegetable systems	Maggio A., Testolin R., Gianquinto G., 2011 European Journal of Agronomy, Volume 32, Argomenti 1, Pagine 59-72	The sustainability of agricultural production systems is a recurrent topic in the public debate, tightly linked to resource use efficiency and energy saving principles. Higher yield with lower input is the paradigm that will guide us in the years to come. This will unavoidably call for a joint effort of different players from research, production and policy sectors. In this scenario, research has a key role since it is the only instrument that may generate a continuous flux of information that in the short, medium and long-term could effectively contribute to defining innovative production systems, more efficient and with a reduced environmental impact. In this short review, some aspects of sustainability in horticultural systems will be presented with a particular focus on the implementation of proven technology, production in saline environments and breeding strategies to improve crops resource use efficiency.

3.7 Final remarks

The following recommendations intend to highlight good practices which involve universities, research centres and other public/private funded R&D bodies (hereafter referred as research community), besides food companies.

An improvement of service and support infrastructures connected to R&D activities, in a context of the low level of investment in R&D in the European food industry, will address the expectations of Killis (GR) that shows “Poor quantity of research results”, and of the food packaging sector in Emilia-Romagna, that complains about the “limited profitability and capability to invest in R&D, because of strategies based on low prices rather than on quality”. “Small investments in R&D” are also witnessed by Murcia in the processing and preserving of fruits and vegetables; manufacture of fruit and vegetable juice, food industry machinery.

Such recommendations consist of a variety of objectives, including:

- providing technology transfer tools,
- providing of life-long education and training of professionals,
- fostering collaborative research.

PROVIDING TECHNOLOGY TRANSFER TOOLS

Why follow this recommendation

Knowledge transfer tools aim to improve collaboration and exploitation of research results and their uptake by companies.

Companies are poorly connected to scientific research institutions, as reported by Killis (GR) and Ervet (IT). It has been recognized that a stronger collaboration between the research community and companies can help to orient research and education activities towards their needs, bring expertise to support knowledge transfer activities, and to introduce innovation-oriented approaches in all activities.

Many European research institutions have set up knowledge transfer offices in recent years, aiming at improving collaboration and exploitation of research results and their uptake by companies.

The ENTERPRISE EUROPE NETWORK has set up a database of cutting-edge technologies, containing more than 23,000 profiles. The Network brings together research and commercial applications, and the database is updated with new profiles on a regular basis. See more at: <http://een.ec.europa.eu/services/technology-transfer>.

PROTON Europe, building on the UK’s Institute for Knowledge transfer, has created an accreditation scheme for existing knowledge transfer officers based on their experience and track record. See more at: www.proton-europe.org.

The ASTER (the Consortium for Innovation and Technology Transfer in Emilia-Romagna) “Catalogue of Research” is a smart and

user friendly tool, available to facilitate the Emilia-Romagna SMEs match with the right research counterpart and get the right research support.

Through the Catalogue it is possible to do searches concerning products and services provided by the laboratories of the HTN (High Technology Network) and specifically on Packaging (Agrifood Platform). See more at: http://www.aster.it/tiki-index.php?page=Catalogo_ALI_en.

PROVIDING OF LIFE-LONG EDUCATION AND TRAINING OF PROFESSIONALS

Why follow this recommendation

The development of R&D infrastructures, and qualified and skills human resources is a precondition for successful innovation policies.

Continuous professional development exists in a limited number of countries but it is often inadequate in terms of cost and/or delivery. The personnel working on knowledge transfer must possess a wide range of skills in order to carry out their tasks effectively. However, relatively inexperienced staff is often appointed to such positions, as stated by Murcia in the processing and preserving of fruits and vegetables; manufacture of fruit and vegetable juice, food industry machinery, “problems of the generational relief influence the adoption of more sustainable technologies and the professionalization of the sector.



PACMAN has identified several training courses related to sustainability that have been organized by thematic areas and segments.

FOSTERING COLLABORATIVE RESEARCH AT TRANSNATIONAL LEVEL

Why follow this recommendation

Through collaboration between transnational economic actors, public authorities and the research community engaged in innovation issues, PACMAN provides new horizontal solutions to the criticalities and inputs for elaboration of innovative models and strategies to support agro-food sector expansion at international level.

Even if companies normally have scarce attitude to collaborate in R&D activities, according to the global results of the survey carried out in PACMAN (see 3.2 Innovation performance), collaboration on R&D&i activities is a widespread formula between innovative companies: 70% of them (47% of the

total respondents) are interested in collaborating with other entities to carry out their R&D activities.

R&D is an expensive activity, but it leads to a better strategic position of the company on the market. The limited ability of cooperation on common technological issues and on dealing with foreign markets can prevent from supporting agro-food sector expansion at international level. This can be partially supported through the project database, aiming to facilitate transnational exchange of knowledge and information, contacts. PACMAN database (Action 3.4) contains over 400 profiles of companies, stakeholders, fairs and promoting events, R&D information, training, and it is updated with new profiles on a regular basis.

The database permits to test the feasibility of transnational collaboration within some of the PPPs' countries. See more at: <http://agro-food.gnomon.com.gr/web/guest/home>.





04

Resource management

*lifecycle thinking, environmental footprint,
waste management, sustainable packaging,
human resources*



4.1 Criticalities concerning sustainability and resources management

OPTIMIZATION OF RAW MATERIALS AND RESOURCES

CUT, dairy industry and traditional products made mainly from fruit. Selection of raw materials produced in a sustainable way/to what extent do the agro-food SMEs make use of local raw materials or other services.

PARMA, tomato chain. Use of water for irrigation; Preservation of soil fertility.

INFO MURCIA, processing and preserving of fruits and vegetables; manufacture of fruit and vegetable juice, food industry machinery. Lack of key resources for the production, as it is the case of skilled workforce.

INFO MURCIA, processing and preserving of fruits and vegetables; manufacture of fruit and vegetable juice, food industry machinery. The low level of collaboration among the companies of the different levels of the food-processing chain of value impedes to share resources or to develop more efficient and sustainable activities.

ENVIRONMENTAL IMPACT

CUT, dairy industry and traditional products made mainly from fruit. CO₂ emissions from the distribution process. Overall additional cost to the environment from CO₂ emissions.

PARMA, tomato chain. Use of fertilizers and agro-chemicals.

PARMA, tomato chain. Use of energy (from non-renewable sources) for machinery.

CRITT, pasta and biscuits, oil and fats, fruit and vegetables. The lack of laws for agro-food industries in sustainability development. Companies are thus not very involved in this topic.

Kilkis, growing of cereals. It's required to accelerate investments in infrastructures in rural areas with actions aiming at the reduction of costs and the protection of the environment.

WASTE MANAGEMENT

ERVET, packaging. Lack of consumer education and information on sustainable waste management and separate collection. Uncertainty of the separate collection at local level affect development strategies and outcomes.

CUT, dairy industry and traditional products made mainly from fruit. Traditional product processors active in fruit and vegetables have not developed a suitable sustainable method for disposing their waste.

MANAGEMENT OF HUMAN RESOURCES

Kilkis - growing of cereals. The reduced EU budget for the Common Agricultural Policy (CAP) imply future bottlenecks, considering that human capital in the agro-food sector is inadequately trained.

CUT, dairy industry and traditional products made mainly from fruit. Is the immigrant labour incorporated into the local population or does it remain a foreign body?

The aforementioned criticalities, identified in the segments chosen by PACMAN partners, are matched with the partners/territories in the following Table 4.1.

4.2 LCA - Life Cycle Assessment - Explanation

DEFINITION OF LCA

The International organization for Standardisation (ISO), a world-wide federation of national standards bodies, has standardised this framework within the series ISO 14040 on LCA. The UNI-EN ISO 14040:2006 standard defines the Life Cycle Assessment (LCA) as "a technique for assessing the environmental aspects and potential impacts associated with a product or service by: collecting an inventory of relevant inputs and outputs system and the evaluation of potential environmental impacts associated with those inputs and outputs, and interpreting the results of the phases of analysis and impact assessment in accordance with the objectives of the study".

The ISO standards identify four phases for conducting a LCA outlined in Figure 4.1.

Another similar definition is provided by the United States Environmental Protection

Table 4.1 - Identification of main criticalities

Selected segments	Territories						
	Emilia-Romagna	Parma	Cipro	PACA Region	Murcia	Alentejo	Kilkis
Dairy industry and traditional products made mainly from fruit			● ■ ▲ ◆				
Packaging	▲						
Fruits and vegetables (manufacturing, processing and preserving)					●		
Growing of cereals							■ ◆
Pasta and biscuits, oil and fats, fruit and vegetables				■			
Tomato chain		● ■					

- Raw materials and resources optimization
- Environmental impact
- ▲ Waste management
- ◆ Human resources management

Agency, that defines the Life Cycle Assessment (LCA) as a technology to assess the environmental aspects and potential impacts associated with a product, process or service.

WHAT DO YOU NEED

Performing an LCA can be resource and time consuming and depending on the data availability and quality, results can change substantially. LCA based claims and comparative assertions made to third parties should comply with the requirements according to in ISO 14040 and 14044, regardless of the LCA tool used to generate the results of the claim.

WHY DOING LCA

LCA is a global analysis of the environmental impacts resulting from a product during its whole life cycle, that is from the moment of the extraction of raw materials to manufacturing, packaging, transportation and use and finally to the disposal of waste. It is used by quantifying the use of resources consumed ("inputs" such as energy, raw materials, water) and environmental emissions causing ("outputs" to air, water and soil) but there is a risk assessment because the real impact of these emissions depends on when, where and how they are released into the environment.

LCA is a decision support tool giving feedback to the designer on the environmental consequences of decisions taken in the production

process over its entire life cycle. It is used, for example, to make tactical decisions in product and process design or improvement, or as a support for strategy, or in supply chain management and procurement. LCA can be used for comparisons of alternative options providing equally acceptable solutions to a specific problem.

Reliable LCA performance is crucial to achieve a life-cycle economy. The integration of this life cycle principle to traditional management practices leads to the concept of Life Cycle Thinking (LCT).

LCA is also used to study market strategies, policies or regulations. EU has accepted LCA as a state-of-the-art methodology and has included aspects of LCT in the 6th Environmental Action Programme.

TWO MAIN APPROACHES

LCA can be performed at different levels depending on the type of questions being asked, the purpose of the study, or the state of development of a new product. There are two main different categories of LCA in terms of level of detail: Simplified, streamlined or screening LCAs (eco-design) and Comprehensive, detailed or full LCA (conventional) LCA tools can also be separated into two major classes: highly flexible conventional LCA software and tailored and rapid ecodesign tools with a lower degree of flexibility (Table 4.2).

CONVENTIONAL LCA TOOLS

Comprehensive LCA's are performed using conventional software packages where the user will go through the full procedure of goal and scope definition, inventory assessment, impact assessment and interpretation.

Conventional LCA tools allow for flexibility on all levels of a LCA. This flexibility also contributes to some of their draw-backs: they require considerable expertise and are laborious and costly. Although such an approach is feasible for companies with products that do not change frequently, it is not an efficient approach for the fast-moving consumer goods (FMCG) sector where systematic product assessment using conventional LCA tools for all product developments would generate excessively high costs. Nor is it an economically viable solution for small and medium sized enterprises (SMEs). In addition to this the time required to complete a conventional LCA study is such that results are frequently obtained at the end of the packaging development when a product is ready to be launched.

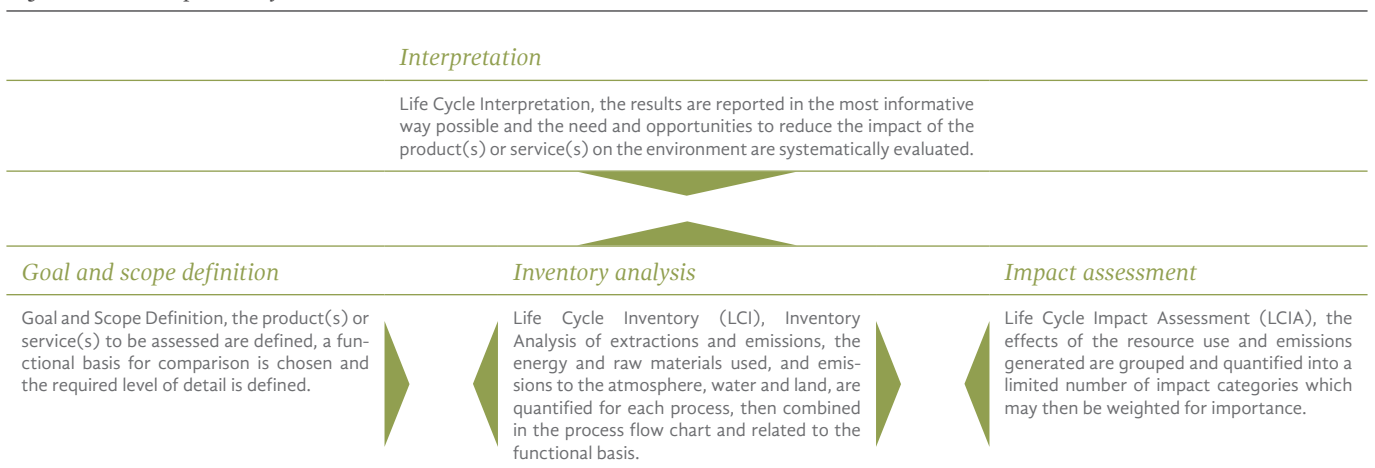
SOME EXAMPLES OF SOFTWARE

GaBi 4.3

Developed by: Institute for Polymer Testing and Polymer Science - www.gabi-software.com.

"GaBi models every element of a product or system from a life cycle perspective, equip-

Figure 4.1 - Four phases of LCA



Interpretation

Life Cycle Interpretation, the results are reported in the most informative way possible and the need and opportunities to reduce the impact of the product(s) or service(s) on the environment are systematically evaluated.

Goal and scope definition

Goal and Scope Definition, the product(s) or service(s) to be assessed are defined, a functional basis for comparison is chosen and the required level of detail is defined.

Inventory analysis

Life Cycle Inventory (LCI), Inventory Analysis of extractions and emissions, the energy and raw materials used, and emissions to the atmosphere, water and land, are quantified for each process, then combined in the process flow chart and related to the functional basis.

Impact assessment

Life Cycle Impact Assessment (LCIA), the effects of the resource use and emissions generated are grouped and quantified into a limited number of impact categories which may then be weighted for importance.

ping businesses to make the best informed decisions on the manufacture and lifecycle of any manufactured product, everything from a hand-held mobile phone to a match-stick to an airport. It also provides an easily accessible content database detailing the energy and environmental impact of sourcing and refining every raw or processed element of a manufactured item. In addition, it looks at the impact on the environment and presents alternative options for manufacturing, distribution, recyclability, pollution and sustainability.”

