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small food businesses and
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Small farms and food and nutrition security: an empirically grounded conceptual framework

WP1 Transdisciplinary theory building and analytical framework

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Executive summary

The SALSA project aims at assessing the current and future role of small farms and related small food businesses in contributing to sustainable food and nutrition security at regional level in Europe and in selected African regions, and to identify the conditions for them to meet the demand for food in an increasingly populated and resource-constrained world.

The present document provides an empirically grounded conceptual framework (CF) for the analysis of small farms' contribution to food system outcomes, with specific attention to food and nutrition security (FNS). It hinges on the SALSA project outcomes, that have been used to integrate, refine and in some cases, revise through an iterative process, the early assumptions about the key concept and categories included in the initial version of the CF.

This final CF is mainly based on the field research conducted in the selected reference regions (RRs) and elaborated in the regional reports. This informative base has been enriched by input derived from the various SALSA Work Packages (WP) and elaborated on the basis of a participated and transdisciplinary process which hinges on interactions with experts and stakeholders, at different levels, and through different tools, beyond desk analysis and field research conducted in each region.

Figure "a" represents the process leading to the definition of the final CF and the key conceptual elements.

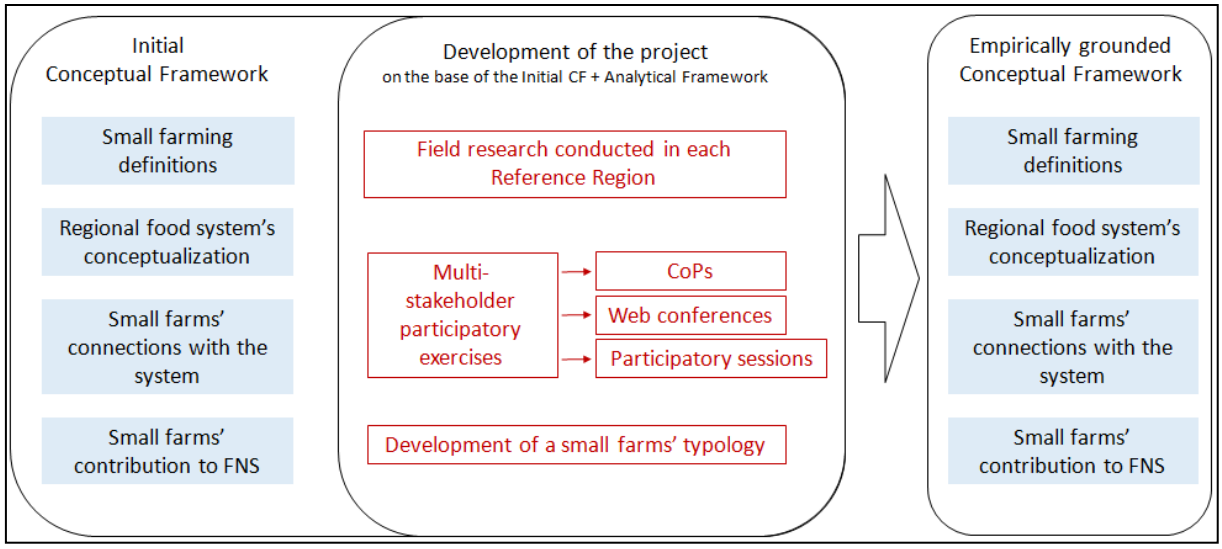

Figure a – From the Initial CF to the Empirically grounded CF

This document is structured around the key concepts explored in the initial CF, that are here refined in light of the project outcomes. The following sections explore each key concept (i.e. small farms, food system, regional food system, small farms' connections, FNS, and small farms' contribution to FNS) summarizing what was argued in the initial CF and then developing the reflections suggested by the research outcomes.

In Section 2 the conceptualisation of small farms and small food business is analysed in the aim to identify a consistent but also flexible definition of what a 'small farm' is. With hindsight, we can state that this definition cannot be based only on quantitative-oriented thresholds (e.g. size of the farm, number of animals, manpower, turnover, etc.). We therefore propose a 'relational' definition of small farm, based on the observation of the specific relations that a farm establishes with the food system, the farm household, and with the rural community. The definition proposed aims at capturing the peculiarities of small farming, highlighting limits and potential of the small size. According to SALSA findings, the key relations that characterise small farms are the farm-household linkages and the connections with the food system (e.g. the choices taken with regard to the destination of the produce or the provisioning of inputs).

More broadly, we frame small farms in relation to their connections to the food system (and also to the wider socio-economic and ecological system) in its spatial and territorial configuration, as argued in Section 3. The analysis of the territorial food system, conducted at a regional (NUTS3) level, is a key element of the research pathway, as it allows to observe production and consumption regional patterns and the small farms-centred flows of food and other resources among the various regional actors (i.e. producers, distributors, retailers, consumers etc.) influenced by the geography as well as by technical conditions and power relations, as reported in SALSA D3.3 (Rivera et al. 2019). Through the territorial approach the specificities of the contexts in which small farms operate and their influence of small farms' trajectories can be highlighted.

The range of connections that small farms establish with the other food system's actors (as analysed in Section 4 and here shown in Table "a") are the key elements for the identification of the "small farm", which tends to engage in a range of market and extra-market connections, in the aim to overcome the limits due to their small size. The eight connection forms listed on the right side of the table represent ideal types and are by no means alternative to each other. Besides, some of the connections identified on the field can be referred to more than one form, in particular for hybrid forms between market and reciprocity-based connections, which have also been given explicit recognition.

Connections	**Small farms' connections with food, welfare and broader economic systems**
Connections with public support and welfare	Public policies with influence on small farming
	Households' access to external income sources
Market-based connections	Vertical market-based supply chains
	Relations with small food business
	Participation in cooperatives
	Connections related to multifunctionality / other farm-based functions (besides production)
	Cooperation based on hybrids between market and reciprocity

Socially embedded connection	Informal arrangements based on reciprocity

Table a - Farm/Household connections' forms

In turn, the range of connections observed and defined for small farms shapes the contribution that small farms bring to FNS. To better understand what this contribution consists of, a broad definition of FNS is needed to grasp the specific small farms' roles in regard to FNS. This vision of FNS, briefly described in Section 5, encompasses freshness and reliability, the cultural value of food, as well as the diversity and resilience of food systems, and it highlights the importance of food access and utilisation's aspects, beyond the mere quantitative food availability.

Following these reflections, Section 6 analyses small farms' contributions to FNS in a system perspective highlighting the forms that this contribution can assume, from the food self-provision for the rural households and for the regional consumption to the improved resilience of the local food system, as well as the conditions that allow these contributions to be recognised and valorised. The outcomes of this reflection are summarised as in Table "b".

Hypothesis	***Contribution to FNS***	***Main dimension and level of FNS***
Hypothesis 1	*Food provision for regional consumption*	*availability, regional level*
Hypothesis 2	*Household access to food through self-provision*	*access and utilization, household level*
	Income provision for the rural households	*access, household level*
Hypothesis 3	*Food system diversity and consequent stability and resilience*	*stability, regional level*
	Food system degree of autonomy from external shocks and global changes	*stability, regional level*

Table b - Forms of small farms' contributions to FNS

These contributions to FNS are then framed in the light of the small farms' typology developed within SALSA (see Guarìn et al. 2019 - SALSA D3.2), and in relation to the different strategic choices of the small farms.

The matrix shown in Table c. offers a concise representation of small farms' types, their strategic choices and contributions to FNS, as emerged for the research participatory process as detailed in paragraph 6.2.2.

Small Farms' Types		Relation between strategic choices and contribution to FNS				
		Hypothesis 1	Hypothesis 2		Hypothesis 3	
		Regional provision	Self-provision	Income for household	System diversity	Autonomy
"Weaker market orientation" group:						
1	Part-time self-provisioners	Informal cooperation, Intensification, Technological innovation, Reliance on public welfare	Informal cooperation, Reliance on public welfare, Self-provision	Informal cooperation, Intensification, Local networks, Technological innovation	Informal cooperation, Reliance on public welfare, Self-provision	Reliance on public welfare, Self-provision
2	Conventional strugglers	Informal cooperation, Local networks	Informal cooperation, Local networks, Self-provision, Subsidies seeking	Subsidies seeking, Cooperatives, Informal cooperation, Local networks, Pluriactivity	Informal cooperation, Reliance on public welfare	Reliance on public welfare
"Stronger market orientation" group:						
3	Conventional entrepreneurs	Informal cooperation, On-farm processing	On-farm processing, Self-Provision	Cooperatives, Externalisation, Local networks, On-farm processing, Downsizing	On-farm processing	Self-provision, Local networks
4	Business specialized	Food quality, Cooperatives	Food quality, Cooperatives, Self-Provision	Food quality, Cooperatives, On-line selling	Food quality, Cooperatives, On-line selling, Organic, Subsidies seeking	
5	Business diversified	Food quality, Local networks, Mixed production, On-farm processing, Pluriactivity	Food quality, Mixed production, On-farm processing, Self-provision	Food quality, Intensification, Local networks, Mixed production, On-farm processing, On-line selling, Pluriactivity	Food quality, Local networks, Mixed production, On-farm processing, Organic, Pluriactivity	Local networks, Mixed production, On-farm processing

Table c - Relations between small farms' types, strategic choices and contribution to FNS

Different small farm's types contribute to the various FNS dimensions through different combination of strategies. The table does not provide an exhaustive view on all the possible relations between types, strategies and outcomes, as it results from a participatory process, described in paragraph 6.2.2, where some linkages could have been missed. It suggests another possible use of the conceptual categories developed in SALSA, and it can be also used as a concise representation of these dynamics. What matters, beyond the grid, are the stories and the pathways with regard to each small farm experience, for which the grid provides a synthetic representation and a conceptual frame.

Finally, section 7 provides some conclusive remarks, highlighting how the theoretical reflections support their identification of policy recommendations tailored to small farms' specificities.

1. Introduction

1.1 Rationale of the empirically grounded conceptual framework

The present document provides the empirically grounded conceptual framework (CF) for the analysis of small farms' contribution to food system outcomes, with specific attention to food and nutrition security (FNS). It hinges on the SALSA research results, which have been used to progressively and iteratively integrate, refine and, in some cases, revise the early assumptions about the key concepts and categories expressed in the initial version of the CF. In other words, while the initial CF was meant to provide concept and categories to guide research activities and theoretical discussions, the final CF describes how those concepts and categories have been revised, in turn, in the light of the research outcomes.

The SALSA project aims at assessing the current and future role of small farms and small food businesses[1] in achieving sustainable FNS in Europe and in selected African regions, and to identify the conditions for them to meet the demand of food in an increasingly populated and resource-constrained world. These objectives originate from two main observations: the large presence of small farms in both higher and lower income countries, in Europe as well as in the rest of the world, and by the increasing attention paid to FNS concerns and to the resilience of the food systems, even in supposedly food-secure contexts.

The elaboration of these concepts led to the definition of an initial overall research question: "*what is the contribution of small farms and of the related small food businesses to sustainable FNS in a wide range of food systems*?". An initial theoretical frame was defined to address this question based on the above-mentioned research question that was then refined and articulated into three hypotheses, plus an additional question.

Hypothesis 1: Small farming is a relevant source of sustainable food production (availability) for many regional food systems

Hypothesis 2: Small farms and small food business provide food and incomes for rural households (access and utilization's assets and capacities) in many regional food systems

Hypothesis 3: Small farms and small food business increase food systems' diversity thereby contributing to their resilience (stability)

The acknowledgement of the diversity within and across food systems, and of the fact that different types of small farms may have different business and livelihood strategies as well as different roles in the food system, leads to the need to articulate the analysis of the different small farms' characters. Thus, an additional research question directly related to the three hypotheses has been identified:

[1] Our analysis focuses on small farms. Thus, in this work we consider as "small food business" those businesses which are directly related to the activity of the small farms, both if the business is developed by the farm itself (or is a farm spin-off) and when it is an independent small scale business whose activity is deeply connected with small farms' one. We do not address the issue of a specific definition of small food business in terms of size thresholds or other criteria.

- *Which types of small farms are identifiable within each region regarding their livelihood strategies and [their] contribution to sustainable FNS?*

This empirically grounded conceptual framework develops concepts and categories through which the three hypotheses can be investigated, in the light of SALSA results.

The observation and analysis of regional contexts, collective initiatives, and individual farm's trajectories that are found in the project's deliverables, support the reflection on the conceptual categories. The overall set of small farms' examples, collected and analysed, provides tangible instances (i.e. concrete forms) of the theoretical concepts, without ambition to be statistically representative (Jaccard and Jacoby, 2009). In fact, specific examples of farm-household relations, forms of connections between farm and system, links between a farm's strategy and the contribution to FNS, and so on, provide the empirical base upon which categories are defined and conceptualised.

This document is also meant to be a base for the identification of policy recommendations capable to strengthen regional food systems where small farms' activity, and their contribution to FNS, are valorized through the promotion of more enabling market and extra-market environments. This reflection can be supported by the identification of the conditions for the development of conducive environments capable to identify, respect, and valorise small farms' specificities. Through the comparison of different regional cases, problems and possible solutions (in the form of practices and/or policies) can be identified, which hinge on context-specific experiences but can be generalised in a common framework and adapted to different situations. This ambitious task requires a reflection on the needs, bottlenecks, and conditions for the survival/development of various types of small farms in the different contexts in which they operate (developed as part of WP6), and in particular on the range of connections between small farms and food system.

SALSA is not only focused on context-specific analyses and policy recommendations. On the contrary, it builds a common framework rooted in the observation and comparison of several regional cases, through problems and solutions (practices and policies) can be identified

1.2 Structure and content

The document is structured around the key concepts explored in the initial CF that are here refined in the light of the project outcomes. In each of the following sections those concepts (i.e. small farms, food system, small farms' connections, FNS, small farms' contribution to FNS) are discussed, starting with a summary of what has been argued in the initial CF to then develop the reflections triggered by the research.

In Section 2, small farms and related small food business, are analysed to identify a consistent but also flexible definition of what a 'small farm' and a 'small food business' are meant to be. These definitions cannot only be referred to quantitative-oriented physical or economic size thresholds. A relational definition, rooted on the observation of the specific forms of behaviours and connections that a farm establishes with the food system in consequence of its "smallness", seems to be more capable to grasp the peculiarities of small farming, highlighting limits and potential of farms (and food business) being small. Key elements for the comprehension of these dynamics are farm-household relations and the choices taken in relation to the access to markets and to the destination of the produce. This indicates the importance of analysing small farms' role in relation to the food system (and also to the wider socio-economic and ecological systems).

A conceptualisation of the system, in which spatial and territorial elements are accounted for, is presented in Section 3. The spatial analysis of the food system, conducted at a regional level, allows the observation of regional production and consumption patterns, and of the flows of food and other resources among the various regional actors (producers, distributors, retailers, consumers, etc.) influenced by the geography as well as by technical conditions and power relations, as reported in SALSA D3.3 (Rivera et al. 2019).

The range of connections that small farms tend to establish with the other food system's actors, as it is analysed in Section 4, emerges as a key element for the identification itself of a "small" farm, as farms tend to engage in a range of market and extra-market connections in the aim to overcome the limits linked to their small size. In turn, these connections shape the forms of contribution that small farms can bring to FNS.

To understand this contribution, a broad definition of FNS is needed, capable to grasp the specific forms that small farms' positive impact on FNS can assume. This vision of FNS, briefly described in Section 5, encompasses freshness and reliability, cultural value of food, as well as diversity and resilience of food system's units, and it highlights the importance of food access and utilisation's aspects, beyond the mere quantitative availability of food.

Following these reflections, Section 6 analyses small farms' contributions to FNS in a system perspective, highlighting the forms that this contribution can assume, from the food self-provision of rural households, their role in regional provisions of food, to the improved resilience of the local food system and the conditions that allow these contributions to be recognised and valorised. The contributions are then framed in the light of the small farms' typology developed within SALSA, and in relation to the different strategic choices of the farms.

Finally, Section 7 sums-up the elements developed in the document, highlighting how they feed theoretical reflections on the one side and support the identification of policy recommendations tailored on small farms' specificities on the other side. A specific subsection is dedicated to underline how the field research and the multi-disciplinary participatory process guided the revision of the initial CF.

1.3 Methodological notes

This final CF is the result of the work carried out throughout the project, mainly based on the field research conducted in the selected reference regions (RRs) and elaborated in the regional reports. This informative base for reflection has been enriched by elements derived from the various SALSA Work packages and elaborated on the basis of a participatory and transdisciplinary process, which hinges on interactions with experts and stakeholders at different levels and through different tools, beyond desk analysis and field research conducted in each region.

"Participatory and transdisciplinary process" means a process of integration and co-construction of knowledge with different actors and by means of different tools. The integration of knowledge takes place among different disciplinary perspectives and in interaction with both academic and non-academic actors (such as NGOs, producers, consumers, innovation brokers, policy makers, decision makers, practitioners, etc.). Multiple researchers with different disciplinary backgrounds and skills (i.e. food studies and rural development, sociology, geography, economics, agronomy, etc..) brought

different perspectives into the project to the analysis of small farms' contribution to FNS. This allowed to enrich the reflections on small farms' connections with the food system, and more generally with their political and geographical context, involving socio-economic and spatial analysis, social practices analysis and so on. Further interaction, also including non-academic partners, was facilitated through different tools:

1. Communities of practice2 (CoPs) were developed in the RRs to enhance interaction with practitioners. The CoPs are operating at two levels, as multi-stakeholder learning and policy dialogue platforms aimed to consult, validate, advance and disseminate SALSA research and to enrich the knowledge base on SALSA-relevant questions (see D. 7.4, Sumane et al 2019). The two levels are the regional or national (RR-CoPs) and the international (I-CoP). Whenever possible, SALSA partners were encouraged to base on and ally SALSA CoP activities with existing relevant organisations and networks to raise the project's impact. The activities of the CoPs have been of different nature, in the different regions. Taking into account the multi-level organization of SALSA CoPs, we can talk about a constellation of CoPs rather than a single, uniform CoP.

