



## D1.2

# Policy Briefing Report on Food Chain Innovation Targets

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## 1. Objectives

In the FOODMETRES DOW **Task 1.2 Setting and Monitoring Innovation Targets** (DLO-2, ZALF-1, COVUNI-0.5, UMIL-0.5, UL-0.5, ASC-0.5) is outlined as follows: Together with the Advisory Committee and representatives from all other WPs, the coordinator will gather, assess and guide the development of innovative food chain targets. The approach is as follows:

- Based on the literature review and considering the Conceptual Framework, **innovative concepts and targets** need to be developed for each aspect of the Food Chain and Food Triangle (see Figure 1): economy, governance, logistics/transport, food safety, food security, social cohesion, the environment.
- Each Case Study leader needs to provide a review document on **how these Innovation Targets are going to be addressed, what is missing, and which is the role of the SMEs**.

The Innovation Targets need to be specific, technically and scientifically sound.

- The WP1 Coordinator will compile both the literature review as well as the Case Study contributions to develop 3 policy briefs on food chain innovation as well as one scientific publication for a peer-reviewed article on Food Chain Innovation.

This report deals with “Setting and Monitoring Innovation Targets” and is structured along the work steps:

1. Compilation of innovation targets of short food supply chains (SFSC) based on a literature review
2. Contextualizing the SFSC innovation targets within the FOODMETRES Conceptual Framework and approaches taken in WP1, 3, and 5, as well as with concepts of relevance in the policy discussion focussing on innovative food issues in sustainable Metropolitan regions
3. Approach to explaining the SFSC innovation targets in a system approach, taking into consideration the relevant innovation domains and items, dimensions, SFSC types, and concepts.
4. Policy briefs an food chain innovation

## 2. Innovation targets and goals of short food supply chains (SFSC)

### 1.1 Background, definitions and structure

As well Metropolitan Agricultural Systems (MAS) as Local Agricultural Systems (LAS) are the spatial entities in which we analyse the emerging innovative short food supply chains.

The broad body of literature on short food supply chains, which in the recent years has been accomplished through many publications specifically focussing on short chain phenomena in the context of organic farming, alternative food networks (AFN), and urban agriculture and gardening encompasses several review studies, which have been carried out from different expertise background. One of these studies critically points to the high level of generality and impreciseness with regards to goal respectively target definition: Literature on alternative and local food networks exhibits a “blurred often individual value –laden view on goals, a partially inconsistent use of concepts and terms, conflation of the structural characteristics of food systems with desired outcomes and/or actor behaviours, insufficient acknowledgement of the problems of marketplace trading, and a continued lack of a consumer perspective between the structural characteristics or properties of phenomena, and the goals of participants within those phenomena” (Tregear 2011).

From this background the first step taken in task 1.2 was a clarification of the terminology. When screening the literature in the named context, the higher frequency of the indication “**innovation goal**” compared to “**innovation target**” becomes obvious. In order to delineate both terms from each other, we follow Parris and Kates (2003) who conducted a review on sustainability transition, carefully distinguishing between goals, indicators, targets, trends, and driving forces. In this taxonomy, “goals are broad, qualitative, statements about objectives”. Targets, in contrast, include more specific and often empirically testable information. Accordingly, in the following we refer to “innovation goals” and not to “innovation targets”.

Theory on food chain organisation and management distinguishes two types of goals differentiated into ‘Generic Goals’ and ‘Product Specific Goals’. In this task we are mainly interested in ‘**Generic Goals**’ that “include general classes or categories of goals that consumers see as means to fulfil their needs”. Product specific goals, in contrast, are “specifically branded or labelled products that individual sees as a way to fulfil a need” (Management Innovations 2008).

The term “**concepts**” addresses more complex general understandings of a theme, often described with an operational orientation, which we identified also through literature analysis. While for the innovation goals our selection is based on a review of relevant state of the art knowledge, based on literature sources from academia, for the concepts we mainly address the current policy debate and by searching strategic documents and work programmes on matters of food, development and environment (Parris and Kates 2003).

In the use of the term “**innovation domains**” we refer to the FOODMETRES elaboration in D1.1, listing the items within the SFSC, in which an innovation area can be located (see chapter 2.1).

“**Innovation dimensions**” are adopted from the FOODMETRES DOW and objective description for Task 2.1 (see chapter 2.2).

“**Innovation Chain Types**” have been introduced in FOODMETRES D5.1, based on a literature survey, and are a classification system, already implemented in the stakeholder processes of the FOODMETRES case studies, and accordingly adopted in this task 1.2.

“**Indicators**” have not been taken into consideration within this report. Examples for such indicators are: networking, trust and mutual knowledge, commitment and solidarity, education activities (skills e.g. marketing, and knowledge e.g. contextualisation), certification, labels, cooperation at local scale, collective approaches of farmers, link to farm sizes, ecological and social conditions (CEC 2012), as well as distance related indicators: Personal interaction, Relations of proximity, Label, brand& certification (Galli and Brunori 2013).

In this deliverable report, we list and explain the goals, relevant in the context of Metropolitan areas, and establish the conceptual links with related categories used in other deliverables as follows:

- With WP5: we link the food chain innovation goals to Short Food Supply Chain Types, along the classification developed in the FOODMETRES D5.1.
- With WP 3: we elaborate on potential innovation impacts, considering food chain organization and logistics (D3.1), food quality and safety (D3.2)
- With WP4: we take into consideration case study evidence and data coordination (D4.1).

Here, especially sustainable development policy goals are addressed and to a lesser extent the impact of the application of a certain food chain type. The objective is to compare different generic chain types regarding their contribution to these goals in a normative sense.

## 1.2 Short Food Chain Innovation Goals

In this paragraph we present a compilation of the state of the art derived from a literature review on short food chain innovation goals, structured along economic, environmental and societal dimensions.

### **Improve environmental sustainability of the food chain**

Short food-supply chains and the integration of primary producers into local markets make important contributions to a sustainable mode of food supply that is less transportation-intensive (Lange et al. 2013, Jarosz 2008). Also Cleveland et al. (2014) state the significance environmental goals, out of which various are related to the establishment of short distance delivery systems (EC 2012, Seyfang 2006).