SimaPro 7.3

Developed by: Pre Product Ecology Consultants - www.simapro.es.

“SimaPro is a professional tool for calculating the environmental, social and economic associated with a product or service throughout its life cycle, with application, among others, to eco-design, to the development of eco-labels, to the calculation of carbon footprints or water footprints.”

AGROLCA Manager

Developed by: Instituto Vasco de Investigación y Desarrollo Agrario NeikerTecnalia - <http://www.agrolcamanager.com>.

AGROLCA manager monitors each stage of the value chain of a product and estimate the potential environmental impacts, allowing design strategies for their reduction. The AGROLCA manager’s tool will be adapted

to the characteristics of the primary sector, with particular emphasis on environmental issues and the needs of each individual company, considering its environmental situation and its level of compliance with the legislation.

ECODESIGN TOOLS

Simplified and tailored LCA-based tools open LCA to non-experts, allowing rapid assessment of environmental consequences of design decisions already at the concept stage. This understanding lays the foundation for efficient streamlining and automation of LCA.

Various sector-specific tools have been developed or are currently being developed; these tools are publicly available. Such tools aim to preserve the integrity of the LCA approach in highlighting environmental issues at each life stage, while doing so more quickly and cheaply. The commonality between streamlined automated tools, or ecodesign tools as they may also be called, is that many of the LCA steps requiring considerable expertise have been pre-defined for the user and the interface emulates the development process prompting a packaging developer only for inputs which she or he works with on a daily basis.

Typically, ecodesign tools have the following features pre-defined: functional unit, system borders, inventory data for materials

and processes, including recovery and disposal operations, and impact assessment methods. Whereas both tool types require the same level of expertise with respect to interpretation of results, the advantage of ecodesign tools is their relative simplicity and user-friendliness as well as the speed of assessment. The disadvantage of ecodesign tools is the fact that although they might be more consistent they are not more precise or reliable than a comprehensive LCA generated with conventional LCA software.

SOME EXAMPLES

The Eco Tool CONAI, National Packaging Consortium

<http://www.ecotoolconai.org/>, allows member companies, wishing to participate in the “Prevention Dossier”, to evaluate the environmental efficiency (eco-efficiency) of their packaging, through a comparison of the environmental impact BEFORE and AFTER the interventions adopted. The tool is based on the “cradle to cradle” concept and allows to calculate, through a simplified LCA (streamlined), the effects of the preventive actions implemented by companies on their packaging.

BEE, Environmental balance assessment of Packagings

<http://bee.ecoemballages.fr/>, is a simplified tool inspired by principles of the LCA to estimate the impact Environmental of the packaging. This tool allows in particular to identify the levers of optimization and to compare various solutions of packaging

Table 4.2 - Types of LCA tools and area of application as a function of strength and weakness

Type of LCA tool	Strengths	Weaknesses	Application
Ecodesign	Quick, low cost, consistent, can be used by non-experts.	Low flexibility No capacity to capture specificities Limited possibility to support environmental claims	Design processes, environmental information, well suited for non expert in a well-framed process
Convenzionale	Robustness, flexibility, it can support marketing claims after external peer review.	More costly and long, requires expert knowledge	Internal evaluation of a product and comparison with alternatives To support marketing claims about the environmental impact of a product

Source: The consumer goods forum (2011), Global Protocol on Packaging Sustainability 2.0

Table 4.3 - LCA applications

Why LCA (applications)	
Comparison To have scientific data for benchmarking (internal or external)	R&S To identify specific issues (Unexpected consequences?)
Communication To provide reliable information to support the environmental communication	Simulation & Ecodesign To support changes of product processes or regulation fulfilment

of an environmental point of view. This tool allows a modelling taking into account the main stages of the life cycle that have an impact on the environment of a wide number of materials and type of packaging. The modelling can be made with representative data of an average packaging, or using specific data. The ergonomics of the tool facilitates the use by persons not specialists of the LCA.

ADEME, Le Bilan Produit @ http://www.ademe.fr/internet/bilan_produit/login.asp. The Produced Balance Assessment was designed by the ADEME to allow the companies to estimate easily, quickly and in an autonomous way the ecological impact of their products. More particularly intended to SME/SMI and for the students, this tool was realized with the university of Cergy-Pontoise and the Ecoinvent center. It allows to model the product in a simple way, by taking into account the main stages of its life cycle: the materials which compose it, the manufacturing processes, the means of transportation, the sources of energy. The estimation of the impacts concerns eight indicators and allows to compare various simulations for the same product.

Ecoinvent, Data v2.2 <http://www.ecoinvent.org/>. The Ecoinvent Centre, offers science-based, industrial, international life cycle assessment (LCA) and life cycle management (LCM) data and services. Ecoinvent data v2.2 is included in the leading LCA software tools as well as in various eco-design

tools for building and construction, waste management or product design.

LCA EXPERIENCES

ADEME, Study for a simplified LCA methodology adapted to bioproducts <http://www2.ademe.fr/servlet/getDoc?sort=-1&cid=96&m=3&id=69583&ref=12441&noche=yes&p1=111>. In this context, ADEME (the French Environment and Energy Management Agency) commissioned a study for the development of a methodological framework to evaluate the environmental impacts of bioproducts. This project showed that some methodological recommendations had to be specified depending on the objective of the LCA: eco-design, environmental labelling or comparative LCA.

ADEME, Agri-BALYSE www.ademe.fr started at the beginning of 2010 a research program named Agri-BALYSE concerning the creation of a database of life cycle assessment of farm produces. The program covered 27 vegetable products (65 declensions), 20 animal products (46 declensions) and 3 imported products, it thus concerns a total of 114 inventories of life cycle.

THE ITERG, Institut des Corps Gras <http://www.iterg.fr/>, realized a Life cycle Assessment for oils of colza and sunflower produced in France. The whole life cycle of oil was estimated, since the production of the oleaginous seeds till the end of life of packa-

gings (bottles). The accent was put on the evaluation of the impacts of the processes of production.

ALCUBILLA 2000, Carbon Footprint from "Luque" ecologic olive oil <http://www.alcubilla2000.com/en/environment.html>. The Association ALCUBILLA 2000, S.L., has started a project (2009) aimed in measuring the "carbon footprint" of several food products. With this new instrument ALCUBILLA 2000, S.L. compared the smaller carbon footprint of LUQUE Organic Olive Oil regarding other (non ecologic) olive oils. This initiative is pioneer in Spain considering the emissions measuring tool has been adapted to a specific agricultural sector. This tool is based on the protocol PAS 2050 (general standard that, at the moment, it has been used by some companies this way) and it also allows to olive oil stakeholders to calculate the carbon footprint of their processes/products.

The AQUA project <http://www.life-aqua.eu>. The AQUA project aims at innovating the productive processes of the agri-food business sector to reduce water consumption and waste, in order to demonstrate the feasibility and the potential achievable. In particular the project will:

- Evaluate the international best practices regarding efficient water management and reuse, analyzing and quantifying the benefits in terms of environmental and economic outcomes;



- Define a water saving kit to spread among companies;
- Engage the companies of the agro-food sector through the involvement in a panel of experts and through the actual implementation and test of the kit in their systems.

LC-IMPACT, Development and application of Life Cycle Assessment methods for improved sustainability Characterisation of Technologies, <http://www.irta.cat/en-us/RIT/Projectes/pages/ProjectDisplayPage.aspx?UrlCode=663>. The IRTA Research Centre has conducted the LC-IMPACT project whith the main goal of developing the LC-IMPACT tool. The main applications of LCA are in the field of characterization of Production Systems, identification of actions for improvement, carbon footprint, Eco-design of products, Eco-Labeling, Declaration of "green" products, etc.

Life Cycle Assessment (LCA) as a Decision Support Tool (DST) for the eco-production of olive oil, source http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=Ecoil_guidelines2.pdf. This project aims at developing a decision support tool (DST) for the adoption of the appropriate processes throughout the life cycle of olive oil, in order to promote its eco-efficient production in three major olive oil producing areas: Voukolies (Greece), Lythro-

dontas (Cyprus) and Teruel (Spain). This goal will be achieved through Life Cycle Analysis.

Lifecycle analysis of case studies GHGs in Spanish Agro-food cooperatives http://www.uco.es/ceiA3/images/stories/pdf/cultura_cientifica/Informe_proyecto_huella_de_carbono_final_protegido.pdf.

This project aims to diagnose the state of the environmental footprint in regards to the balance of emissions of greenhouse gases in agro-food products in 18 cooperatives of different sectors: 5 cereal, 6 fruit (peach and navelina), 3 vegetables (cucumber and pepper), 1 cheese factory and 3 warehouses.

LCA in the production of red wine <http://unescochair.es.ci.es/es/proyectos-por-tematica/analisis-de-ciclo-de-vida-acv/141-analisis-de-ciclo-de-vida-del-vino-de-crianza-doc-rioja>. This initiative refers to a local project about the use of LCA for evaluating the environmental impact of a wine production at La Rioja, Spain. The project has been conducted over the year 2005, considering the production from grape culturing to wine consuming. The objectives of the project have been to apply LCA as tool for defining environmental strategies and to instruct key local stakeholders (farmers, wine producers, government) LCA.



4.3 Laws and regulations/Policies supporting sustainability and resources management in the MED Area

Regulations listed in Table 4.4 concerning sustainability and resource management.

Table 4.4 - Policies supporting sustainability and resources management in the MED Area

Partner	Reference/ Institution/ Territorial level	Description
<i>Waste management</i>		
CUT Cyprus	Reference: - Waste Law N.185 (I)/2011 - the Packaging and Packaging Waste Law 2002-2006 - the management of waste from extractive industries law N.82(I)/2009 Institution: Ministry of Agriculture, Natural Resources and Environment Territorial level: National	The Cyprus policy for the management of waste follows the waste hierarchy, as defined by the Directive 94/62/EC (prevention, preparing for re-use, recycling, recovery and disposal). The priority target is the efficient management of natural resources and waste. According to the waste legislation, Cyprus must succeed specific targets for the recycling and recovery percentages for packaging waste, electrical and electronic equipment waste and waste of batteries and accumulators. For these three waste streams, there is an obligation to apply the Extended Producer Responsibility principle, and for the household waste a specific percentage of waste must be diverted from landfill sites.
CUT Cyprus	Reference: 2007-2013 Rural Development Programme (RDP) - Measure 1.5.2 – Farming waste management Institution: Department of Agriculture – Cyprus Ministry of Agriculture, Natural Resources and Environment Territorial level: National	Measure 1.5.2 is an incentive given to pig and cattle farmers for efficiently managing their waste, while contributing in the sustainability of the agro-food sector. According to this Measure, the state provides funds for setting up biogas plants from animal waste, and hence electrical power.
CUT Cyprus	Reference: Label agri waste Institution: A project supported by the European Commission through the SIXTH FRAMEWORK PROGRAMME Horizontal Research Activities involving SMEs Collective Research (Contract -2005-516256) Territorial level: National	The scope of the research work was to develop and integrate the collection, sampling and labelling procedures and the methodologies to valorize the agricultural plastic waste streams by facilitating their routing to the best disposal alternative (technically feasible, most environmental friendly and economically valuable). The labelling, in addition to facilitating and improving the efficiency of the disposal alternatives, allows transport of labelled agricultural plastic waste across boundaries and evaluation of the waste streams in an open European market, simultaneously preserving valuable material resources and protecting the environment. http://labelagriwaste.aua.gr
<i>Environmental footprint</i>		
CUT Cyprus	Reference: Nitrate Vulnerable Zones Act 534/ 2002 Institution: Ministry of Agriculture, Natural Resources and Environment Territorial level: National	The law is in line with the European directive for nitrate pollution of surface and underground water aquifers as a result of agricultural activities, especially through the use of nitrate based fertilisers. The legislation has designated six NVZ zones in which the risk of nitrate pollution is high as a result of intensive agricultural activity. Hence, in these NVZ designated areas a set of preventive actions are being enforced through the legislative framework with the aim of controlling and reducing the nitrate levels in the underground water.
CUT Cyprus	Reference: 2007-2013 Rural Development Programme (RDP) - Measure 1.5.2 – Farming waste management Institution: Cyprus Agriculture Payments Organization Territorial level: National	Measure 2.3 supports producers as a result of the reduction in their income due to non-use of herbicides. The purpose of the measure is to achieve significant agro-environmental improvements and reduce the overall environmental impact, sustainable management of available resources, protect public health, improve the texture and fertility of the soil and retain population in the countryside.
Province of Modena	Reference: Climate change and energy - Legislative Decree 171 of 21 May 2004 Institution: - Territorial level: Local	Climate change and energy linked to agro-food system. The NEC directive is implemented by Legislative Decree 171 of 21 May 2004, which defines the method for drawing up the national reduction program for emissions of sulphur dioxide, nitrogen oxides, volatile organic compounds and ammoniac substances.
IVACE Valencia	Reference: Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel. Institution: European Parliament and of the Council Territorial level: European	The EU Ecolabel may be awarded to products and services which have a lower environmental impact than other products in the same group (LCA is required for the development of ecolabel criteria).

CRITT PACA Region	<p>Reference: The Regional Plan Climate Air and Energy (SRCAE) in the course of writing with the National State (law n°2010-788) Territorial level: Regional</p>	<p>Established by the law n°2010-788 named “Grenelle 2” the Regional Plans of the Climate, Air and the Energy (SRCAE) aim at the consideration of the stakes connected to the climatic risks, by defining the orientations and the regional objectives regarding control of the energy demand, of atmospheric pollution control measures, development of the renewable energies, the reduction of greenhouse gas emissions, and adaptation to the effects expected from the climate change. The SRCAE defines, on horizons 2020, 2030, 2050, the orientations and the regional objectives regarding energy consumption, greenhouse gas emission, quality of air, development of the renewable energies and the adaptation to the climate change.</p>
CRITT PACA Region	<p>Reference: Support to companies (Contract of Project State-Region-Ademe) Institution: Region Provence-Alps Côte d'Azur and the ADEME Territorial level: Regional</p>	<p>Within the framework of the Contract of Project State-Region-Ademe, the Region Provence-Alps Côte d'Azur and the ADEME launch two calls for projects to help companies to set up an approach of energy management:</p> <ul style="list-style-type: none"> • a call for projects energy efficiency in two parts: 1) implement an energy management system, 2) to invest in effective equipment and techniques; • a call for projects “Innovant Service” intended to support experiment of new control services of the energy for SMEs.
<i>Promotion of sustainable development; protection of environment; social responsibility</i>		
Province of Modena	<p>Reference: Presidential Decree n°178 of March 27, 2001 Territorial level: Local</p>	<p>The Presidential Decree n°178 of March 27, 2001, which regulates the organization of the Ministry of the Environment and Territorial Protection, assigned to the Directorate for the Defense of the Sea / Water Resources Department, responsibility for the protection of marine biodiversity and species protected marine environment and marine environment as a whole. The service implements measures aimed at the protection and management of the species reported by international agreements, as priorities for the Mediterranean, the conservation status of which is particularly threatened. In particular, the lines of current activities relate to the species level, all cetaceans found in Italian waters, sea turtles, the Posidonia meadows and invasive alien species.</p>
IVACE Valencia	<p>Reference: Order 11/2012 from 1st August 2012 Institution: Ministry of agriculture, fishing, alimentation and water from Comunitat Valenciana Territorial level: Regional</p>	<p>This regional regulation refers to the conditions that must be followed by all beneficiaries of measures for promotion the sustainable development of rural areas including protection of the environment, social conditions, food quality and safety and animal wellbeing, etc. The regulation is extensive to all along the Comunitat Valenciana.</p>
INFO MURCIA	<p>Reference: The RSC in the Law of Sustainable Economy Institution: n/a Territorial level: National</p>	<p>The article 39 of the new Law of Sustainable Economy refers to the Social Responsibility of the Companies. The General Administration of the State will adapt his strategic plans to the new law in the maximum space of one year from the entry into force of the law, in such a way that they contemplate the production of memories of sustainability, and the orientation of the environmental management towards the EMAS.</p>

4.4 Literature review

In the literature review carried out by the PACMAN partnership during the project, the following references have been identified concerning resources management in the agro-food system in the MED area.