2. As part of the CoPs activities, but enlarging the circle also to other stakeholders, a series of events were organised. The most significant interactions occurred in 109 focus groups discussing key products relevant for small farming in the different RRs. In addition, a regional workshop was organised in each RR to deliver and validate regional specific outcomes of research and to discuss governance issues and arrangements characterising small farming. Furthermore, scenario workshops were organised in a subset of 13 regions (according to WP4 guidelines) to discuss with selected stakeholders the future orientation of small farming.

3. Two moderated e-conferences were organized by WP7 leaders (FAO). Participation to the on-line conference took place in two dedicated time frames and was moderated around a range of SALSA questions (with the principal one being the role of small farming in the regional food systems and for FNS, as part of WP1). A total of 855 people subscribed to the e-conference with 124 unique contributors responding to specific questions under six overarching topics, sharing examples and lessons from their own work, experience or region, as well as engaging with each other in relation to the questions. There is an important methodological note to be considered with regard to these e-conferences. They were thought to be a tool to open the discussion to external observers and players, without a controlled identification and selection of the contributions. They did not represent participatory exercises in a controlled setting. For this reason, the interesting outcomes of these exercises have been used to support and illustrate the categories (connections, contributions, farms' types) developed in the project, rather than for defining those categories.

4. Two participatory sessions were organised during project meetings (in Valencia, Spain, in January 2018 and in Brasov, Romania, in May 2019). The analysis of the small farms' interactions with the food system was complemented by WP1 leaders, who organised two sessions engaging project partners to collectively reflect on and refine the theoretical concepts underpinning SALSA. During the Valencia consortium meeting partners were involved in a facilitated session aimed at linking Conceptual Framework and Analytical Framework to the empirical work in the project. Participants discussed the

[2] According to Lave and Wenger (1991) and (Wenger, 1999) Communities of practice are groups of people sharing goals, activities, and knowledge in the context of a given practice.

concepts of - and the activities related to - market integration and self-provisioning for small farms across SALSA macro-regions, as well as the relation between these aspects and small farms' types, based on empirical cases. The session yielded examples and reflections, particularly in relation to the farm-household definition and dynamics. The second interactive session took place in the Brasov consortium meeting, and built upon the previous meeting's outcomes on the base of more recent results of the field research and subsequent elaborations. The exercise led to the identification of links between small farms' activity and FNS outcomes in relation to their strategic choices.

All these activities were aimed at harvesting elements useful for the fulfilment of the various project tasks and objectives and, among them, for the refinement of the initial CF. Figure 1 summarises the project activities that contributed to develop the empirically grounded CF on the base of the initial version of the document.

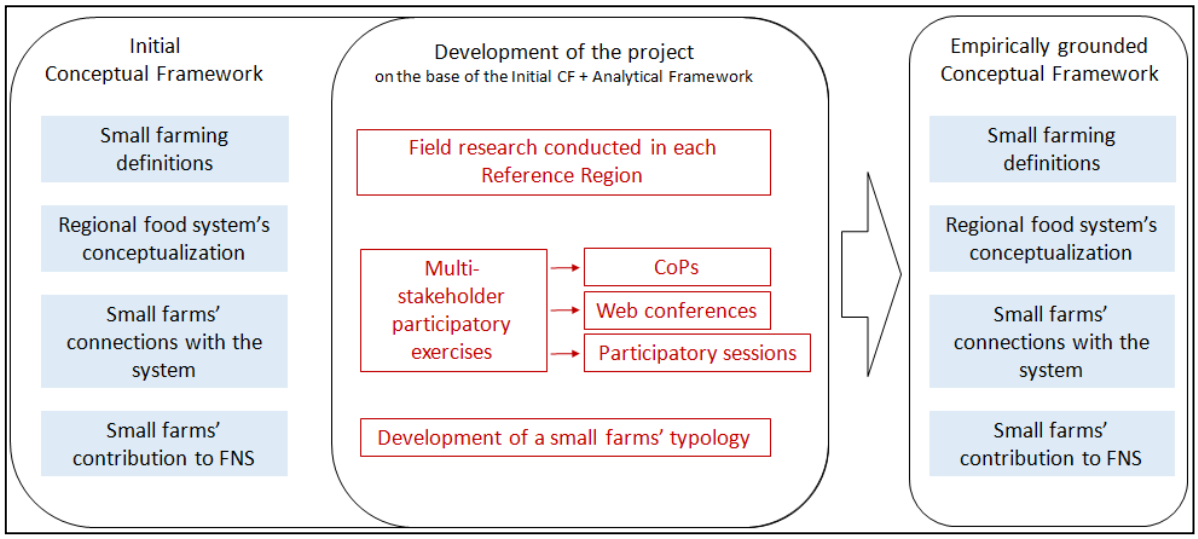

Figure 1 - From the Initial CF to the Empirically grounded CF (own elaboration)

2. Definition and characteristics of small farms

2.1 Initial CF

One of the initial questions concerned the definition of the object of study. What defines "small farming"? What is specific of small farming and of small farms?

Project partners moved from the awareness that there is no universally accepted definition of a small farm (Guiomar et al. 2018, Davidova and Thomson 2014). Small farms are usually identified through thresholds set for different size indicators, influenced by the aim of the classification as well as by the geographical context in which the analysis is conducted (Hazell et al., 2010, Lowder et al. 2016). In this perspective, definitions based on standard size criteria are not meant to account for the diversity of the situations and for the true specificities of a "small" farm. At the same time the appeal of such a simple identification cannot be denied, as it allows cross-country comparisons and facilitates the design of policy measures (Guiomar et al. 2018, p.786). For example, the identification of small farms as those with less than 5 ha of agricultural area, as defined by EUROSTAT and FAO (Davidova et al. 2012), has been used in several recent scientific publications (Davidova 2014; Galluzzo 2015, Papadopoulos 2015). Among other possible definitions, some rely on full-time labour equivalents (up to 2) as in Winter and Lobley (2016), or on strictly economic measures like standard output, gross margin, total sales, etc. (see Unay-Gailhard et al., 2018).

Based on these reflections, at the beginning of the project three possible groups of criteria were identified for defining a small farm. Two of them were related to structural and economic size, in terms of, respectively:

- Structural size criteria: i) acreage/hectares and number of animals; ii) number of employed/full-time equivalents; iii) number of commodities produced / degree of specialisation;
- Economic size criteria: i) gross revenue or sales threshold; ii) number of people fed by the farm directly or from its income; iii) proportion of off-farm income; iv) ratio of business size to household size.

In both cases, the identification a small farm requires quantitative thresholds. This implied choosing between common and region-specific thresholds, with pros and cons in terms of comparability, communicability and support to policy design on the one side, and capability to account for regional specificities on the other.

The final choice was made on a common threshold referred to a structural criterion, to be used when identification based on statistical data are required or relevant: small farms are those with less than 5 hectares of land (EU 2011; EPRS 2014), with room for flexibility in order to consider, when possible and relevant, micro farms of less than 2 hectares. A minimum threshold was also suggested (1000 square meters) in the conviction that, below that size, identification and differentiation of the farm were impossible.

Besides, a third criterion had been considered at least as an element to structure subsequent analyses:

- the internal relation between family and farm with regards to i) the percentage of family labour; ii) the land tenure (who controls the land); iii) the percentage of production consumed at home;

The last criterion led to the consideration of the farm-household approach, in which the farm/household is seen as a dual production/consumption unit (plus opportunity costs in the choice between working on farm and looking for external jobs; household as an employment buffer, etc.).

This third criterion has emerged as critical for the identification and conceptualization of small farming (and related small food business) and their role in the food system, as detailed in the following sections.

2.2 Empirically grounded CF

In the initial conceptual framework we stated that small farms are characterized by the structural, physical, and economic size, and by the relevance of farm-household relations. This section discusses these aspects in relation to the empirical results.

2.2.1 The size of the resource mix

The diversity of farms' characters (production, technology, etc.) and of the conditions in which they operate (land value trends, market opportunities, available services, etc.) makes any criterion based on simple quantitative thresholds which are hardly applicable.

The identification of a common size threshold of 5 hectares was needed in order to have a workable definition of small farms. Indeed, the quantitative threshold of 5 ha has been adopted and utilized in the following Work Packages, particularly in WP2.

Nonetheless, the identification of common size-based thresholds showed limitations in accounting for the specificities of each region and product. Moreover, any size-based definition of smallness, based on a given threshold, does not valorize the elements that truly identify a ‘small’ farm vis-à-vis a ‘large’ one, in each particular context. Also, a quantitative threshold does not represent a theoretical concept, but rather a context-specific operational tool which can be useful in practical terms but does not enhance our comprehension of small farming' crucial characters.

This concern has also been witnessed by the FAO-hosted web-conference debate, where very different thresholds have been suggested for different regions and countries, from 2 ha in some African countries to 100 ha in the Argentinian pampas (Rouane 2016, p.4)[3]. These wide differences also reflect, in connection with geographical characters, the different kinds of produce and the different markets in which each farm operates. As emerged in the web-conference, the definition of small farm should be rooted in a discussion held in a given national (or regional) context based on the observation of the farms’ role in those specific rural development processes and agro-food systems (ibid., p.5).

Besides, the field research activity carried out for the WP3 clearly highlighted the need for a more comprehensive definition, reflecting the specific potential and limits of small farms in relation to the surrounding environment and to the food system.

The first web-conference hosted by FAO gave interesting insights on this issue. Most of the participants underlined the insufficiency of size-based thresholds, although it was also reaffirmed that common quantitative criteria have many strong points (e.g. clarity, communicability, comparability). Rather than looking at additional or completely different criteria, the debate highlighted that any threshold should be context-specific, not only in geographical terms, but also considering a range of elements that make a farm of a given size "large" or "small". The main elements mentioned were: the role of the

[3] The web-conferences, hosted by the FAO within the SALSA project, were open also to extra-SALSA countries.

household in the farm; the conditions of market access; the type of crops and livestock; the technology used; the quality of the soil/farmland; the availability of natural irrigation and/or dedicate infrastructures; the knowledge and learning needs and processes, the presence of multifunctional activities. These elements “mediate” between any given farm size and the need for a farm to be connected or to engage in specific territorial or sectorial configurations in order to pursue its goals[4].

The need to move towards a definition capable to integrate any size-related criterion with dynamic and relational elements leads to consider the functional specificities of a farm in relation to its (small) size. The idea is that "smallness" is first and foremost a relational concept. It must be considered, in each geographical or sectorial context in relation to the farms’ capability to activate alone, or not, a range of capabilities and functions, and to achieve a certain degree of control over its own development trajectory. In this view, a farm can be considered "small" when the size of one or more of its resources (land, labour, capital) put the farm in a disadvantaged position compared to farms with bigger size. On the other hand, “smallness” can be considered a positive property when the size helps performing certain functions, such as direct contact with consumers, production of goods and services with markets of limited size, possibility to monitor directly farms’ operations. Also, the self-perception that farmers have regarding to their own farm is an element worth considering, as it is influenced by the above-mentioned elements, and eventually influences the farmers' behaviour.

The assessment of the size-related performance can be made in relation to functions that the farm performs, and therefore to its outcomes. We can list such functions as follows (we indicate with (+) or (-) the outcome related to smallness).

Economic efficiency

- Size makes it impossible to achieve a production scale capable to activate scale economies; this occurs, for example, when the set-up costs are higher than the benefits, as in the case of irrigation infrastructures;
- Available resources are not sufficient to harness the potential of other non-divisible resources: for example, when processing plants have a capacity much higher than the raw material produced, or when administration burden don’t justify a full-time (or even a part-time) clerk;
- The utilisation of certain resources and assets (workforce, machinery) is required in peak periods in amounts that the farm is not able to mobilise alone, which makes it difficult to employ them efficiently;

+ the prevalence of human resources over land and capital allows the farmer to better monitor farming processes, as in the case of occurrence of pests or animal diseases;

+ the prevalence of human resources over land and capital allows to carry out more accurate operations, and thus improve the quality of products;

+ the requirements of the production process allow a more balanced relation between work and other activities;

Connection with markets

- the size of its output does not allow to establish a relationship with retailers. This depends on various factors: retailers’ size, retailers’ requirements on the products, geographical distance;

[4] These mediating elements are reconsidered in regard to the relation between farm size and connection to the system in Figure 6, in the last part of Section 4.

- the costs of certifications are disproportionally high in relation to the size of the output.

+ some business models – for example direct selling or on-farm small business – can hardly be carried out in farms over a given size threshold.

Contribution to farm household livelihood

- the amount of work needed makes the interplay between household and farm complex in terms of balance between on-farm and off-farm occupation, particularly when its physical and economic sizes are not sufficient to fully employ available household's workforce;
- the amount of the output is small enough to generate trade-offs between food self-provision for the household and food selling. In this case self-consumption may not be negligible vis-à-vis the total farm' s production.

+ When farming is embedded in a vibrant labour market, the size of the farm can be tailored to household's food needs, and farm could play the function of income integration and stability.

Contribution of farming to the rural environment

+ A plurality of small farms generates functional diversity (different capacity to generate ecosystem services) and functional response (different capacity to respond to external pressures), properties that give resilience to the system.

+ A plurality of small farms contributes to the social capital of rural communities. The tendency to farm concentration is often linked to depopulation and desertification.

From this analysis we can conclude that functional outcomes of a given structural size are context specific. For example, the economic or physical (small) size can be an obstacle to market the products in a region, but not in another one where markets channels, infrastructures and consumers' habits are different and more adapted to small farms' characters. What matters is whether a farm reaches or not a certain size - in terms of land, produce, turnover, relations, market integration, or any other parameter - corresponding to a "critical mass" which enables the farm to work in autonomy, fulfil its needs, live in rural areas, provide an adequate amount of public goods. If this threshold is not reached, the farm depends on forms of aggregation of resources - i.e. a wholesaler, a cooperative, landowners to get land for rent, machinery services, external administrative consultants – or on subsidies. Empirical evidence shows that when this is the case, small farms may decide to establish forms of cooperation in order to overcome those limits and to avoid being trapped into captive relations with powerful actors of the food system (despite the lack of cooperation and the difficulties for collective action has been emphasised in several context).

The same farm can be regarded as a large farm in its local/regional context and as a small one in a broader context, populated by big players in the global food system. For instance, in the Pisa (RR 12)[5], it clearly emerged that high-specialized cereal farms, while operating in several dozens of hectares, within their value-chain are considered small farms (and, therefore, they consider themselves as small farms). Differently, those farms are considered large farms within their territorial context, since they are associated to a rural context characterized by several (much) smaller farms, including niche and diversified cereal small farms. Similarly, in the RR11 of Lucca, specialized horticultural farms tend to be too large to access profitable markets through direct selling, while they are too small to supply large industrial retailers (supermarkets).

[5] The list of the Reference regions is provided in Annex.

Another example comes from the meat production sector in RR 12 Pisa where farms producing livestock are structurally large and had to interrupt traditional direct selling, due to increasing quality and safety requirements. However, their meat production was not large enough to compete within their value-chain. In this case, a strong collective strategy, technically supported by the producer association, allowed gathering the local meat supply and, therefore, allowed producers to sell their products to supermarkets through a collective labelling scheme. In Alentejo Central (R22, small sheep producers do need grazing areas significantly larger than 5ha, although in the value chain, and compared with other livestock producers (cattle), they are small. Similarly, in Montana (RR1) for arable crops production in the North part, small farms are considered the farms with arable land from 10 to 20 ha. In other contexts, such as for Jihočeský (RR4), what the project considers as small farms represent a very small group within a Czech agricultural sector and sometimes these farms are not even considered farms (noting that the average size farm in the Czech Republic is approximately 130 ha).

2.2.2 Farm-household relations

SALSA empirical outcomes highlighted the relevance of the interrelations between farms and households as one of the main characters contributing to the specificities of small farms[6] (Ruane 2016; Guarín et al. 2019 - SALSA D3.2; Rivera et al. 2019 - SALSA D3.3). This element had been already mentioned in the initial CF in general terms. According to the reflections developed on the field research results, the observation of farm-household relations can be structured according to:

a) Importance of familiar traditions
b) Business objectives, participation to farm's activities
c) Balance between self-provisioning and market integration

a) Importance of familiar traditions

Familiar traditions are often important determinants of small farms' trajectories. The deep connection between the household and the farm for many small farms makes familiar habits and lifestyles hardly separable from the farming-related decision-making processes, However, these linkages have different weights in different contexts, in relation to the socio-economic context and to the presence of alternatives to farming for the farmer and the family.

In more favourable contexts, the importance of family traditions and welfare can be seen in relation to the search for autonomy, to a lifestyle choice and to presence of emotional links with farming and with the land (RR 18 Hedmark, RR 23 Oeste), such as in the case of hobby farms. In the Czech region of Jihocecky kraj (RR 4) small farmers and even hobby farmers often explains their choices highlighting the importance of their independence and pointing out that living in countryside has become a part of their lifestyle. Many small farmers from Ille-et-Vilaine in France (RR 5) express their general aspiration of small producers to stand out from the agro-industrial model by choosing a sustainable and more autonomous way of farming.

For small farmers in many RR, in particular for developed European regions, being a small farmer is the result of a choice rather than the only option, living in the countryside in relative autonomy has become a part of lifestyle. Farmers do not want to disconnect their personal and professional life in their aim of keeping themselves detached from the dominant agro-industrial model, as argued

[6] We do not explore the debate on the definition of family farming (see Brunori and Bartolini, 2016, for a review), a term "even more elusive than small farming" (Winter and Lobley 2016, p.10).

by small farmers from Ille-et-Vilaine (RR 5). This is also true in the case of retirees who maintain a part of their land for self-production (again in Ill-et Vilaine) as well as in the case of hobby farming performed by families with dominant extra-farm income (in RR 4 Jihocecky). The link with familiar traditions is important also in those cases in which the new generation keeps working in the family farm but progressively moves to other occupations, looking at the farm mainly for self-consumption, as argued in both Italian cases (Lucca RR 11, Pisa RR 12). In Pieriga (RR 15) a common reason for farming is the continuation of a family tradition, but also the search for new business opportunities and lifestyle changes as well as for the social safety net function that a small farm can assume.