### **Maintain biodiversity**

As well Metropolitan Agricultural Systems (MAS) as Local Agricultural Systems (LAS) are characterized by food production that can include diverse commodities as well as monocultures (FOODMETRES D3.1). Particularly if vegetable production is concerned, richness in crop species and varieties is often observed. However, the link between cropping diversity and maintaining biodiversity as an explicit goal is mentioned rarely, e.g. by Brunori (2007).

### **Earn a livelihood**

Income generation, is primarily described as goal of farm households engaging in on-farm marketing or direct marketing as a diversification strategy towards building an additional economic pillar (Evans and Ilbery, 1993; Ilbery, 1992) as it increases turnover and reduces the vulnerability to macroeconomic changes (Ilbery, 1991; Edmond and Crabtree, 1994; Meert et al., 2005). It has been observed that the proximity of the farm's location to urban consumer markets is highly relevant to direct marketing options (Zasada, 2011; Ilbery, 1991), and regional marketing forms like Farm-gate purchasing, box delivery systems or other direct marketing schemes are more often evident within peri-urban areas (Aubry et al., 2008). But also in the new emerging non-professional forms of SFSC, like urban agriculture in community gardens, yielding an economic benefit belongs to the goals of the members (Okvat and Zautra 2011, Alkon 2008, Tei et al. 2010).

### **Test and establish individualized/ innovative business models**

The goal to operate a business model suited to own way of life, and capacities of farm holding and farm household is described as well for professionals as in many cases for new emerging forms of AFN and urban agriculture. (Moroney et al. 2013, Cleveland et al. 2014)

### **Improve territorial viability**

Re-linking urban-rural relationships and re-strengthening local economy, what can be achieved through improving the multifunctional character of land use in urban vicinity (Moroney et al. 2013, Zasada et al. 2013) and through linking SFSC to the territory around (EC 2012)(Galli and Brunori 2013), belong to the central goals of improving territorial viability.

### **Influence land use change/ spatial development**

New ways of agricultural food production and logistics, like metropolitan food clusters, are theoretically discussed as regimes changes, that occur in landscapes, and amongst other factors affect land use change and spatial arrangements (e.g. Gerritsen et al. 2011). Urban agriculture has been contextualized to political motivations towards spatial transformation (Pudup 2008). Hence, influencing land use change through protecting agricultural land from losses through other uses (Piorr et al. 2011) or from other ownerships (land grabbing) can be assumed another goal.

### **Reduce waste and food loss**

Reducing food waste and food loss belongs to the explicitly stated goals of SFSC. Minimised packaging, waste and food transport as well as reducing food miles are to be mentioned in this context (Seyfang 2006).

### **Improve health and wellbeing**

Particularly urban gardening, self-harvesting farms and community supported agriculture are SFSC types connected to the goals of improving health and wellbeing through direct activity, move and have fun, but also through developing a new awareness on food, what can contribute to combat obesity (Opitz et al. *in press*). The significance of wider food strategies and integrated policy approaches, in which SFSC often play a relevant role, has been stressed (Lang and Barling 2012).

### **Grow fresh food in and near towns**

Traditionally, horticultural land use around cities has had a significant importance for the supply of cities with fresh vegetables and fruit, what along with increasing land use pressure through competing land uses (e.g. building) and globalized markets markedly declined (Piorr et al. 2012, Zasada et al 2011). The new demand for regional food is to a high degree related to fresh products, like vegetables, and is both related to producer as consumer goals. In this context, the potential conflicting demands of organic versus affordable are discussed (Tei et al. 2010).

### **Maintain traditional farming methods/varieties**

Maintenance of traditional farming methods and /or varieties has been described in connection with the goal to re-entangle socio-nature relations with values attached to production, such as quality, environment, jobs, ethic, culture, social link, conviviality (Kenis and Mathijs 2014, EC 2012).

### **Maintain food traditions**

The goal of maintaining food traditions results from the increasing marginalization of traditional food and a re-vitalized perception value particularly communicated through the slow food movement. “Most local food strategies are based on the claim that, when properly managed, the cultural traditions and natural characteristics of the place of origin, impart particular qualities to a product” (Brunori 2007).

### **Increase trust between consumers and farmers**

SFSC innovation is also a response to scandal surroundings of food safety. The goal to increase trust between consumers and farmers is mainly achieved through establishing more direct producers-consumers link ( EC 2012, Seyfang 2006) and allowing transparency about food supply chains (Seyfang 2006). The direct link is in many cases a personalized one, but it also works through information and knowledge sharing intermediates. In this context, Renting et al . (2012) established the relationship to food sovereignty and empowerment of ‘food citizenship’, and points to the ‘need to move beyond food as a commodity and people as consumers’ , connected with new developments in food governance like the control of the chain through stakeholders involved ( EC 2012, Renting et al 2012).

### **Create socially responsible production conditions**

The goal of creating socially responsible production conditions and addressing social aspects of rural development is referred (Seyfang 2006, Cleveland et al. 2014).

### **Take part in community building**

The SFSC innovation goal of taking part in community building has been addressed by various publications (Cone and Kakaliouras 1995, Hinrichs 2000, Lang 2010). While cooperation per se is a central goal in non-profit oriented SFSC types (Opitz et al. *in press*), cooperation as a means in order to achieve economic goals, in particular to realize marketing advantages on product sales, has been identified as a feature of professional farms rather than part-time or hobby farms (Huynh et al 2014).

### **Contribute to social/societal integration**

A broad body of literature addresses the goal of contributing to social or societal integration, and to connecting people from different cultures and social backgrounds (Bonacich & Alimahomed-Wilson, 2011; Holland, 2004; Lyson, 2005; Saldivar-Tanaka & Krasny, 2004; Travaline & Hunold, 2010).

### **Contribute to social justice and equality**

Traditionally more a topic of SFSC in developing countries, with economic crisis the global North put the goal of SFSC contributing to social justice and equity on the agenda (Bonacich & Alimahomed-Wilson, 2011; Tregear 2011, Alkon 2008). Also access to seasonal quality food belongs to this category (EC 2012, Seyfang 2006).