Main issues are:

- Environmental impact assessment of agro-food production and distribution
- Models and analysis of sustainability.

4.5 Final remarks

Agro-food systems, due to the increasing consumption that is placing unprecedented demands on agriculture and natural resources,

are expected to address the main two challenges: providing global food security while lowering their environmental impact.

Business strategies are being re-assessed to analyse their overall impact, in terms of the whole life cycle, leading to the integration of this principle to traditional management practices (Life Cycle Thinking, LCT).

Hereby we analyse solutions to this dilemma, showing that important progress could be made by increasing crop yields, and cropping efficiency, shifting diets and reducing waste. Together, these strategies could double food production, while greatly reducing the agro-food footprint.

OPTIMIZING OF RAW MATERIALS AND RESOURCES UPTAKE

To meet the world's future food security and sustainability needs, agro-food industry must rely substantially on sustainable agricultural products, as reported by CUT in dairy industry and traditional products "seeking the selection of raw materials produced in a sustainable manner". There is also a need to increase the food chain integration, as reported by Info Murcia "the low level of collaboration between the companies of the different levels of the food-processing chain of value impedes to share resources or to develop more efficient and sustainable activities".

Table 4.5 - Literature review concerning resource management

Title	Author/ Date/Link	Description
<i>Assessment</i>		
A review of studies applying environmental impact assessment methods on fruit production systems Identified by: Province of Parma	Alexandros Gasparatos, Mohamed El-Haram, Malcolm Horner, 2011 Journal of Environmental Management, Volume 92, Issue 10, Pagine 2277-2286.	The objective of this paper is to evaluate the impacts of agriculture and water policy scenarios on the sustainability of selected irrigated farming systems in Italy, in the context of the implementation of the directive EC 60/2000. Directive EC 60/2000 (Water Framework Directive) is intended to represent the reference norm regulating water use throughout Europe. Five main scenarios were developed reflecting aspects of agricultural policy, markets and technologies: Agenda 2000, world market, global sustainability, provincial agriculture and local community. These were combined with two water price levels, representing stylized scenarios for water policy. The effects of the scenarios on irrigated systems were simulated using multi-attribute linear programming models representing the reactions of the farms to external variables defined by each scenario. The output of the models consists of economic, social and environmental indicators aimed at quantifying the impact of the scenarios on different aspects of sustainability relevant for irrigated farming systems. Five Italian irrigated farming systems were considered: cereal, rice, fruit, vegetables and citrus.
The impact of water and agriculture policy scenarios on irrigated farming systems in Italy: An analysis based on farm level multi-attribute linear programming models. Identified by: Province of Parma	F. Bartolini, G.M. Bazzani, V. Gallerani, M. Raggi, D. Viaggi, 2007 Agricultural Systems, Volume 93, Issues 1-3, Pagine 90-114	The objective of this paper is to evaluate the impacts of agriculture and water policy scenarios on the sustainability of selected irrigated farming systems in Italy, in the context of the implementation of the directive EC 60/2000. Directive EC 60/2000 (Water Framework Directive) is intended to represent the reference norm regulating water use throughout Europe. Five main scenarios were developed reflecting aspects of agricultural policy, markets and technologies: Agenda 2000, world market, global sustainability, provincial agriculture and local community. These were combined with two water price levels, representing stylized scenarios for water policy. The effects of the scenarios on irrigated systems were simulated using multi-attribute linear programming models representing the reactions of the farms to external variables defined by each scenario. The output of the models consists of economic, social and environmental indicators aimed at quantifying the impact of the scenarios on different aspects of sustainability relevant for irrigated farming systems. Five Italian irrigated farming systems were considered: cereal, rice, fruit, vegetables and citrus.
Integrated sustainability assessment of cropping systems with agro-ecological and economic indicators in northern Italy Identified by: Province of Parma	Nicola Castoldi, Luca Bechini, 2010 European Journal of Agronomy, Volume 32, Issue 1, Pagine 59-72	The sustainability of agricultural systems is frequently evaluated with indicators, which are synthetic variables describing complex systems. Each indicator deals with one aspect of sustainability (e.g. nutrients, pesticides, energy), and therefore the result of a complete assessment usually includes several indicator values. These values are frequently presented separately, while an integrated evaluation could benefit from the calculation of a single sustainability index. The aim of this work was to integrate 15 economic and environmental indicator values into a global sustainability index (Sg) ranging from 0 to 1. To calculate the indicators, we used a large data set of cropping systems management for 131 fields cultivated with arable crops in northern Italy, obtained through periodic interviews with farmers over a 2-year period. The fields were chosen to represent the main cropping systems in the area (cereals and forages, on animal and cereal farms). The 15 indicators describe a large variety of sustainability aspects, e.g. the economic performance and the management of energy, nutrients, soil, and pesticides.
Valutazione di sostenibilità delle aziende agricole del PASM e delle loro filiere produttive Identified by: Province of Parma	Paola Migliorini e Bruno Scaltriti, 2011 Relazione "Analisi territoriale, Ricerca agro-ambientale e socio-economica" (UNISG).	The sustainability of three agricultural sectors (fruit and vegetables, rice, livestock) of the PASM (Parco Agricolo Sud di Milano) was studied by means of a set of agro-environmental and socio-economic indicators for 9 farms with different management: conventional, integrated and organic. The environmental sustainability was measured by means of indicators of soil, water, air, landscape-biodiversity. The socio-economic sustainability was investigated through a synthesis of economic indicators. The result of the analysis showed that all of the companies analysed are handled sustainably just in regard to the economic aspects but have a very negative impact on the environment. Only organic farms got positive values for environmental sustainability but reached the worst economic performance.

Title	Author/ Date/Link	Description
Un modello per la valutazione della sostenibilità territoriale delle filiere agroalimentari: struttura e applicazione alla sfera ambientale	Cicatiello C., Pancino B. e Franco S., 2012 Paper provided by Italian Association of Agricultural and Applied Economics (AIEAA) in its series Congress Papers	This work aims to provide an interpretative approach to guide the assessment of the sustainability of different agri-food chains, and to offer an initial application to the measurement of the environmental sustainability of different food chain models. The proposed model takes into consideration the three aspects of sustainability - environment, society, economy - to define the sustainability of the food chain, articulated in a hierarchical structure in which each of the three dimensions has some variables measured. In the paper, after having argued the decision to assess the environmental impact of different food chains within a common spatial reference, it is proposed a first application of the model referred to the comparison between three different types of food chains.
Identified by: Province of Parma		
A multivariate analysis for evaluating the environmental and economical aspects of agro ecosystem sustainability in central Italy	Vincenzo Di Felice, Roberto Mancinelli, Raphaël Proulx, Enio Campiglia <i>Journal of Environmental Management</i> , Volume 98, Pages 119-126, 2012 <i>Journal of Environmental Management</i> , Volume 98, Pages 119-126	Over the past century farming activity has intensified worldwide, characterized by an increasing dependence on external inputs and on land conversion. Although the intensification of agriculture has increased productivity, the sustainability of agro-ecosystems has also been compromised. The objective of this study is to build multivariate relationships between farm structural characteristics and farm performance to highlight the relative costs and benefits of four main farming systems in Central Italy: organic, conventional, mixed and non-mixed farms. Results show that the relationship between cropping diversity and agro-ecological sustainability is associated to a mixed versus non-mixed farm management dichotomy, not to organic or conventional farming practices. The presence of livestock appears to have played an important role as an economic lever for diversifying the farm cropping system.
Identified by: Province of Parma		
Assessing eco-efficiency with directional distance functions	Andrés J. Picazo-Tadeo A, Mercedes Beltrán-Esteve, José A. Gómez-Limón <i>European Journal of Operational Research</i> 220 (2012) 798-809, 2012 <i>European Journal of Operational Research</i> 220 (2012) 798-809 Date of publication, 2012	Eco-efficiency is a matter of concern at present that is receiving increasing attention in political, academic and business circles. Broadly speaking, this concept refers to the ability to create more goods and services with less impact on the environment and less consumption of natural resources. This paper proposes the use of functions and Data Envelopment Analysis techniques to assess olive-growing farms eco-efficiency by using indicators regarding economic (Net income) and environmental (erosion, pesticide risk, consumed energy and CO ₂ fixation). The study reveals that eco-inefficient management is a widespread practice among olive farmers and that a win-win strategy in which environmental pressures are reduced at the same time as net income is increased is feasible for olive-growing scenarios. In addition it recommends policy measures targeting an improvement in farmers knowledge and managerial skills through learning processes to encourage farmers' environmental awareness as the most advisable ways to improve eco-efficiency on Spanish olive-growing sector.
Identified by: Province of Parma		
A comparison of energy use in conventional and organic olive oil production in Spain	Gloria I. Guzmán, Antonio M. Alonso <i>Agricultural Systems</i> 98 (2008) 167-176, 2008 <i>Associazione Italiana Agricoltura e Economia Applicata (AIEAA)</i> , serie "Le Carte del Congresso"	According this and other authors, organic olive oil production provides several environmental and socioeconomic benefits face conventional production. Those benefits are: increase in biodiversity, reduction of pesticide residues, less erosion, increase in edaphic organic material, higher incomes for farmers, etc. This article addresses the sustainability of organic way of olive oil production in Spain face to conventional strategies by using several quantitative parameters as energy balances watering regime, intensiveness of cultivation, etc. The results show, on one side, the lower energy efficiency of flood irrigated land as opposed to dryland (i.e. non-irrigated) regardless of their style of management and, on the other side, the greater energy efficiency of organic olive cultivation in comparison with conventional production. Nevertheless, organic management could still improve its energy efficiency if it further adjusts and internalizes the flows of nutrients needed in order to achieve greater sustainability.
Identified by: Ivace		
Application of the MIPS method for assessing the sustainability of production-consumption systems of food	Lucia Mancini, Michael Lettenmeier, Holger Rohn, Christa Liedtke, 2012 <i>Journal of Economic Behavior & Organization</i> , Volume 81, Issue 3, Page 779-793.	The article estimates the natural resource consumption due to nutrition from the supply and demand sides. Using the MIPS (Material Input per Service Unit) methodology, we analysed the use of natural resources along the supply chains of three Italian foodstuffs: wheat, rice and orange-based products. These figures were then applied for evaluating the sustainability of diets in 13 European countries. The results outline which phases in food production are more natural resource demanding than others. We also observed different levels of sustainability in the European diets and the effect of different foodstuffs in the materials, water and air consumption.
Identified by: Province of Parma		
Sustainable de-growth" in agriculture and food: an agro-ecological perspective on Spain's agri-food system	Juan Infante Amate, Manuel González de Molina, 2013 <i>Journal of Cleaner Production</i> 38 (2013) 27-35	The article evaluates the energy cost of the Spanish agri-food (AFS) system in the year 2000 with a view to ascertaining the relative importance of each step of agro-food chain into a sustainable de-growth frame. The study outcome highlighted that a fundamental transformation of the AFS is required, including a moving towards organic farming and corresponding new consumption patterns, (i.e., local, seasonal food, less meat consumption) and may considerably reduce resources use in the AFS and contribute to sustainable de-growth in Spain.
Identified by: Ivace		
Handbook of saving and efficiency of fruit and vegetable sector in the Murcia Region	FECOAM, 2011 www.agro-alimentarias.coop/ficheros/doc/03201.pdf	This report is composed of a set of actions that meet the demands of business cooperatives regarding the measures of energy saving and efficiency that affect their costs production. The project objectives CO2OP took four sectors of the food industry strategic both in the economy and as a percentage of representation: mills, horticultural power plants, wineries and feed mills. The project was conducted in a series of phases. It began with the completion of 30 energy audits. With energy audits performed, energy efficiency of such facilities was studied extensively, and an analysis from this studies performed, developing a sectorial report on energy situation of each of the agro-businesses studied in the project. The specific findings of the sector of horticultural plants are included in this manual. Finally, it was developed the "savings and energy efficiency handbook" specific to the horticultural plants sector.
Identified by: Murcia		

<i>Title</i>	<i>Author/ Date/Link</i>	<i>Description</i>
<i>Models and analyses of sustainability</i>		
Territorial analysis District of Parmigiano – Reggiano Identified by: Prov. Modena	LIFE/07/ENV/IT/000515, Progetto ECCELSA www.eccelsalife.it	This document constitutes the critical environmental cluster analysis of the District of Parmigiano Reggiano located in the provinces of Parma and Reggio Emilia in Emilia-Romagna, prepared within the project LIFE + ECCELSA (“Environmental Compliance based on Cluster Experiences and Local SME-oriented Approaches” FE/07/ENV/IT/000515). The main methodological reference used is made by the Guidelines of the Cluster Approach ECAP Oriented, prepared within the project ECCELSA (www.eccelsalife.it) and, in particular, the chapter dedicated to the Guidelines implementation of the environmental cluster and its critical evaluation of the environmental and the level of regulatory compliance. In line with the approach adopted, the implementation of the analysis was conducted by moving from evidence emerging from the Map Orientation of the District of Parmigiano Reggiano, with reference to key environmental priorities of the territory in particular, and in respect of which focus on the subsequent environmental analysis: water discharges, water consumption and waste.
Policies of competitiveness for the agrifood sector - strategic priorities - Portuguese agrifood industry Identified by: Adral	Portugal Foods, 2009 www.anilact.pt/documentos/fipa003.pdf	This document contains a chapter dedicated to the sustainable development of the sector in which it is addressed the importance of environmental sustainability for the agrifood industry, in particular at reducing consumption of water and energy, reducing waste, increasing resource efficiency and involvement in initiatives with partners in the row.
Project more sustainable production Identified by: Adral	FIPA - Federation of agrifood Portuguese Industrie, 2009 www.portugalfoods.org/pdf/maissustentavel.pdf	This is a project that aims to involve associations of producers in order to sensitize them to use a cleaner, more sustainable - economically, socially and environmentally - and most profitable agricultural production. It aims to improve the processes of sustainable and organic production, appropriate to the requirements of large retailers and thereby ensure more competitive and suitable products.
Study about the sustainability of the industry of foods and drinks. Identified by: Ivace	Price Waterhouse Coopers Fonte, FIAB (Spanish Food and Drink Industry Federation) http://www.fiab.es/archivos/documentoMenu/documentomenu_20120103135926.pdf	The document reviews the key parameters of the Spanish food industry sustainability and focuses on the following objectives: <ul style="list-style-type: none"> • To analyse the actual Spanish initiatives for improving food sector sustainability • To analyse the main parameters related with the use of Carbon Footprint as emerging indicator • To provide recommendations for improving the competitiveness of Spanish food industry regarding other countries.
Environmental sustainability in the food chain: vision and actions of agro-food industry Identified by: Ervet	Federalimentare, 2012 n.d.	The document aims to underline the commitment of Confindustria and Federalimentare in supporting sustainability in the agro-food supply chain. The document deals with: supplying of raw materials, efficient use of water and energy, packaging, sustainable consumption, research and innovation for sustainability. Confindustria has also written a Code of Conduct for the environmental sustainability. Focus Packaging As concerns packaging, the documents highlights that the agro-food industry utilizes 2/3 of the total produced packaging. Ecodesign is the main tool to save raw materials, support any kind of reuse of the packaging, optimize logistics and integrate more functions in one component. The food industry is involved in promoting the full utilization of the products, preventing food waste by a correct portioning, extending the duration of conservation of fresh products with innovative technologies, providing all the information for a correct management of waste.

