

Concept Paper

A Community-Based Agro-Food Hub Model for Sustainable Farming

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Abstract: This conceptual paper focuses on the Agro-Food Hub paradigm as the main enabler for the sustainable development of agro-food Small and Medium Enterprises (SMEs) in the context of the currently established agro-food systems. This paper is based on a shared knowledge-driven research that presents different approaches/types of Agro-Food Hubs, providing useful insights into the strategic, operational and institutional approaches of the topic. After the illustration of the main approaches for the Agro-Food Hubs met in the literature, a holistic Agro-Food Hubs model was proposed (the Agro-Food Sustainability Knowledge Hub model), incorporating the main principles and functional guidelines within the framework of the Corporate Social Responsibility (CSR) and Sustainable Supply Chain Management. This study is in line with the demographic, economic and social prospects for the 2050 and the European Economic and Social Committee decision for “An EU Industrial Policy for the Food and Drinks Sector” adopted on 4 May 2015. In particular, since the majority of research in the past focused on large organizations, this paper is expected to enlighten the problems emerged from current applied practices together with the opportunities for potential synergies among agricultural SMEs, through the utilization of alternative sustainable channels of distribution and value creation, such as the Agro-Food Hubs.

Keywords: Agro-food Hubs; Sustainable Food Communities; Small Farms; Family Farms; SMEs; Agro-food Sustainability Knowledge Hub

1. Introduction

Smallholder and family farming is a key element of the European model of agriculture, as identified in the Luxembourg European Council in December 1997. In 2010, sole-holder family farms accounted for 85% of all EU farms, for 68% of Utilized Agricultural Area (UAA) and for 71% of total Standard Output (SO). In the agro-food industry of the 283,000 food companies in Europe, over 99% are Small and Medium Enterprises (SMEs). These SMEs generate almost half of the industry’s food and drink turnover and employ over 61% of the workforce.

The main challenges facing family farms in the EU are access to farming resources, such as land and capital, and access to markets, particularly in terms of bargaining power in the food chain. Moreover, family farms need to compete not only in terms of productive efficiency (scale productivity) but also in terms of innovation and entrepreneurship. Family farms need to collaborate via various forms of producer organizations such as cooperatives and networks in order to gain scale economies and negotiating power on markets and for policy.

Many small farms have managed to transform themselves into efficient enterprises by entering new markets; utilizing new technologies; and capitalizing upon flexibility and working commitment, advantages related to their size and the use of family labor. Within the scope of community building, many farms combined these with scale efficiencies achieved through collective action. Other small farms are shrinking in size and fail to link with markets or to rationalize their value chains to become economically viable. Still, there is a great potential for small farms to contribute far more than they are currently doing to job growth and creation, to the environmental and climate change agenda and to food security and nutrition [1].

In general, Agro-food markets are controlled by larger size private stakeholders that seek control over their supply chains through vertical integration; although these structures have undoubtedly contributed to increase productivity levels, they have also resulted in several negative externalities with a direct impact on the sustainable development of small and family farms [2], leading to increased marginalization, inequality and vulnerability [3]. Thus, there is a significant need to create viable economic alternatives to the existing agricultural system that is dominated by SMEs. A critical research question that arises is how to scale them in order to achieve the required economies of scale and resulting cost savings together with their development and adjustment in the new, irreversible and ever-changing business, economic, social and physical environments.

Despite the impressive growth of “alternative” food supply chains and networks within the framework of sustainability imperatives, the market share of conventional supply chains is still very high globally. Thus, for instance, according to Willis [4], in the UK, national supermarket chains dominate grocery spending—accounting for 77% of all main shopping trips. Moreover, comparatively little systematic research exists regarding alternative channels of distribution for farm SMEs, such as the agro-food hubs and the long-term viability of such entities that have been explored only minimally in current literature.

2. Aims, Objectives, and Methodology of Research

This paper aims to provide useful insights into the collaborative synergic action from SMEs in the agricultural sector through the exploitation of the alternative channel of the Agro-Food Hubs that could be helpful for future research in the light of sustainable SME farming. Based on the work of Berti and Mulligan [3], this paper further addresses the main levels of operations of Agro-Food Hubs, while also focuses on the value creation network and their role in the community.

A review of the literature has been conducted with the aim first to discuss briefly the position of agro-food SMEs into food systems and then to establish a comprehensive framework comprising of different approaches and types of Agro-Food Hubs, providing useful insights into the strategic, operational and institutional approach of the topic. To develop such a framework, different scientific papers in reference to Agro-Food Hubs from different academic databases were analyzed. After the illustration of the main approaches for the Agro-Food Hubs met in the literature, a holistic Agro-Food Hub model is proposed (the Agro-Food Sustainability Knowledge Hub model), incorporating the main principles and functional guidelines within the framework of Corporate Social Responsibility (CSR) and Sustainable Supply Chain Management.

The proposed model is built on a community approach as the “community” forms the essential link between the small farms, agro-food SMEs and the globalized urban market. A community is a system in which farming, the value addition (e.g., processing and marketing), the distribution, and the consumption are integrated to enhance the environmental, economic, social and nutritional shape of a specific region. The community approach emphasizes on strengthening the existing or developing new relationships between all stakeholders of the food system, internal (value chain) as well as external (social enterprise). This reflects a prescriptive approach to building a food system, one that holds sustainability—economic, environmental and social—as a long-term goal toward which a community strives [5].

The proposed model is then analyzed, and its implications are discussed in respect to the value addition and the contribution to sustainability and food security.

3. Farm SMEs and the Need for Collective Action

Conventional agro-food markets exhibit “structural holes” as “a buffer, like an insulator in an electric circuit”, that impede small farms from connecting with consumers due to a lack of material infrastructure on behalf of small farms, as well as the unequal redistribution of the economic value produced which impede small farms accessing the food market.

A literature review has shown various constraints and difficulties for performing a Sustainable Supply Chain Management, more particularly for SMEs [6–8].

Small farms’ high costs being unable to achieve economies of scale and the unequal bargaining power in the food chain have increased the barriers to market access and led to declining shares of profit. Thus, small farmers are struggling to sustain and, therefore, are unable to invest for their development in terms of producing competitive products in their farms. The critical role plays the “asymmetric information” flow and control and impedes equal chances between SMEs and large enterprises. This leads inevitably to high costs of production and low bargaining power and so on, trapping the Agro-food SMEs in a “vicious” cycle (Figure 1).