### **Improve skills and knowledge**

In SFSC types with narrow ties to the transition movement the goals of improving skills and knowledge are labelled “re-skilling” or learning through experimenting. As well the rather individual objectives of awareness building and education but also the societal change objective of food supply chain resilience are mentioned (Strites 2013, Kenis and Mathijs 2014).



## 2 Contextualizing the SFSC innovation goals within the FOODMETRES Conceptual Framework

### 2.1 Innovation Domains and Items

In FOODMETRES D1.1 the following Innovation **Domains and Items** have been identified (Fig. 1)

- Product innovation: Goods & Service, Market Impacts, Ideas & business models
- Process innovation: Technology, Infrastructure, Delivery & Services
- Social innovation: Change of behaviour, New relationships, Cultural inclusiveness
- Governance innovation: Taxes & Subsidies, Labels & Certificates, Food Planning

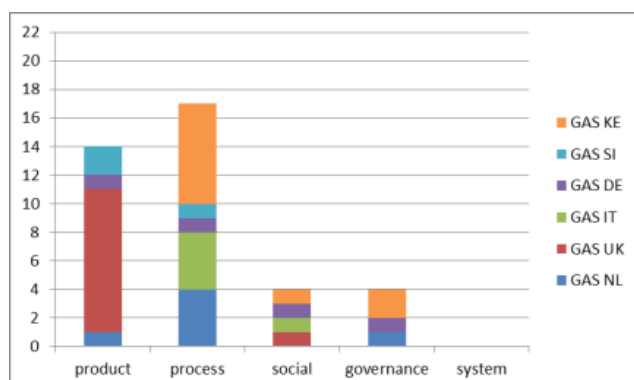
The FOODMETRES Conceptual Framework (D1.1) outlines the connection between Innovation Domains and Innovation Goals as follows:

At the heart of the scheme stands the development of “**innovation storylines**” also sometimes referred to as “innovation biographies”. ..These innovation storylines are linked to certain commodities and will be drawn up on by means of two desktop studies, namely the identifications of generic innovation targets for short food chains (WP1.2) and the analysis of the generic urban footprint (WP2.1), as well as by inquiries among stakeholders in the commodity - specific food chain analysis (WP3.1).

In FOODMETRES D3.1 these innovation storylines have been drawn up for case study evidence on the SFSC in the dairy sector, namely for the commodity “milk”. Hereby, a distinction on the spatial entities GAS (Global Agricultural System), MAS (Metropolitan Agricultural System) and LAS (Local Agricultural System) was carried out and placed in the context of logistics theory, relating the occurrence of innovation domains in the named spatial entities.

For this task 1.2, we were interested in the empirical relevance of the innovation domains and accordingly mapped the frequency distribution of described items in FOODMETRES innovation storylines on the commodity „milk“ from the case studies (n=121), based on number of stated examples in the D3.1.( Fig. 1).

Product innovations and process innovations proved highest incidence across GAS, MAS and LAS, particularly often, process innovations in the LAS were stated. Examples for social innovation and governance innovation were named less frequently, but more often in the regional and local context, where social innovation tends to be a property of LAS and governance innovation one of MAS. System innovation was not mentioned at all in the D3.1 examples.



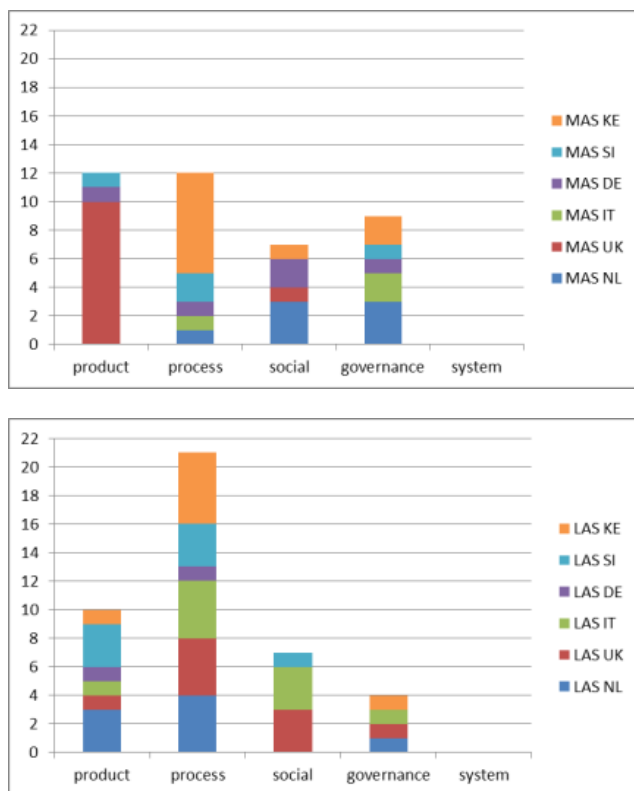


Figure 1. Innovation dimensions and empirical evidence on relevance in the GAS, MAS and LAS: Frequency distribution of described items in FOODMETRES innovation storylines on the commodity „milk“ from the case studies (n=121), based on D3.1

## 2.2 Innovation Domains and Innovation Dimensions

The FOODMETRES DOW presents a list of innovation dimensions, which the innovation goals identified are supposed to cover. In Table 1 we mapped them in relation to the innovation domains in a normative generic way. The intention to draw clear relationships between both could not be reached due to the complexity and multi-purpose and multi-area character of the subject. We therefore decided for a system approach for contextualization.

Table 1. Mapping table SFSC innovation dimensions and innovation domains

Dimension	Domain				
	Product	Process	Social	Governance	System
economy	X				
food safety	X				
logistics/transport		X			
social cohesion			X		
governance				X	
food security				X	
environment	X	X			

## 2.3 Innovation Goals and Sustainability Impact areas

The literature review on SFSC innovation goals presented in chapter 1.2 provided a background for the derivation of Sustainability Impact areas in D5.1 (Tab.2). The generic goals had been fed into an assessment framework consisting of a food-oriented set of impact areas, which are understood as wider impact and policy fields, rather than narrow indicators (Zasada et al. 2014).