As retailers and brand holders are held responsible for the safety they provide to the consumers, they ask suppliers to control their inputs through contractual arrangements structured in quality assurance systems and enforced through third party audits (see certification schemes).

This in turn may call for the challenge of creation of countervailing powers for agricultural producers that are improving the effectiveness of their market positioning strategies through the setting up of producer groups and agro-food cooperatives, by joining farmers associations and through the development of contractual arrangements with the downstream players (see Chapter 2 - Supply chain)

The complexity of some agro-food chains means dealing with more sophisticated systems of management and control. Management tools enable firms to control and monitor their production and financial processes, identify process bottlenecks, make decisions under risks, build long-term strategies, explore markets, reduce costs. Lack of adoption of managerial tools is frequently a barrier to improved efficiency, in particular for small and medium enterprises.

Adequate responses can be brought to the agro-food systems by chain integration initiatives in transport and logistics, as reported by CUT “an overall additional cost to the environment from CO₂ emissions, is mainly due

to the distribution stage” (dairy industry and traditional products made mainly from fruit).

REDUCING THE AGRO-FOOD ENVIRONMENTAL FOOTPRINT

The environmental impacts of agriculture include those caused by expansion (when croplands and pastures extend into new areas, replacing natural ecosystems) and those caused by intensification (when existing lands are managed to be more productive. We must find more sustainable pathways that increase crop production, while greatly reducing unsustainable uses of water, nutrients and chemicals, as witnessed by the Province of Parma which focused the attention on “the high use of fertilizers and agro-chemicals” and “the increasing needs of reduction of water for irrigation, and preservation of soil fertility” (tomato chain). Also INFO MURCIA reported “the shortage of resources for the production, as water in processing and preserving of fruits and vegetables, in juice manufacturing and food industry machinery”.

Key-factor becomes a stronger participation of farmers in food chain management, moving away from being simple raw materials suppliers “seeking at an overall reduction of production costs and higher protection of the environment” as stated by Killkis (growing of cereals).

Agro-food innovation and management of the agro-food chain are meant to be sustain-

ned also by the improving socio-economics aspects, such as training, information and communication. According to Killkis, “the reform of the Common Agricultural Policy (CAP) implies future bottlenecks, considering that human capital in the agro-food sector is inadequately trained (growing of cereals).

LCA-based tools for the environmental impacts resulting from a product during its whole life cycle, are becoming worldwide key instruments to quantify the use of resources consumed (“inputs” such as energy, raw materials, water) and environmental emissions (“outputs” to air, water and soil) (for more information see 4.2).

Agro-ecological innovations in crop and soil management show great potential in improving the resources efficiency uptake of farming, maintaining the benefits of intensive agriculture, while greatly reducing harm to the environment.

Integrated pest management (IPM) means careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of populations of harmful organisms and keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically justified and reduce or minimise risks to human health and the environment. As far as organic farming, some scientific results show that these practices



generally have positive impacts on the environment per unit of area, but not necessarily per product unit. Organic systems had lower energy requirements, but higher land use, eutrophication potential and acidification potential per product unit. This requires much more in-depth analysis. In particular, more work needs to focus whether this practice is economically, socially, and environmentally more sustainable over the long term¹⁴.

REDUCING FOOD WASTE

A large volume of food is never consumed, but is instead discarded, degraded or consumed by pests along the supply chain. A recent FAO study¹⁵ suggests that about one-third of food is never consumed; Developing countries lose more than 40% of food post-harvest or during processing because of storage and transport conditions. In Western Europe, at most 3% of food spoils before it reaches the consumer; in developing countries, up to 50% does¹⁶.

Packaging makes a valuable contribution to economic, environmental and social sustainability through protecting products, preventing waste, enabling efficient business conduct, and by providing consumers with the benefits of the products it contains. Consumer awareness, local demographics and the availability of efficient recovery and recycling technologies all influence the final result.

The variations in performance of collection schemes often correlates with lack of information, according to ERVET: “the lack of consumer information on sustainable waste management and separate collection at local level affects development strategies and outcomes in food packaging management”.

According to CUT: “fruit and vegetables processors complained about the lack of a sustainable method for disposing their waste, that reduces the potential reuse and poses criticalities on local waste management systems”.

Solutions to these criticalities are brought to the food chain by the HandeBook on Green Packaging, which is designed to support companies and other interested actors involved in agro-food packaging sustainability, through setting up a simple and practical user manual. The hand-eBook is committed to bridge the innovation and knowledge gaps among the enabling environment and companies, according to PACMAN project’s main objective of building R&D and innovation capacity of the agro-food sector in MED Regions, by strengthening the links among research bodies, institutions and food enterprises. This document is designed as a resource to help decision makers have informed views about the role of packaging in sustainable development. Put into practice, it will help achieve more efficiency, better cost control, and easier relationships among producers and users and the supporting actors.





05

Trade and export

*international trade, distribution and logistics,
trade agreements and standards*



5.1 Criticalities identified concerning trade and export

DIFFICULTIES TO GAIN ACCESS TO FOREIGN MARKETS

Poor visibility of Portugal and the Alentejo produce in some important foreign markets; Weak institutional support abroad; Existence of an enormous pressure on prices. The price of Alentejo wine is above what the consumer is willing to pay (the discrepancy between price / quality), the euro affects exports, supermarkets “crush” prices (ADRAL - Wine) - Identification of SME that could be characterised as a promoter of a sustainability factor, producing and marketing organic dairy products; (CUT - Dairy industry and traditional products made mainly from fruit) - Still new market in Spain, not well known yet; High prices of ecologic products (IVACE – general) - Trade of agricultural food products of Greece is steadily in deficit, as imports always outweigh exports (KILKIS – general).

Differences emerge among the agro-food segments and the partner regions from the interviews carried out by the PACMAN project on almost 600 companies. The re-

sults from the Murcia region and, in a lesser extent from the Emilia-Romagna and Provence-Alpes-Côte d’Azur regions, underline an advanced state of internationalization, while agro-food companies from the Kilikis region and Cyprus display a poor level of international sales. (Source: Task 3.3_Global_report_12.11.28)

DISTRIBUTION AS A BOTTLENECK

Retailers have high power over producers/ More direct trade between producers and consumers (MODENA - Dairy industry/ Parmigiano Reggiano) - Organic food distribution still focused on small markets (IVACE – Agro-food) - Distribution chain is one of the main bottlenecks to overcome (IVACE – Table grapes) - An increasing number of small local producers supply with fresh products the markets situated in a small distance of their installations, which is something that many consumers prefer and trust (Kilkis – Dairy industry).

CONTROL OF SURPLUS PRODUCTION

New international guidelines resulting from the recent reform of the CMO (Common

Market Organisation) in wine and the WTO agreements, namely: imposition of production quotas for Portugal (ADRAL - Wine); control of surplus production (MODENA - Dairy industry/Parmigiano Reggiano).

The aforementioned criticalities, identified in the segments chosen by PACMAN partners, are matched with the partners/territories in Table 5.1.

5.2 Internationalization and sustainability

In 2012, an in-depth analysis involving almost 600 agro-food companies has been carried out in PACMAN in each partner region. In one of the questions the companies were asked to self-assess their situation regarding 10 factors of competitiveness. The results are summarized in the graph of Figure 5.1.

“Environmental sustainability” has been considered as a strength by 40% of the companies, confirming that sustainability issues can support the competitiveness of the sector rather than limit it. As concerns the other factors, the product identity emerges as a main distinctive feature, followed by food sa-

Figure 5.1 - Strong and weak factors of competitiveness

Source: PACMAN survey, 2012

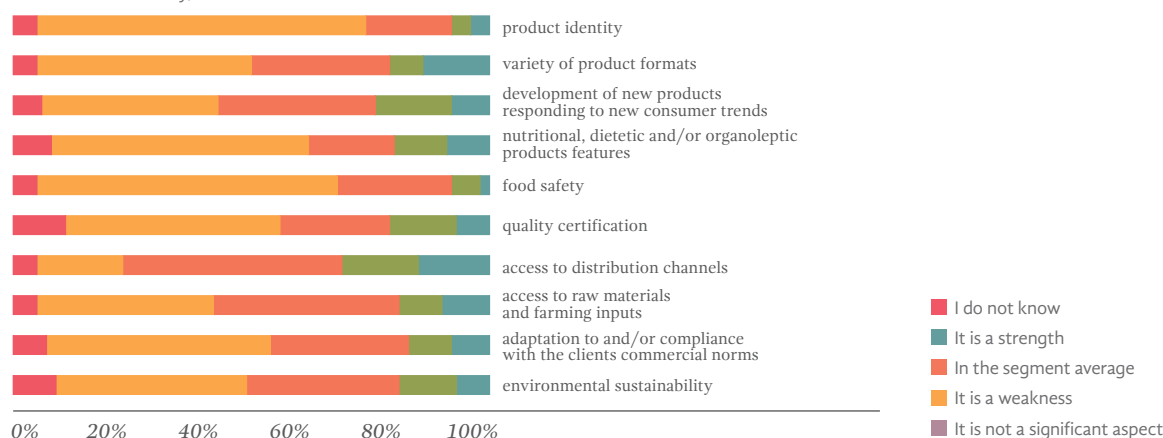


Table 5.1 - Identification of main criticalities

Selected segments	Territories				
	Alentejo	Cyprus	Modena	Kilkis	Valencia
Agro-food				●	■ ●
Wine	● ▲				
Table grapes					■
Dairy industry			■ ▲	■	
Dairy industry and traditional products made mainly from fruit		●			

● Difficulties to gain access to foreign markets
 ▲ Distribution as a bottleneck
 ■ Control of production

fety and health, dietetic and/or organoleptic characteristics of products.

Even if the survey outcomes showed that none of the aforementioned factors has been considered as a weakness by a majority of respondents, the interview confirms some of the criticalities identified in the previous paragraph: “access to distribution channels” appear among the weaker factors. At the same time, the survey reveals that “access to global markets” is still a pending challenge among PACMAN partner regions. A bit more than half of companies do not export, while international sales are almost marginal for 9% of them. Figure 5.2 represents the share of international sales.

If we consider the correlation among the strengths that the companies declared to have and their degree of internationalization,

we find a stronger correlation in the “access to raw materials and farming inputs”, followed by “product identity”. Although “Quality certification” and “food safety” don’t show a strong correlation with internationalization, they are anyway a factor that increases the access to foreign markets, Figure 5.3 shows correlations between strengths and the degree of internationalization.

The companies interviewed (90 per each region of the PACMAN project) identified the following markets for international cooperation in the MED area, Figure 5.4.

5.3 Literature review

In the literature review (Table 5.2) 5 references have been identified concerning trade and export in the agro-food system in the MED area.