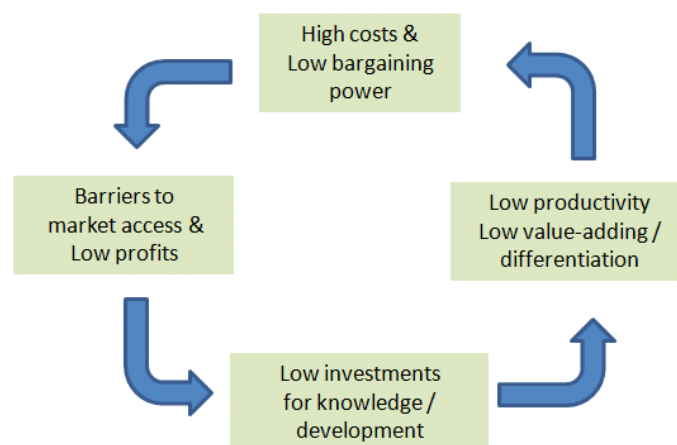


Figure 1. The “vicious” cycle of small farmers.

This situation leads to the abandonment of agriculture-related activities, the alternative use of land and even the migration of populations from rural to urban centers, which also impacts the demand of services and the infrastructure of local communities [9].

New “strategic thinking” can initiate collective innovation by the alignment of the “triple bottom line approach” of sustainability with the so-called “three Ds” triangular analysis: Decentralization–Democracy–Development [10]. Moreover, small and family farms need to collaborate and form various producer organizations such as cooperatives and networks in order to gain scale economies and negotiating power on markets and for policy.

In response to the imminent sustainability crisis of the conventional agro-food system, a switch to alternative models of food production and distribution has led to the “re-territorialisation” or “re-localization” of the supply chains into “short circuits” often referred to as short food supply chains or alternative agro-food networks [11]. Alternative agro-food chain literature uses supply chain optimization concepts to convert unsustainable conventional food chains [12] to value chains where the “non-value adding” stakeholders (such as the “middlemen”) are being removed. In this sense, the number of intermediaries between farmer and consumer should be minimal or ideally nil.

Streamlining the supply chain of small farms can help to develop a new value creation strategy based on the shared value. In this perspective, this paper focuses on the role of Agro-Food Hubs on redefining the food supply chain. Through a critical literature review, this paper aims at illustrating

how such hubs are emerging as innovative intermediary organizational forms that enable Agro-food SMEs to overcome their organizational and infrastructural limitations.

4. Agro-Food Hubs Types and Main Issues

According to the literature, there are several different approaches for the concept of the Agro-Food Hub that actually reflect their primary goals. Cleveland et al. [2] argues that it is possible to distinguish instrumentalist from idealistic approaches. The former approach defines the main objective of such structures as to address consumers' demand for local products and to regulate the mainstream food system by reducing what have become "unacceptable externalities", while the latter emphasize on prioritizing environmental and social goals. The literature also stresses that the hybrid nature of Agro-Food Hubs goes beyond the contrast between "conventional" and "alternative" food systems; it is in this hybridity that Agro-Food Hubs have the potential to capture many of the advantages of both alternative direct marketing and the mainstream large-scale distribution systems, while minimizing the disadvantages of each.

Horst et al. [13] site a distinction between the instrumental producer-oriented and humanist people-oriented approaches. The first concerns the gathering of products from local small and mid-sized producers and providing source-identified locally grown products to wholesale buyers. The second regards the provision as easy access, opportunities and viability for small producers and low-income consumers with the main purpose of contributing to a healthier, more vibrant and equitable system.

According to Baraham et al. [14] and Morely et al. [15], emerging definitions of Agro-Food Hubs can be grouped into two general distinct approaches, depending on the goals or expectations attached:

- Those that narrowly define Agro-Food Hubs in terms of market efficiency functions towards opening new, more financially viable market channels for smaller farmers (values-based approach) and
- More expansive definitions that incorporate Agro-Food Hubs into wider visions of building a more sustainable food system, including community development (Figure 2).

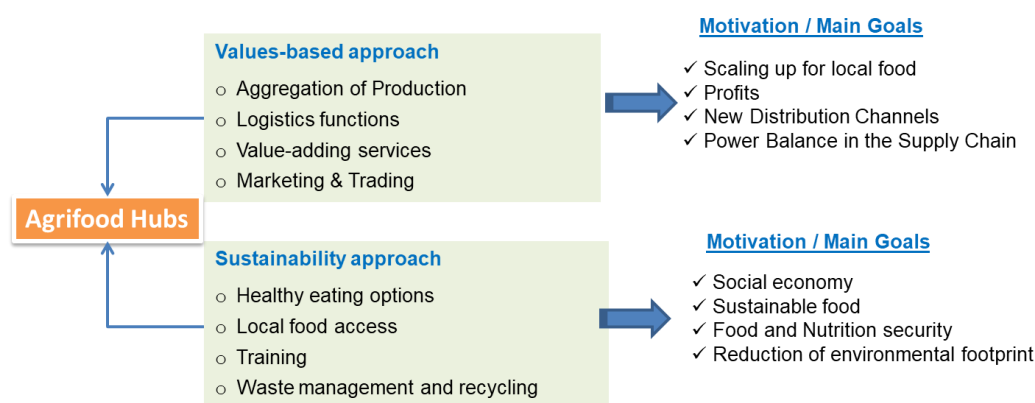


Figure 2. The two main Agro-Food Hub approaches met in the literature.

In this direction, Franklin et al. [16] suggest that hubs should be designed mainly to assist the economic and operational performance of producers and distributors and to promote the sustainable development of community in which hubs have social linkages (community cohesion, social gain, healthy eating options, etc.) while, at the same time, to promote environmental protection and wellbeing.

In the value-based approach, Agro-Food Hubs are perceived as innovative business platforms aiming at scaling up local food production through the coordination and consolidation of small and medium-size producers in order to achieve better market access and positioning [17]. Fischer et al. [18] highlights that Agro-Food Hubs are financially sustainable stakeholders that can play a significant

role in the consolidating and marketing of local food products. This is in line with the United States Department of Agriculture (USDA) working definition of a food hub as “a business or organization that actively manages the aggregation, distribution and marketing of source-identified food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail and institutional demand[s]” [17]. On the other hand, from a European perspective, the Agro-Food Hubs are more related to an ageing farmer’s generation, the lack of employment opportunities in rural areas and uncompetitive small farms. Therefore, promoting the Agro-Food Hub concept aligns with the European Common Agricultural Policy (CAP) system in its present outline as the CAP includes support schemes for agricultural production and for local rural development initiatives [19].