Table 2. From innovation goals to sustainability impact areas

<b>Innovation Goals (D1.2)</b>	<b>Sustainability Impact areas (D5.1)</b>
	Environment
<ul style="list-style-type: none"> <li>• Improve environmental sustainability of the food chain</li> <li>• Maintain biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>• Eco-efficiency in abiotic resource use (land/soil, water, nutrients)</li> <li>• Provision of ecological habitats and (agro-) biodiversity</li> <li>• Animal protection and welfare</li> <li>• Reduction of transportation distance</li> <li>• Reduction of packaging</li> </ul>
	Economy
<ul style="list-style-type: none"> <li>• Earn a livelihood (income, profit)</li> <li>• Test and establish individualized/ innovative business models (income, profit)</li> <li>• Improve territorial viability</li> <li>• Influence land use change/ spatial development</li> <li>• Reduce waste and food loss</li> </ul>	<ul style="list-style-type: none"> <li>• Employment along the food chain</li> <li>• Income and profitability</li> <li>• Rural viability and competitiveness</li> <li>• Transportation efficiency</li> <li>• Reduction of food loss and waste along the food chain from producer to households</li> </ul>
	Society/ culture
<ul style="list-style-type: none"> <li>• Improve health and wellbeing</li> <li>• Grow fresh food in and near towns</li> <li>• Maintain traditional farming methods/varieties</li> <li>• Maintain food traditions</li> <li>• Increase trust between consumers and farmers</li> <li>• Create socially responsible production conditions</li> <li>• Take part in community building</li> <li>• Contribute to social/societal integration</li> <li>• Contribute to social justice and equality</li> <li>• Improve skills and knowledge</li> <li>• Empower for self-reliance</li> </ul>	<ul style="list-style-type: none"> <li>• Food safety and human health</li> <li>• Food quality (freshness, taste and nutritional value)</li> <li>• Viability of food traditions and culture</li> <li>• Transparency and traceability</li> <li>• Food security (availability and accessibility)</li> </ul>

## 2.4 Concepts and Sustainability Impact areas

The literature review identified an additional element, frequently mention in the context of SFSC, which is concepts. In order to identify those concepts that are of policy relevance, we extracted a shortlist of conceptual key words. In order to verify the list we screened relevant strategic documents at EU level (Work Programme Horizon 2020) and only maintained those that were mentioned n>1. The resulting list of policy relevant concepts related to SFSC are:

- Co-creation
- Multi-functionality
- Food justice
- Territorial resilience
- Circular economy
- Niche production
- Micro-entrepreneurship
- Sharing economy
- Green Infrastructure

In order to establish the link between SFSC sustainability areas and the named concepts, a matching table has been set up (Tab. 3). The concept of territorial resilience shows the highest number of matches, and a balanced coverage across environmental, economic and societal impact areas. For others like micro-entrepreneurship, circular economy or multi-functionality there are also many matches, but often covering only two sustainability areas.

Table 3. Matching table of SFSC sustainability impact areas and concepts of policy relevance

	Multi-functionality	Green Infrastructure	Territorial resilience	Micro-entrepreneurship	Niche production	Circular economy	Food justice	Sharing economy	Co-creation
<b>1 Environment</b>									
1.1 Eco-efficiency in abiotic resource use	x		x			x			
1.2 Provision of ecological habitats and (agro-) biodiversity	x	x							
1.3 Animal protection and welfare	x		x		x				
1.4 Reduction of transportation distance			x			x			
1.5 Reduction of packaging			x			x			
<b>2 Economy</b>									
2.1 Employment along the food chain	x			x	x				
2.2 Income and profitability	x			x	x			x	
2.3 Rural viability and competitiveness	x		x						x
2.4 Transportation efficiency			x			x			
2.5 Reduction of food loss and waste						x			
<b>3 Society/culture</b>									
3.1 Food safety and human health			x	x			x		
3.2 Food quality (freshness, taste and nutritional value)			x	x	x		x		
3.3 Viability of food traditions and culture			x					x	x
3.4 Transparency and traceability									x
3.5 Food security (availability and accessibility)			x				x	x	

### 3 Explaining the SFSC innovation goals in a system approach, taking into consideration the relevant innovation domains and items, dimensions, SFSC types, and concepts

#### 3.1 Innovation system analysis approach

For the integration of single elements and interlinkages presented in chapter 2, chapter 3 suggests a system approach, specifically developed for Innovation System Analysis by Carlsson et al. (2002).

The Innovation system analysis approach (Carlsson et al. 2002) comprises a stepwise analysis of four elements, which we can easily apply to the above mentioned components of the FOODMETRES Analytical Framework.

- 1 Structure - Innovation Domains of the SFSC
- 2 Components (operating parts) – Chain types
- 3 Functional capabilities of the system SFSC - Innovation Dimensions
- 4 Functional relationships of the system SFSC - Concepts

#### 3.2 Validation forms for SFSC innovation goals across the named components through an expert survey

For the possible validation by principle expert surveys are a feasible instrument. We suggest to use the following questions and assessment templates in order to identify

- A. generic and specific relevance of the innovation goal
  - a. the system relevance of the innovation goal, regarding structure, components, functional capabilities and functional relationships.

**Example...**

- **Improve environmental sustainability of the food chain (goal)**

**A. Characterize the innovation goal:** Assess generic relevance and specific relevance as

Evaluation Scale	Very irrelevant	3	2	1	2	3	very relevant
Generic relevance for SFSC		3		1		3	
Specific relevance as							
Individual/ consumer goal		3		1		3	
Collective/ public goal		3		1		3	
Farmer goal		3		1		3	

- B. **Assess the system relevance of the innovation goal**
  1. Relation of innovation goal to the **structure** of the system SFSC (“**Innovation domains**”, **D1.1**)  
WHERE is the starting point for the innovation goal to reach its targets?  
**QUESTION: How much does the innovation goal address/ affect the innovation item?**

Evaluation Scale	Very weak	3	2	1	2	3	Very strong
Product innovation		3		1		3	
Process innovation		3		1		3	
Social innovation		3		1		3	
Governance innovation		3		1		3	
System innovation		3		1		3	
		3		1		3	

2. Relation of innovation goal to the **components** of the system SFSC (“**SFSC types**”, D 5.1) WHO and WHAT (i.e the operating parts within a SFSC type – farmers, retailers, consumers, their activities, the outputs) deals with the innovation goal?