Figure 5.2. - Share of international sales

Source: PACMAN survey, 2012

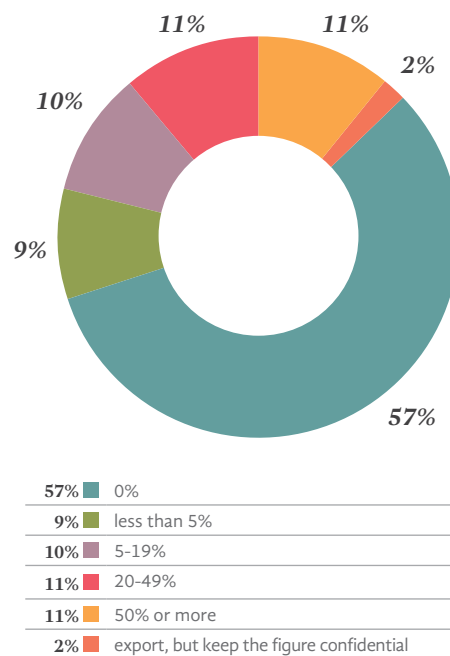


Figure 5.4 - Countries to cooperate with

Source: PACMAN survey, 2012

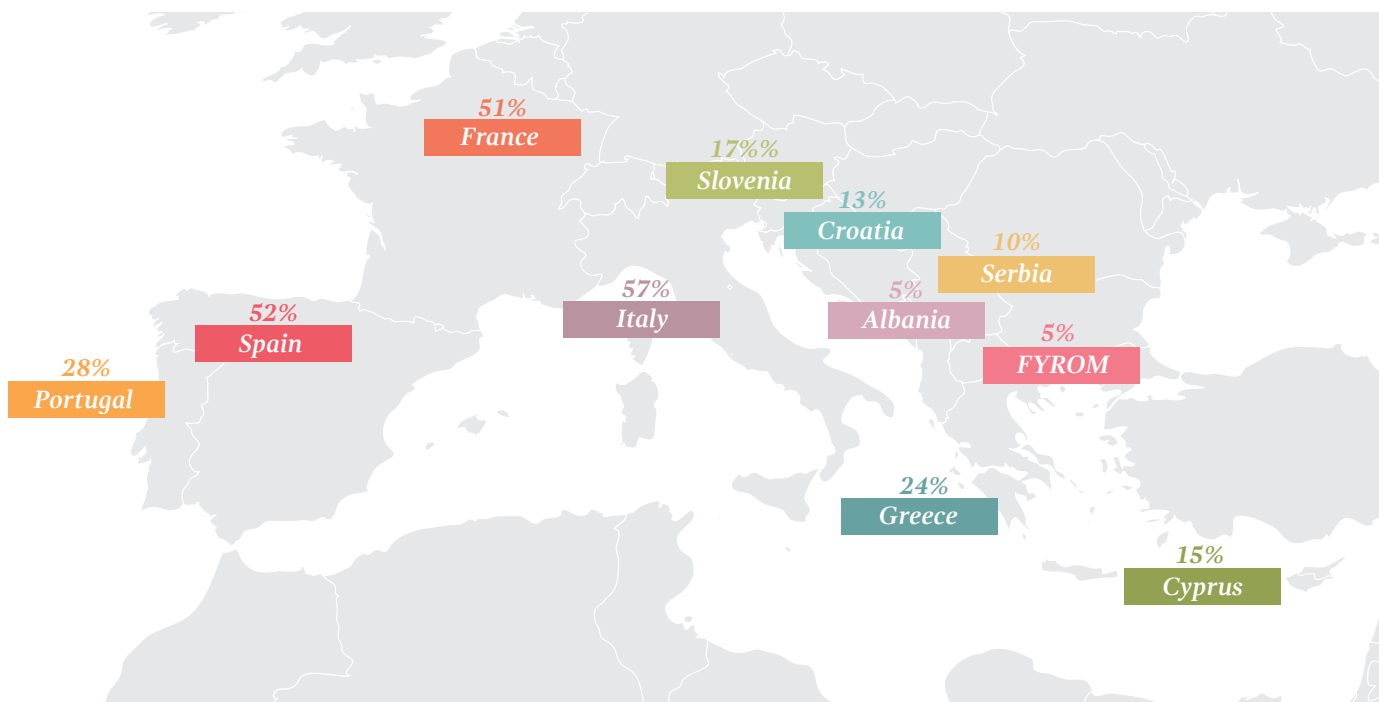


Figure 5.3 - Correlations strengths/degree of internationalization

Source: PACMA survey, 2012

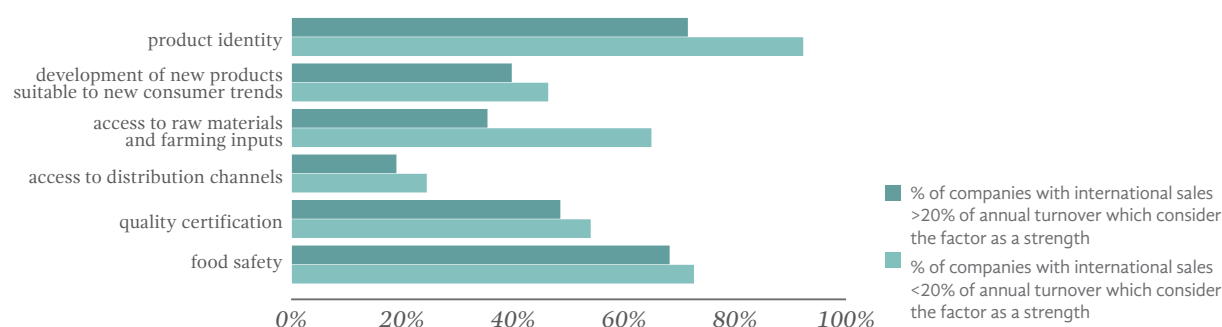


Table 5.2. - Literature review concerning trade and export

Title	Author/ Date/Link	Description
The future of the ecologic food elaboration: sustainability-quality-integrity	Spanish Society of Ecological Agriculture, 2011 www.agroecologia.net/index.php?option=com_content&view=article&id=1417:el-futuro-de-la-elaboracion-de-alimentos-ecologicos-sostenibilidad-calidad-integridad&catid=218:noticias-seae-2012&Itemid=1	Extracted from the 2nd conference of IFOAM (International Federation of Organic Agriculture movements) (Frankfurt Nov. 2012). The article describes the actual situation of EU Organic Agriculture and highlights the main needs for the sustainable development of the sector; the following among others: <ul style="list-style-type: none"> • Policies for promoting harmonisation of EU product labelling (avoiding overlapping). • Reinforcement of the environmental profile of ecological producers and traders into the EU legal frame. • Regular advice from official organizations as EGTOP regarding legal updates in new ecological foods or new ecological strategies/technologies. • More transparency of laws about ecological production for avoiding unbalances on the market. • To promote the perception improvement of consumers regarding confidence, safety and quality of ecologic foods. • Need of increasing harmonisation and quality of organic food
Value and volume of the national ecologic product from the Spanish agro alimentary industry	Ministry of Environment, Rural and Marine media, www.magrama.gob.es/es/alimentacion/publicaciones/valoraci%C3%B3n_de_la_producci%C3%B3n_ecol%C3%B3gica_espa%C3%B1ola_(2009)_tcm7-132015.pdf	This document has been elaborated in order to identify the actual situation of the ecologic market as the future projections of it. To achieve this, the main objectives of the work have been the following: <ul style="list-style-type: none"> • Determination of the characteristics of the Spanish industry of manipulation and transformation of ecological products. • Estimation of the economic volume obtained by ecologic products in Spain • Definition of the commercialization chains of ecologic products (manipulated or transformed), the final price and the added value. • Revision and integration of concepts and suggestions from the sector and other related documents.
Strategy for the development and management of the Agricultural sector in the Region of Crete	Region of Crete, 2011 www.crete.gov.gr	The Strategy for the development and management of the agricultural sector in the Region of Crete was prepared by the Innovation Council of Crete and adopted by the Regional Council. Its main goals are: <ul style="list-style-type: none"> • To promote the sustainable agricultural development in the region of Crete • To support all involved stakeholders in keeping the traditional characteristics of the local production and to promote the famous "Cretan diet". • To connect local agricultural production with tourism.
Market intelligence sostenibile. Agosto 2012 relazione trimestrale.	Ministry of Foreign Affairs and Trade and New Zealand Trade and Enterprise, 2012 www.nzte.govt.nz/explore-export-markets/market-research-by-industry/Food-and-beverage/Pages/FB-Sustainability-Report-for-Spain-August-2012.aspx	Organic food makes its way into Spanish households: Organic foods are present in one out of every four Spanish households and there are strong growth prospects for organic products in the domestic market. <ul style="list-style-type: none"> • Increased commitment to sustainable seafood among Spanish fishing industry and food retailers: Spanish fishing, transformation and distribution industries are growing increasingly interested in sustainable fishing and are taking steps to introduce Marine Stewardship Council (MSC) eco-labels into their seafood products. • Spain falls out of the top 30 countries in the 2012 Environmental Performance Index report: Spain's ecological footprint and debt increase despite the economic recession. • Environmental NGO report reveals low levels of "food miles" awareness in Spain: The rise in Spanish food imports in recent years is having a significant social and environmental impact in rural areas.
Sustainability and Carbon in the Agrifood Sector: problem or opportunity?	Pedro Santos, Pedro Falcato, Rui Almeida, Luis Mira, 2011 www.consulai.com/newsletter/17/pdf/VR-201103-Carbono.pdf	There are more and more environmentally conscious consumers trying to reduce their "carbon footprint" through consumer choices, such as buying local and seasonal products with low emissions or zero carbon. This document clearly states that the carbon footprint of food and its labeling may become mandatory for food products. This is an opportunity of creation / launch of new product segments that will surely add sufficient value to allow recovery of the initial investment required to adapt processes, products and behaviors.

5.4 Laws and regulations / Policies supporting trade and export in the MED Area

The regulations included in Table 5.3 refer to trade and export.

5.5 Final remarks

The agro-food industry is seeking to find solutions able to improve its competitiveness in the new markets, as the growth of emerging countries has provided new opportunities, but at the same time has generated an increased demand for raw materials and natural resources.

According to HLG, Report on the Competitiveness of the European Agro-Food Industry (EC 2009), due to the overall decrease of the European agro-food industry share in the world market, and the steady domestic consumption, the development of the European agro-food companies becomes more and more dependent on the external dimension, and access to foreign markets both for exporting and importing goods.

The recent debate about the reform of the Common Agriculture Policy (CAP) is strategic in terms of trade and export of the agro-food sector, as the European agriculture is the main supplier of raw materials for the EU food and drink industry. At the same time, the entire European food supply chain has

to adapt to the aforementioned challenges in a more sustainable way. This is the reason why the European Commission's food safety policy guiding principle is to apply as an integrated approach "from farm to fork" covering all sectors of the food chain.

ENHANCING OF THE MANAGEMENT CAPABILITIES OF THE COMPANIES

The benefits of new markets, that can be exploited by the internationalization processes, require new management capabilities of the companies. It means not only dealing with different consumers preferences but also the differences in production possibilities, access to raw materials and markets, standards, rules, etc..

Existing trade barriers which the European Agro-food companies face in their efforts to expand activities in non- EU markets remain a great importance.

INTRODUCING FAIR TRADE AGREEMENTS AND STANDARDS

Private standards may confer competitive advantage due to improved control and increased efficiency generated by the quality management systems adopted. Some of these standards are firm-specific while others are collectively adopted by a group of stakeholders in the supply chain (producers, processors, retailers). Both show that the agro-food industry and retailers take responsibility for food safety in the supply chain, often using

business-to-business approaches, but unfortunately the efforts are not always well communicated to consumers. Growing attention on private labels by retailers also poses additional demands on producers and processors to satisfy high and uniform quality standards and delivery requirements. For more information refer to Chapter 6.

Another challenge is harmonization, as the evidence suggest that it is still a pending issue at international level. The EU food law aims to harmonise existing national requirements in order to ensure the free movement of food and feed in the EU.

DEVELOPING EFFICIENT AND EFFECTIVE TRANSPORT AND LOGISTICS SERVICES

The rationalization of the transport systems, the development of efficient and effective logistics services which can comply with the needs of the different actors (producers, distributors, transport and logistics operators) aim at reducing transport costs, meeting rising standards and ensuring also a higher value added by shifting from a production-oriented approach to a broader system perspective that emphasizes agro-food chain coordination and value creation.

GETTING A DEEPER UNDERSTANDING ON THE SUPPORT OFFERED BY THE ENABLING ENVIRONMENT

There is a need of a better awareness of the roles of the public sector, organizations and

Table 5.3. - Policies concerning trade and export

Reference	Institution/ Territorial level	Description
<p>"Criteria to recognize the regional agro-food producer groups and the Interprofessional Organizations (IO), in application of the Regional Law 24/2000"</p> <p>Regional Council Decision Nr. 339 of March 14th, 2011</p>	<p>The Emilia-Romagna Regional Council Regional</p>	<p>Emilia-Romagna has defined criteria to recognize the Interprofessional Organizations (IO) on a regional level for all the agro-food segments in application of the Regional Law 24/2000.</p> <p>The IO can develop common rules on production, models of interprofessional agreements to be used among members, organize databases for programming production, make collective actions to promote their products, develop common services aimed at improving product quality and social and environmental sustainability.</p>
<p>2007 - 2013 Emilia-Romagna Rural Development Plan - Measure 121 - Measure 123</p>	<p>Emilia-Romagna Region Regional</p>	<p>Support the capacity of aggregation of companies active in the dairy sector towards supply chains, so as to make them stronger and more competitive in the market, in view of the European important deadline, e.g. the abolition of milk quotas in 2015 and the consequent liberalization of the market.</p>
<p>Supply chains policies</p>	<p>Greece central government National</p>	<p>The sector of cereals in Greece presents a lot of development potentials, through the implementation (by central government) of the following policies:</p> <ul style="list-style-type: none"> • enhance the role of agricultural associations on production management and strengthen cooperative actions • promote team building among organic farmers and capacity building for their scientific support • promote 'contracting agriculture' between primary sector and manufacturing sector in order to produce specialized products (e.g. organic grains, pasta, etc.) • creation of an inter-professional organization for each crop

associations of representatives in supporting food companies. Because some specific characteristics of the agro-food sector represent non-negligible and often uncontrollable sources of risk for most agro-based investments (e.g. raw materials variability in quality and prices) and also due to the demanding food quality and safety policies.

GROUPING OF COMPANIES FOR JOINT INTERNATIONALIZATION ACTIVITIES

Small medium companies can join together and be supported by institutions to allow joint strategies to access foreign markets. Normally this initiatives are focused on specific sectors and targeted towards emerging markets with high perspectives of growth.

GROUPING OF PRODUCERS TO IMPROVE STRATEGIC SOURCING OF RAW MATERIALS

As reported by many project partners, primary producers are in a weaker position versus the larger ones belonging to the food industry and distribution (see also par. 5.1). Producer organizations and associations represent a valid strategy to enhance the bargaining power of the primary producers, marketing quality local production and control surplus produce, so as to have more visibility and strength on local and international markets (see also Chapter 2). Raw materials produced at local level can be supplied to the food industry, rather than importing them, this way decreasing the transportation cost.

One example is represented by the tomato district of the North Italy, coordinated by the Province of Parma (partner of the PACMAN project).



06

Quality and consumers

*food safety and quality, healthy lifestyles,
consumer information and consumer choice*



6.1 Criticalities identified concerning quality and consumers

AWARENESS OF CONSUMERS ABOUT QUALITY AND SUSTAINABILITY OF PRODUCTS

The following criticalities have been witnessed. Investments in sustainable packaging is not always valued by the consumer, particularly if they result in an increase of the sales price; lack of communication actions/strategy to promote the value added of the packaging segment to the end consumer (ERVET, Agro-food, packaging); awareness of consumers' purchase of PDO (Modena, Dairy industry/Parmigiano Reggiano); awareness about official labelling and benefits of organic products; Requirement of adaptability to the novel demand of consumers (IVACE, general); consumers seem to prefer products with low fat and low caloric value as well as organic products (Kilkis, operation of dairies and cheese making).

STRATEGIC ROLE OF CERTIFICATIONS

Certification perceived as unnecessary by packaging companies' customers (ERVET - Agro-food dosing, wrapping, packaging); Complex structure for control and certification; Harmonisation of European regulations concerning EU and non EU product labelling (IVACE – general)

The aforementioned criticalities, identified in the segments chosen by PACMAN partners, are matched with the partners/territories in the Table 6.1.

6.2 Opportunities

New consumer trends are among the key challenges facing the food and beverage industry in Europe. The research and development of innovative products and processes (see Chapter 3) are strategic for the entire food supply chain, aimed at satisfying the ongoing changes in consumer preferences, while ensuring product safety and quality. The cultural differences and the different food habits provide an opportunity for innovation and the development of new products.