Morley et al. [15] argue that an Agro-Food Hub is a business mechanism that can collectively link small producers with distributors, wholesalers and other supply chain stakeholders and enable them to trade with large customers (i.e. supermarkets, food service vendors or public procurement consortia) that none of them would be able to trade with if acting alone.

The second general approach regards primarily social motivations related to the building of sustainable food communities to foster resilient, regenerative local ecologies through “equitable, healthy food communities” [14]. Within this perspective, Agro-Food Hubs can be seen as an evolving type of Agro-Food Networks with a potential to transcend their capacity and to expand their scope beyond direct markets reaching directly to consumers or consumer groups [20].

Agro-Food Hubs incorporate a great variety of activities, purposes, organizational structures and types; each of them can be customised to address specific community-driven objectives [13]. There are community-driven initiatives that link directly producers with consumers, reinforce local and regional food production systems, as well as enable community goals for sustainable food and nutrition security [21]. According to Blay-Plamer et al. [22], there is a “well-established literature on the merits of using a localised food system as a cornerstone for building sustainable communities and improving local ecologies as part of the social economy”.

Compared to the cooperatives, the food hubs represent a different business model that corresponds to a different hybrid organisational arrangement [23], namely the strategic network or strategic alliance because they are inherently profit-driven and not driven by the principle of solidarity and mutual aid that are at the core of the cooperative. In this sense, they are horizontal patterned forms of coordination for the aim of constructing and distributing shared values through aggregation and product differentiation, among different typologies of participants which are independent units maintaining a complexity of individual strategic interests not necessarily always convergent [3].

On the other hand, farmer cooperatives as well as food hubs provide a scaling-up of the operations by the aggregation of the various functions, allowing producers to meet new opportunities to the market place. Therefore, according to Matson et al. [24], food hubs should be considered as a “natural progression in the application of the cooperative spirit of producers working together to provide outlets for their products, while also addressing the concerns of workers, consumers and the community and of the cooperatives principles and ideals”.

5. Agro-Food Sustainability Knowledge Hub

5.1. Operational Level of the Agro-Food Hub and the Agro-Food Sustainability Knowledge Hub

An Agro-Food Hub may have a multitasked role, as far as its main scope of operations concerns, starting with information sharing and reaching the highest level of sophistication that represents the proposal of this paper, namely an integrated Agro-Food Sustainability Knowledge Hub critically based on the continuous improvement of knowledge through synergic action, as analyzed further in this section (Figure 3).

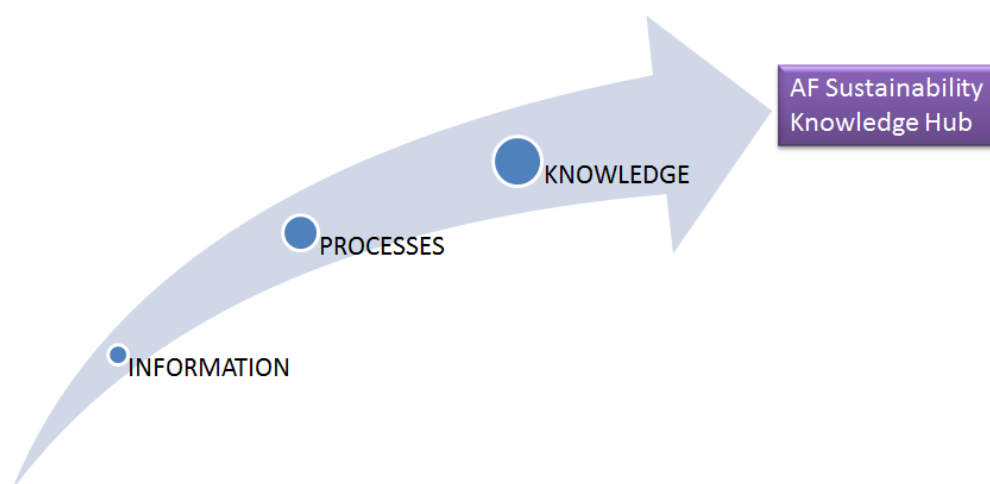


Figure 3. From information sharing to the Agro-Food Sustainability Knowledge Hub.

Agro-Food Hubs are essentially facilitators that bridge production and markets through mechanisms that are based on accurate and on-time information management. Thus, the fundamental function of an Agro-Food Hub is information gathering, processing and sharing through well-designed data platforms, so as to lead to successful transactions between all the participating members of the supply chain, namely farmers, customers and transport carriers. This represents the first level of Figure 4 (informative role of Agro-Food Hub). In such a level, the contribution of the Agro-Food Hub is restricted, since the main tasks of sales (deals with customers and transactions) are undertaken by the farmers themselves.

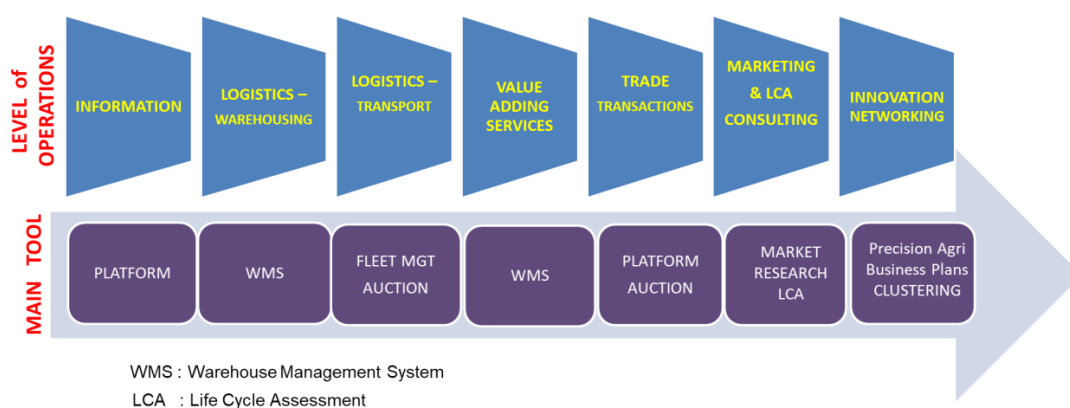


Figure 4. Agro-Food Hubs: The seven levels of operations.