**QUESTION: How important is the innovation goal for the named SFSC type?**

Evaluation Scale	Very unimportant	3	2	1	2	3	Very important
UG self supply							
UG commercial							
CSA							
DS on-farm							
DS off-farm							
Sale to enterprise							
MFC							
		3		1		3	

3. Relation of innovation goal to the **functional capabilities** of the system SFSC (“**dimensions**”, D1.1)

HOW GOOD TARGETED are the innovation goals within the SFSC (how selective, organisational, functional, learning oriented are the features) (functionality= does it work?)

**QUESTION: Is the innovation goal (connected with better functioning or robustness of the system through...) affecting the named dimension?**

Evaluation Scale	No	3	2	1	2	3	Yes
economic							
environmental							
Social cohesion							
Logistics/transport							
Food safety							
Governance							
Embeddeness							
		3		1		3	

4. Relation of innovation goal to the **functional relationships** of the system SFSC (**related to concepts**)

BY and THOUGH WHAT ? (Matching expectations , goals and functions with concepts) (function= how does it work?)

**QUESTION: In how far does the innovation goal rely on/ build on/contribute to the named concepts and principles?**

<b>Evaluation Scale</b>	<b>Not at all</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>Very much</b>
Co-creation							
Multifunctionality							
Food justice							
Territorial resilience							
Circular economy							
Niche production							
Micro- entrepreneurship							
Sharing economy							
Green Infrastructure							
		3		1		3	

## 4 Policy briefs

### 4.1 Policy Brief 1: The Spatial Challenges of FOOD SAFETY

#### Introduction

To date, food safety problems are often directly related to the fact that many people live in high population density areas, animals are intensively kept, transport networks are complex and pathogenic vectors affecting human health are extremely mobile by air, water and organisms. At the same time, the ongoing 'transition' toward a 'low carbon' society calls for a new 're-localisation' of energy and matter flows, especially between urban and rural domain. In this context, the FOODMETRES project ([www.foodmetres.eu](http://www.foodmetres.eu)) seeks to contribute with spatial and functional assessment tools that are based on the principles of coherent 'food sheds' or zones.

Conventional food production operates in a global food supply network, which has been increasing exponentially since the 1960s. These global networks have become more and more complex, which may impose risks for microbiological and/or chemical contaminations. There is thus a need to monitor, understand, and control food trade flows as food safety problems no longer affect just single countries, but have consequence at the global level. At the strategic level, the following seven food safety principles (BMELV 2013) are considered as being of fundamental value:

1. The food chain principle
2. The producer's responsibility principle
3. The traceability principle
4. Independent scientific risk assessment
5. Separation of risk assessment and risk management
6. The precautionary principle
7. Transparent risk communication

A closer inspection of these principles in the context of today's global food supply network shows that they are substantially affected by transport, logistics, technology and regulations. For example, according to the 'farm-to-fork' approach, a closed system of regulations and inspections is meant to encompass every phase of production. Therefore, the food chain principle is directly affecting the 'traceability principle' – an operation that requires open communication systems, monitoring procedures, common standards and *functional connectivity* within the food system.

It is not surprising that consumers perceive local and regional food chain products to be environmentally more reliable, operationally more transparent and socially more responsible. In particular, urban agriculture and its many variations such as vertical farming and roof-top-gardening are a social phenomenon that enjoy increasing popularity- not only as a resource for food, but also for their contribution to a new quality of life in cities. However, while urban agriculture does not produce the amount of food that high density urban areas require, most regional food systems are spatially exposed to food safety issues arising from conventional agriculture in their vicinity, connected through air- and water-borne infection vectors, as well as (wild) animal movement and human interference. Even at the regional scale, risk assessment and food safety monitoring can hence be considered a challenge. Currently, there is limited information on the food safety issues at this scale. Most research so far focused on food safety at the global level.



## **Approach and Results**

Within the FOODMETRES project, metropolitan footprint tools have been developed that can be used to match food supply and demand at the local and metropolitan scale. These tools can be used to estimate the self-sufficiency levels to be achieved in various urban regions. The tools are also able to derive spatial zoning with an urban core area, followed by a green buffer reserved for nature and recreation, a metropolitan food production zone differentiating a plant-based and a protein-based supply zone, and a transition zone, which is meant to provide food for adjacent urban areas. Within this zoning strategy, food safety aspects are incorporated by placing livestock farming at a remote position following the need to reduce direct exposure of core urban population to this sector's impacts (health, odours and food safety issues).

The phenomenon of gardening as one of many forms of urban agriculture, from environmental and socio-economic point of view, was a research objective within the FOODMETRES case studies. Due to rather specific characteristics (e.g. a high self-sufficiency), a bottom up approach in research was followed, supported by extensive interviews. In the Ljubljana metropolitan region, additionally, soil samples were collected from all interviewed gardeners (N=193) to analyse the content of phosphorus, potassium, organic matter and heavy metals.

*Output of the metropolitan footprint tool for the Rotterdam City Region.*

In order to identify food safety issues to be handled when moving from the global to the local scale, a questionnaire has been developed focusing on possible microbiological and chemical contaminations during food production. A pilot study of urban farmers showed that irrigation, fertilization, (personal) hygiene, the use of a track&trace system and storage are elements that can be improved to ensure a good quality and safe end product.

*Output of the gardening research for the Ljubljana Metropolitan Region.*

The results for phosphorus, potassium and organic matter show that gardeners often over-fertilise their plots (although with organic fertilisers), which does not have a large negative impact on the environment, but it is unnecessary and not good for plant resistance. Concentrations of cadmium, lead and zinc were mainly below the limits, although in some cases exceedances were found, which may pose a risk for vegetable consumption from these locations. The gardeners in the area usually do not perform soil tests and less than 1% has knowledge about heavy metals in their gardens soils.

## **Conclusions**

Tools have been developed to assess food security and food safety at local and metropolitan regions. These tools showed that, depending on the region, areas can be self-sufficient. However, more densely populated areas limit the possibilities for metropolitan food supply. Spatial planning of activities should take various aspects, such as food safety, into account.

The food safety questionnaire proved to be successful in pinpointing critical areas that need further attention to improve food safety at the local level.