The importance of traditions and habits is also witnessed in less (economically) favourable African contexts (RR 7 Gushegu and RR 17 Balaka). The role of traditions deeply influences business choices. In Gushegu, for example, the choice of sheep as the commonly kept livestock is linked to easier breeding in comparison to other livestock, but also to religious habits and cultural heritage.

b) Business objectives and participation to farm's activities

The link between household and farm goes beyond the importance of traditions ad habits. For instance, in the Ille-et-Vilaine case (RR 5), quantitative thresholds were not perceived as valuable criteria to identify small farms. Indeed, two qualitative characteristics of small farms, related to business organisation, were suggested by local actors: the willingness to be autonomous in decision-making, and the aim to be deeply integrated in their social and ecological environment. The field research across the RRs witnesses that in most of the small farms there is not a sharp distinction between farm and household's goals as well as between farm and household's budgets, as witnessed for example by the interviewed farmers in Giurgiu (RR 25).

An important element to be considered in the analysis of the effects of farm-household relations on business objectives is the perspective of farmer's intra-household succession. The already discussed role of family traditions, the presence of alternative options, the social perception of farming, are all elements that shape forms and outcomes of the succession (as in the Italian RRs but also in RR 13 Ugunja). In Novotarski (RR 21) farm' successors used to be those children with fewer chances to find a job beyond farming. Now farming is getting more complicated, and requires capable people who are hardly interested in taking over the farm. Participants to the Focus group in Novotarski mentioned that small farmers support children to get higher education, but they know that those children will probably not come back to farming.

The vision of the farm as an asset for the new generations may lead to disregard the possibility to sell the farm (RR 5 Ille-et-Vilaine, RR 7 Gushegu), and to invest in it, whereas old farmers with no perspective of passing the farm to their heirs may tend to be conservative and limit investments in innovation. This is argued for instance in the Italian and Polish contexts (RR 11 Lucca, RR 12 Pisa, RR 20 Nowosadecki). In another Polish region Nowotarski (RR 21), inheriting a farm is often perceived as an obligation to parents or other members of the family by the younger generations, in a context in which farming receives a low social consideration. However, an inheritance perspective can reinforce the social and personal expectation for all household's members to give their contribution to the farm, perceived as an important family asset for the future (RR 7 Gushegu). Thus, socio-cultural elements interact here with business-oriented strategies in the decision-making processes.

Indeed, for many small farms household's work is crucial, almost all family members across generations participate in agricultural activities and they cover almost all farm's needs (RR 2 Santiago, 29 PK Stirling), with scarce reliance on external work. This entails an internalization of labour costs, as family work can be low paid or not paid at all, according to circumstances (RR 4, RR19). In many regions, hired work has an important role in peak seasons (RR 7 Gushegu, RR 23 Oeste, RR 25 Giurgiu) and/or for those tasks specific tools or skills are required, as, for instance, land preparation or harvesting (RR 23 Oeste, RR 28 Haouaria). Gender plays a role in various contexts, as distribution of responsibilities is often gender-oriented (RR 3 Varazdinska) and strong gender norms and cultural barriers keep influencing women's role in farm and household decision making (Sutherland et al. 2019 - SALSA D5.2 p.6). An experience reported in the FAO web-conference and related to Pakistan witnesses that women are actively involved in agriculture and have an important role in small farms, but they are not given rights to be part of any form of cooperation. Even in Malawi rural women are said to be hampered by a range of barriers[7].

In all these considerations, the reference to the household has to be enlarged rather than limited to the close family of the farmers. Extended households include first and foremost relatives but can be referred also to close friends/neighbours with which households' members have strong linkages. In the French region Vaucluse (RR 6) and in Alentejo central (R22), for instance, it is common to see small farms where only one person works and receives support from family and neighbours to perform some farm work (cutting, harvest) in peak moments of activity.

The variety of elements and dimensions to be considered in the observation of small farms is witnessed by the reflection conducted in the already mentioned French region Ille-et-Vilaine (RR5), and it led to the development of a list of quantitative and qualitative indicators for small farms' identification. Suggested indicators were: share of sales through short supply chains and proximity channels; customers' diversification; non-use of contracts imposing constraints on production choices; small farms' possibility to make experimentations and make changes in productions; priority given to environment friendly techniques; frequent adoption of quality certifications; small farms' participation in local association and networks; no distinction between private and professional life as farming corresponds to a lifestyle choice based on personal and familiar values.

c) Balance between self-provisioning and market integration

The destination of the output, and the balance between food self-provision and market integration, is another way to look at farm-household relations. This is an exemplary case of interconnection between household's and farm's needs. For example, in Pisa (RR 12), family access to fresh healthy food often goes hand in hand with income as the goal of farming for various interviewed farmers. As described in D.3.2., in general, all small farms surveyed have a share of their production aimed at the household (Guarin et al 2019 - SALSA D3.2), even though this share is quite variable.

Each small farm finds a balance between food self-provisioning and selling of the produce through market-oriented or community-based relations, or with hybrids of the two forms. These different strategies regarding the destination of the output are identified and combined by each small farm in relation to a set of circumstances and opportunities, internal and external to the farm-household. A vibrant labour market, for example, have a strong influence on how farm-household relations are

[7] Contribution to the FAO-hosted web conference.

shaped. The combination of self-provisioning and market integration in its different forms influences the degree of autonomy of each farm and its resilience vis-à-vis external factors.

A contribution to the FAO web-conference from the Yucatan peninsula in Mexico, highlights the opportunity to consider the overall differences between the case of small farms where agriculture is part of a subsistence strategy, and those for which agriculture is a business: the two farm's types respond differently to stress and opportunities, their households are organized in different ways and even their demographic structures will vary[8].

The balance between self-provisioning and market integration frames the analysis of small farms' connections with the food system, as a key lens through to understand small farms' contribution to FNS. In turn, this analysis requires a suitable conceptualization and representation of the food system (provided in Section 3). Small farms' connections with the food system will be then explored, again on the base of SALSA research findings, in subsequent Section 4.

[8] Contribution to the FAO-hosted web conference. This stakeholder's contribution supports the relevance of the distinction between self-subsistance and business-oriented farms that has been considered in the development of the small farms' typology (see paragraph 6.2.2, and Guarín et al. 2019 - SALSA D3.2).

3. Towards a territorial conceptualization of the food system

3.1 Initial CF

3.1.1 The functional representation of the food system

The conceptualization of the food system in the Initial CF started from a functional representation, derived from Ericksen (2008). According to this representation, a food system is constituted of actors and activities interacting to produce outcomes.

A systemic approach allows to identify the dynamics deriving from the interactions between the activities within the systems, thus their consequent impact on system outcomes, and - in turn - it allows to capture feedback mechanisms (between different food system's outcomes).

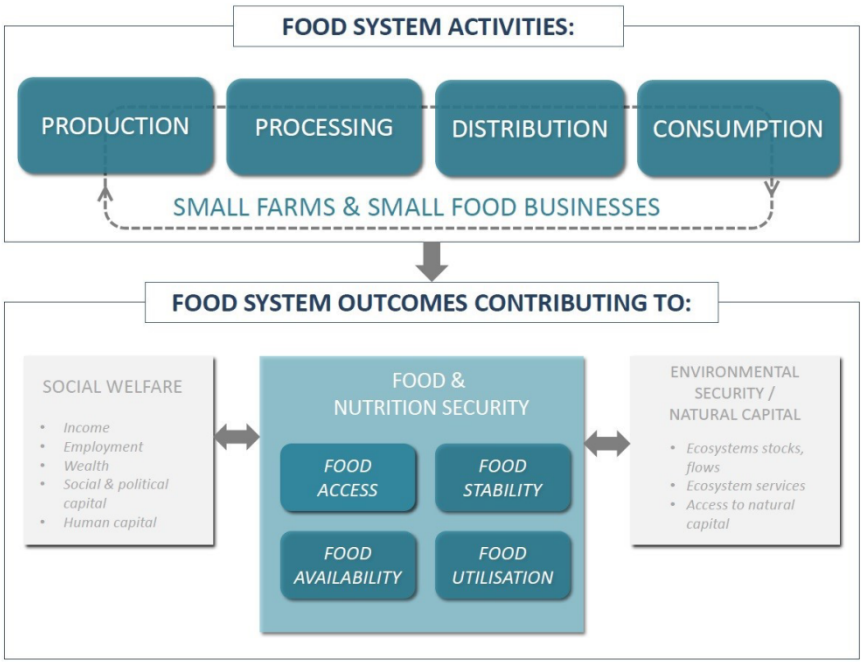

Figure 2 - Food system conceptualisation (Source: Initial SALSA CF, adapted from Ericksen, 2008)

A representation like the one shown in the figure has ideally no borders. However, the system boundaries can be identified in relation to the outcomes of interest, in our case FNS. The reflections shared within the SALSA consortium confirmed the usefulness of a conceptualisation of the food system, rooted in the EU policy framework.

A recognition on current EU policy documents confirmed the validity of the functional representation referred to in the initial CF. The main EU policy initiative focusing on of FNS priorities, in line with SDGs and COP21 commitments, is FOOD2030, which hinges on a functional conceptualisation of the food system comprehensive of the wide range of outcomes and impact areas. A recent Report by the EC FOOD 2030 Independent Expert Group stated "*The food system incorporates all elements and activities that relate to the production, processing, distribution, preparation and consumption of food, as well as its disposal. This includes the environment, people, processes, infrastructure, institutions and the effects of their activities on our society, economy, landscape and climate*" (EC 2018, p.9). Food systems are also seen in dynamic terms as adaptive systems, characterised by many interrelations evolving under the pressure of external and internal factors (ibid, p.7).

The systemic view does not limit the possibility to focus on specific actors and to valorise their role. On the contrary, as argued in the context of the SUSFANS project "*The use of the food systems lens, breaking something as complex and dynamic as the food system down into activities, actors and drivers, allows for improved collaboration between stakeholders*" (Zurek et al. 2018, p.10), as it helps them to develop a comprehensive view over the linkages between their activities and others'. As argued in the FAO web-conference, a food system approach makes it possible to follow the all the steps in the pathways of food products until the disposal phase (Rouane 2016, p.6). Thus, developing a food system view in a participated way can contribute "*to a mediation of the many different, and sometimes contesting, discourses actors hold about the trajectory of food systems*" (ibid., p.10).

However, a functional conceptualisation of the food system may be not capable to fully account for those spatial elements that are crucial to assess FNS at regional level and to identify the role played for this outcome by specific local actors. The suitability of a territorial or space-based conceptualization of the food system, already introduced in the initial CF, is suggested for example by the OECD report on a territorial food systems approach (OECD 2016), or by a Policy brief of the European Observatory on Health Systems and Policies. This last one underlines how food systems operate at multiple levels, with interactions between policies and processes at global, regional, national and local levels (WHO 2018, p.7). It introduces the concern for multi-scale geographical issues and the observation of the food system functions through territorial lenses, in the aim to integrate the functional representations towards (i) a better understanding of the system activities and outcomes, and (ii) the identification of problems and opportunities for improvement, also through proximity-based collaboration between actors. A central thesis developed in SALSA with regard to governance is that policies supporting small farms and their capability to strengthen FNS must be place-based, adapted to the diversity of territorially embedded food systems (Ellis et al. 2019 - SALSA D5.1, p.13).

3.1.2 The food systems from a territorial perspective

A territorial food system perspective allows to observe production and consumption activities and flows taking place within a given space (e.g. a territory or region). UNEP (2016) describes the interplay between food 'production systems' and food 'consumption systems' that do not generally geographically overlap, because part of the regional production is usually exported to other regions, and part of the consumed food is imported (UNEP 2016, p.129). If FNS is the regional food system outcome around which actors and activities are selected, the starting point for the analysis of the system can be consumption and its flows, to be traced back to the primary production (i.e. where the food comes from). Conversely, one can start from the production phase and move downstream along the chain to identify the actors involved in its processing and distribution.

Figure 3 presents the production and consumption subsystems and their overlap in the case of food produced/processed and consumed within the region. The flows of food and inputs between the "regional" system identified at the regional level and the external environment are represented by the two ellipses and the related arrows. The overlapping area represents ideally circuits completely contained within the region's borders.

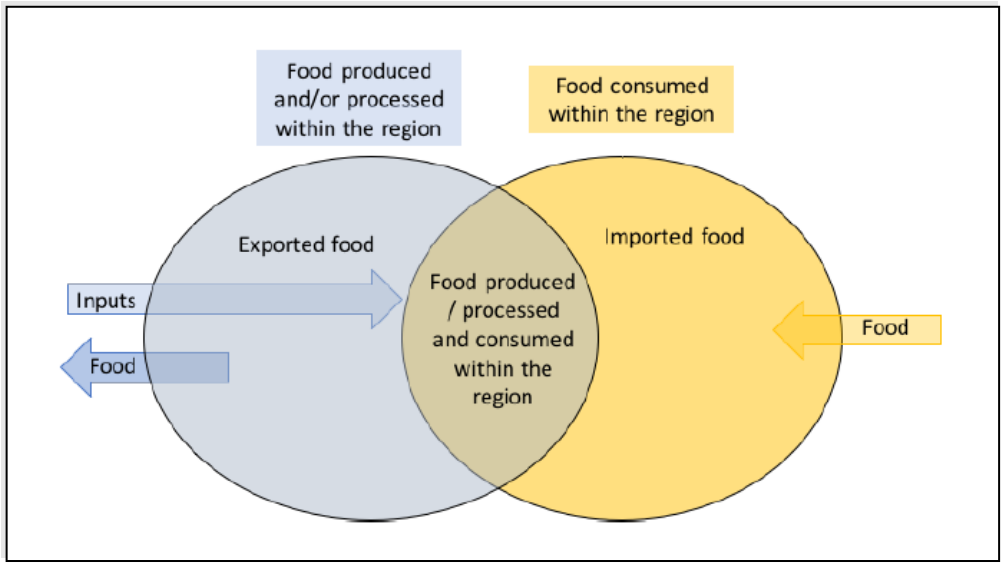

Figure 3 - Food consumption and food production interacting within the food system (Source: Initial SALSA CF, modified from UNEP, 2016)

The initial CF had suggested to develop a regional food system map, as a simplified chart where all main regional food chains actors and spatial flows related to a specific food product were displayed. Figure 4 shows what the preliminary representation to be used for food systems' mapping was meant to look like, indicating the relative importance of the flows through the thickness of the arrows, and possible examples of subsystems which could be found within the regional food system (e.g. domestic, proximity, agro-industrial).

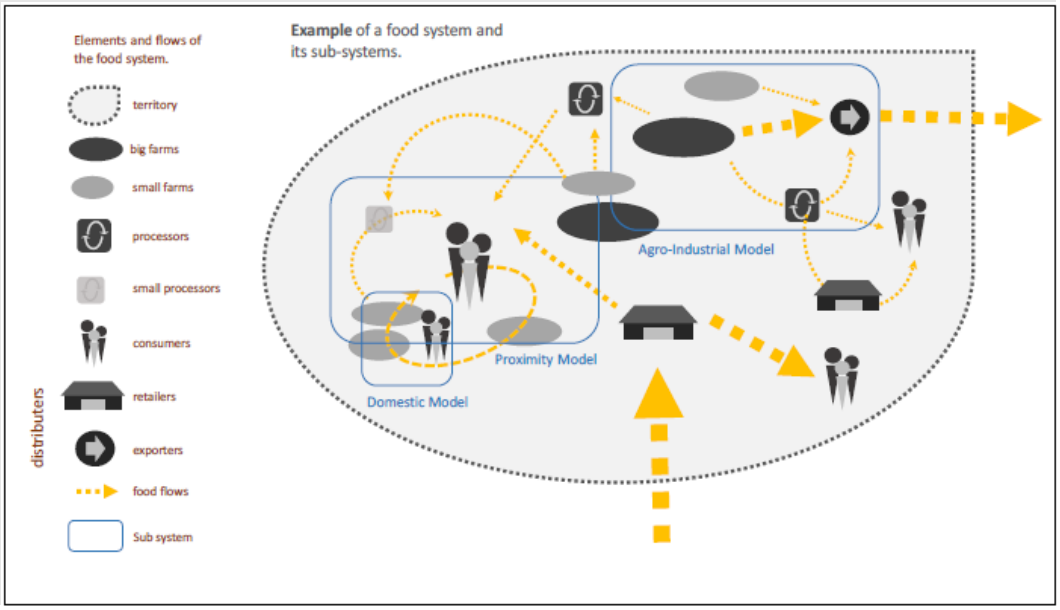

Figure 4 - Example of a territorial food system and its sub-systems (source: Initial SALSA CF)

This figure may also be read starting from consumption and tracing the flows backwards. Consumers living in the reference region express a demand for food through the various channels, which on their side are supplied by producers and processors. This representation was initially meant to be developed, for the food system of each product studied, in interaction with practitioners in the participatory processes, and for communication purposes, whereas the possibility to use it as an analytical tool had to be tested through the actual field research, with possible adaptations.

3.2 Empirically grounded CF

3.2.1 Construction of a territorial food system map

The relevant flows and actors identified at regional level proved to be too complex for an effective and readable representation of the agro-food systems covering more than one food item. This led to confirm the idea of addressing (a number of) individual products in each region. The decision to focus the analysis on individual products was was based on the awareness of complexity and uniqueness of the system for each single product, which would make impossible to combine different products This consideration has also been reflected in the maps produced as field research outcomes. focused on a set of representative (raw or processed) food items, in order to accurately capture and represent the actors and flows.

Nonetheless it should be recognized that the selection of specific products narrows the scope of investigation, for at least two reasons.