Logistics functions, such as warehousing and transport, are included in the following operational level of an Agro-Food Hub. More specifically, the warehousing operation provided by the Agro-Food Hub enables the farmers to mitigate their logistics costs, notably in the case of the cold supply chain and the related infrastructure requirements.

The transport operation may run according to different scenarios. Thus, an Agro-Food Hub may either utilize its own fleet or the services of external carriers. In both cases, the critical task is the consolidation of the orders destination in order to achieve cost savings through economies of scale. In addition, Agro-Food Hubs may also make use of an auction mechanism, fostering competition between carriers to come up with the minimum prices for the farmers.

In addition to warehousing, value-adding services can be provided by an Agro-Food Hub such as the following: washing, cutting, drying, bottling, capping, packaging, labelling, waste management, etc.

Trade transactions, the next level of operations, involve the management of the whole process for the final deal between farmers and customers. In more sophisticated Agro-Food Hubs, such operations are supported by an auction mechanism, such as the Aalsmeer Flower Auction which is set up as a Dutch auction in which the price starts high and works its way down. E-auctions mechanisms have increased rapidly in the last few years providing both buyers and suppliers with visibility of the bid status in real time and allows an instant response.

Marketing consulting includes two basic components in relation: seeking markets for farmers by making use of market research tools and suggestions about product/cultivation process (i.e. organic), types of packaging, etc., specifications tailored to meet specific market needs. In addition, with the use of Life Cycle Assessment tools, Agro-Food Hubs can assess the environmental impacts derived from the farmers supply chain and drive improvements for reinforcing the capacities of the individual producers, supporting the transition to sustainable agro-ecological practices. In this context, they can contribute to the promotion of significant and up-to-date issues, like the Climate Neutrality concept in relation to sustainability and sustainable supply chain management that would enhance potential sales in niche markets.

The final level of sophistication, which represents the proposal of this paper, is the Agro-Food Sustainable Knowledge Hub that involves all the previous operations as well as innovation, new technologies and networking. In their position of intermediary, the Agro-Food Hubs may act also as “innovation brokers” [25], involving training in new practices and technologies in cultivation, processing, packaging, etc. of agricultural operations, such as precision agricultural, based on developing a Agro-Food Practices database for various Agricultural products as a benchmark, a guide for new initiatives and a baseline for continuous improvement of the research process.

Moreover, this type of Agro-Food Hub promotes a “web of practices” [14], which actually refers to acting as knowledge brokers and developers to all the actors involved in the network, by helping the effective communication and build-up of long terms relationships among various agro-food value chain actors. Furthermore, sustainable supply chain management expands the concept of sustainability from a company to the supply chain level and should lead to competitiveness, sustainability and responsibility towards stakeholder expectations. In this respect, an Agro-Food Hub involves producers, wholesalers, retailers, transport carriers and even consumers, through the participation of NGOs in a strategic collaborative network (cluster) that nurtures the continuous collaboration among the agro-food supply chain partners, the tourism sector (supplies, agro tourism, etc.) and research institutions (Figure 5). Sustainable SME farming calls for collaborative innovative thinking and the build-up of a value creation network to transform challenges to new opportunities.

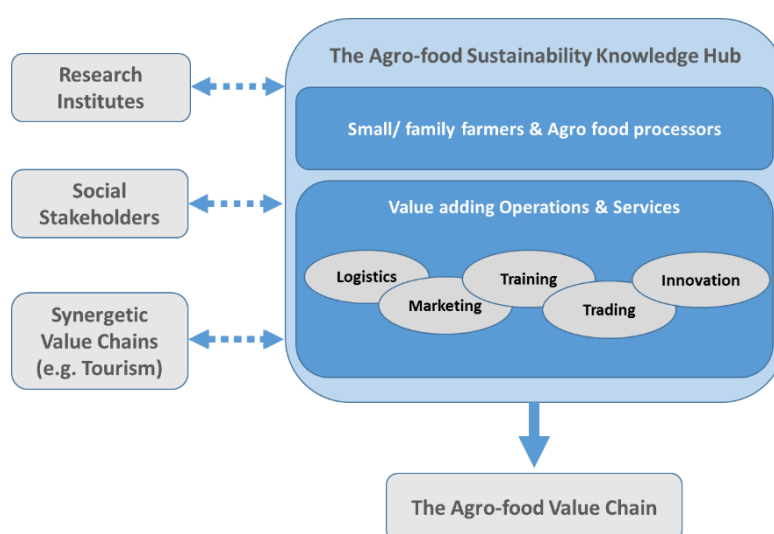


Figure 5. A holistic integrated network organized by the Agro-Food Sustainability Knowledge Hub.

Additionally, an Agro-Food Sustainability Knowledge Hub supports spinoff companies and entrepreneurship for individual farmers or groups of farmers through concrete business plans.

In retrospect, the Agro-Food Sustainability Knowledge Hub is a business or organization that actively coordinates the storage, distribution and marketing of locally produced food, providing economies of scale, know-hows and networking towards a regional development through helping small producers reach a wider range of markets.

An Agro-Food Sustainability Knowledge Hub may balance the share of power between the supply chain stakeholders (Figure 6). As a consequence, a better-balanced share of power may lead to what is called “distributive justice”, referring to the distribution of value along the chain, and to “procedural justice” that refers to the management of processes and relationships [3]. In order to achieve this balance of power and supply chain “justice”, an Agro-Food Sustainability Knowledge Hub must invest in unlocking the full potential of the small producers by acknowledging their specific needs in training and awareness, jointly developing strategies and actively including them in decision-making processes through board representation and annual meetings [26].