Production of healthy food requires avoiding excessive accumulation of undesirable or even harmful substances like heavy metals or nitrate in the products, which can be a problem in urban agriculture. The by far major share of food produced in urban agriculture is consumed directly by the growers themselves, without having passed any health security assurance system.

## **Recommendations**

- Introduce spatial planning modules as a pre-cautionary food safety principle according to which food chain operations are managed within clearly defined zones.

- Increase the resource efficiency of food system operations within dedicated regional zones that separate livestock farming from vegetable production.
- Make use of tools developed within the project (Sustainability Impact Assessment & Metropolitan Footprint Tools) to support policy makers in establishing optimal spatial planning of metropolitan food production.
- Make use of the food safety questionnaire that is derived in the project, in which actors within the food supply can assess possible critical points for producing safe and good quality end products.
- Enable more research into the food safety consequences of a transition from global to metropolitan or local food production.
- Perform more analyses and give targeted professional advice on food safety issues to practitioners who are laypersons.

## 4.2 Policy Brief 2: Food Chain Innovation In Metropolitan Regions

### Introduction

The European Sustainable Development Strategy (CEC 2009) addresses a broad range of ‘unsustainable trends’ ranging from public health, poverty and social exclusion to climate change, energy use and management of natural resources. A key objective of the SDS is to promote development that does not exceed ecosystem carrying capacity and to decouple economic growth from negative environmental impacts. A report commissioned by the European Commission (CEC 2008) came to the conclusion that the Ecological Footprint approach should be used by EU institutions within the Sustainable Development Indicators (SDI) framework. In this context, The FOODMETRES project ([www.foodmetres.eu](http://www.foodmetres.eu)) seeks to contribute with spatial and functional assessment tools that are responsive to the dynamic nature of urban development trends and which can guide food chain planning and innovation at the level of metropolitan regions.

Recognizing that food production and consumption is not only linked via one-directional food chains in terms of processing and logistic pathways, but also part of cross-sectoral and hence multi-directional *value chains* associated with bio-economy, FOODMETRES has explored the role of metropolitan agriculture as a driver of system innovation. In practical terms this has meant that the FOODMETRES approach is rooted in both European as well as regional data supply, allowing cross-scale assessments at different resolutions. Central to these efforts has been the attention to different types of food chain innovation, namely product, process, governance and various social forms of innovation (see Figure 2).

As global hotspots for trade, transport and tourism, metropolitan regions hold extremely high stakes in food logistics, safety and quality. At the same time they are places where local, regional and global agro-food processes have a great potential for generating synergy. Therefore, metropolitan regions can be considered as being privileged for agro-food system innovation.

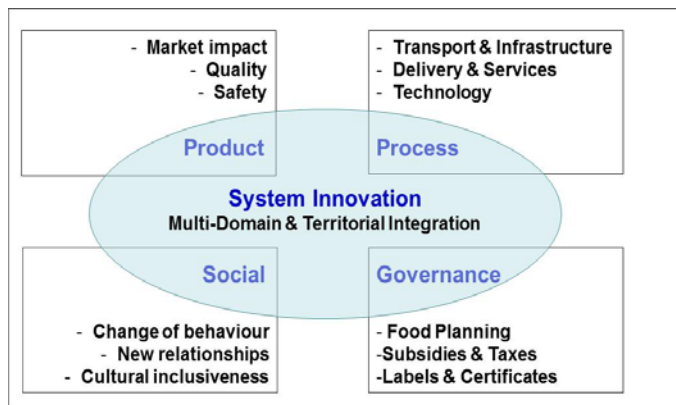


Figure 2: *Different system innovation dimension relevant for sustainable food chains*

It is hence not surprising that Dutch researchers and policy makers have coined the notion – if not the vision – of a Metropolitan Agro-Food System (MAS) as “*a deliberately designed system of intelligently connected production sites that uses the available resources, conditions and infrastructure in metropolitan areas to produce material and immaterial demands for the same metropolitan area*” (van Latesteijn 2008). The latter suggests nothing less than to fundamentally rethink and redesign the agricultural value chain with the goal of establishing a more resilient link between food security and food safety at the level of metropolitan regions. Such an approach needs to adhere to the following principles:

- i. spatial-functional entities with boundaries which are determined by system integration at the production level thereby defining what constitutes a metropolitan area;
- ii. sustainable principles, among them the limitation of agriculture’s ecological footprint by improved use of resources, conditions and infrastructure that are available in the area of demand;
- iii. a multifunctional approach by covering society’s material as well as immaterial demands (commodity and non-commodity goods and services).

Translating this vision of modern metropolitan agriculture into a spatially explicit planning concept for food security requires a more dynamic approach that is based on multi-functionality, evidence-based planning principles and multi-actor governance – assets yet to be incorporated into many European and national policies.

## Approach and Results

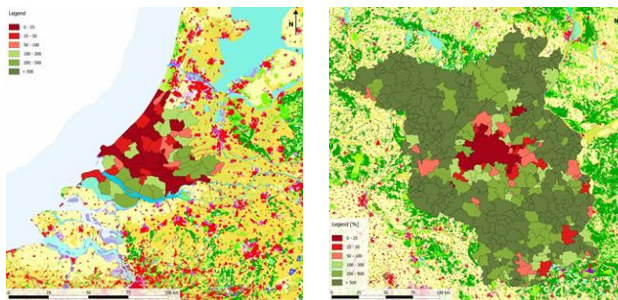
Focussing on the spatial dimension of metropolitan regions, FOODMETRES puts forward three footprint assessment tools allowing stakeholders from agro-food business, governance and civil society organisations to enter a knowledge-driven debate on sustainable and innovative food chain planning:

- **The Metropolitan Economic Balance Assessment (MEBA)** tool applies an economic approach to assess the food demand-supply balance within a metropolitan region;
- **The Metropolitan Area Profile and Scenario (MAPS)** tool adopts a straightforward data-driven approach to applying different food production regimes (e.g. organic farming, food loss) and consumption patterns (e.g. vegetarian, healthy diets) or population scenarios; and
- **The Metropolitan Foodscape Planner (MFP)** allowing stakeholders to re-allocate up to 10 commodities on the basis of landscape-ecological principles while measuring the ecological footprint effects at the scale of 1 hectare-grids.