First, small farms are often not specialized, their production being characterised by several products. A map focused on single food items describes only some of the flows (and related networks) in which farms are engaged and does not account for the connections between supply chains at the system as well at the farm level. This limitation was partially overcome through a wider definition of the product category - for example choosing a product category, e.g. fruits, or orchard vegetables, considering that data about vegetables consumption are usually aggregated by production group (see RR 6 Report).

Second, the selection of the key food items (or groups of products) for the analysis, guided by pre-defined criteria at project level (see Analytical framework D 1.2) is a sensitive issue. The selection of products was guided by three complementary criteria:

- two staple items that both produced and consumed in the region (i.e. that rank high in production and also in consumption);
- one staple item produced in the region but is not consumed (or in limited amount), within the region (i.e. an export crop)
- one more staple item that, according to the researchers' judgement, was important in the region for culinary, cultural or social reasons, even if it scored relatively low in production tonnage.

Some additional elements were considered by the various research groups, and accounted for in each RR report, such as the importance of the products for small processing purposes and for the development of regionally-grounded networks, and the availability of reliable information to make consistent estimations.

Following the tests developed with the map in Figure 4 a new mapping format was defined. Figure 5 provides two examples taken from RR 1 and RR2.

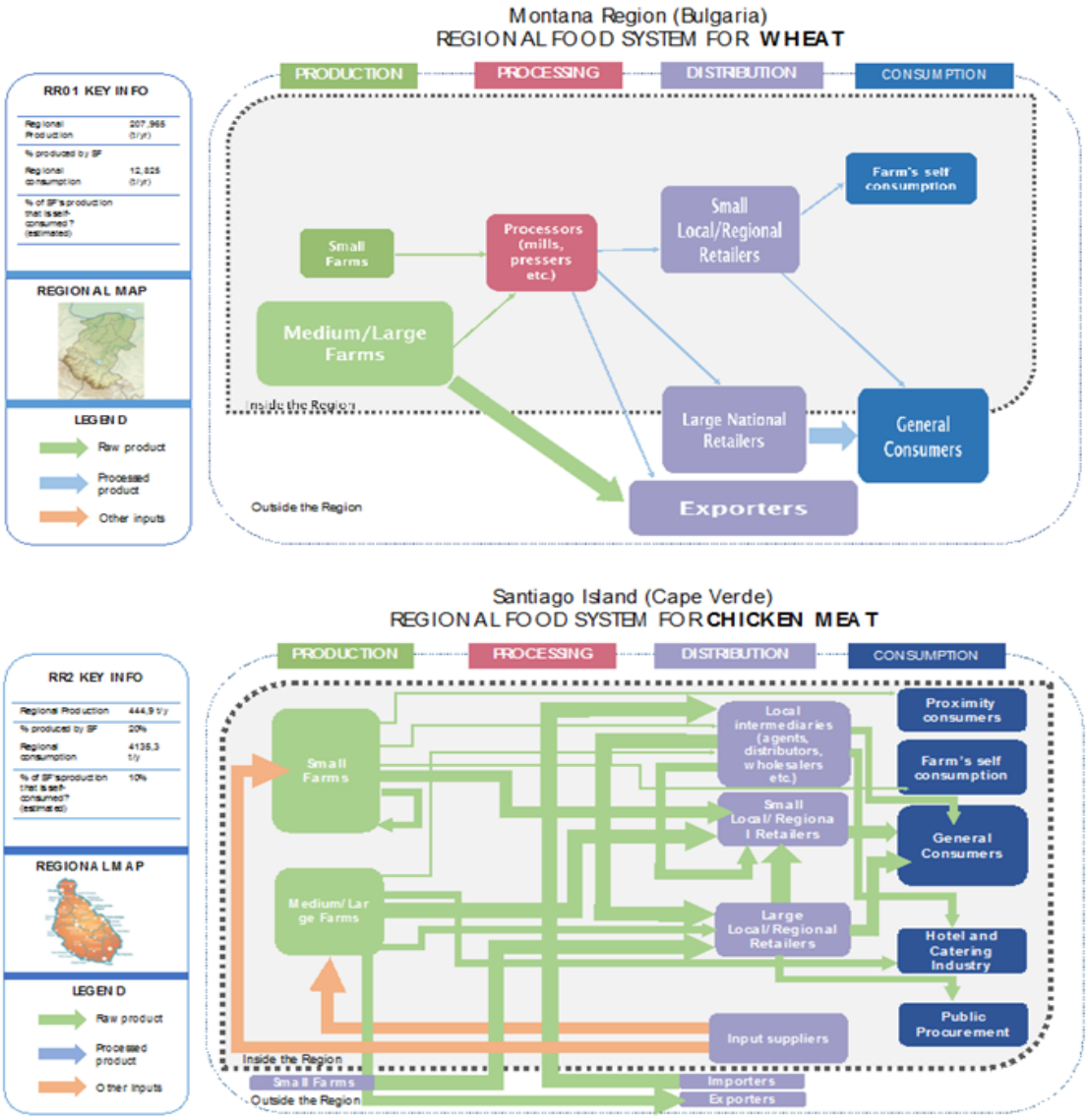

Figure 5 - Examples of territorial mapping from Reference Regions reports

The new figure provides a logical representation of actors and flows, organized by food system activities aligned as steps of the supply chains (farming, processing, distribution and consumption). The chosen system mapping is mainly based on the flow-chart-like representation of the supply chain for the selected item, centred on small farms and related small food business, which shows the vertical and horizontal linkages between actors, key nodes and flows of the supply chain. The maps have been produced, in each region, through participatory meetings with the active involvement of the main actors (stakeholders and experts) of the territory.

In this revised format the territorial boundaries are still indicated, in the form of the borders of the reference region (i.e. the administrative boundaries at NUTS3 level) vis-à-vis the rest of the world[9]. The supply chain reaches the final consumer, internal to the reference region, whereas when flows cross

[9] The technical definition of boundaries based on administrative borders, which was necessary to operationalise the research, does not always fit the concept of 'territory' defined by actors and their relations. As a consequence, the administrative boundaries obliged to represent artificial in-and out-flows (i.e. which do not always coincide with 'exports')

the regional borders the representation is limited to the first external node. The flows internal to the region correspond to the intersection between the two circles (food produced and food consumed in the region) identified in Figure 3. The maps focus on the internal flows, but also represent the initial steps of the export-oriented connections in which small farms are engaged.

The food balance sheets developed in the reference regions provides only a preliminary understanding of the territorial context in which small farms operate. For example, a region with a positive balance for many food items (i.e. more production than consumption) can be more self-contained or more open to import/export trade (depending on the degree of specialization and competitiveness). For instance, in Giurgiu (RR 25) a highly positive food balance for all key products coexists with low levels of locally sourced households' food consumption, as consumption is principally covered by import, while raw commodities are exported before coming back as final processed products. Similarly, in Castellon (RR 26) some key products produced within the region are then sent outside the province for some steps of their value chain.

From a theoretical point of view, this representation of territorial food systems helps to understand the context in which farmers operate, and it allows to assess the level of autonomy of farming functions. For example, the presence of a good number of farmers' markets or purchasing groups shows that the market environment is favourable to small farmers and their business strategies. On the contrary, when food systems are characterized by the exclusive presence of big retailers or processors, the viability of small farmers is linked to their capacity to create market niches either in locally or abroad (SALSA D 4.2). In some cases, tourist flows allow the blossoming of small farmers networks based on high quality, high added value business models. In each of the contexts, small farms and related small food business can contribute to food exports or to regional food provision (through self-consumption, reciprocity or local market channels) and small farms' role for regional FNS is different, according to the different configurations.

From a policy point of view, a territorial approach helps to better understand the strategies that could be deployed to create favourable environments for small farming and the type of stakeholders that can be mobilized in this endeavour. Such an approach acknowledges that territorial specificities, including the institutions, infrastructure, education, health, natural resources, and human and social capital, strongly influence the multiple elements of the food system, and the functioning of the flows, therefore playing a decisive role in food security and nutritional outcomes (OECD 2016).

3.2.2 Territorial food systems and FNS

The conceptualization and representation of the territorial food system is preliminary to the analysis of small farms' contribution to FNS at regional level. It allows to highlight the specificities of the contexts in which small farms and related small food business operate as well as the local production and consumption flows for the observation of the role played by small farms and small food businesses.

Several questions arise: is it possible for a developed region to be in condition of food and nutrition insecurity because of low or unbalanced regional food production, even when food import is viable? Which role small farms and related small food business can play to enhance FNS at regional level in a region, in relation to their self-provisioning vis-à-vis, market integration choices?

These questions require first an observation of the forms of small farms' connections with the food system. This observation must be rooted on the awareness of the importance of specific characters of

small farming, like the centrality of farm-household interaction, the presence of hybrid relations between market and reciprocity and more generally the variety of governance forms, the relevancy of policy support.

4. Small farms' connections to the food system

4.1 Initial CF

The analysis of small farms' connections with the food system was aimed at reflecting on the configurations that allow a greater autonomy for small farms and enhance their capability to give a contribution to FNS.

The observation of small farms' connections was referred, in the initial CF, to the HLPE scheme (Figure 6). The scheme reflects the interconnectedness between the farm and the household in terms of labour, goods and income flows. This conceptualisation implies that production and consumption coexist in the same organizational unit (HPLE 2013).

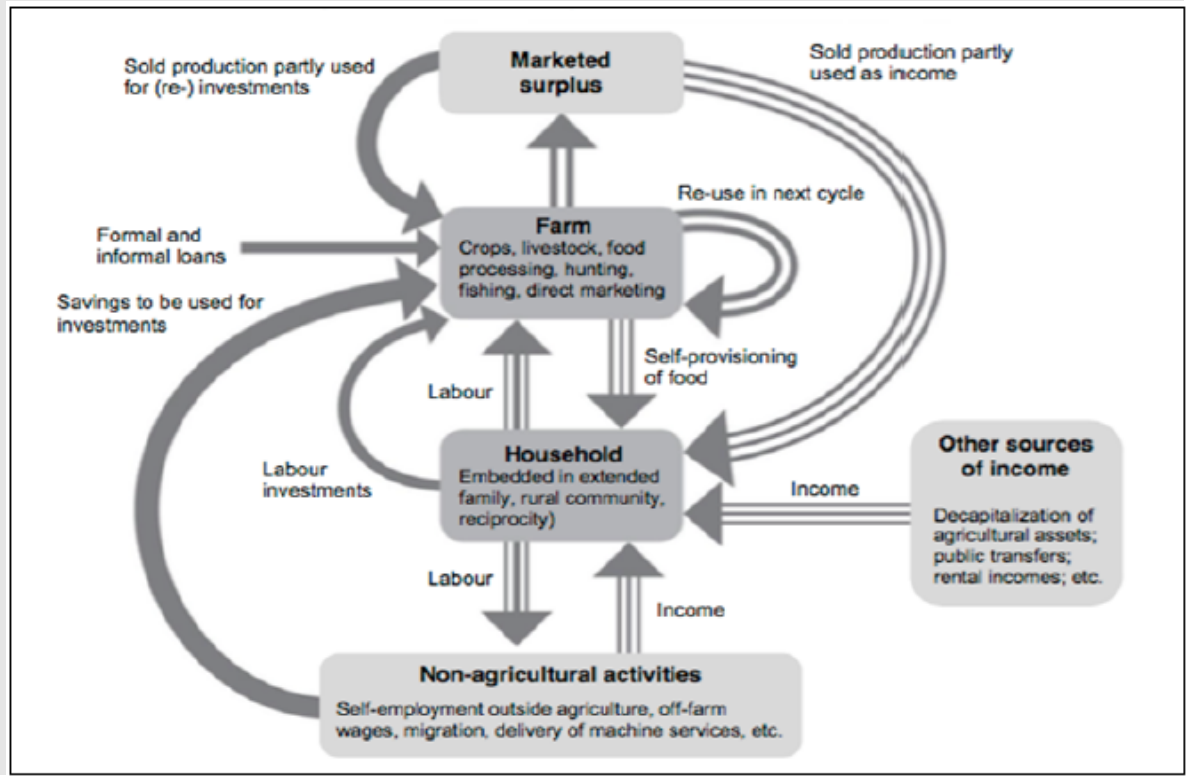

Figure 6 - Flows of income and sources of investment in an agricultural smallholding (Source: Initial SALSA CF, from HLPE 2013)

The Initial CF argued that the analysis of small farms' connections must consider both market and extra-market relations, with particular attention to informal and extra-market exchanges in the case of the subsistence farming. At the same time, it was suggested that – in most the cases - even subsistence farms depend on their connections to the markets for at least part of their household's food needs. It was then argued that the relative weight and relevance of these different arrangements will be analysed and validated case by case through the field research carried out in each region.

4.2 Empirically grounded CF

Small farms' connections and flows reflect, shape, and are in turn shaped by governance relations, whose observation helps to analyse the institutional, regulatory, market, and social structures as relevant conditions that determine whether small farms can continue to operate in a territory and to produce sufficient food that is then channelled to consumers through market or extra-market channels (Ellis et al. 2019 - SALSA D5.1 p.47).

The field research conducted in SALSA collected information about a wide range of small farms' connections and governance arrangements. The number and the nature of these connections and arrangements are influenced by the specificity of each food production and by their different regional contexts, leading to quite diverse outcomes.

The comparative analysis across the reference regions evidences some macro-regional or sectorial patterns that influence forms and relevance of farms' connections. For example, "*in Southern Europe the number of direct connections between small farms and the market is the lowest, but these regions are also recognized by having really structured sectors, thus reducing the need for connections*" (SALSA D3.3, Rivera et al. 2019), p.62). This can be partly explained by the fact that in less structured environments small farms needs to get directly in touch with consumers though a diversified range of channels, vis-à-vis contexts in which there are processors, intermediaries and other middle persons. The product type is also relevant, as "*the less need for processing a product has, the higher the number of connections small farms are able to make*" (ibid. p.62). Indeed, SALSA evidence has showed that small farms' dependency is stronger in Southern Europe in relation to specific sectors/products, like citrus and olive, partly related to processing needs (olive), partly to post-harvest conservation needs (citrus), but also because of the lack of innovation capacity and of the conventional structure of the sector, which makes it difficult for those farms to find other marketing channels. These dynamics can be seen as an example of lock-in typical of less innovative mainstream sectors.

Provided this general observation, we may ask what research findings suggest with regard to the categories that come into relevance for the analysis of small farms' connections to the food system (and to the broader economic system). The investigation carried out for SALSA identified a wide array of interactions, arrangements and formal and informal rules[10].

Table 1 presents the main types of connections emerging from the regional reports and from the participatory process. They have been grouped into three main groups reflecting Polanyi's distinction between "redistribution", "market", and "reciprocity"-based economic integration forms, which has been identified as a useful lens for the organization of the research findings[11].

[10] We do not analyse here those connections that are not directly related to the destination of the small farm's produce or to the income flows towards the small farms itself and/or the household. For example, connections due to advisory and extension services, technological transfer, financial and credit services acquired by the farm on the credit market. These are important elements whose analysis, however, goes beyond the scope of the conceptual framework, which is focused on small farms' contribution to FNS rather than on broader analysis of their socio-economic environment.

[11] In Polanyi's conceptualisation (Polanyi, 1944), re-proposed by Meert et al. (2005), economic integration includes (1) 'market exchange', covering all remunerated activities using money as exchange tool, (2) 'redistribution', which involves compensation (by state or society) of inequalities generated through market

For a better comprehension of the table it is worth underlying that the eight connection forms listed on the right side of the table represent ideal types and are by no means alternative to each other, and that some of the real connections identified on the field can be referred to more than one form. This is particularly true for the market and the reciprocity-based connections. As shown in the table, hybrid forms have been given explicit recognition. However, in most of the market-based connections elements of social embeddedness and reciprocity can be present, particularly when relations concern actors rooted in a specific territory.

Polanyi's forms of connection	**Connections**	**Small farms' connections with food, welfare and broader economic systems**
Redistribution	Connections with public support and welfare	*1. Public policies influencing small farming*
		2. Households' access to external income sources
Market	Market-based connections	*3. Vertical market-based supply chains*
		4. Relations with small food business
		5. Participation to cooperatives
		6. Connections related to multifunctionality / other farm based functions besides production
Reciprocity	Socially embedded connections	*7. Cooperation based on hybrids between market and reciprocity*
		8. Informal arrangements based on reciprocity

Table 1 – Small farm/Household connections with the system

1. Public policies influencing small farming.

There is a range of connections of the farms with institutions and other bodies contributing to small farms' access to financial, technical or informative resources through forms of public support referable to the redistribution function. Not all policies have a positive impact on small farming, but we highlight here the ones are "used" by the small farms to pursue their goals. Despite not having investigated these connections in detail, many farmers across the various RRs mentioned public support availability as a determinant factor of the farms' choices with regard to the destination of the produce, and thus the forms of their contribution to FNS. The policies

The field research highlighted various forms of policy support to small farms, based on EU (for the European regions), national or regional funding and agencies. The importance of direct payments and agro-environmental schemes is key in various regional reports (for instance in the RRs 1, 2, 6, 12, 15, 16, 19, 22, 29), but other support forms have been mentioned by the stakeholders in the various RRs as capable to influence farms' choices and trajectories. For example support to traditional varieties safeguard (RR 22 Alentejo central), to organic method (RR1 4 Jihocecky) to modernization and innovation (RR 15, RR 23), for access to advisory and extension services (RR 13 Ugunja, RR 21 Nowotarski, RR 30 - various areas in Western Scotland), for inputs and fuel (RR 13 Ugunja, RR 15

exchange; (3) 'reciprocity', which refer to relations based on a social network with shared trust and mutual help between members.

Pieriga). All these public support types impact on the strategic choices of the small farms in relation to the crops and commodities produced, to farming methods, to the amount of produce, and so on.

2. Households' access to external income sources, with no direct relation to the farm's activity.

This is not referred to the food system in the strict sense, as for income flows that depend on the general welfare (e.g. pensions), or to the economic system in general. However, external income sources influence household economic conditions as well as the availability of time and resources to be invested in the farm, and thus the decisions taken with regard to the farm activity and strategies.