The increasing importance of biotechnology, resulting in new functional food, starts to link agricultural and food production with health.

A better know-how in the relationship between food and health has the potential to change the way we think about eating and drinking. Risk assessment on the emerging issues by helping consumers and other partners along the food chain to make informed choices by providing them with accurate and understandable information on relevant product characteristics.

The EU Regulation No. 1169/2011 on consumer information on food, called "INCO", introduces significant changes to information on food supplied to consumers (see Final Remarks).

6.3 Certifications

The in-depth analysis of the interviewed companies, carried out by PACMAN Project on 600 companies about the kind of certifications under which they were operating, showed that about three quarters (74%) of the companies which participated in the survey operate under one or several types of certifications. Public and private certification standards are fundamental tools to establish control and compliance in the production, processing and transportation of food, both at national and international level.

Figure 6.1 represents the types of certification.

Product quality certifications are the most common among PACMAN's partner regions, with 30% of respondents. Geographical indications and traditional specialties come next (26%).

Although management quality and environmental certifications are less spread they represent respectively 15% and 10% of the total. "Other" category refer to food safety certifications (HACCP: Hazard analysis and critical control points; governmental veterinary checks; ISO22000, etc) and, in a lesser extent, organic farming certifications.

A key-role of certification standards is to facilitate the coordination of agro-food value chains across space and between producers/

Figure 6.1 - Types of certifications

Source: PACMAN survey, 2012

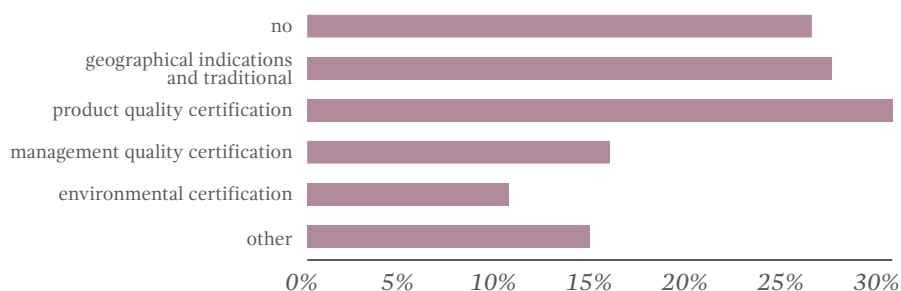


Table 6.1 - Identification of main criticalities

Selected segments	Territories			
	Emilia-Romagna	Modena	Kilkis	Valencia
Agro-food				■ ●
Packaging	■ ●			
Dairy industry		●	●	

● Awareness of consumers about quality and sustainability of products
■ Strategic role of certifications

firms and, in doing so, to transmit credible information to final consumers on the nature of products and the conditions under which they are produced, processed and transported.

LIST OF CERTIFICATIONS IN THE MED AREA

Hereby we provide an identification of certifications, directly or indirectly related to sustainability - with a focus on food quality and safety - in the agro-food sector in each region, specifying the objectives, and segments interested (Tables 6.2 and 6.3).

PRIVATE STANDARDS

Due to the consumers concern about safety, and partly in order to comply with public standards, agro-food players are changing their production processes and improving coordination among different stages of the chain. To a large extent, this has been achieved by requiring suppliers to adopt various private standards that are more demanding than the legal requirements, and have become increasingly important at both domestic and international trade.

Within the broad array of private standards relating to food safety (some examples in Table 6.4), according to the WTO we distinguish between three types of standard. This classification is based on who sets (defines and codifies) the standard¹⁷.

These standards, listed in the Table 6.5, may relate to food safety, but can also refer to aspects of food such as origin, environmental impact, animal welfare, etc. One of the key characteristics of private standards, par-

Table 6.2 - Certifications concerning the environmental dimension

Reference	Partners	Description
European Label of Organic Product	ERVET, CRITT, ADRAL, Province of Parma	Label that certifies the production of organic food and beverage. From 1 July 2010, the EU introduced a new organic logo to ensure consumer protection and common standards. Agro-food Segments interested: Farming/ Breeding
MSC - Marine Stewardship Council	ERVET	Mark that certifies sustainable fishing and traceability of fish products. Agro-food Segments interested: "Sea Food and Fish Breeding"; "Processing and preservation of seafood and its derivatives"
Forest Stewardship Council® (FSC)	ERVET	The Forest Stewardship Council® (FSC) promotes environmentally appropriate, socially beneficial, and economically viable management of the world's forests. Agro-food Segments interested: Packaging
Friends of the Sea	ERVET	Marchio che identifica i prodotti ittici provenienti da pesca sostenibile e l'allevamento Agro-food Segments interested: "Sea Food and Fish Breeding";
EPD Environmental Product Declaration	ERVET	Mark that permits to compare environmental impact of different products/services in their whole life cycle. Agro-food Segments interested: Whole Agro-Food chain (and many other sectors)
Globalgap	CRITT, ERVET	The GlobalGAP standard is a partnership between agricultural producers and retailers to establish a set of widely accepted certification standards and procedures for good agricultural practices (GAP). Its scope currently covers fresh fruit and vegetables, propagation material, integrated farm assurance (livestock, dairy, pigs, poultry, combinable crops and grains), flowers and ornamentals, tea, coffee and aquaculture. Agro-food Segments interested: farming/breeding/aquaculture
EMAS	ERVET, Province of Modena, CUT	Voluntary certification. The EU Eco-Management and Audit Scheme (EMAS) is a management tool for companies and other organizations to evaluate, report and improve their environmental performance. Agro-food Segments interested: Any organization
UNI EN ISO 14001:2004	ERVET, Province of Modena, CRITT, CUT	Voluntary certification. ISO 14001 maps out a framework that a company or organization can follow to set up an effective environmental management system. Benefits: reduced cost of waste management; savings in consumption of energy and materials; lower distribution costs; improved corporate image among regulators, customers and the public. Agro-food Segments interested: It can be used by any organization regardless of its activity or sector.*
ISO 14040 e 14044 LCA	CRITT, ERVET	ISO 14040:2006 describes the principles and framework for life cycle assessment (LCA) including: definition of the goal and scope of the LCA, the life cycle inventory analysis (LCI) phase, the life cycle impact assessment (LCIA). ISO 14044:2006 specifies requirements and provides guidelines for life cycle assessment (LCA). Agro-food Segments interested: Any organization
LACON Certification for Organic Farming	CUT	LACON certifies organic farming according to regulations for the production, processing and labelling of organic products in the Organic Regulation, Commission Regulation (EC) No 834/2007 and the accompanying guidelines hereto, Commission Regulation (EC) No 889/2008. (EC-No 1254/2008 & EC-No 710/2009). Agro-food Segments interested: Primary sector agricultural producers and farmers
Produzione integrata	Province of Parma	Applicare tutte le tecnologie disponibili per ridurre l'uso di prodotti chimici in agricoltura Agro-food Segments interested: Agricultural production (label can be used also for processed products)

ticularly as they relate to food safety, is an increasing focus on the processes by which food is produced. In this respect, they mirror the increasing importance of certification schemes in public regulations, as the increasing use of HACCP concerning food hygiene.

6.4 Laws and regulations/Policies supporting quality and consumers in the MED Area

Only two regulations have been identified by the PACMAN partnership and refer to quality and consumers' new trends.

Table 6.3 - Certifications concerning the social dimension

<i>Riferimento</i>	<i>Partner</i>	<i>Descrizione</i>
Fairtrade	ERVET	Fairtrade offers producers a better deal and improved terms of trade. This allows them the opportunity to improve their lives and plan for their future. Agro-food Segments interested: In the MED Area it doesn't involve the breeding/ farming segments, since the raw materials come from countries with higher level of poverty.
OHSAS 18001	CRITT, ERVET	OHSAS 18000 is an international occupational health and safety management system specification. Benefits: minimize risk to employees/etc; improve an existing OH&S management system; demonstrate diligence; gain assurance; etc. Agro-food Segments interested: Any organization
ISO 26000	CRITT, ERVET	ISO 26000 provides guidance on how businesses and organizations can operate in a socially responsible way. It helps businesses and organizations to translate principles into effective actions and shares best practices. Agro-food Segments interested: Any organization
SA8000	ERVET	SA 8000 is an international certification standard that encourages organizations to develop, maintain and apply socially acceptable practices in the workplace. Agro-food Segments interested: Any organization
Intermon Oxfam	IMPIVA	Oxfam is an international confederation of 17 organizations networked together in more than 90 countries devoted with human rights all along the world as part of a global movement for change, to build a future free from the injustice of poverty. Agro-food Segments interested: Agro-food

Table 6.4 - Examples of private standards in agro-food chains

<i>Individual firm standards</i>	<i>Collective national standards</i>	<i>Collective international standards</i>
Quality Chain (Carrefour) - version applied in multiple countries	British Retail Consortium Global Standard	GlobalGAP
Regulated Chain (Auchan) – version applied in multiple countries	QC Emilia Romagna	International Food Standard
P.Q.C. (Conad Quality Itinerary)		Safe Quality Food (SQF) 1000/ 2000
		Marine Stewardship Council (MSC)
		Forest Stewardship Council (FSC)

Table 6.5 - Food safety and quality certifications for agro-food supply chains

Reference	Partners	Description
ISO 22000	Ervet, Critt	Food safety management systems- Requirements is a voluntary standard for the certification of safety management systems in food-related fields. The main goals of this new rule are: <ul style="list-style-type: none"> the harmonization of the various specific standards concerning food safety the supply of a tool to develop the HACCP method during the whole production chain of food sector. Segment involved: agro-food supply chain
BRC	Ervet, Critt	The BRC Global Standards are a suite of four industry-leading Technical Standards that specify requirements to be met by an organization to enable the production, packaging, storage and distribution of safe food and consumer products. <p>Segment involved: Production, packaging, storage and distribution</p>
IFS	Ervet, Critt	IFS Food is a GFSI (Global Food Safety Initiative) recognized standard for auditing food safety and quality of processes and products of food manufacturers. It concerns food processing companies or companies that pack loose food products. <p>Segment involved: Processing companies/packaging</p>
PDO Protected Designation of Origin PGI (protected geographical indication)	Kilkis, Adral	Protected designation of origin (PDO) designates the name of a product which must be produced within a determined geographical area using recognized and recorded know-how. All products with PDO status must be produced exclusively with grapes from the area in question. Protected geographical indication (PGI) designates a product with a quality, reputation or other specific features that can be attributed to a determined geographical area. All products with PGI status must be produced with at least 85 % of the grapes coming from the area in question. <p>Segment involved: All agricultural products and foodstuff</p>
AGRO 1-1	Kilkis	The AGRO 1-1 standard is mainly addressed to agricultural products manufacturing or packaging enterprises/units wishing to certify the hygiene and the safety of their products. <p>Segments involved: All agricultural products</p>
AGRO 1-2	Kilkis	The AGRO 1-2 standard describes the guidelines for agricultural products manufacturing or packaging enterprises/units, so as to facilitate their smooth operation within the wider framework of Quality System. <p>Segments involved: All agricultural products</p>
CRETACERT, Certified Authentic Cretan Products	Forth	Certification of the products that are produced and processed in Crete under the control of the production process. Certification of geographical origin of products. <p>Segments involved: Olive oil, Wine, Vegetables</p>
Quality Label "OPEN WINERIES"	Forth	The quality Label "Open Wineries" of Region of Crete is the result of a collaborative effort of the winemakers networks of Crete. It is based on standards that have already been established by the winemakers network of Heraklion and was finalized with the help of the "Cretan Quality Agreement". <p>Segments involved: Wine</p>
Quality Label of Cretan Cuisine	Forth	Region of Crete and the Cretan Quality Agreement has created the "Quality Label of Cretan Cuisine" which aims at the participation of restaurants around Crete, in order to create a relation of trust with the consumers and promote the destinations as a gastronomy destinations. <p>Segments involved: Wine, Olive Oil, Vegetables</p>

Table 6.6 - Policies concerning quality and consumers

Reference	Institution	Description
Resolution 72/2011 from 10th June. Information system for food security	Ministry of Health from Comunitat Valenciana Territorial level: Regional	The objective of the resolution is to provide a suitable tool, the so called Food Safety Information System (SISA in Spanish), for improvement the social sustainability of the Valencian food chains. That system has been created to identify the main food chain risks, to prevent those risks and to provide a coordinated reaction in case of possible alimentary emergency; it is applicable to all steps of the Valencian food chain (from the production steps to final consumption of the food). Among other missions the SISA programs aims: <ul style="list-style-type: none"> to identify the risks associated with the food chain, to evaluate the risks due the food consumption, to provide mechanisms for detection and reaction to crisis situations, to provide information, to evaluate the effectiveness of the food control and prevention programs, to provide information for statistics, to communicate the information among scientific and market sector.
Province of Parma	Ministry of Agriculture SQNPI - National Quality System of Integrated Production Territorial level: National	According to EU regulation 1783/2003, Member countries may define National quality system, according to some guidelines. Italy has decided to develop a National Quality System with reference to Integrated production that is of great importance for the fruit and vegetable sector. The tool is almost ready for implementation.

6.5 Literature review

In the literature review carried out by the PACMAN partnership during the project, four references have been identified concerning quality and consumers' trend in the agro-food system in the MED area (Table 6.7).

Table 6.7 - Literature review concerning quality and consumers

Title	Author/Date/Link	Description
The future of the ecologic food elaboration: sustainability-quality-integrity Ivace id 1	Spanish Society of Ecological Agriculture, 2011 www.agroecologia.net/index.php?option=com_content&view=article&id=1417:el-futuro-de-la-elaboracion-de-alimentos-ecologicos-sostenibilidad-calidad-integridad&catid=218:noticias-seae-2012&Itemid=1	Extracted from the 2nd conference of IFOAM (International Federation of Organic Agriculture movements) (Frankfurt Nov. 2012). The article describes the actual situation of EU Organic Agriculture and highlights the main needs for the sustainable development of the sector, the following among others: <ul style="list-style-type: none"> • policies for promoting harmonisation of EU product labelling (avoiding overlapping), • reinforcement of the environmental profile of ecological producers and traders into the EU legal frame, • regular advice from official organizations as EGTOP regarding legal updates in new ecological foods or new ecological strategies/technologies, • more transparency of the law about ecological production for avoiding unbalances on the market, • to promote the perception improvement of consumers regarding confidence, safety and quality of ecologic foods, • need of increasing harmonisation and quality of organic food.
Norme NF ISO 26000	Afnor (French Association of Normalization), 2010 www.iso.org/iso/iso_catalogue/management_and_leadership_standards/social_responsibility/iso26000	The relationship to the society and environment in which companies operate is a critical factor in their ability to continue to operate effectively. It is also increasingly being used as a measure of their overall performance. ISO 26000 provides guidance on how businesses and organizations can operate in a socially responsible way. This means acting in an ethical and transparent way that contributes to the health and welfare of society.
Guide of use of ISO 26000 for food industry (AC X30-030)	Afnor (French Association of Normalization), da publicare	COOP de France and Ania initiated a joint work which will result in a frame of reference for structuring approaches of RS of food industries and make the ISO 26000 standard available to any company in the sector. It is important to make the distinction between the development of this repository as a base common to the entire sector and the accompanying and diagnostic tools (such as the self-diagnosis ania guide or the 3d program) that will enable businesses, if they wish, to evolve in their approach to corporate social responsibility.
Other Spanish Fruits: Table Grapes	Pablo Neustadt www.foodsfromspain.com/icex/cda/controller/pageSGT/0,9459,35868_6908150_6912156_4446313_7826885,00.html	The article describes the main varieties of grapes as important food on Mediterranean countries such as France, Italy and Spain. The article remarks their main organoleptic characteristics of grapes, focussing on table grapes and emphasizing the special contribution of Spain as the biggest European producer of this fruit. Among this, some regions such as Valencia, Murcia, Almería, or Protected Designation Origin (PDO) as Vinalopó (Valencian Community) are highlighted as producers of table grape. In addition, other important varieties of table grape such as Muscatel, Dominga, Cardinal, etc. are described as specific dessert refined meals.