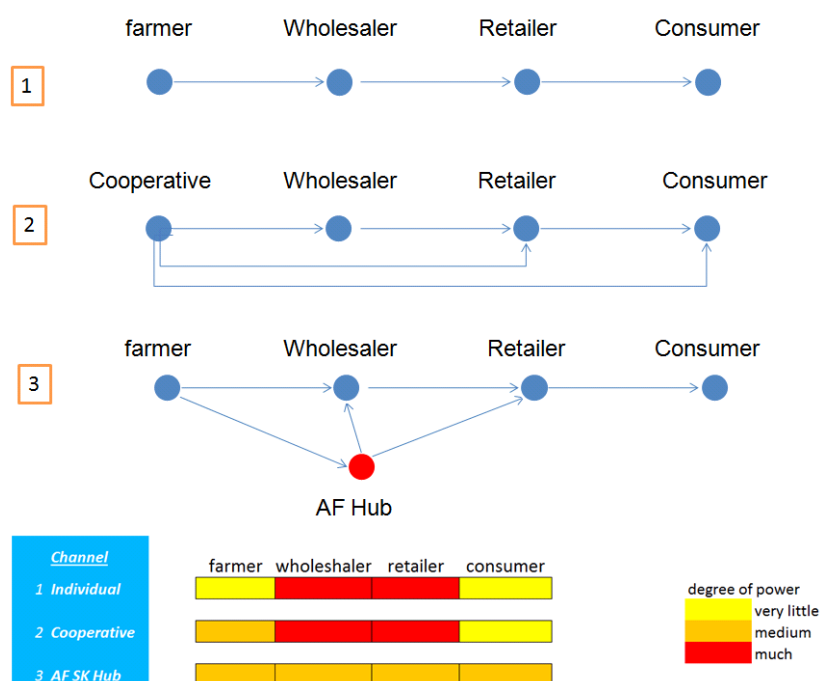


Figure 6. Re-balancing the power structure in the agro-food supply chain with Agro-Food Sustainability Knowledge Hubs.

Furthermore, critical is the role that an Agro-Food Sustainability Knowledge Hub plays for the promotion of healthy and sustainable local communities, as analyzed in the following paragraph.

5.2. Agro-Food Sustainability Knowledge Hub Role in the Community

Over the past few years, there is an increasing research interest on the role of Agro-Food Hubs as community-centered stakeholders designed to address the demand for local foods market and to unlock the potential of sustainable local food value chains, with an overall objective to promote local food and nutrition security [27]. The community approach aims at consolidating existing or developing new relationships between all stakeholders of the food system.

Brasili and Fanfani [28] addressed the community approach in the context of the Italian agro-food districts, on the basis of high value-added rural products (e.g., Parmigiano Reggiano), highlighting the role and contribution of agro-food SMEs to local and regional development. Nowadays, more emphasis

is given to agro-food districts related to agriculture, biological districts and food districts, giving specific support to a bottom-up approach and a community vision [28].

With improvements in technology, rural community operations such as local canneries or local creameries eventually disappeared due to the rise of large regional factories, affecting negatively local communities [17]. The recent increasing interest in locally sourced foods has shifted the focus to the attributes of the existing food system that could promote the sustainability of local communities, a goal that must involve more than just the mass production of commodity foods at the cheapest prices.

The agro-food SMEs' decisions for planning their production models are largely affected by several parameters which often are limited in control. Such parameters are presented by Manikas [29] (Figure 7) and may affect the SMEs in many ways. Figure 7 illustrates a multidimensional model that combines sustainability and food and nutrition security; in this model, each of the four dimensions of sustainability (environment, economy, technology and society) consist of two main sub-factors (e.g., Environment's sub-factors are Land Resources and Energy); each sub-factor can be described and analyzed according to a number of parameters. For Land Resources, for example, such parameters could include soil degradation, climate change and land grabbing. Reinforcing the role of small farms and small agro-food businesses in maintaining a balance between the 8 sub-factors (covering the 4 dimensions of sustainability) for achieving sustainability is the key objective to be achieved through the proposed operational model.

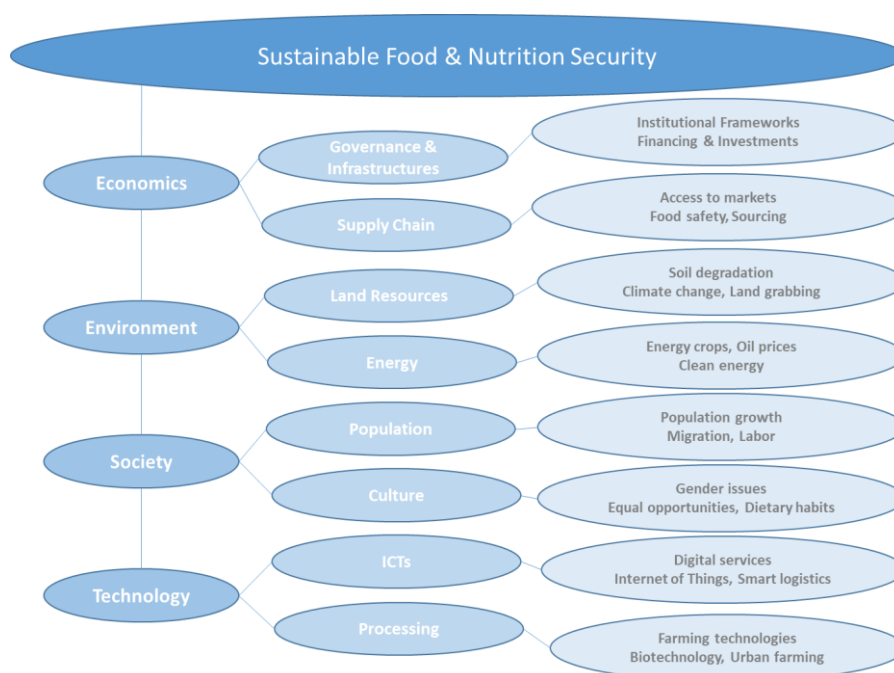


Figure 7. A multidimensional model for sustainability and Food and Nutrition Security.

For example, land resources, soil degradation or climatic changes may impact land availability for farming. Access to markets, adequate information, knowledge and technologies all play a strong role in driving the farmer's choice of production. Therefore, it is a key issue to empower the farmers and agro-food SMEs with an enabling environment (i.e. the community) and necessary infrastructure and resources for fostering the contribution to the sustainable production and distribution of food.

In the "sustainable food community", approaches of Agro-Food Hubs in the literature are understood as community based organizations or enterprises with primarily social motivations related to the building of sustainable food communities. Thus, Agro-Food Hubs represent a new model of "community-based organizations" focused on improving local food access options more than economic profit [30]. Matson et al. [17] define "community-based organizations" as "public or private

not-for-profit organizations of demonstrated effectiveness that [are] representative of a community or significant segments of a community. They provide educational or related services to individuals in the community, they play a leading role in involving new or different groups of people in the civic life of local communities, and in agriculture, these organizations make long-term commitments to developing the capacity of the producers they support and [to] creating infrastructure that supports and maintains market access for them”.