By external income sources we mean those forms of support or welfare not directly referable to agriculture and farming, but that nevertheless sustains farm/household's living. In Oeste (RR 23) interviews revealed that public expenditure and welfare (e.g. retirement, sickness, disability, child, or unemployment benefits) is considered a noteworthy source of extra income for many of the non-specialised small farms.

Off-farm income (salaries, rents and retirements treatments) mainly for part-time farmers, should also be mentioned as relevant income sources (and connections), although not referable to the redistribution sphere. Interviews in Larissa (RR9) reveal that more than 40% off-farm income derives from off-farm source, a percentage that rise to 60% for those interviewed in RR 18 Hedmark. This element can be relevant for decisions about investments and future panning. In the other Greek region of Ileia (RR10) it has been noted that farmers with higher off-farm income are the least interested on making plans for the future of the farm.

3. Vertical supply chains: actors and flows at territorial level.

In various cases small farms happen to engage in and contribute to specific local food system configurations, strongly locally specific, to meet increasing demand for local-based products with specific quality characters and to add value for small farms and related small food business.

These configurations can be categorized in different ways. Deliverable 5.1 describes how, across many of the European Regional Workshops held for the SALSA project, participants expressed interest and at times enthusiasm for innovations in food provisioning through "alternative food networks" (Ellis et al. 2019 - SALSA D5.1 p.38). The Report argues that in some regions these networks can hardly be considered "alternative" since they represent the continuation of historically embedded modes of trading and food provisioning (ibid., p.39). Besides, small farms' relations with industrial networks cannot be overlooked. A typology of food systems' configurations is suggested: traditional networks (local processors/intermediaries, corner shops, street markets); alternative networks (on-farm processing and selling, farmers' markets, box schemes); industrial networks (wholesalers, large processors, large distribution).

The variety of supply chains in which small farms engage (in particular the survival of traditional networks and the creation of alternative ones) is triggered by the difficulties faced when small scale players have to cope with industrialised large-scale business models and public policy mechanisms or regulations in tune with the large-scale production. An example is the imposition of high or inappropriate quality standards, as witnessed in various regions, for example in Latgale (RR 14) for milk. In Alentejo central (RR 22) it has been mentioned how EU food production standards led to closing of several slaughterhouses, dairies and other small processing units, making it more difficult for small-scale farmers to transform their fresh products on-site or at a reasonable distance from their

farms. Other factors are poor transport and storage infrastructures (RR 7 Gushegu) or more generally the captive relation established between small producers and large private processing factories, as indicated for example in Haouaria (RR 28).

The distinction among the food system types is not always sharp and similar forms of networks can be attributed to one type or to the other in different regions and in different times. Proximity and agro-industrial models are often coexisting and even interlinked. Small farms sell to large buyers, local processors or retailers, cooperatives, directly to final consumers, or to HoReCA. In many cases a general aspiration of small farms to stand out from the agro-industrial model has been noted, in the aim to pursue an autonomous ways of farming al living, for instance by building on local social formal and informal structures and producer networks for sales and quality valorization (RR 4 Jihocecky, RR 5 Ille-et-Vilaine), by accessing local food supply chains (RR 16 Vilniaus apskitis), and by building on family relations and support (RR 18 Hedmark). Other examples are also witnessed (RR 14 Latgale, RR 26 Castellón) where large primary production is destined to and managed by large processors and cooperatives that still represent a dominant paradigm/model of food system.

SALSA research findings about connections and governance lead to two reflections. While quantitative data witness low levels of cooperative participation vis-à-vis other forms of governance, qualitative data suggested that these collaborative arrangements were the most enabling form of governance for small farms and related small food business (Ellis et al. 2019 - SALSA D5.1 p.7, SALSA D4.2). Rather than exploring in detail the various possible configurations, which is more an aim of a comparative analysis (Cf. Deliverables 3.2, 3.3), we can here highlight some exemplary dichotomies that characterize the supply chain relations established by the small farms. These dichotomies are only indicative, whereas the real examples are often hybrid and mixed:

- more local vs more global -oriented supply chains,
- shorter vs longer chains in terms of number of steps "from farm to fork",
- mainly controlled by small farms vs mainly controlled by downstream players,
- mainly formal vs mainly informal governance and arrangements.

As witnessed by research findings, these different forms coexist in the same regions and even for the same small farm, which often engages in a range of supply chains to diversify its business or to meet the specificities of the various products. The result is a diversification of small farms-based local networks according to several farm/household and contextual conditions and the variety of supply chain configurations depends on regional context elements. The research highlighted the following ones, among the wider landscape of elements that influence small farms' strategies. All of them have to be considered in relation to some farm-household, like the type of product (fresh vs processed food, niche products, raw commodities), the time that family members can/want to spend for market-related activities, the importance of farm's income for the household:

- the importance of large players in the local agro-food chains in which cooperatives can play a key role (RR 10 Ileia), few large actors can dominate wholesale and retail (RR 18 Hedmark), consumers mostly depend on supermarkets' supply of staple foods (RR 19 Rzeszowski, 27 Cordoba), and in contexts in which small food actors financially belong to large actors since cooperation and bank loans are missing (RR 28 Haouaria).
- the presence of small food business in situations where transport infrastructures and storage facilities are lacking, despite the important production/processing potential of the area (RR 7 Gushegu, RR 15) Pieriga. The importance of small food business has been confirmed also by

the FAO web-conference, as they facilitate the activity of small farms, but also as their presence strengthen community activities and contribute to local income and jobs (FAO, no date p.13).

- the proximity to urban centers or densely populated areas that on the one hand can represent fertile contexts for short supply chains (RR 11 Lucca), or on the other hand strengthen the link with large suppliers do to the presence of supermarkets in urban centers (RR 17 Balaka)
- the presence of social cohesion and attitude to cooperation linked to agro-industrial sectors (RR 14 Latgale, RR 16 Vilniaus apskritis)

In the broader context of market connections, relations with food business and cooperative arrangements represent two specific forms of links between small farms and the food system which deserves some dedicated comments.

4. Relations with small food business

Small farms' relations with small food business take different forms. As described in D.3.2. (Guarin et al 2019), we found a significant diversity of SFBs in profile, structure and role in the food system. Processing and selling can take place within the farm/household, as an additional activity to primary production, in the aim to integrate poor family income by valorising own produce or to engage in an additional entrepreneurial business developing diversified chains (RR 5 Ille-et-Vilaine). Small food business can also be an independent activity, with which small farms' establish market connections. Our evidence has also showed that connections between small farms and off-farm small food businesses are not as evident as what was expected and often described in literature in terms of linking to the market (Rivera et al 2019 - SALSA D3.3). in the market connections of SFs expressed in the food system analysis, small food businesses do not show to be relevant. SFB can be more relevant as processors, or suppliers of inputs for the farms, as well as in guaranteeing other roles, as complementary labour, social connections, among others.

The type of product influences the supply chain, alongside logistics and infrastructures and legal requirements for food processing that facilitate or hamper on-farm processing and small-scale processing in general (RR 18 Hedmark, RR 22 Alentejo central). For example wine producers in Lucca (RR 11) tend to process their product to preserve value added within the farm. Fruit and vegetable on-farm processing is also witnessed, but a lack of infrastructure and logistics was mentioned as a limitation for smaller farms. Likewise small farms, some small food business engage in direct selling, whereas other sell their products through small or large-scale retailers (RR 3 Varazdinska). However, small food business, either in processing or in retailing sectors, are often said to play a vital role in the function of the whole local food system at least in some regions, with a multitude of up-stream and down-stream inter-sectoral linkages (e.g. bridging between small farms and consumers, processing the food based on traditional recipes), generating incomes and securing a significant number of jobs as explicitly mentioned in RR 9 (Larissa). In Giurgiu (RR 25) small wholesalers are playing an important role in connecting the region with Bucharest and other extra-regional areas, bridging between local small farmers and distant consumers. Small businesses process the food on the base of traditional recipes and sell it through informal networks directly to urban consumers in Bucharest, so contributing to the maintenance traditions which otherwise would get lost.

5. Participation to cooperatives

Cooperative arrangements can have a relevant role in coordinating and organising the food marketing in the aim to valorise the products, bargain the price collectively, facilitate exchange of facilities and resources, speed-up innovation, supporting small farms' political bargaining, etc., as emerging by various RR cases (RR 2, 5, 15, 24), but also by several contributions to the FAO web conference debates. Cooperation emerges as a strategy to contract with buyers or engage in quality schemes (RR 5 Ille-et-Vilaine), operating at large scale by supplying supermarkets and exporting (RR 15 Pieriga), and implementing training schemes for producers (RR 24 Bistrita). They have been also described as real engines of development in a territory and acting as fundamental way to add individual initiatives for a common strategy, therefore representing a leadership in the economic and social life of the region (RR 27 Cordoba).

Participating to a cooperative is one among other options a farmer can engage in, evaluating pros and cons. An interesting example comes from small olive-oil producers in the Spanish region of Castellon (RR 22, Alentejo central; RR 26 Castellon), who sell individually their produce through different channels, and at the same time join cooperatives that sell the oil collectively. The farms may compete with the cooperatives to which they belong, so that the latter use incentives to convince producers to deliver to them. In most of the cases the tendency towards cooperation - not rarely hampered by low trust, search for autonomy and historical heritages especially where producers' association activate similar coordination dynamics (RR 4 Jihocecky) - is strong among small farms as they are conscious of the burden represented by their small scale.

6. Connections related to multifunctionality

The variety of networks that small farms promote at the regional level go much beyond the classical food chains based on the vertical linkages between producers, processors and retailers. Multifunctionality is a key feature of many small farms, not least in consequence of the small size which forces farming household to establish new farm-related businesses (alongside looking for, or keeping, off-farm jobs). The analysis of these activities and these connections goes beyond the scope of SALSA, but at least agro-tourism deserves to be mentioned, as it can have a direct influence on food consumption. There has been no specific investigation in this regard, but some useful elements can be derived by the RR reports.

Many of the reference regions are characterised by rural environments highly attractive for tourists. For example, the Polish region Nowotarski (RR 21), with less than 350 thousand inhabitants, attracts about 3 million tourists every year (in Tatrzański and Nowotarski counties) who stay also on farms, and who eat and spend money for local products strongly connected with agriculture production.

The increasing tourist flows in the region are expected to boost the demand for traditional foods, encouraging small farms and related small food business to valorise local varieties and traditional processing. Agro-tourists can access small farms-produced food both when they become customers of an agro-tourism (multifunctional farms), and where they purchase local food at on-farm shops or farmers' markets, as witnessed for instance in Lucca province (RR 11). The same happens for Alentejo central (R22) where tourism visits have been increasingly growing the last years, with the connected raise in local food demand. Here, small food business is also highly interested by the rural tourism flows, where it is considered by the focus groups an important driver of local tourism, or again in the Lucca area, where local oil milling plants are important actors of short chains oriented towards tourists.

These forms of consumption cannot directly be referred to forms of FNS, as they represent temporary consumption behaviours. However, they contribute to the survival of small farming and small food business, and they represent a form of access to fresh quality food for the visitors whose relevance cannot be neglected.

7. Cooperation based on hybrids between market and reciprocity

Not all connections between agents are mediated by the market, in particular when we focus the attention to local contexts and small-scale players. Reciprocity-based and informal connections are different forms that are often identified in close connection to each other. However, they are described in two separate sections to better highlight their specificities.

The wide range of hybrid practices between market and reciprocity and the informal arrangements in the agro-food networks are crucial in the analysis of small farms' relational patterns and on the forms of their contribution to FNS. The social networks and mutually supportive farming practices, informal relations with relatives, friends, colleagues and neighbours are typically, hybrid forms of cooperation and a base to develop market activities (RRs 2, 5, 7, 13, 15, 20).

An interesting example of informal cooperation of small-scale producers is witnessed in Nowotarski (RR 21), where some shepherds with a limited number of own animals use to gather animals from various producers (their own as well) to bring them to graze and looking after them in the common grasslands in mountain areas. These shepherds also produce cheese, which then they sell by themselves, keeping the money. This is like a job for them, because they are paid for this activity after spending several months in the mountains. Similarly, some meat producers in Alentejo central (RR 22) graze their cattle on land owned by other landowners, and utilizable on a temporary basis through informal agreements with these landowners, who receive meat in exchange. These arrangements are often based on spatial proximity, where shared trust, personal reputation and social capital among local communities play a key role, as for example for mutual products selling (RR 15 Pieriga, RR 20 Nowosadecki), for the establishment of self-organised and self-managed farmers' markets (RR 11 Lucca). These networks allow the exchange of goods but also of labor, knowledge and information (RRS 4 Jihocecky, RR 5 Ille-et-Vilaine, RR 7 Gushegu).

8. Informal arrangements based on reciprocity

In some cases, the relations are purely based on reciprocity and/or on the willingness to support household's members, relatives, neighbours or friends, with interpersonal or communal relations detached by market rules. The food maps can hardly capture the intensive informal trades between small farms at local level, or the food gifts and donations, or even the frequent exchange of services that can be mediated through food-based payments (RR 25 Giurgiu) or through an informal system of loans (RR 13 Ugunja).

Many informal cooperation arrangements involve family members, colleagues and neighbours supporting the farmer in periods of peak production and high temporary labour needs. These activities are often not paid, relying upon a principle of reciprocity or barter and on flexible and time-delayed exchanges of goods and services (RR 6 Vaucluse, 14 Latgale). Besides, informality is often aimed at bypassing the heavy burden of regulations and taxation not tailored on small scale actors' specificities or simply perceived as not sustainable (RR 8 Imathia, 14 Latgale, 19 Rzeszowski). In these cases informality characterises also the relations based on pure market rather than reciprocity. For example,

in Ileia (RR 10), high taxation creates favourable conditions for informal marketing channels, as transactions through 'formal' channels are heavily taxed and wholesalers delay payments to producers for months, a situation that has worsened after the imposition of capital controls in Greek economy in 2015. Consequently, farmers opt for informal transactions with unregistered traders, who can pay better prices and in cash. Informal agreements also allow small farms to sell imperfect or non-standard products. This is witnessed for instance in RR Vilniaus apskritis (RR 16), where local community organisations accept non-standard vegetables and use them to produce spices, candied products, and sell them.

These different experiences witnesses that in many situations small farms can hardly engage in industrial or large-scale agro-food networks because these networks tend to insufficiently pay the full value of farm products, profiting of unbalanced power relations. Besides, these networks impose rules hard to meet by small farms, as they rely upon economies of scale, predictability, an industrial definition of quality. In line with the 'relational' definition proposed, small farms are characterized by the need to achieve a critical mass in order to overcome the limits of small scale and profit of synergies, access good markets for products and services, obtain fair conditions of input supply (seeds, fertilizers, labour, land, energy (as witnessed by the FAO web-conference, and emerged by the CoPs).

Indeed, the development of alternative local-based food networks is generally rooted on the activism of small farms, which shape and re-shape cooperative arrangements to overcome their limits and to achieve greater autonomy vis-à-vis industrial agro-food chains. These hybrid connections assume specific forms and relevance in more traditional contexts. In various regions, food and food-centred activities assume a social function in terms of community cohesion through gifts, barters, but also through mutual help and cooperation. In the case of RR 25 Giurgiu, it has been explicitly noticed how difficult it is for any food system mapping to capture the very intensive local trades among small farms as well as the importance of the food gifts offered to the children studying in Bucharest or to relatives in other cities.

The FAO web conference provides an interesting example of social fabric triggered by small scale farmers and shepherds. In a district in Uganda, during the dry season pastoralists and the crop farming pastoralists allow the livestock to graze over the cultivated fields to facilitate crushing and manuring for a period of 3 months. Then, during the wet season, the livestock keepers move to mountain areas, as more land is used for crop farming. Besides, crop farmers provide cereals and some small resource support to the livestock keeper meanwhile the livestock keepers provide milk and meat to the crop farming households[12]. Another exemplary case has been reported in the interactive exercise carried out during the Brasov project meeting. Small lamb producers in the Nowotarsky region in Poland (RR 21) leave their animals to shepherds who graze them in the common grasslands in mountain areas. These shepherds (who own some animals as well) remain for long time alone in these remote areas, but are paid for this activity and are also allowed to produce and sell cheese with the milk of animals of other producers, keeping the money as additional remuneration, which entails a high level of personal trust.

The various connections a farm can establish with the food system (but also with other related systems, like the public welfare or the social fabric of the community) are displayed on the right side of Figure 7. The farm' size (indicated on the opposite side) is seen in relation to the need/willingness

[12] Contribution to the FAO-hosted web conference.

to establish these connections, through the influence of the elements highlighted in paragraph 2.2.1 and showed in the middle of the figure, mostly derived from the FAO web-conference, but also supported by regional case-studies analyses.