The results demonstrate that quantitative assessments can provide important contributions to a wider societal debate on the characteristics and effectiveness of Metropolitan Agro-Food Systems (MAS).

## Conclusions

Re-interpreting the Thünen model we have demonstrated that data on regional food supply potentials can help to frame the dynamics of metropolitan regions in the light of spatial planning, rural development objectives and food chain innovation. The results are considered as valuable references for the emerging discipline of sustainable food planning as a young branch at the very interface between social and environmental sciences.



**Figure 3: Metropolitan Area Profile (MFP) tool output for Rotterdam and Berlin (Wascher, Zasada and Sali 2015)**

## Recommendations

- Integrate the notion of metropolitan regions into Rural Development programmes and funding schemes. It is crucial to achieve a common understanding on how metropolitan regions are triggers for sustainable development in rural regions, and that funding instruments and rules require appropriate consideration in territorial eligibility settings.
- Provide incentives and financial support for the agro-food sector where system innovation including aspects of governance and social embedding are properly addressed at the level of metropolitan food sheds.
- Establish European Cross-border Partnerships between policy makers, spatial planners and entrepreneurs to share experiences and to build up cross-border food shed activities for metropolitan regions.
- Make RIS 3 (Regional Innovation Strategies of Smart Specialization) an approach to develop metropolitan innovation strategies targeting at *Agrofood clusters* that act as technological, infrastructural and economical hubs.
- Use footprint assessment tools in knowledge brokerage session to raise the awareness regarding impacts of urban food consumption;
- Monitor and report on innovation impacts on the ecological footprints at the level of metropolitan regions metropolitan regions at a regular base.

### 4.3 Policy Brief 3: Rural Development Policy And SFSCs: New Perspectives For Sustainability, Food Security And Social Inclusion

#### Introduction

Innovation, sustainability, reconnection: the evolution and future development of metropolitan agri-food systems revolves around these three keywords. In this context, the FOODMETRES project ([www.foodmetres.eu](http://www.foodmetres.eu)) contributes spatial and functional assessment tools that are responsive to the dynamic nature of urban development trends and which can guide food chain planning and innovation at the level of metropolitan regions.

Global issues, from climate change to the consumption of natural and energy resources, and local issues, such as the increasing demand from civil society for a closer relationship with the territory, lead to possible solutions in the regional reconnection of agri-food production and consumption.

The food security of metropolitan areas (that in the near future will encompass most of world population) requires not only an environmental impact lower than the current productive and distribution structure (footprint), but also a greater resilience in responding to several shocks (e.g. natural disasters, social instabilities, geopolitical tensions, etc.).

#### Approach and Results

Analysing six case studies has made it possible to highlight how the complex structure of a Metropolitan Agri-food System (MAS) is able to respond to the challenges of domestic food supply, to compete in the global context (in connection with the Global Agri-food System, GAS), and to meet citizens' demand for a direct relationship through the development of Local Agri-food Systems (LAS). The involvement of experts and stakeholders has revealed that the fields in which the rural development policy need further adjustments concern (i) the strengthening of local supply chains, (ii) vertical integration, (iii) support to innovations in governance that aim to develop agro-industrial local clusters.

With the new RDP 2014-2020 thematic development priorities have been put on the agenda, that exhibit particular significance for SFSC in Metropolitan regions: Knowledge transfer, Food Chain, Resource Efficiency and Social Inclusion. Our research underlines that different types of SFSC are based on fundamentally different forms of chain organisation, professionalism and regional and social embeddedness.

However, considering commonalities in motivations and innovation directions between types we want to point to the following issues:

- Spatial entities of innovative urban-rural interactions rarely coincide with the target areas and spatial designation rules applied in RDP. It is crucial to achieve a common understanding on how metropolitan regions are triggers for sustainable development in rural regions, and that funding instruments and rules require appropriate consideration in territorial eligibility settings.
- Local governance, including networking, objective setting, development of novel chain organisations and solutions is a characteristic of new SFSC and can provide learning from best practices for other cases. However, although local governance is recognized as a mechanism which should be enabled through and for RDP design, in reality many hurdles are in the way of this. With new area settings for LEADER eligibility and the new instrument EIP, first steps are taken, but these are still insufficiently known by the actors of SFSC.

- The target groups of RDP are traditionally farmers or rural actors from other sectors or administration. SFSC are comprised from different and mixed groups, also underlying more volatility.
- New entrepreneurs are an important group of innovation agents, and the RDP offers relevant measures, however, it is necessary to actively convey actors and measures, e.g. through intermediaries like knowledge brokers and novel services that apply different information pathways and advisory services than the traditional ones.

Furthermore the RDP is a complex system of measures which can contribute with different impacts to the development of SFSCs and to their sustainability.

The project FOODMETRES, through a survey, has analysed the relevance of different RDP issues to the different types of SFSCs, in order to comprehend how rural development policies at European level and rural development programs at local level can best support the spread of sustainable SFSCs in European metropolitan areas.

In general, Knowledge transfer and information actions, Investments in physical assets and Setting-up of producers groups and organisations are the most relevant measures.

Analysing the different SFSC typologies we can underline that the support to organic farming can be determinant in Urban gardening for private consumption and in Direct sales on-farm to the private consumers where the relationship between producers and consumers (even in case of self-consumption) is not mediated at all.

The measures concerning the Setting up of producers groups and organizations plays a particular role in the Urban gardening for commercial purpose, Sale to regional enterprises and Agro Parks/Metropolitan Food cluster. Despite these three SFSCs acting at different scales, (local for urban gardening and metropolitan for regional enterprises and Agro Parks), the survey brings out the need for organization of farmers/producers in order to meet the aggregate demand for food.

Moreover investments in physical assets can be a fundamental element in different SFSCs like Direct sales on and off farm, sales to regional enterprises and to public procurement and Agro Parks, as they can increase the level of internal organization (logistics, access to the market, etc.) of individual farmers and or groups.

Finally the Quality schemes are essential to enhance and standardise the production quality in order to meet the requirements of consumers in particular in complex systems like the Sales to regional enterprises and to public procurement.