Fischer et al. [18] conducted a survey on the performance and success stories of Agro-Food Hubs in the United States; among the results of this research, it was reported that Agro-Food Hubs facilitate the supply of locally produced food, increasing community food access with a direct contribution to the food and nutrition security of local populations. Moreover, Agro-Food Hub suppliers and customers are mostly regional, therefore improving environmental sustainability by reducing the carbon impact as well as affecting the economic and social sustainability by creating jobs for the community.

In addition, communities may have a very active role in an Agro-Food Hub, participating or even organizing various activities such as volunteering programs, social events, education and training programs, as well as sustainability awareness programs and activities such as waste management, recycling, etc. [3].

To improve the position of small farms and agro-food SMEs and to ensure the appropriate balance between the economic, environmental, social and technological dimensions of sustainability, the Agro-Food Knowledge Hub model introduced in this paper is built on “economic sustainability”, stressing its hybrid nature that goes beyond the dichotomy between “conventional” and “alternative” food systems [2]. Thus, share value maximisation allows keeping the agri-food systems within the safe operating space for humanity, namely much more than on short-term profit maximisation. In such a context, Agro-Food Hubs distribute more than food; they distribute social connections, relationships and education [15], and the economic mutual advantage of producers and consumers in retaining food expenditures at the local level results in broader positive impacts [3]: local socioeconomic vibrancy, health, community building and environmental sustainability which demonstrate that in building new agri-food economies, there is no trade-offs between economic and socio-environmental benefits but “the competitiveness of a company and the health of the communities around it are closely intertwined” [31]. “Community” forms the essential link between the agro-food SMEs and the globalized urban market. The community may be regarded in a horizontal perspective (e.g., a cooperative) or a vertical perspective (e.g., a supply chain). It is the horizontal and vertical integration of small farms and the regional small food enterprises within the food sector, which is at the base but linked to the environmental, social and related needs of the region, where companies operate. With the support of Information and Communication Technologies (ICTs), the community approach expands into the e-community concept that may integrate rural business entities (farmers and processors) with urban-based small businesses with adding value functions (e.g., creative economy companies that design food containers and labels and contribute to the better promotion and marketing of agricultural products), adding e-marketplaces or even linking with social networks (e.g., a Facebook page) and thus interacting directly with potential customers or investors (Figure 8).

The model proposed in this paper considers a hierarchy of horizontal communities of farms or enterprises building on a local, regional, national or global reach. A regional community may build on farms within the region, on several local communities or on a combination of both. Similarly, a national community may build on regional communities, local communities, individual farms or any combination of these.

Examples of a local or regional community include cooperatives, an example of a country-wide community may be farmers’ associations or sectoral industrial chambers and an example at a global level organization is fair trade.

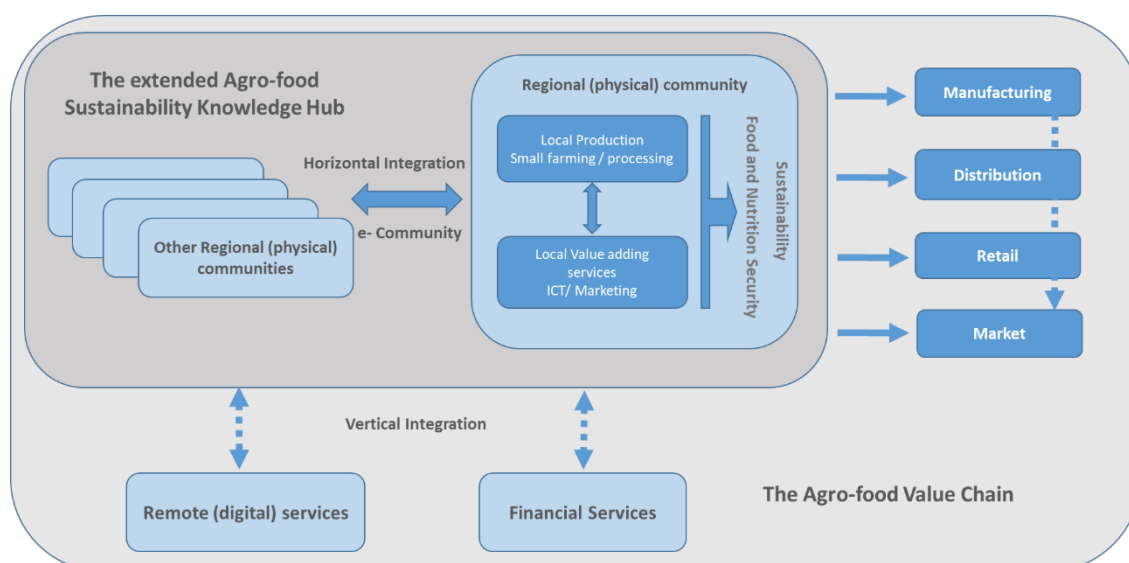


Figure 8. A community-based Agro-Food Knowledge Hub.

Communities on higher levels within the hierarchy are usually based on less intensive cooperation than communities on lower levels which might even act as a unified entity.

The hierarchy of horizontal communities is complemented by a hierarchy of communities organized around vertical cooperation. These communities are usually referred to as “chains”. Horizontal communities are usually an integral part of vertical communities. Local vertical communities constitute short chains. Short chains have principal advantages regarding environmental effects but are less linked to global markets than national or global chains.

6. Discussion

In the literature, the main types of Agro-Food Hubs are met within the framework of two main approaches, the Values-based and the Sustainability/Community-based ones (Figure 2). The first focuses on establishing a new organizational model that prerequisites a regional aggregation from small and medium sizes towards attaining economies of scale. In this respect, attention is given to the efficient supply chain management that will ensure the required volume, consistency and quality standards but also new business relations and partnerships with the mainstream markets. The second one shifts the focus to the promotion of sustainability of local communities, a goal beyond economies of scale in production and supply chain. Within this perspective, the Agro-Food Hubs are community-based organizations with primarily social and environmental motivations and towards developing new relationships between all stakeholders of the food system.

Values-based approaches focus mainly upon the economies of scale in Logistics and Marketing functions towards accessing the food market more effectively. Sustainability approaches, on the other hand, highlight the need for increasing healthy eating options and improving local food access options. These two approaches overlook to a degree the required integrated approach within the ever-changing business environment within the framework of Social Responsibility, Innovation and sustainable Supply Chain Management. Thus, in this paper, attention is attributed on filling the gaps of the two main approaches that prevail in the literature by proposing a community-based knowledge hub towards the sustainable development of the agro-food value chain (Figure 9).