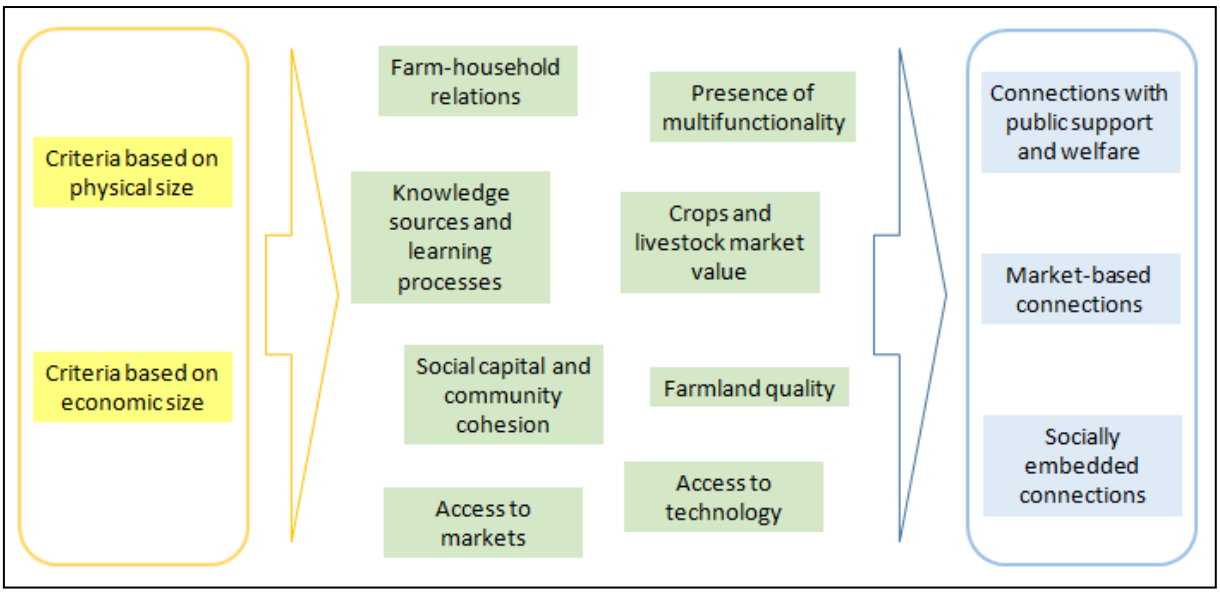

Figure 7 - Small farms' size, context and connections

It is on these elements, which mediate from the farm's size and the need/opportunities for connections, that policies can operate in order to create an enabling environment for the small farms, as suggested in the final subsection 7.3.

5. Food and nutrition security: a policy-rooted definition

5.1 Initial CF

In the Initial CF the conceptualisation of FNS was rooted in the definition from the 1996 World Food Summit (FAO 1996), reaffirmed in the 2009 Declaration of the World Summit on Food Security (FAO 2009). According to this definition, food security exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

The definition was then detailed and unpacked following the well-established distinction between the three (plus one) FNS dimensions (FAO 2006; FAO 2008). In summary:

- *Food availability*. The availability in the given geographical space of sufficient quantities of food of appropriate quality, supplied through domestic production or through imports.
- *Food access.* Economic and physical access by individuals to appropriate foods for a nutritious diet. It is shaped by the commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live.
- *Food utilisation*. Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. It also accounts for the biological processes related to food absorption and to the general physical conditions of the eater.
- *Food stability.* To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks or cyclical events.

The initial CF also referred to another important lens to look at FNS is the scale at which it is assessed: individual and intra-household scale, household, local/communal/regional scale, national and global scales. FNS at a given scale depends on the specific characteristics of the food system at that scale, and on the links between food systems.

5.2 Empirically grounded CF

The contribution of small farms to FNS was initially mainly focused on "access" and "availability" dimensions. The research also highlighted the influence of small farms and related small food business on the food system stability, through the diversification of production and distribution, deriving from the presence of small-scale actors. Some insights were developed on the “utilisation” dimension, which was partially investigated.

Regarding the scale at which FNS was analysed, the research has addressed the farm scale and to the local/communal/regional scale, as the most pertinent ones in relation to the regional level at which the research has been conducted (see also previous Section 3.3 and WP3 deliverable 3.3 p. 6-7 that specifically analyses “*the contribution of small farms to their local food systems in particular to the availability dimension of regional FNS […] by looking from a regional level perspective at the activities and flows activated by small farms, […] small farm’s market linkages, through the analysis of different key food products in 30 reference regions […].* ”).

As we did earlier for the food system conceptualization, it is worth linking FNS in relation to the policy context. The reflection developed in the main EU food-related initiative, FOOD2030, and of the outcomes of the SUSFANS project, lead to identify three main elements that characterise the vision of FNS in the current EU context.

1. The importance of a system approach to FNS: a sustainable FNS shall be assessed/promoted in a system perspective, as "*ensuring FNS in the long term requires adopting a food systems approach underpinned by sustainability, linking land and sea, and encompassing the entire 'food value chain." (FOOD 2030 2016 p.4-5).* A systemic approach becomes even more crucial if we widen the view beyond the short- medium term on the one side and beyond the European borders in the other. As suggested by FOOD2030, "*Achieving Food and Nutrition Security (FNS) for future generations worldwide, faces multifaceted and interrelated global challenges such as climate change, urbanisation, population growth and natural resource scarcity. This raises the need for a more systemic approach to FNS that embraces all actors in the food system"* (EC 2018 p.19). This leads to reconsider the role of R&I as a base to support an FNS policy capable to integrate different concerns "*across the whole food system into a coherent, coordinated and multi-dimensional policy to deal with the full complexity of FNS"* (EC 2018 p.21). The need for a systemic approach to the analysis of small farms' activity in relation to FNS is fully acknowledged by SALSA. Field research and information collection have been structured with attention to the interrelations between small farms and the food system. Besides, the analysis of the findings has been carried out in a system perspective, focussing in particular on the connections between small farms and the food system as a key to understand their contribution to FNS.

2. The emphasis on nutrition. This is reflected by the dominance of the definition "food and nutrition security" over the narrower "food security", in relation to the importance of the promotion of balanced and healthy diets and lifestyles, (seen as one of the ultimate targets of a food policy). Although not explicitly addressed in SALSA, nutrition-related issues emerged from various contributions. What is worth stressing here is that the capability of the food system to provide nutritious food requires, again, a systemic approach. This is reflected by the FOOD2030 rationale, when it is argued that "*The definition of food systems goes beyond the production and delivery of sufficient food for all (quantity) to include the provision of safe and nutritious food for healthy and sustainable diets (quality)* (EC 2016, p.5). The SUSFANS vision paper underlines these elements, talking about an EU "agri-food-nutrition system" (Rutten et al. 2016, p.6). The centrality of nutrition is linked to sustainability concerns, as expressed within SUSFANS *"sustainable FNS in Europe has to be based on "SHARP" (Sustainable Healthy Affordable Reliable Palatable) diets, and that patterns of consumption, production, processing and trade will shift to better support those qualities"*[13].

When dealing with nutrition, we cannot simply refer to the availability of nutritious food in a given place. It is important to think in terms of access to adequate fresh and nutritious food for all, in relation to questions like: Adequate nutrition for whom? Adequate nutrition through which food chains? New consumption patterns, triggered by emerging food habits but also by emerging food chain arrangements in which small farms and related small food business can play an active and central role, must be taken into account.

[13] SUSFANS factsheet, https://susfans.eu/pillar-i

3. The attention to a sustainable FNS, following the classic ecological, social and economic sustainability dimensions. This concern is first reflected in the key FNS priorities identified by the FOOD2030 initiative, whose description directly hinges on sustainability-related issues[14]:

- *Nutrition* for sustainable and healthy diets
- *Climate* smart and environmentally sustainable food systems
- *Circularity* and resource efficiency of food systems
- *Innovation* and empowerment of communities

The assumption that strengthening FNS in Europe requires more sustainable food production and consumption (Rutten et al. 2016) is also underlined by the Plovdiv FOOD2030 Declaration, according to which *"ensuring sustainable Food and Nutrition Security in a changing world is becoming increasingly challenging and urgent"*[15].

In SALSA, the systemic vision of FNS and its expression at a territorial level for given regions, has been at the core of the field research and of the subsequent reflections, as witnessed by the analyses developed in the last section. The nutrition dimension has been addressed less directly, as no specific investigation has been carried out on consumers' behaviours and on the nutritional contents of the food. However, elements like availability of different food products and access to fresh food for the households have been considered in relation to the presence of small farms. Sustainability concerns are indirectly present when small farms' contribution to FNS is considered in a system perspective and through the observation of strategies that are often connected to environmental and sustainability goals.

An explicit focus on sustainability would have required investigation and analyses beyond the scope and the possibilities of the SALSA project. Resilience-related concerns were accounted for in SALSA through the attention paid to small farms' contribution to the diversification of food system actors, products and flows, with subsequent effects on system resilience and capacity to adapt. This attention is reflected in the categories emerged by research findings, through which the analysis of small farms' contribution to FNS can be framed, as suggested in the last section.

[14] https://fit4food2030.eu/food-2030/
[15] Plovdiv Food2030 Declaration, http://food2030plovdiv.eu/?page_id=1111

6. Small farms' contribution to regional FNS in a system perspective

6.1 Initial CF

The contribution given by small farms to food system outcomes, and specifically to FNS is a key research field for the SALSA project, together with the analysis of the conditions enhancing small farms' small farms' capacity to deliver those outcomes. The Initial CF provided a preliminary list of potential contributions, to be tested and revised though the field research. Seven main forms of contributions had been identified:

1. Direct food provision for the farmers' households.
2. Producing food from economically marginal lands, or lands which are not suited to large-scale industrial farming, thus enlarging the base for food production.
3. Diversification of food systems in terms of business' size, production techniques and relational patterns, which create the conditions for the coexistence of different forms of food production and distribution.
4. Safeguard of biological diversity, through higher crop diversity per unit of area than larger farms, but mainly in the assumption that in small farming traditional varieties and productions can be preserved and transmitted.
5. Provision of quality food at affordable prices to low income urban and rural consumers who are not food producers.
6. Food education and awareness, in the assumption that small farms are often characterised by a deeper and more personal consumers' involvement, often based on informal social networks.
7. Socio-economic development, in terms of preserving agricultural skills, generating employment and incomes also in rural areas with reduced job availability, contributing to social cohesion.

A preliminary set of connections between these contributions and the most pertinent FNS dimensions are shown in Figure 8.

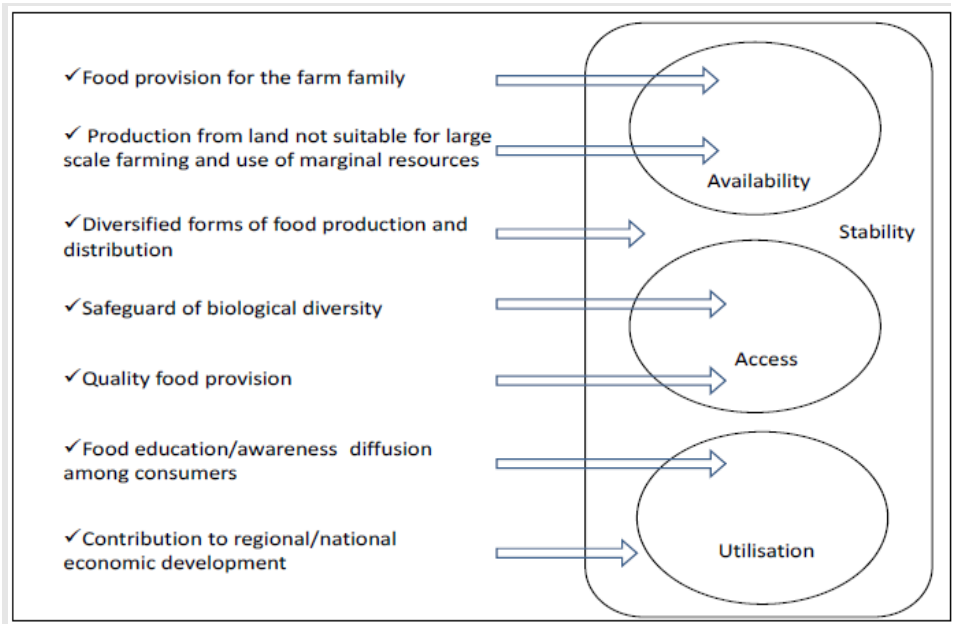

Figure 8 - Preliminary identification of small farms' contributions to FNS (Source: Initial SALSA CF)

6.2 Empirically grounded CF

The 3 hypotheses mentioned in the introduction provided the backbone of the research in SALSA:

Hypothesis 1: Small farming is a relevant source of sustainable food production (availability) for many regional food systems

Hypothesis 2. Small farming and small food business provide food and incomes for rural households (access and utilization's assets and capacities) in many regional food systems

Hypothesis 3. Small farming and small food business increase food systems' diversity thereby contributing to their resilience (stability)

For each hypothesis, specific small farms' contributions have been identified. These contributions are shaped by the connections that a small farm establishes, first with the farming household itself, and then with the food system and the external environment. The contributions summarized in Table 2 are explored in more detail in the following sections in the aim to highlight their main characters and to identify useful categories for future research:

Hypothesis	***Contribution to FNS***	***Main dimension and level of FNS***
Hypothesis 1	*a) Food provision for regional consumption*	*availability, regional level*
Hypothesis 2	*b) Household's access to food through self-provision*	*access and utilization, household level*
	c) Income provision for the rural households	*access, household level*
Hypothesis 3	*d) Food system diversity and consequent stability and resilience*	*stability, regional level*
	e) Food system level of autonomy from external shocks and global changes	*stability, regional level*

Table 2 - Forms of small farms' contributions to FNS

The list is hinges on the three hypotheses identified in the initial CF, expressing more direct contributions to FNS as emerged from the research. There can be other less direct effects of small farms on FNS. For example, they could contribute to the general economic development of a region; they could enhance ecological sustainability, as long as small farms are supposed to use less pesticides and other pollutants; they could contribute to the survival of a vibrant civil society, with higher shared trust and a positive attitude towards collective efforts for the future of the region. These represent possible contributions to FNS in the medium-long term, whose investigation goes beyond the scope of SALSA, although some elements harvested in relation to, for instance, food system diversity, can give hints for further analyses.

6.2.1 An empirically grounded conceptualization of small farms' contribution to FNS

This section highlights the most relevant and specific contribution of small farms to regional FNS, using the three initial hypotheses as a guide for the analysis[16].

Hypothesis 1.

a) Contribution to food provision for regional consumption

Looking at small farms' contribution to regional availability of products, from WP3 research activities, we have seen that African small farms contribute most, followed by Eastern European, Southern European and finally Northern European. However, this contribution to FNS is strongly affected by the number of small farms in the region as well as by the connections established (Comparative Report, SALSA D3.3 (Rivera et al. 2019). A positive role of small farming for regional food availability has been identified in very different contexts through the work done for SALSA WP2, based on Sentinel-2 data. In particular the observation showed that small farms play a central role in various reference regions for a set of key products (for example vineyards in RR 10 Illeia, potatoes in RR 19 Rzeszowski) (Godinho et al. 2019, p.28 - SALSA D2.4). More specifically, according to the data, small farms are responsible for a very high percentage of the total regional production for a set of crops, like in the case of citrus for RR 26 Castellon, and for tomato and pepper in RR 28 Haouaria (ibid). This importance has also been witnessed by the participants to the FAO e-conference (Ruane 2016, p.7). It is worth noting that the large majority of the small farms analyses throughout the project were to a certain extent, if not fully, market oriented.

However, it is difficult to assess the real impact on FNS, given that trade remains an alternative for the regional supply of most/all food products. This does not lessen small farms' contribution to FNS, if we enlarge the view to consider FNS also in other regions. Besides, small farms contribution to the regional availability is due to food that never reaches the formal markets, as it is used for self-consumption, shared with relatives and neighbors, or sold informally to local consumers.

Some key elements deserve to be considered, derived from the observation of RR case-studies:

- The share of small farming produce in the regional context for each product. Sometimes most of regional production comes from small farms (like in some extra-European regions like RR 2 Santiago and in RR 28 Haouaria) and is particularly clear for some products (like honey in RR 14 Latgale). However, these products can be more or less relevant in consumers' purchase box, and specifically for FNS.
- The importance of small farms' productions in the regional food systems, with regard to the survival/development of local chains, networks, actors, hubs. In this way small farms fill the gap of products not accessible through conventional chain. Small farms contribute to make seasonal and non-standardized food available to local consumers in farmers' market and farm shops at affordable prices, rescuing local varieties (RR 23 Oeste). On one side this means increasing food

[16] In the following we consider the forms of contribution for the small farms in general, as emerged by the research process. In SALSA a typology of small farm has been identified, with 5 different types that can have specific roles in the contribution to FNS also in response to the additional hypothesis highlighted in Section 1.1. Subsection 6.2.2 provide an explanatory investigation on the links between these types, the farms' strategies and the contribution to FNS.

system diversity and consequent resilience in case of shocks, but there is also a benefit in times of stability, making the system more capable to reach all consumers with fresh and diverse food. The foresight analysis conducted in WP4 (SALSA D4.2) points out how SF production could play a role in securing food availability for more vulnerable groups or areas under more food insecure regional scenarios.

- Small farms and related small food business' products are often characterised by specific quality, reflecting some peculiar food knowledge, farming methods, processing skills, rooted in the local context[17]. An example comes from in the RR 15 Pieriga: a farm specialized in tomatoes and other vegetables uses mostly natural inputs available in the farm or in the immediate surroundings (soil, water, manure) and adopts land-based approach which gives tomatoes a special taste, highly appreciated by costumers in the local markets (SALSA 2018, p.18).
- The fact that small farms tend to occupy also marginal and less accessible areas not attractive for larger farms and industrial agriculture, practicing a "territorial fitting", cultivating small areas that are difficult to access (RR 6 Vaucluse, RR 10 Ileia). Thus, their presence increases the farmed surface, increasing local production potential. By this, they also contribute to preserving que diversity and quality of the local landscape, significant for the well-being of those living there and for the attractiveness of the area for tourism and recreation.

Hypothesis 2.

b) Household's access to food through self-provisioning

Self-provisioning is an additional channel to access food, available for farming extended households. In the RR 19 Rzeszowski it has been observed how small farms, in case of an external shock, are able to increase the chicken meat production quite easy and fast to the benefit of their food security. The extent of self-consumption for farming households gets to an average of 50% of needs even in well-developed contexts, like in the Pisa province (RR12).

This form of contribution is mainly related to the access dimension of FNS. However, the utilisation dimension, which has not been specifically investigated, can also be influenced by the possibility of households and local communities to access fresh and diversified food, and by the survival of local food-related traditions about the ways in which food can be prepared, stored and consumed. In this view, supporting the survival of traditional food processing and consumption habits can be seen as another specific small farms' contribution to FNS. In RR 14 Latgale, for example, on-farm small-scale processing represents not only a profitable niche market for small farmers, but also a way to valorise old recipes and to preserve local culinary traditions.