6.6 Final remarks

The growing consumers concerns about food safety and quality makes it necessary to seek new solutions that answer to their new expectations at global level. In this perspective, the quality of (traditional) products has great potential for export and internationalization.

The national policies on the competitiveness of the agricultural and agro-industrial sector have focused on enhancement of the quality of the production, according to the project partners review of laws and regulations. However, the quality by itself does not seem to be sufficient to act on the price differential that allows manufacturers to cope with rising costs of raw materials and other inputs.

The intrinsic characteristics of the product are no longer enough. The challenge of sustainability means shifting the focus “from the products to the processes” through which they are obtained, and their “quality” with respect to the four dimensions of sustainability.

Product and process attributes (food safety, quality, environment, animal welfare, etc.) are requiring further structural adjustment of agro-food industry by vertical integration, logistics, raw materials management.

As competitiveness depends on the ability to respond “better” and “before” the other

economic actors, the existence of strong relationships among the actors of the agro-food system in providing answers to these challenges becomes the key variable of competitiveness.

The emphasis on food safety and on nutritional value also increases the need for research and development, therefore, for new types of skills in the local agro-food systems.

How the MED agro-food system can achieve the aforementioned challenges.

BY IMPROVING THE COMMUNICATION ACTIONS

Agro-food businesses have to create an effective action plan in order to ensure compliance with the implementation of product labeling, according to the new European Regulation No. 1169/2011 on consumer information on food, called “INCO”. The new regulation serves the interests of the consumer by increasing the level of information; it protects consumer health by establishing common rules on food information, and also encourages food business operators to set in place measures enabling access to information for the visually impaired. Consumer information is enhanced and reinforced by making nutrition labelling mandatory, by reinforcing any cases in which the origin must be indicated, and by specifying rules for information legibility as well as rules of fair practice regarding labelling.

BY IMPROVING TRANSPORT AND LOGISTICS EFFICIENCY

The changing consumer preferences pose new challenges for agro-food logistics. The increasing variety of products on offer requires innovative logistics solutions (ICT-based). The increasing diversity of products on offer requires more diverse logistic channels. Therefore, in order to secure the competitive position of the food industry, the improvement of transport and logistics efficiency is essential. For example, by putting in place technical and organizational solutions typical of modern logistics. This results in the evaluation of different levels of impact - measured in terms of emissions of CO₂, PM₁₀ and congestion - generated by different logistical choices and, in particular, from the different localization of the stages of production and distribution by different choice of methods and means of transportation.

BY PROMOTING MEDITERRANEAN DIET

The Mediterranean diet may represent the right path to increase agro-food sustainability, according to The Double Pyramid model, developed by the Barilla Center for Food and Nutrition, where food is linked to its environmental impact¹⁸. As a result, an important issue for the agro-food companies is to ensure that consumers understand the original premise of the quality of Mediterranean model¹⁹. The Mediterranean diet can also represent an opportunity to



link promotion of local products with activities that mix tourism with education. For further information see the Pilot Action "Establishing a trans-national marketing cluster based on the «Authentic Mediterranean» concept", involving Cyprus, Province of Modena, Crete, Kilkis, Alentejo. Mediterranean origin, quality raw materials, characteristics linked to tradition and culture.



Table 6.8 - Certifications bodies identified in the PACMAN project regions - Full list contacts

<i>Institution</i>	<i>Partner</i>	<i>Description</i>
AGROQUALITÀ S.p.A.	Ervet	Agroqualità is active in the agrofood quality certification and operates in accordance with the national, European and international rules and regulations for certification bodies. The company was created with the aim of responding to the need of supporting the development of agro-food products, through quality certification of products and systems. The main purpose of Agroqualità is to achieve audit services and certification of products and management system, according to voluntary certification schemes or regulated by national and international laws. www.agroqualita.it
CHECK FRUIT S.r.l.	Ervet	Check Fruit is an Italian Certification Body, providing independent assurance and certification services to the agricultural, produce and food processing industries. Check Fruit is accredited to the EN 45011 and ISO 17021 standards by ACCREDIA (the national accreditation body in Italy) for product and quality system certification. Check Fruit is recognised by the Italian Ministry of Agriculture for the control and certification of many products with Protected Geographical Indication (PGI's) and Protected Designation of Origin (PDO's). They also provide inspections and training courses on different issues of food safety, quality and regulatory. Check fruit works with food industries, retailers and trade organisations, because of its independence, experience and competency on the specific food sectors. Check Fruit has a unique perspective on the food chain and the ability to address a wide range of issues in a constant and integrated way. Check Fruit employs team of highly qualified agronomists and food technologists with experience, knowledge and competency on the food sector. www.checkfruit.it
CERMET Soc. Cons. a r.l.	Ervet	Certification services. Certification body, Quality Management System, Environmental Management System ISO 14001, ISO / TS 16949 for Automotive Sector, Information Security Management System ISO 27001:20000, Food Safety Management Systems, Medical Services, CE Certification. www.cermet.it
CMI ITALY S.r.l.	Ervet	The main fields of activity of CMI Italy srl include the following certification services: GLOBALGAP, LEAF and Tesco Nurture certifications, ISO 22000, ISO 9001, BRC (Consumer products, Food standards, packaging), IFS (Food, Logistics). www.cmi-italy.it
TÜV Italia S.r.l.	Ervet, Forth	Certification services. BRC Consumer Products, BRC Food Standard, BRC Packaging, HACCP, Halal, Kosher, QS, Voluntary Product Certification, Food contact, GLOBALG.A.P F&V, GLOBALG.A.P GRASP, IFS Food, IFS Logistic, ISO 22005, ISO 22000, UNI EN 15593. www.tuv.it
RINA Services S.p.A.	Ervet	Certification services. ISO 22000 Food safety management systems, Product certification, Traceability, IFS, BRC, NO GMO, ISO 20000, UNI 10854, DOP, IGP, STG, GLOBALGAP, ISO 14001, EMAS, SA 8000, ISO 9001, ISO 27001, OHSAS 18001, EPD/LCA, Best 4, Survey of risk levels and construction of organisation model Italian decree 231/2001, Certification in the field of Governance, Certification of services, ISO 28000, UNI EN ISO 22005:2007, GEOGRAPHICAL COLLECTIVE MARK, Voluntary labelling, ISO 50001, UNI EN 15593, HALAL food product certification scheme, The Bribery Act 2010 (BA), Marine Stewardship Council Fishery Certification, Friend of the Sea Certification. www.rina.org
CSQA Certificazioni S.r.l.	Ervet, Provincia di Parma	Quality Management System (ISO 9001), Food Safety Management (ISO 22000), Environmental Management Systems (ISO 14001), EMAS registration, Life Cycles Assessment (ISO 14040 - LCA), Workplace Health and Safety Management System (OHSAS 18001), Voluntary Product Certification, Certification of controlled products (PDO, PGI, CSC, traditional products), Supply Chain Certification (Controlled Supply Chain and ISO 22005), Social Accountability (SA 8000), Sustainability Reporting (AA 1000), E-commerce (Qweb), IFA- Globalgap, BRC, IFS, Information security management systems (ISO 27001), Inspections. www.csqa.it
Certiquality	Ervet	Certification services. ISO 9001, ISO 14001, EMAS REGULATION, BS OHSAS 18001, SA 8000, BRC, IFS, GLOBALGAP, HACCP. www.certiquality.com
SGS Group	Ervet	Agriculture and Food As agricultural goods progress from field to fork they require attention, tracking and integrity. We offer an end-to-end supply chain range of services that reduce risk, ensure quality and improve productivity. We help ensure the integrity of the food chain by managing crops, enhancing seed development, conducting soil testing and harvesting, moving products through the global supply chain and managing trade inspection at export and import. Sustainability We help organizations ensure that they and their partners have efficient and manageable processes and systems in place which comply with stakeholder requirements related to quality, health and safety, environmental management, corporate social responsibility and other areas of sustainable development. www.it.sgs.com
Bureau Veritas Italia S.p.A.	Ervet, Critt	Certification services: ISO 22000 Certification, GlobalGap Certification, BRC/IFS Certification, FAMI-QS Certification, FSSC 22000 Certification, Responsible Fishing (MSC...), Responsible Aquaculture, GMP+Feed, Organic, EFISC, AIM Progress, Biomass and Biofuels Sustainability Verification. www.bureauveritas.it
Det Norske Veritas Italia S.r.l.	Ervet	Certification services: ISO 22000 Certification, GlobalGap Certification, FSSC 22000, BRC (British Retail Consortium) Global Storage and Distribution and the IFS Logistics, Animal Feed and Ingredients, FAMI-QS Certification, FSSC 22000 Certification, SQF 1000/2000 Quality Food Program, Voluntary Product Certification, Product Sustainability, Green & Efficient Supply Chain solutions, Supply chain risk management. www.dnvba.it
Afnor certification	Critt	It is organized around 4 major areas of expertise: Standardization, certification, publishing solutions and services of technical and professional information and training. www.afnor.org/en
Ecocert	Critt	Ecocert is an organism of control and certification, certified according to international standard ISO Guide 65 (EN 45011). www.ecocert.fr

AGROCERT	Kilkis	Segments of activity: Integrated Management in Agricultural Production, Organic Agriculture, PDO, PGI, Traditional Specialty Guaranteed Agricultural Products, Quality Assurance of Pork Meat, Special Poultry Farming, Quality Assurance of Bovine Meat, Quality Assurance of Aquaculture Products, ISO – HACCP. www.agrocert.gr
A-CERT (A-Cert European Organization for Certification S.A.)	Kilkis	<p>“A CERT” is accredited by the Hellenic Accreditation System (ESYD) as a Certification Body in the following areas:</p> <ul style="list-style-type: none"> • Organic Products according to EN 45011 standard. • Quality Management Systems in compliance with ISO 9001:2008 standard according to ISO / IEC 17021:2006. • Food Safety Management Systems in compliance with ISO 22000:2005 standard according to ISO / IEC 17021:2006 and ISO / TS 22003:2007. <p>Integrated Management in Agricultural Production / Management of Rural Environment, in compliance with the AGRO 2.1 and AGRO 2.2 standards, according to ISO/IEC 17021:2006. www.a-cert.org</p>
CERTIS - Controlo e Certificação, Lda	Adral	Control and Certification of Traditional Products (PDO, PGI, TSG, DO, IG), Modes of Production (Organic Farming, Integrated Production, Integrated protection), optional labeling, Private Benchmarks, Management Systems. www.certis.pt
AGRICERT - Certificação de Produtos Alimentares, LDA	Adral	Agricert is a private organization of inspection and certification of food products, recognized based on the NP EN 45011:2001 - General requirements for Certification Bodies Products, the competent organ of the Ministry of Agriculture of the Sea of Environment and Spatial territory for twenty four traditional products as well as organic farming, integrated protection and integrated production. www.agricert.pt
Greek Standardization Organization (ELOT)	Forth	In Greece, ELOT is the sole national body responsible for the elaboration, approval, publication and distribution of Hellenic Standards. www.elot.gr
Cretan Quality Agreement	Forth	The Company's AIMS are to Promote the Cretan Diet and certifies to Local Restaurants with the Label for the “Cretan Cuisine”. The overall Goal of the Company is the Sustainable Development of the Island through Partnering with the Public Sector, Business Sector and Civil Society. www.cretan-nutrition.gr
ENAC (Entidad Nacional de Acreditación)	Ivace	ENAC is the official body designated by the Spanish Government to assess technical competence in accordance with international standards and certifications at the country. ENAC is strongly related to agriculture and environment. It provides certifications as: BRC, IFS, EUREP, GFSI and certification schemes for large-scale agro-food sector distribution. www.enac.es
ACERTA	Ivace	ACERTA is an auditing and certification body, truly independent and specialized in the food industry mainly from Spain but also in more than 20 other countries. ACERTA is able to certify for international protocols as: ISO, Tesco NURTURE, IFS, BRC, GLOBALGAP, etc. www.acerta-cert.com
IFOAM (International Federation of Organic Agriculture Movement)	Ivace	The worldwide mission of IFOAM is to lead, to unite and to assist to organic movement in order to achieve social, environmental and economical sustainability of organic agriculture. n/a
ARPA Emilia-Romagna	Province of Modena	EMAS certifier
Department of Environment - Cyprus Ministry of Agriculture, Natural Resources and Environment	Cut	The Department of Environment apart from implementation and enforcement of legislation which is a result of the harmonization with the environment European acquis, is also the focal point for most of the U.N Conventions regarding global and regional environmental issues. www.moa.gov.cy/moa/environment/environment.nsf/index_en/index_en?
CYCERT - Cyprus Certification Company	Cut	Cycert, the Cyprus Certification Company founded in 2002, is a subsidiary of the Cyprus Organisation for Standardisation (CYS), and provides the following certification services: Quality Management System ISO 9001:2000, Environmental Management System ISO 14001, Occupational Health & Safety Management System, Health & Food Safety (HACCP), CE Marking (in cooperation through and notified bodies), Product Certification. www.cycert.org.cy/index.php
LACON Institute for Inspection and Certification in Agriculture and Food Processing Ltd	Cut	Company operating all over Cyprus in inspecting certifications for the LACON certification scheme (organic farming). n/a
CCPB	Province of Parma	Evaluation and certifications of environmental performances of products based on LCA with specific evaluation services focused on agrifood and agroenergetic supply chain. Areas of activity: Integrated production, Global Gap, traceability system, GMO-free products, organic Farming, Verified Environmental Impact. www.ccpb.it
ENEA	Province of Parma	ENEA activities include the development and implementation of environmental management systems (EMS) and environmental product labels. It supports national and local productive systems for the implementation of Directives, Regulations and European or international Standards. www.enea.it