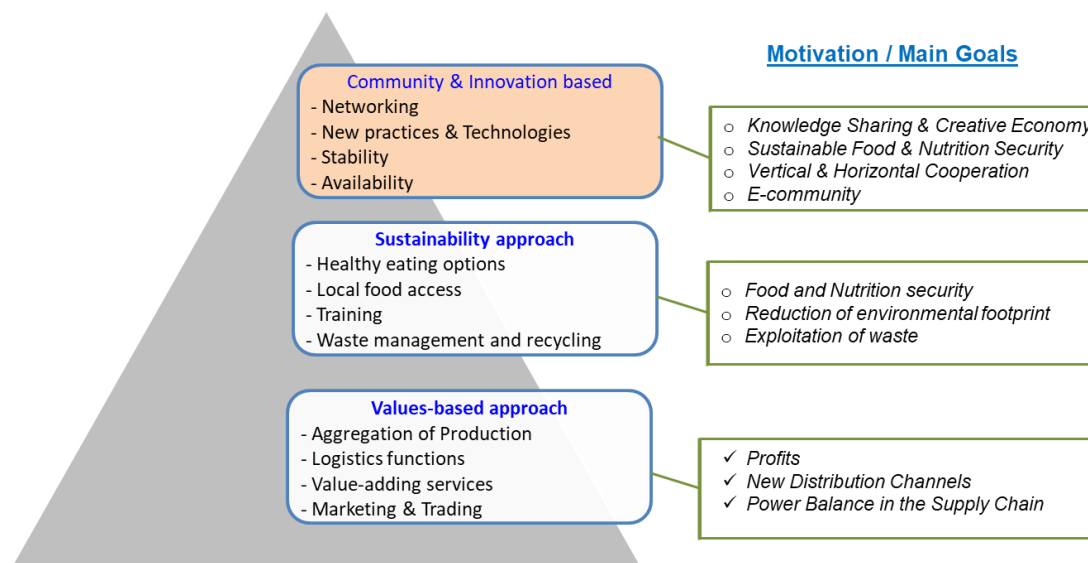


Figure 9. The Agro-Food Knowledge Hub goals and dimensions.

The authors of this paper argue that in the new turbulent business environment, there is a need of combining the abovementioned attributes of the two models, focusing upon the final level of sophistication (Figure 4), namely training, innovation and new technologies, in order to create a long-lasting competitive advantage grounded on differentiation and sustainable practices. In addition, the proposed model links the small farms with business partners upstream and downstream (Figure 8), promoting thus the access and stability (price stability, securing of incomes for vulnerable populations and long-term sustainability of food and nutrition security (FNS), two of the four pillars pointed out by the United Nations Food and Agriculture organization (2017). The other two pillars of FNS are availability and utilization/quality. According to this organization, FNS is achieved when “adequate food (quantity, nutritional quality, safety and socio-cultural acceptability) is available and accessible for and satisfactorily used and utilized by all individuals at all times to live a healthy and active life”. The pillar of utilization and quality partly falls under the horizontal and vertical approach but is also related to the policy discussion about land use and bioenergy. Similarly, the pillar of availability is strongly linked to policies, infrastructure, demographics, economics as well as natural conditions for farming.

The model proposed is, therefore, a “hybrid” model, combining values-based with sustainability/community goals and conventional food system infrastructures with the alternative goal of building local food systems. It aims at an alternative source of economic income for local farmers, together aligned with social motivations relating to community cohesion, social gain and the improvement of local food access options.

The introduction of the “e-community” perspective in the proposed model aims to consolidate the impact of web-based synergies through cloud-based solutions with a wider impact on the possibilities for “working together” in a horizontal and a vertical perspective. The extension of the Agro-Food Hub approach towards the concept of space-independent e-communities considering technological developments in the digital economy opens the development towards knowledge intensive collaboration models that support transparency, promote the dissemination of knowledge, and facilitate flexible and space independent horizontal and vertical cooperation opportunities. E-communities, within the scope of the proposed Agro-Food Knowledge Hub, enhance the inclusion of farmers in the information exchange and trading activities, thus enabling them to get more actively engaged in decisions about their livelihoods. Such communities can facilitate a more equitable participation in the market by eliminating the need for middlemen. These emerging opportunities are still less apparent than the solutions with a focus on single farms or enterprises. Supporting

horizontal e-cooperation improves the efficiency and market relevance and, in turn, empowers small farms in linking up with partners along the chain on not only a local but also a national and global scale. Cloud-based services not only provide support in horizontal cooperation but also open new dimensions in vertical cooperation, getting farms closer to the market. Apart from the traditional need in transparency or tracking and tracing, cloud-base services open new marketing opportunities for small farms such as interactive services between farms and traders or flexible farm-driven market places for reaching out to traders, to consumers at local markets or to customers even on a global scale.

As presented in Figure 6, the Agro-Food Sustainability Knowledge Hub restores distributive justice in the agro-food supply chain, including indicatively fair profit margins to the producers and decision-making, provided a moderate or high degree of involvement of small farmers in such a strategic process. Although this supply chain power restructuring enhances small producers' negotiation position while restricting other intermediaries like local wholesalers, the expected regional/community development will contribute, in the long term, to significant gains for all stakeholders in the agro-food value chain due to the increase of production efficiency, innovative new sustainable products and penetration in new distribution channels. In other words, the proposed model based on the fundamental source of value, the cultivation process, will be attractive even for players that will become less powerful. Moreover, big food retailers such as supermarkets have already moved toward sourcing local foods in response to increasing consumer demand; however some authors argue that they have centralized purchasing systems that do not interface well with more regional supply chains [32].

The proposed knowledge-intensive and sustainability-oriented model enables small agro-food farms and businesses to formulate resilient communities; resilience refers to the capacity of a system to absorb disturbance and reorganize while undergoing change, so as to still retain essentially the same function, structure, identity and feedbacks. Resilient systems are adaptable, diverse, self-reliant and collaborative [33]. Knowledge-intensive sustainable synergies through the proposed physical and e-communities model enable agro-food businesses to withstand or overcome adverse shocks, to recover and to continue to transform them. Common shocks that have direct effects on sustainability and food security may include conflicts, the displacement of people, climate change variability, food price variability, and natural and health disasters. Shocks are never static but change over time, and some may not be anticipated at all [29].

Resilience in agro-food systems means that the systems can adapt and transform themselves in such a way that no matter what the future looks like, they can still produce enough healthy food to which everyone has access, can avoid environmental damage and can contribute to livelihood generation [34].