The current debate around small farms is related to the importance of self-provisioning and its relevance for rural households' livelihoods. Davidova et al. (2012) and Davidova and Thompson (2014) and more recently, Jehlicka et al (2018) argue that self-provisioning is very important for small farms in Eastern European countries, and particularly among poorer farmers. Our evidence shows that this

[17] Among the several examples in the regional reports, one comes from RR 15 Pieriga: a farm specialized in tomatoes and other vegetables uses mostly natural inputs available in the farm or in the immediate surroundings (soil, water, manure) and adopts land-based approach which gives tomatoes a special taste, highly appreciated by costumers in the local markets (SALSA 2018, p.18).

statement is true, but it is also true amongst small farms in all European countries analysed, where small farms in all regions keep part of their own production for themselves. The more specialised the small farms are, the less product is kept for themselves, thus conventional entrepreneurs and business specialised keep relatively less produce. Nevertheless, there always is a share of the production kept in the household, meaning there is always part of the small farms' production that never reaches the market (SALSA D3.3, Rivera et al. 2019).

There are some key themes to be considered in the analysis of the role of self-provisioning and of its effects on FNS, derived from RR case-studies.

One theme is the distinction between self-provision and self-sufficiency is important and deserves careful observation. The relation between the two depends case by case by some specific farm/household features, like the small farms' products, that can be more or less relevant for households' daily consumption, as accounted for in several RR studies across the various regions and countries. The different relevance that the specific farms' products have for the households' consumption is reflected in the different importance of self-provision for different farms. For example those with home gardens and a diversified production of fruits and vegetables tend to have higher and more important self-provision than those specialized in one single product. At the same time specialised farms can have lower overall self-provision rates (thus, lower self-sufficiency levels), but up to 100% of self-provision of their product (for example: part-time or hobby olive oil farmers in RR10 (SALSA 2018, p.23);

Another theme is the availability of more or less extra-farm income. In RR 7 Gushegu, for example, small farm-household with a diversified production and in need of farm-generated income tend to cultivate at least one "cash-crop" in the aim to get the income they require to meet family expenses, while diversifying the rest of the production.

A last theme relates to the profitability of the market for specific quality products, which can lead farmers to reduce self-provisioning and move towards higher market integration. In RR 16 the growing demand for fresh, natural high-quality food encourages farmers, especially small and medium-sized, to produce higher added-value food products to sell them directly to the consumers and thereby to increase their income.

When we deal with self-provisioning practices, what matters is the extended family networks rather than the sole household. This makes the analysis more complex, as when we enlarge the view from the close family to the personal networks and the surrounding community, it becomes more difficult to separate self-provision from reciprocity-based economic integration. This is witnessed in several regions (RR 13 Ugunja, RR 14 Latgale, RR 15 Pieriga, RR 19 Rzeszowski, 26 Castellon) in very different geographical contexts like Kenya, Poland, Latvia, Spain. The contributions given to the FAO web-conference confirm the importance of proximity-based relations centred on small farms for access to fresh quality food (Rouane 2016, p.7).

The presence of these reciprocity-based food exchanges is also likely to influence the utilisation dimension of FNS. Quite often, diets in some farming households tend to be quite determined by their farming activity, as they produce most of what they consume, grounding their food intake on what they grow and selling only their excess produce, exchanging food with other small farmers as long as it is needed (RR 22 Alentejo central). In the RR 23 Oeste it has been noticed how non-specialised small farms tend to base their diets on what they produce whereas the surplus is sold but also channelled

to family members, neighbours and relatives as gift or through barter. This encourages fresh food consumption also beyond the inner circle of the farm household, potentially influencing also the forms in which food is processed and utilized. Some farms use some raw products for provision and sell the rest for being processed. For example, keeping for self-consumption milk and fresh cheese, but not butter and hard cheese, which are sold (RR 10 Ileia, RR 29 PK Stirling). In other cases small farms engage in own-processing for self-consumption, like the pork producers in RR 19 Rzeszowski.

c) Income provision for the farm-household

Income provision for the farm-household is a crucial element for the survival of small farms, and an important aspect of their contribution to the FNS. Particularly the RR reports, highlighted some key elements and categories to consider for further analyses.

Farm-generated income can be the unique source of income, for instance in those situations in which local population does not have any other relevant alternative (RR 14 Latgale. RR 20 Nowosadecki, RR 25 Giurgiu), or a major source of income when consumers demand more and more fresh food (RR 16 Vilniaus apskritis), or an important source of income bringing about half of the household revenues (RR 18 Hedmark). In other cases, farm-generated income can represent just an additional, even marginal, source of income, the other sources being both represented by off-farm jobs, retirement treatment, social welfare, as observed in the majority or regions.

Besides, for processed food, farm's income can be generated through on-farm processing, but also through the selling of the produce to independent processors and intermediaries (alongside the possible relations with large food processors). The capability to develop on-farm processing and to establish relations with external processors can help small farmers to generate additional income. In RR 16 Vilniaus apskritis, it has been noticed that small farmers capable to cooperate with small food business have better possibilities to sell flour and grains directly, getting higher sales and revenues.

Two further general comments can be made on the choice and balance between food self-provision and income generation strategies.

First, there is no polarization between food self-provisioning and food selling to generate income. On the contrary, there is a continuum between the two opposite strategies, with a balance which varies from farm to farm and from time to time according to household's needs, climate conditions, and market opportunities.

Second, the combination of self-provision and food purchase gives farm households flexibility and thus resilience in food access, and thus resilience in case of shocks. They can have flexible self-provision rates according to the yearly harvests. In RR 15 (Pieriga) apple producers use to sell their produce to local consumers in very productive years, only when their own apples have been consumed, following a "first eat then sell" strategy, following a pathway also seen in other regions like RR7 Gushegu. Similarly, cereals producers in RR 17 (Balaka) rarely sell their produce because production level are usually low and sometimes not enough to meet annual food requirement of the household, but they are open to sell them when possible.

Hypothesis 3.

d) Contribution to food system diversity and consequently to resilience

A contribution by small farms and related small food business can be seen in relation to various diversity levels:

- Diversity of crops and food varieties and of animals and vegetable species. According to the outcomes of the analysis of small farms' spatial characteristics based o the Sentinel-2 data, the regions presenting the lowest mean farm size (0-5ha) are the ones with the highest crop diversity values (Godinho et al. 2019 - SALSA D2.4, p. 22). The contributions given to the FAO e-conference (beyond the informal way in which they have been collected) and particularly the regional reports confirmed that small farms contribute to the resilience of the food system by providing a more diverse product range (Ruane 2016, p.10 and p.16). For example, some farm animals can be better breed at small scale, thus small farms tend to choose them (for ex: goats vis-à-vis cows, as in RR 4 Jihocecky). Small farms tend to cultivate different local varieties, for family traditions or in the aim to diversify their products. Some of these varieties or species can have good resistance to various extreme weather events (RR 5 Ille-et-Vilaine), are well suited for local climate or soil conditions (RR 22 Alentejo central, RR 23 Oeste), and can be harvested in different periods of the year (RR 7 Gushegu). An interesting example comes from Alentejo central, where small farms-based lamb production, being less demanding than cattle, can profit even from poor quality pastures and creates important production synergies due to its co-existence with olive groves and the large scale silvo-pastoral systems *Montados*. Moreover, sheep have an important function in maintaining olive groves, as they eat and keep under control the growing olive branches around the tree base. Similarly, in RR 4 Jihocecky, the cheese goat production is mostly provided by small farms, whereas large farms play a minor role, mainly because goat farms can operate even on small scale, contrarily to cows and because a limited consumption of goat milk products prevents this production from industrialization. Data suggest that there may be greater diversity in produce on smaller holdings, compared with the dominance of cattle and sheep grazing on the larger farms (RR 30 - various areas in Western Scotland). In some cases the choice to engage in varieties and species diversification provide alternatives to the market forces-led standardisation trends, as for instance in the case of RR 30, where small livestock farmers choosing rare breeds of sheep and cattle are less integrated in the market because those animals do not conform to market requirements (slaughter weight) (SALSA 2018, p.10).

Diversity of farming knowledge and processing methods, with survival or artisanal craftsmanship, thanks to reviving regional culinary traditions and increasing of a vital home processing movement that emphasises craftsmanship and artisanal production. Thus, diversity creates the condition for diversified impact on the local food system of possible shocks and stressors, as food habits are more diverse. Besides, it further increases the potential for variety of raw and processed food in the households' desks (RR 17 Balaka, RR 28 Haouaria). In RR 14 (Latgale) an important role for small food business has been observed, with a recent engagement by small businesses in the revival of regional culinary traditions and in the development of a vital home processing movement that emphasises craftsmanship and artisanal production. In this regards, the several experts and stakeholders who have participated in the research insisted on the necessity to recover, improve and valorise local varieties and breeds, and to explore retro-innovation pathways, in order to respond to the challenges that SF, SFB and regional food systems will need to confront in the future (SALSA D4.2).

- Diversity of business models and distributive channels. Small farms tend to engage in a range of business models, which detach themselves from the most standardised agro-industrial business,

with which they found often difficult to engage because of a range of reasons, as argued above in subsection 4.2. These "alternative" business models include the range of cooperation forms among small scale players as well as other connections and formal and informal arrangements witnessed across most the analysed regions, like food supply to the community through direct selling, street/local/farmers' markets, local HoReCa, corner shops, kindergartens and schools, solidarity purchase groups and collective catering, eco-markets.

The Horizon 2020 SUFISA project (https://www.sufisa.eu/) identified some strategies among others, namely "multifunctionality" and "territorial integration", that can be seen as business models particularly suited for small farms. The first one refers to the diversification of activities and functions within each farm. A farm can still produce food (or other primary products, but also engage in direct selling, rural services like agro-tourism, didactical farming, kindergartens, etc). Territorial integration refers to the range of diversified links that a farm establishes with the surrounding territory (and local actors) to develop its business, like participation to farmers' markets and local fairs, workers' and machinery's exchange, participation to local development groups or programs, and so on. Both the trajectories contribute to the diversification of the regional food system. For instance, in RR 11 (Lucca) we have observed the activity of a highly diversified small farm, concurrently linked to the territorial production activities but also innovative in terms of product and process diversification. Such diversification implies the emergence of new dynamics of value creation, vale proposition and, therefore, value capture. Indeed this farm, through its innovative value management dynamics, was able to access local supermarkets with its products, establishing new dynamics of the local food system through its innovative business model.

An additional dimension of food access diversity, for which small farms play a specific role, was suggested during the FAO web-conference, with particular regard to the low income regions. It has been argued that the tendency of small farms to keep a share if their harvest to feed the family in case of need, and more generally the possibility to rely upon self-consumption, represent an important safety net against economic fluctuations, trade limitations, weather extreme events and other possible shocks (Rouane 2016, p.7). Two additional elements are to consider, in relation to business models' diversity, derived from RR case-studies:

- Small farms tend to engage in relations with small food business, establishing both upstream and downstream linkages. For instance, in Larissa (RR 9) small food business, either in processing or in distributing sectors, play a vital role in the function of the whole food system, with a multitude of up-stream and down-stream inter-sectoral linkages, generating incomes and securing a significant number of jobs. This observation leads to consider that the presence of small farms in a region tend to trigger the diffusion of small food business and vice-versa, further contributing to food system diversity.
- Local market channels can be based on formal (RR 15 Pieriga), as well as on informal (RR 10 Ileia) mechanisms, as well as the hybrid configurations described above, which represent another factor of diversification.

In general terms, the high number of people involved in small farming activity, the high number of small independent farms, and the varieties of the solutions they have to find to their problems generate diversity. Thus, food systems based on small farming are more diverse than food systems based on larger farms. Small farms give a contribution to food system's sustainability/resilience as they

diversify (or keep diversified) products range, market channels and broader social-based exchange relations.

e) Food system level of autonomy from external shocks and global changes linked to a degree of self-containment of the small farm's agro-food networks.

Those actors more rooted in the regional food system and (to a certain extent) less connected with the global level are less dependent on the national and foreign policy decisions and on global economic context. This can reduce the food system exposure to external shocks and stressors.

A similar tendency to self-containment can be found for the production phase, when it is argued that small farms tend to better adapt their farming practices to available local resources, territorial assets, ecological and natural conditions, with an approach described as "territorial fitting" (RR 4 Jihocecky).

In the FAO web-conference it has been argued by several participants, mostly form low income countries, that small farms' contribution to the food system resilience included their use of easily-accessible, simpler technologies, of communal water management arrangements, of common storage areas, as well as their relying on local resources and resource recycling (FAO, no date p.10).

6.2.2 Small farms typology and relation between different small farms' types and contribution to FNS

On the basis of SALSA research data, an empirically-based and theoretically-consistent small farm typology has been produced (Guarín et al. 2019 - SALSA D3.2). The typology was based on a multivariate and cluster analysis of the data from the survey to a sample of small farms in all reference regions. The analysis includes ordination and clustering methods, aimed at identifying explanatory variables and to group small farms in homogeneous types. Through this methodology, five main clusters/types of small farms have been identified to improve the understanding of small farms and their role on FNS, as it is a tool that reduces complexity and allows us to make sense of their diversity.

The first significant divide is between weaker and stronger market integration, although almost all farms have some degree of market integration, based on whether their market linkages are formalized by contracts, or whether farms invest in certification schemes or participate in cooperatives. Further distinctions within the two macro-groups are based, for the less market-oriented on the difference between part-timers with relevant external income sources and strugglers who make most of their living from the farm. As far as the stronger market-oriented are concerned, the different degrees and forms of entrepreneurship and innovation lead to identify three different types.

Table 3 shows the result of an exploratory exercise aimed at analysing the relation between the five identified small farms' types and their contribution to FNS from a dynamic perspective, looking at behaviours and strategies in which they engage (being these choices the result of an autonomous decision or forced by the circumstances).

The filling-in of the grid is based on a participatory exercise conducted during the SALSA workshop organised in Brasov (Romania) in May 2019. Participants have been asked to describe the trajectories of small farms' trajectories (or initiatives) based on the strategic choices adopted[18], and to link them

[18] A base for discussion was provided by an adaptation of the farm's strategies landscape identified in the Horizon 2020 SUFISA project (https://www.sufisa.eu/), already mentioned in paragraph 6.2.1. Additional strategies

with the contribution to the various FNS outcomes (plus other additional outcomes) and to display them on a flow chart like the one showed in Figure 9.

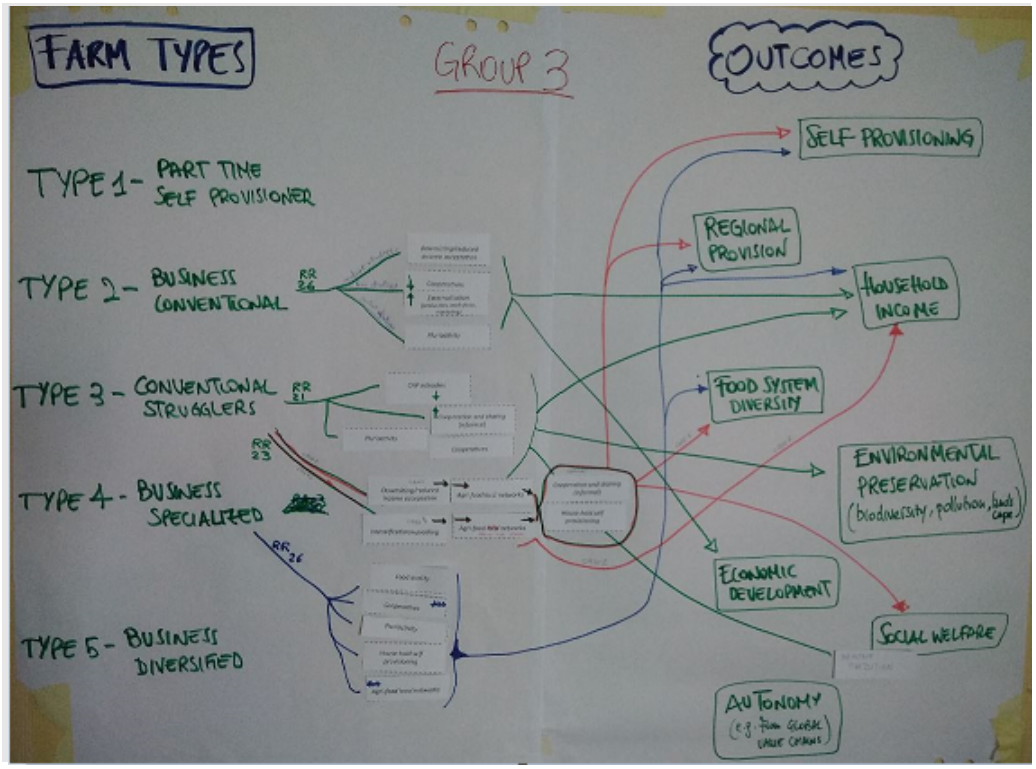

Figure 9 - Example of flow chart with small farms' types, strategies and outcomes

Table 3 shows the outcome of this exploratory exercise, integrated by additional instances harvested though subsequent contacts with the research partners. The table is not meant to provide an exhaustive view on all the possible relations between types, strategies and outcomes. It suggests another possible use of the conceptual categories developed in SALSA, and can be also used as a concise representation of these dynamics.

have been recorded during the exercise, which has been followed by the harvest of further examples asked to SALSA members via email. The most relevant strategies/choices have been then recorded in each cell.