## **Conclusions**

Results confirm that to set a food policy able to deal with the challenges of urban food supply, adequate cognitive, simulation and planning instruments are needed.

- RDP should include new areas like metropolitan regions and new groups, not only farmers.
- RDP should consider and support new food chains models in particular SFSCs, which benefit from a great recognition in civil society.
- RDP should assess and monitor the sustainability (environmental, economic and social) of SFSCs in comparison with the conventional food chains.

## Recommendations

At European level the innovative approach to the RDP must address specific measures to the sustainable development of SFSCs including areas and social groups other than rural ones within a metropolitan and regional vision.

At local level Rural Development Programs must contemplate the specificity and diversity of SFSCs which arise from the local contexts and adapt measures and actions to support the most sustainable and promising initiatives according to sustainability goals.

### 4.4 Reflections on Policy Briefs: Feedback from Policy Workshop, Brussels

The event was attended by approximately 30 people from universities, civic organisations, business and DG Agriculture. The event began with an introduction from a representative of the Brandenburg region, who kindly hosted the event, followed by an overview of the project from the co-ordinator, Dirk Wascher. He highlighted the key achievements of the project, including:

- The food commodity storylines
- The Sustainability Impact Assessment
- The food chain typology
- The cross scale approach (using EU data sets at regional scale)
- Implementation of knowledge brokerage – learning by doing
- Use of qualitative and quantitative data



Dirk Wascher, FOODMETRES Co-ordinator

He pointed out the FOODMETRES is innovative in its work on the actual area needed for food production (rather than using the theoretical concept of 'global' hectares). He argued for an integrative approach to innovation, which makes use of expertise from many dimensions, including food systems and logistics experts who can assist in the redesign of food chains.

This was followed by a keynote speech from Dr Damian Maye, a member of the project's advisory board, who offered theoretical perspectives from his experience of working on two 'sister' projects

of Foodmetres – ‘Superbfood’ and ‘Glamur’. He identified some common themes including the need to re-think sustainability assessments of food chains, and to implement ‘smart city’ governance for resilience.



Dr Damian Maye, Countryside and Community Research Institute, UK

Members of the FOODMETRES consortium then presented 3 policy briefs. There then followed a very rich and lively discussion which covered the following key points/questions:

**governance and food policy councils:** What are the different ways of capturing change and transformation? Indicators can miss ‘softer’ changes and ‘horizontal’ relationships. Policy councils can be powerful but they need to be resourced and supported. How can they be mainstreamed? There needs to be a shift in policy thinking towards more integrated approach. E.g. proposals to develop ‘food departments’ or ask planning departments to have oversight of food issues.

**rural development policy:** Is governance about ‘enabling’ or ‘controlling’. E.g in agriculture there is a lot of trade. It can be negative, but it can be positive too (we need ingredients from afar and people like choice). What is hidden in the word ‘planning’? There are broader questions about the role of the market, private retail, regulation etc. We need mechanisms to facilitate discussion. There are also questions of responsibility and scale of action. Who wants which governance? Which phenomenon do we talk about? Which type of SFSC are we talking about?

**Smart Cities initiative:** Mainly focus on energy so far, but there could be synergies with food planning.

**External market regime:** gives right of way to productivist, large scale food systems. The conflict is that certain regions aspire to ‘feed the world’ and the world will be ‘saved’. It’s nothing to do with



prohibiting imports. It's to do with re-balancing – to reduce vulnerability to abrupt changes. The Netherlands government did a study on whether they would be self-sufficient. They found that they would have to go through a 3 year preparatory phase, substituting some things and re-establish a different balance. Should you really wait for the crisis or try to act sooner? Looking to find a balance would be an innovation in its own right.

**The different nature of zones:** There are areas which have the right kind of soil etc and are not a significant urban centre. We should avoid giving the impression that there is no room for farms selling further afield. We need re-balancing, but perhaps not a complete shift from one model to another?

**Vertical farming:** products that are important for nutrition are grown near cities in Africa – providing cities with these is vital given problems with stunting. Have any studies been done on vertical production in FOODMETRES? Although it was not a specific focus, some studies have been done which question the sustainability. Also, the vertical farms are disconnected from communities as well as disconnected from the ground. Costs are big too. Are we actually sharing knowledge about what food is and what insects do? It's an artificial environment.

**'Transformative capacity':** Reflects current debate on food politics – on one hand post-normal approach (enjoy complexity, richness) and on other hand we have a CAP, a 'top-down' political framework with a different nature. Visions collide. E.g. agroparks contrast with organic movement. Maybe it is better to have a more 'horizontal' approach and look for 'alignments of interest'. More place-based assessment to pick up more subtle changes occur. We need to avoid putting boundaries around things where possible. Need forms of governance that bring interest groups together eg. 'market' and others. No 'one size fits all' model of pathways of innovation for regions.

**Be brave.** Think about visioning different food realities for the future. Bring this back from the people to the politics.

**Think about geographical scope of policies.** Rural Development does not stop far away from the city. They do cover regions which are very close to the city. MS have discretion for defining the programme area that's covered. Only some measures specify 'in rural areas'. It's not so much an issue in the legislation as decisions taken by managing authorities. There is provision for territorial approach by combining rural development and regional development. There is mention of 'community-led' development. There are more opportunities in the new programme than previously. But it can be difficult to implement for traditional reasons e.g. influence of certain lobby groups. We need interface of knowledge brokerage, bringing together different groups etc. Managing authorities respond to lobbies. Some lobbies are more effective than others. It has to be done professionally and properly.

**Research projects have to include political lobbying in their activities.** Projects have to take the recommendations part seriously. Lobbying has to be built into the project. In Foodmetres we have community of practice already involved in the project. They can be channels of distribution of knowledge.

**Was language a barrier through the project?** workshops were in the local language. The project tried to keep 'top down' impact low and let participants come up with their intentions, visions. E.g. in Rotterdam, people spent time on their needs, incentives, plans using Serious Gaming. It was a joyful

and positive experience but remember that farmers only wanted to come if paid. They are so often asked! They are flooded with research activities.

The formal discussion then closed, with delegates staying to talk over delicious sustainably sourced food.



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