Appendix

*Indicators of sustainability identified
by the PACMAN partnership and concerning
agro-food in general or specific segments*

<i>Segment</i>	<i>Indicator</i>	<i>Type</i>	<i>Dimension</i>
Packaging	Packaging weight and optimization (includes Primary, Secondary and Tertiary packaging) **	Quantitative (weight/ weight reduction), possibly by material category	Environment, Economy
Packaging	Packaging to Product weight ratio - The ratio of the weight of all packaging material used to the weight of the product or functional unit delivered**	Quantitative (% packaging weight/ total weight)	Environment, Economy
Packaging	Material waste – The mass of material waste generated during the production and transport of packaging (including materials, constituents, components) **	Quantitative (Kg /FU - Material destined for landfill and final disposal)	Environment
Packaging	Recycled Content – The ratio of recycled material (post consumer and pre-consumer as defined by OSP 14021) to total material used in packaging constituent, component or systems.	Quantitative (%)	Environment
Packaging	Renewable Content – The ratio of renewable material used to total material used in packaging	Quantitative (%) Percentage by weight on material lever (ISO 14021) or on carbon level (ASTM D6866)	Environment
Packaging	Packaging reuse rate – The number of times packaging accomplishes the same use, rotation or trip for which it was conceived and designed within its life cycle (according to EN 13429 – ISO/CD18603)	Quantitative (can be used for primary, secondary and tertiary packaging)	Environment
Packaging	Packaging recovery rate – The mass fraction or absolute mass of packaging recovered from all sources based on relevant waste management statistics	Qualitative: recoverable (yes/no)	Environment,
Packaging		Quantitative: recovery rate (%)	
Packaging	Cube Utilization – The overall volumetric measurement of packaging design efficiency for the packaging system. Concerns only tertiary packaging.	Quantitative (% - percent of volume in a transport unit occupied by the product)	Environment, Economy
General	Environmental Cost of distribution chain (includes both the transport of raw materials and packaging, plus the distribution of the finished goods)	Quantitative (CO2 emissions across the agro-food chain)	Environment
General	Nitrate diffusion in waste water measures the level of nitrates disposed in waste water from the manufacturing process thereby affecting the underground aquifers	Quantitative (mg/lit of nitrates per ton of finished goods)	Environment
General	Raw Material waste The portion of material waste (in volume) generated during the production process reused (comprising materials, constituents, components)	Quantitative (% of tons/ liters of waste material reused)	Environment, Economy
Primary sector	Raw material used from accredited sustainable production systems The ratio of raw materials to total procured from accredited sustainable production systems (a) organic, (b) CO2 neutral, (c) GlobalGap	Quantitative (%)	Environment
General	Average distance of factory from the sources of raw materials	Quantitative	Economy
General	Environmental ethics index*Indicator destined to identify the effort undertaken by SMEs to implement environmentally sustainable actions in a year	Quantitative in terms of points collected from actions undertaken to reduce environmental impacts	Ethics, Environment
General	Annual electricity consumption in Kw/h per ton produced	Not specified	Environment
General	KW of electricity produced: panels solar, co-generation, etc.	Not specified	Environment
General	Number of KW of electricity produced	Not specified	Environment
General	Volume of water collected from water in M3 / finished products tons	Not specified	Environment
General	% recycled water / total water consumption	Not specified	Environment
General	Volume of water used (liter of water / finished products tons)	Not specified	Environment
General	% of producers using rainwater for their farming activities	Not specified	Environment
Generale	% di produttori che partecipano alla raccolta differenziata	Non specificato	Ambientale
General	% of production using tools and methods to reduce water consumption	Not specified	Environment
General	% of waste and process recovered/recycled products	Not specified	Environment
General	% of producers participating in the selective collection	Not specified	Environment
General	Penalties inherent in a bad sort of waste	Not specified	Environment

<i>Segment</i>	<i>Indicator</i>	<i>Type</i>	<i>Dimension</i>
General	% consistent analysis of effluent	Not specified	Environment
General	Number of actions carried out to preserve the endemic local flora and fauna	Not specified	Environment
General	Amount of participation in profits	Not specified	Economy, Social
General	Number of stakeholders met regularly	Not specified	Economy, Social
General	The number of references products	Not specified	Economy
General	Part of the agro-food industries in the turnover	Not specified	Economy
General	% of the agrienvironmental practices that are certified	Not specified	Economy
General	Number of eco-design product	Not specified	Economy
General	% of employees in indeterminated contract	Not specified	Social
General	Number of agricultural producers	Not specified	Social
General	Number of agricultural employees in ETP	Not specified	Social
General	Part of the dismissal on the total of departures	Not specified	Social
General	Share of voluntary departures out of the total of departures	Not specified	Social
General	Average number of training hours per employee ETP	Not specified	Social
General	% of the gross salary mass for training	Not specified	Social
General	Utilization rate of the DIF (individual right to training)	Not specified	Social
General	% of employees covered by appraisal interview	Not specified	Social
General	% of women in the Board of Directors	Not specified	Social
General	% of women in coaching	Not specified	Social
General	mean difference between the wages of men and women	Not specified	Social
General	Number of producers accompanied on the OHS theme	Not specified	Social, Environment
General	Work accident severity rate	Not specified	Social, Environment
General	Accidents at work frequency rate	Not specified	Social, Environment
General	Absenteeism rates	Not specified	Social, Environment
General	Number of incoming students	Not specified	Social
General	Number of trainees in contract of professionalisation	Not specified	Social
General	Amount of sponsorship and donations	Not specified	Social
General	Amount of the aid for young farmers	Not specified	Social
General	% of the purchases made locally	Not specified	Social
General	Amount of settlements paid to suppliers in the territory of the company	Not specified	Social
General	% of local employees	Not specified	Social
General	national and UE turnover	Not specified	Economy
General	export turnover (off UE)	Not specified	Economy
General	added value	Not specified	Economy
General	Amount of inputs to producers regulations	Not specified	Economy

<i>Segment</i>	<i>Indicator</i>	<i>Type</i>	<i>Dimension</i>
General	% of revenue paid to agricultural producers	Not specified	Economy
General	Certification ISO 9001	Not specified	Economy, Environment
General	Certification NF V 01 005	Not specified	Economy, Environment
General	Certification ISO 14001	Not specified	Economy, Environment
General	Certification NF V 01 007	Not specified	Economy, Environment
General	Certification IFS / BRC / ISO 22000	Not specified	Economy, Environment
General	other certifications if yes, precize	Not specified	Economy, Environment
General	% of compliant products	Not specified	Economy, Environment
General	% of products marketed under SOQ (official quality signs)	Not specified	Economy, Environment
General	Access to water (includes water consumption measurement, reduction of water demand and water treatment)	Quantitative (CO2 emissions across the agro-food chain)	Environment
General	Use of energy (includes reduction of energy demand in all the processes and use of renewable energies as alternatives to carbon, fuels....)	Quantitative (CO2 emissions across the agro-food chain)	Environment
General	Use of raw materials (includes CO2 emissions of transports)	Quantitative (CO2 emissions across the agro-food chain)	Environment
General	Valorisation and waste raw materials and co-products	Quantitative (CO2 emissions across the agro-food chain)	Environment
General	The portion of material waste (in volume) generated during the production process reused (comprising materials, constituents, components)		
General	Economic indicators / social n. markets, direct sales initiatives	Quantitative	Economic
General	n. of companies certified EMAS and ISO 14000	Quantitative	Environment
General	Communication no. information campaigns consortium MIPAF, Consorzio Parmigiano-Reggiano	Quantitative	Economic
General	new products	Qualitative/ Quantitative euro invested in research and development	Economic
Olive Oil	Specific Net income: (€ for sealing the production - € for producing the product) per unit of culturing surface and year	Economical Quantitative (€/ha.y)	Economic
Olive Oil	Specific Production: Total production of oil per unit of cultivation	Economical Quantitative (m3/ha.y)	Economic
Olive Oil	CO2 fixation: estimated amount of CO2 fixated per ha of vegetal surface	Environmental Quantitative (t/y.ha)	Environment
Olive Oil	Employment: number of employees generated by the sector per year / total employment *100	Social Quantitative (%)	Social
Olive Oil	Specific Consumed Energy: Total energy consumption over the product production	Environmental Quantitative (kWh/t.y)	Environment
Olive Oil	Employees salary: total gross salary per person and year	Social Quantitative (€/y)	Social
Olive Oil	Specific Water Consumption: volume of water required for producing one ton of product per year	Environmental Quantitative (m3/t.y)	Environment
Olive Oil	Energy of Re-used substrates: energetic valorisation of residual biomass per ha of cultivation and year	Environmental Quantitative (kWh/ha.y)	Environment
Table Grapes	Specific Net income: (€ for sealing the production - € for producing the product) per unit of culturing surface and year	Economical Quantitative (€/ha.y)	Economic
Table Grapes	Specific Production: Total production per unit of cultivation	Economical Quantitative (t/ha.y)	Economic

<i>Segment</i>	<i>Indicator</i>	<i>Type</i>	<i>Dimension</i>
Table Grapes	Ecological production strategies: agro biotechnology, biological traps, pheromones, etc.	Social Qualitative	Social
Table Grapes	Employees salary: total gross salary per person and year	Social Quantitative (€/y)	Social
Table Grapes	Employment: number of employees generated by the sector per year / total employment *100	Social Quantitative (%)	Social
Table Grapes	Energy of Re-used substrates: Energetic valorisation of residual biomass per ha of cultivation and year	Environmental Quantitative (kWh/ha.y)	Environment
Table Grapes	CO2 fixation: estimated amount of CO2 fixated per ha of vegetal surface	Environmental Quantitative (t/y.ha)	Environment
Bakery (Cocas-coquetes)	Specific Net income: (€ for selling the production - € for producing the product) per unit of culturing surface and year	Economical Quantitative (€/ha.y)	Economic
Bakery (Cocas-coquetes)	Water consumption: total volume of water required per ton of produced product and year	Environmental Quantitative (m3/t.y)	Environment
(tomato processing chain)	Carbon footprint (from farm to processed products) – It measures the amount of carbon dioxide emission directly or indirectly connected with the production process	Quantitative	Environment
(tomato processing chain)	Water footprint - The amount of water directly or indirectly used for the whole production process (from farm to the final product)	Quantitative	Environment
(tomato processing chain)	Adoption of Integrated Production schemes – These certifications require to optimize the use of agrochemical products during the production process.	Quantitative (% of tomatoes produced using a certified IP scheme)	Environment

Notes

1. Report of the World Commission on Environment and Development: Our Common Future, 1987.
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2. FAO (Food and Agriculture Organizations of the United Nations), 2011 - Linking climate change financing and sustainability – Implications for Agriculture.
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3. OECD (The Organisation for Economic Co-operation and Development) - May 2011 - A green Growth Strategy for Food and Agriculture. Preliminary report.
www.oecd.org/greengrowth/sustainableagriculture/48224529.pdf
4. The Consumers Goods Forum, 2011, "Global Protocol on Packaging Sustainability 2.0"; "A Global Language for Packaging and Sustainability – A framework and a measurement system for our industry".
globalpackaging.mycgforum.com/allfiles/FinalReport_2011.pdf
globalpackaging.mycgforum.com/allfiles/GPPS_2.pdf
5. According to the article 'Sustainability to support end-to-end value chains: the role of supply chain management' (Closs, Speier, Meacham - 2012 - Academy of Marketing Science).
6. Ibidem.
7. There are also other ways to represent the concept of sustainability. The approach adopted by the 3D Destination Development Durable elaborated by CRITT/PACA Region is the following: Governance, Economic, Market & Customers, social, Societal, Health and Security at work, Environment, system and product Quality.
8. OECD (The Organisation for Economic Co-operation and Development) - May 2011 - A green Growth Strategy for Food and Agriculture. Preliminary report.
www.oecd.org/greengrowth/sustainableagriculture/48224529.pdf
9. "Sustainability to support end-to-end value chains: the role of supply chain management" - Closs, Speier, Meacham - 2012 - Academy of Marketing Science.
10. See 3.1 methodology and ALSO next chapter.
11. Focus groups, analysis on the key factors and specific interviews carried out during the projects in specific agro-food segments represent the main source utilized by the Project Partners to identify these criticalities.
12. See also the Grid for the selection of the three most relevant agro-food segments
www.pacmanproject.eu/page/project-documents/doc2013/2_MAP%20_SEGMENTS_05032013.pdf
13. See also Hand-e-book on Agro-Food Green Packaging developed by PACMAN Project.
14. H.L. Tuomisto, I.D. Hodge, P. Riordan & D.W. Macdonald, (2012), Does organic farming reduce environmental impacts?; *Journal of Environmental Management* 112 (2012) 309-320, available online:
www.sciencedirect.com/science/article/pii/S0301479712004264
15. Gustavsson, J., Cederberg, C., Sonesson, U., van Otterdijk, R. & Meybeck, A. Global Food Losses and Food Waste Section 3.2 (Study conducted for the International Congress "Save Food!" at Interpack2011, Dusseldorf, Germany) (FAO, Rural Infrastructure and Agro-Industries Division, 2011).
16. Ibidem.
17. Packaging in the Sustainability Agenda-A Guide for Corporate Decision Makers.
18. Individual company standards are set by individual firms, predominantly large food retailers, and adopted across their supply chains. Collective national standards are set by collective organisations that operate within the boundaries of individual countries, including industry associations and non-governmental organisations (NGOs). Some of these standards are specifically designed to establish claims about food from particular countries or regions. Others, however, have international impacts through their application to globalised value chains. A third set of standards, collective international standards, are designed to be adopted (required or used) by organisations in different countries.
19. Those food items that nutritionists believe should be eaten more often (fruit, vegetables, bread, rice, pasta and legumes) are also those that have a lower impact on the environment. While the nutritional value of the Mediterranean diet has been recognized by the international scientific community for some time, the Double Pyramid now demonstrates that this model also contributes to protecting the environment.
20. The programme for increasing and improving the nutritional quality of modified Mediterranean produce was carried out since 2010 also by the Provence Alpes Côte d'Azur regional branch of the French innovation and technology transfer centre (CRITT), in partnership with the French technical centre for food preservation (CTCPA) and a unit of the French national institute for agricultural research (INRA) in Marseille1, which have been coordinating the "OPTIMED" project. This project aims to increase and improve the nutritional quality of 13 specially selected modified Mediterranean products.



Projet cofinancé par le Fonds Européen de Développement Régional (FEDER)
Project cofinanced by the European Regional Development Fund (ERDF)



ISBN 978-88-908954-0-1



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