The critical role of the collective cooperation throughout the process for enhancing the sustainability performance responds to the new call for collaborative innovative thinking. It presumes the interdisciplinary build-up of a value creation network to transform the challenges to opportunities for a new partnership consensus throughout the reform of the institutional set-up and discipline to sustainable supply chain management and circle economy. The new approach incorporates advanced planning (of strategic, tactical and operational character) to contribute to the use of all available resources and to achieve "resources efficiency" by a "holistic strategy" performance.

7. Conclusions and Further Work

Growing environmental, social and ethical concerns have led to increased pressures from consumer organisations, environmental advocacy groups and policy makers for agro-food companies to deal with their supply chains. Stakeholders demand corporate responsibility to go beyond product quality and to extend to areas of labour standards, health and safety, environmental sustainability, non-financial accounting and reporting, procurement, supplier relations, product lifecycles and environmental practices [35–37].

Transforming smallholder farming and promoting the intensification of sustainable agricultural management practices requires the design of farm- and community-level mechanisms through which smallholders can address the trade-offs between individual productivity and increased collective sustainability. In the past, the promotion of sustainable agriculture has focused on minimizing the impacts of agriculture on the environment, and many smallholders have felt and continue to feel that this “robs” them of already limited opportunities for growth [29]. The challenge will be to develop and scale up a sustainability landscape approach that takes these concerns into account [38]. Agreements between small farms and enterprises on the “right” balance of priorities within a community setting assure an impact on a local and regional view which, in turn, may result in a global reach. Food security, nutrition security, food safety, energy, carbon footprint, water footprint, cultural identity, demographics, urbanization, etc. are all representing sustainability concerns within the four major dimensions of sustainability.

Farms must be able to retain their individuality and organizational independence and to control their own brand identities and their economic strategies. At the same time, through Agro-Food Hubs, farms are able to act collectively at different levels of integration from the low to the high levels of collaboration [39] with a shared strategic agenda.

In contrast to the conventional food system that is concentrated in the hands of a small number of globalised distributors, this paper highlights the need for the redefinition of the SMEs agro-food chains within the framework of sustainability and introduces an integrated operational model towards meeting the growing demand of local sourced foods and strengthening local communities. Planned cooperation among producers and the collective use of all available knowledge can lead to sustainable competitive advantage, breaking the unequal terms of big-size channels for the benefit of producers and consumers. Synergic action can be founded on the establishment of an Agro-Food Sustainability Knowledge Hub through the exploitation of diversity in valuable agricultural products and in cultural and local-regional preferences, together with economies of scale and Logistics and Marketing/Trade know-hows. The proposed model promotes the access to and application of new resources, addressing means of financing (e.g., crowd funding and micro loans) and the means of knowledge transfer (e.g. networks and ICT tools) and overall promotes the entrepreneurship and development of new business models for farm income generation. This will enhance the small farms’ and businesses’ innovation capacities and overall will increase their competitiveness. Thus, the model proposed aims at the following:

- ✓ ensuring more equal distribution of power and economic value among all the involved actors in the supply chain
- ✓ retaining sustainable practices, including maintaining small farmers’ identity
- ✓ confronting effectively their lack of knowledge and asymmetric information
- ✓ enhancing continuous research and development/innovation initiatives
- ✓ establishing effective communication among different partners in a holistic strategic network

As highlighted in Section 3, agro-food SMEs need to strengthen considerably their capacities in order to overcome their organizational and infrastructural limitations that lead to the “vicious” cycle of development (Figure 1). Critical issues regarding business challenges for sustainable SMEs farming in the economic crisis environments have to be addressed towards increasing their competitiveness while at the same time enhancing local value chain and regional development. In this sense, the real importance of the proposed model is attributed to the fact that although it focuses on the sustainability of local farming through reaching a wider range of markets, it is also aligned with social motivations relating to community cohesion and the improvement of local food access options. It is very important to mention that the expected regional/community development will contribute, in the long term, to significant gains for all stakeholders in the agro-food value chain, even for big food retailers such as supermarkets that have already moved toward sourcing local food in response to increasing consumer demand. In retrospect, the proposed model provides a sustainable practical framework that

can be a strong motivation for policy makers, since the past years have demonstrated that existing mechanisms for the agricultural sector are not adequate and we need, therefore, to move to innovative and market-based approaches that are scalable and can reach a large number of beneficiaries [40]. It is noteworthy that small farms (less than 2 ha) operate about 12% and family farms about 75% of the world's agricultural land [41].

Future research needs to shed light on the critical factors that lead to the effective application of such a model facilitating policy makers' recommendations and initiatives on the local level. Such factors should be explored in view of the requirements for specific minimum scale points in order to operate at optimum efficiency while still taking into account their social mission.

Policy makers need to measure the performance of sectors within the supply chain context for effective stated goals and objectives setting and decision-making. The development of sustainable and competitive strategies requires new data regarding environmental impacts. Part of the problem consists of the lack of this kind of information to enable and motivate sustainable solutions. Information Systems could play a crucial role in supporting companies to improve their sustainable and competitive performance.

Moreover, no research has been conducted on the sustainability of the Agro-Food Hubs themselves, as well as regarding the assessment of the economic impacts of Agro-Food Hubs at the regional level. No single measurement can be applied to all Agro-Food Hubs, as each must be measured by its success or failure in achieving its own underlying goals.

As improving knowledge and innovation systems (AKIS) in Europe represents one of the most significant goals of the European Union Research and Innovation initiatives in the agricultural sector, Horizon 2020 programs, in the framework of the agricultural European Innovation Partnership (EIP-AGRI), should address issues concerning the Agro-Food Hubs, as they have been already acknowledged as a critical solution towards sustainable food value chains. It is noticeable that in the Rural Development Plans for the period 2013–2020, only lately have measures to support innovation in favor of all stakeholders in the agro-food chain been introduced, with a new approach called GOI (Organization for Innovation Crops).

It will develop synergies between the main economic sectors of rural areas and strengthen the sustainable development of food and non-food chains making use of territorial assets, so as to boost innovation and the delivery of the European Innovation Partnership "Agricultural Productivity and Sustainability" (the so-called EIP-AGRI).

It is believed that the conclusions and recommendations drawn in the present study are expected to enlighten the issue of Agro-Food Hubs as an alternative channel of distribution that contributes critically to sustainable SMEs farming. Additional research is necessary to fully explore the exciting possibilities that exist for local food producers in today's food industry.

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