Small Farms' Types		Relation between strategic choices and contribution to FNS				
		Hypothesis 1	Hypothesis 2		Hypothesis 3	
		Regional provision	Self-provision	Income for household	System diversity	Autonomy
"Weaker market orientation" group:						
1	Part-time self-provisioners	Informal cooperation, Intensification, Technological innovation, Reliance on public welfare	Informal cooperation, Reliance on public welfare, Self-provision	Informal cooperation, Intensification, Local networks, Technological innovation	Informal cooperation, Reliance on public welfare, Self-provision	Reliance on public welfare, Self-provision
2	Conventional strugglers	Informal cooperation, Local networks	Informal cooperation, Local networks, Self-provision, Subsidies seeking	Subsidies seeking, Cooperatives, Informal cooperation, Local networks, Pluriactivity	Informal cooperation, Reliance on public welfare	Reliance on public welfare
"Stronger market orientation" group:						
3	Conventional entrepreneurs	Informal cooperation, On-farm processing	On-farm processing, Self-Provision	Cooperatives, Externalisation, Local networks, On-farm processing, Downsizing	On-farm processing	Self-provision, Local networks
4	Business specialized	Food quality, Cooperatives	Food quality, Cooperatives, Self-Provision	Food quality, Cooperatives, On-line selling	Food quality, Cooperatives, On-line selling, Organic, Subsidies seeking	
5	Business diversified	Food quality, Local networks, Mixed production, On-farm processing, Pluriactivity	Food quality, Mixed production, On-farm processing, Self-provision	Food quality, Intensification, Local networks, Mixed production, On-farm processing, On-line selling, Pluriactivity	Food quality, Local networks, Mixed production, On-farm processing, Organic, Pluriactivity	Local networks, Mixed production, On-farm processing

Table 3 - Relation between small farms' types, strategic choices and contribution to FNS

What matters, beyond the grid, are the stories and the pathways told with regard to each experience, for which the grid provides a synthetic representation. It also matters to acknowledge the differentiation which exists, among what is commonly designated only as small farm: there are many different small farms with different technical orientations, strategies and business models, more or less linked to the household strategy. In the analysis of these trajectories, it is worth considering that those defined as "strategic choices" also include behaviours that are intrinsic characteristics of the farm (like self-provisioning for a hobby farmer) or forced attitudes shaped by the circumstances (as the reliance on public subsidies for same farming households).

Some exemplary pathways, collected through the participatory exercise in Brasov, illustrate the relations summarized in the table.

In Alentejo central (RR 22) meat-producing hobby farms (which in this case share some features with the conventional entrepreneurs' farms), have an impact on FNS through self-provisioning, regional provision, self-provisioning and income for the household through a range of complementary formal and informal linkages. First, the meat produced is part of the household's consumption. As mentioned in subsection 4.2 (as example of hybrid market-reciprocity relations), most of the land used for grazing is used on a temporary basis through informal agreements with the owners of the land. Very often, these agreements are based on the provision of meat from the producer to the landowner. It thus

contributes to the regional provision of meat. The producer sells the meat to intermediaries as well as through auctions. Sales to intermediaries are particularly strategic for the producer since he has a large number of contacts and he changes buyers very often, depending on the best price achieved. These sales are an important factor contributing to the household's income.

Another hobby farm (classified as "business diversified") is described in Hedmark (RR 12). It is a family farm with adults working in sectors different from agriculture, and where all the family helps in different tasks. It produces mainly potatoes and few vegetables in 6 ha of land. The products are labeled with an own label and then sold to local retailers, boats (catering), and on farm (boxes), thus contributing to household income, regional provision, diversity of the food system and autonomy of the local system from global forces.

The case of the shepherds ("conventional strugglers") in Nowotarski (RR 21), already described as an example of informal connection among small producers, can also illustrate the scheme in Table 3. Informal cooperation and local networks, as well as self-processing, are elements of converging strategies that leads to achieve FNS outcomes (the shepherd bringing other farmers' animals to graze in the common grasslands, and the other farmers, who allow their colleague to sell the milk produced with their animals). Quite surprisingly, lamb is a typical production in the region, but not a typical consumption, so that lamb meet is more relevant for self-provisioning and for income provision than for regional consumption.

The role of intensification and upscaling as strategies to survive and contribute to FNS is witnessed for example in Ghana in RR 7 Gushegu. Maize farmers are seen as conventional strugglers with almost no technical equipment, so that they have to rely on external services (for example tractors to plough), beyond relying on familiar labour. Technological innovation and mechanization (also for land preparation and fertilization of soil) are thus seen, when available, as key strategic factors.

Finally, small olive-oil producers in the Spanish region of Castellon (RR 26), identified as "specialised business", have a dual engagement in individual and cooperative selling. They sell part of the produce through a range of local channels, and at the same time deliver part of the oil to cooperatives that sell the oil collectively (so they "compete with themselves" on the markets). Through this diversified strategy, these producers contribute to food regional provision, because in any case most of the produce is sold and consumed in the region, and to food system diversity as they produce specific qualities and types of olive oil.

7. Conclusions

7.1 Research outcomes as a base for conceptual reflections

The research process and results led to consider that a general frame to analyse small farms and related small food business' contribution to FNS can be structured around to two main dimensions:

1) forms of product utilisation:
- ✓ Through food self-provisioning for the (extended) household
- ✓ Through farms' economic integration in its different forms (formal and informal markets and reciprocity relations)

2) levels of FNS (the global level has not been directly addressed):
- ✓ The farm/household level
- ✓ The community/regional level

Research findings indicate promising directions for further research aimed at exploring small farming contribution to FNS, that are addressed in more detail in other project deliverables (Ellis et al. 2019).

In short, findings suggest that small farms contribute –and could keep doing in different future setting- to fill the gaps of industrialized chains in terms of land exploitation, local varieties, and local market channels, they contribute to alleviate overall poverty (through income provision for small farm's households) and its effects on FNS (through self-consumption extended to relatives, friends and neighbours through reciprocity relations).

Besides, they contribute to a general access to fresh nutritious food, and to the safeguard of food traditions, reproducing a food-based local social fabric through which the food systems' diversity and resilience are enhanced. However, their effects on general food availability are less easily identifiable, as they depend on specific regional situations strongly influenced by global food trade patterns.

Results also show that small farms give the most significant contribution to food security when they are subsistence based, or when mixed commercial farms contribute to family income in less developed economies (Ellis et al. 2019 - SALSA D5.1, p.7). The forms and relevance of small farms' contribution to food system outcomes, and to FNS in particular, depend on their connections with the system. The choice/balance between self-provision and economic integration is one of the main elements that shape these connections. It is also a central criterion for the differentiation of small farm types, which need to be taken in consideration if the complex contours of the small farms to FNS are to be fully grasped.

Thus, a system approach is well suited to grasp the specificities of small farms' networks and their contribution to FNS. The food system is the field in which small farms, with related small food business, operate, but it is also modified and to a certain extent shaped by small farms' activity. This is true for all actors, but in the case of small-scale ones, their capacity to contribute to the system development is linked to the possibility for them to cooperate, in the aim of achieving the critical mass above mentioned as a condition for autonomy and for a valorisation of their potential. Moreover, cooperation is seen as a crucial mechanism for resilience in front of economic, social and climate challenges. The capability of small players to cooperate and engage in coordinated initiatives is favoured by a vibrant social fabric on the one side, and on the presence of proactive policy initiatives

on the other. Policies aimed at creating favourable conditions and conducive environments for small farming can play a key role on at local and regional level, even beyond the direct support.

In particular, public support to the creation of local food systems (food policy councils, support to farmers' markets, tailored safety regulation etc.) can strengthen an FNS based on a diversified array of business models, networks and governance arrangements which hinges on the presence of small farms and related small food business. For instance, in Lucca RR11 a policy tool was established for the preservation and valorisation of the local agro-biodiversity. Several small farmers were involved and identified as “custodians” of the local agro-biodiversity richness. This policy tool allowed the most innovative small farms participating in this network to get value from their agro-biodiverse local production, enriching small farms’ opportunities and strategies of resilience within the local food system.

An interesting insight in this regard comes from the project itself. The Communities of Practice established (or joined) at regional level in the various regions represented in themselves an experiment of local actors’ engagement. In some cases, it has been difficult to mobilise people and to recruit participants, due to the lack of time and to the idea that meeting together to exchange ideas and experiences was not a priority for small farmers. However, is many cases participants expressed their satisfaction for the opportunity to be involved in such meetings, and showed willingness to work together to solve problems, particularly in those contexts in which initiatives like these were never or rarely promoted or in cases where there is today a particular awareness to the need for action, if the diversity of farm sizes and models is to be preserved (Šūmane 2019).

7.2 Main integrations and challenges to the initial CF suggested by the research process

The research process, including field research, interactive processes and transdisciplinary activities contributed to stimulate and feed relevant reflections that validated or refined - and in some cases challenged - the initial conceptual framework. The development and the utilisation of a common conceptual and analytical framework for the analysis of the small farms' connection to the system brought to interesting comparative analyses that enriched the assumptions made at the beginning of the project.

Besides integrations, validation and refinements, as expressed in the previous sections of this document, we summarise here the main challenges brought to the initial CF by the research process, with specific attention to the reflection directly triggered by the participatory transdisciplinary process.

- A common size-based understanding of the definition of ‘small-farm’ is strongly challenged. Structural size in terms of physical and economic assets is not considered representative for defining small farms. Small and large farms should be categorised depending on the specific context and on the connections the farms are able to establish within their value chain and in their local context. These elements had already been mentioned in the initial conceptual framework, but in close relation to the farm-household and to the relation between small farms and small food business. The research findings and the interactive activities highlighted the centrality of the connections through which small farms valorise their specificities and overcome their limits. Thus, the importance of the relational patterns vis-à-vis the mere size thresholds has been extended and rooted in actual experiences and perceptions.

- An interesting contribution on these issues came from the transdisciplinary process, mainly from the FAO web-conference, where the debate highlighted the importance to consider a range of elements before setting a size (however measured) as the threshold between small and medium or large farms. Figure 7 in Section 4.2 highlights the main elements: the role of the household in the farm; the conditions of market access; the type of crops of livestock; the quality of the soil/farmland; the technology used; the availability of natural irrigation and other dedicated technologies and infrastructures; the available knowledge sources and the learning processes.
- Self-provisioning and market integration have been discussed, and it emerged that trade-offs that guide the choice of farmers are linked to changing dynamics within their social, economic and relational context. Also, relevant reflections emerged on the way to measure the integration of small farms in the market, considering the diversity of market connections or taking into account the intensity of those connections. Besides, the research highlighted the importance of hybrid connections, between pure market and reciprocity-based relations in which small farms tend to engage.
- The Initial Conceptual framework included reflections on nutrition aspects within the FNS frame. However, the outcomes of the interactive reflections were mainly oriented towards production and market aspects. Similarly, the initial aim to consider the sustainability concerns faced the need to focus on manageable dimensions of small farms' contribution to FNS. Thus, the research field and the interactive and transdisciplinary activities led to identify a more specific research focus.
- The participatory processes highlighted the connection between diversity contributed by small farming and food system resilience. In the e-conferences it was mentioned that the range of products provided by small farms is a significant contribution to food system resilience, as well as the range of formal and informal distribution channels which small farms engage with (either directly or through local intermediaries). This is more an integration than a challenge to the initial framework, confirming reflections derived from the regional reports. Other contributions argued that, in some regions, small farms are more resilient than large farms due to their greater adaptability to change.
- The participatory processes allowed to reflect on specific cases that local stakeholders and experts consider key for the future of the small farms, and for their local food systems. Beyond the description of the most represented types of farms in the regions, what types of existing small farms are crucial for the capability of the food systems to provide FNS in a, as much as possible, socially sustainable way, was part of this reflection.
- With regard to the food system mapping, the territorial representation suggested in the initial CF maintain its validity for attractive visualization and communication purposes. However, in analytical terms, the hybrid representations based on value-chains within a given territory proved to be effective to represent the diversity of the experiences and to compare vertical networks across regions and food items.
- The five small farms' types can be used as a base to further explore the contribution that each typology can give to FNS in relation to the different strategies they engage in, as suggested in Table 3. A similar consideration can be made for the outcomes other than FNS (for example to environmental or social sustainability). Further, acknowledging the diversity in types of small farms, is key in defining tailored made policy instruments which can target specific needs of the different small farms in the different regions – or macro-regions.

Finally, at a more general level, the open consultation process based on the two e-conferences, brought experiences and perspectives from countries beyond those represented in the SALSA Consortium. Moreover, those contributions were mostly related to experiences from developing countries, so enlarging the view on very different contexts (being SALSA focus still on the EU context with a small insight from African countries). The importance of traditional norms and cultural habits, and of the specificity of those strategic choices (for example between self-provision and market integration) when they are taken in condition of deep poverty or high uncertainty represent elements that must be carefully considered in the investigation of farm-household's relations and decision-making processes. Some interventions (for example from Malawi witness the barriers hampering women from having an active role in cooperation and decision-making, even when they have important roles in the household and in the farm (especially in multifunctional farms).

The reflection triggered by the research outcomes also highlighted elements that deserve further exploration for a deeper and more comprehensive understanding of small farms' contribution to FNS. At least three investigation areas can be mentioned. In particular the "utilisation" dimension of FNS could be investigated in more detail by focusing on the relation between the small-scale family-based food production on one side and the forms in which food is processed and consumed within the extended household on the other, with attention to the understanding of health care, dietary choices and to the more general cultural context of food individual and collective consumption.

Moreover, the link between the presence of small farms and the environmental impact of the regional food system with its consequences for the sustainability of FNS is another field of investigation to be explored, and for which the conceptual elements derived from SALSA outcomes can be utilised.

Finally, the effects of small farms and related small food business on FNS at a global level has not been addressed as such in SALSA. The analysis focused on the regional level, and extra-regional actors have been considered either because of their relevance in the food chains in which small farms were engaged (i. e. exporters) or as long as they were purchasing and consuming food within the region (as for the agro-tourists). This high level of complexity of this field of investigation will require specific tools and dedicated research agendas.

7.3 Towards the identification of policy recommendations

A central thesis developed in SALSA with regard to governance is that policies supporting small farms and their capability to strengthen FSN must be place-based, adapted to the diversity of territorially embedded food systems (Ellis et al. 2019 - SALSA D5.1 p.13).

In several cases, having a sufficient number of small farms in a territory is a desired outcome. This happens when their contributions to FNS and their other socially welcomed outcomes (attractive landscapes, vital local communities, cultural heritage and biodiversity preservation, socio-economic buffer for poor households, just to name some) are deemed relevant and worth pursuing. This creates contradictions with the general economic trends that would drive farmers towards scale enlargement, aggregation or disappearance. Thus, the policy goal is often to adapt the environment (and namely the food system and the welfare system) so to make it hospitable for small farmers. conducive environments and innovation systems.

The following table summarises key policy implications and validity conditions in relation to the three hypotheses.

Salsa HP	Validity conditions	Policy implications
1. Small farming is a relevant source of sustainable food production (availability) for many regional food systems	It depends on the configuration of territorial food system	Policies should look at how territorial food systems are configured
2. Small farms and related small food business provide food and incomes for rural households (access and utilization's assets and capacities) in many regional food systems	It depends on small farms' forms of economic and market integration Small food business are one of the ways in which small farms connect to the food system	Policies should look at the diversity of relations with the system
3. Small farms and related small food business increase food systems' diversity thereby contributing to its their resilience (stability)	Diversity of products, business models → diversity of food systems. It depends on the level of cooperation among farmers and local actors	Policies should encourage cooperation among independent actors

Table 4 – SALSA hypotheses, validity conditions and key policy implications

Policy can be aimed at creating the conditions for an "operating space" in which small farms can develop as they can overcome the limits due to their small size. Elements on which policies can have an influence are the ones harvested through the FAO web-conference, mentioned in paragraph 2.2.1 and then considered in Figure 7 at the end of Section 4.2 as well as the actions plans developed by stakeholders in the course of the participatory foresight exercises (WP4).

. Easily accessible broadband, availability of spaces for farmers' markets and other short supply chains, food regulation adapted to the small-scale processing and direct selling, improvement of advisory and extension services tailored on small farms' needs, development of innovative technologies suitable for small farms, support to credit access are examples of possible elements of this enabling and conducive environment capable to valorise small farmers' specificities and their peculiar contribution to FNS and other socio-ecological goals.

Another lens through which policy support to small farms can be framed is given by the connections' forms highlighted in Table 1. Each of the specific connections' types listed, if deemed worthy of a support, can be facilitated or strengthened by appropriate policy measures. These measures can, on the one side, be supportive to the single farm, and on the other trigger the achievement of a critical mass of small farms. When such critical mass is achieved, the small farms themselves will be in condition to contribute to the conservation and development of the enabling environment, and hence of their operating space.

This observation broadens the traditional vision of the neoclassic economic theory. In this theory, in the normal condition of perfect competition, all firms have the same size (small in comparison to the whole market), and their contribution to price determination is negligible: they are merely price-takers. On the contrary, when the size of a firm (or of a group of firms that act with some coordination)

has the capacity to influence the relation between supply and demand, then an issue of market power emerges, and the firm increases its capacity to have an influence on prices. In a small farming perspective, the achievement of a critical mass (supported by the policy-promoted enabling environment) can be a condition for small farm to be not only environment-takers, but also environment (co)-makers.

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Annex 1. List of the Reference Regions

N°	***Reference Region***	***COUNTRY***
1	Montana	Bulgaria
2	Santiago	Cabo Verde
3	Varazdinska	Croatia
4	Jihocecky kraj	Czech Republic
5	Ille-et-Vilaine	France
6	Vaucluse	France
7	Gushegu	Ghana
8	Imathia	Greece
9	Larissa	Greece
10	Ilieia	Greece
11	Lucca	Italy
12	Pisa	Italy
13	Ugunja	Kenya
14	Latgale	Latvia
15	Pieriga	Latvia
16	Vilniaus apskritis	Lithuania
17	Balaka	Malawi
18	Hedmark	Norway
19	Rzeszowski	Poland
20	Nowosadecki	Poland
21	Nowotarski	Poland
22	Alentejo central	Portugal
23	Oeste	Portugal
24	Bistrița Năsăud	Romania
25	Giurgiu	Romania
26	Castellon	Spain
27	Cordoba	Spain
28	Haouaria	Tunisia
29	Perth and Kinross, Stirling	UK
30	Lochaber, Skye and Lochalsh, Arran and Cumbrae, Argyll and Bute	UK