



Interreg - IPA CBC
Greece - Albania



EUROPEAN UNION

OLIVE_CULTURE 

Project co-funded by the European Union





OLIVE_CULTURE: Contribution to the enhancement of olive sector by promoting certified good cultivation practices, applying precision agriculture technologies, creating innovative local products and supporting relevant SMEs

Subsidy Contract No: A2-2.2-5
 MIS: 5031027

**TECHNICAL
 REPORT**

WP3

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**Olive and more agrobusiness HUB
 (oliHUB)**

PART B

**Digital Innovation Hub in
 Agriculture**



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Regional Council of Vlore

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University of Ioannina -
Research Committee

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BASHKIA BERAT

Del 3.2.1 Olive and more agrobusiness HUB (oliHUB)

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Περιεχόμενα

Defining Digital Innovation Hub in Agriculture	5
Why Digital Innovation Hub is important to the future of agriculture	6
The strategic values and objectives of the Digital Innovation Hub in agriculture	7
Actors and interested parties of the Digital Innovation Hub in agriculture and specific agricultural products the Hub can be focused on.	10
The role of the farming community in the Digital Innovation Hub	10
The role of the Competence Centre in the Digital Innovation Hub.....	11
The role of National and regional authorities	12
Specific needs and barriers to consider for developing Digital Innovation Hubs for agriculture. ...	12
Operations of the Digital Innovation Hub	14
Adopting the Lean approach in the operations of the Digital Innovation Hub.	19
Defining Lean	19
The application of Lean in services	20
The application of Lean in the Digital Innovation Hub	20
ΠΑΡΑΡΤΗΜΑ Ι	Σφάλμα! Δεν έχει οριστεί σελιδοδείκτης.

Defining Digital Innovation Hub in Agriculture

Huet (2018) defines "hub" as a center of a network that exploits complementarities (local and European). According to the Final Report of the EIP-AGRI Seminar (2017), Digital Innovation Hubs in Agriculture are meant to foster "many-to-many" connections between competence centers, the farming sector, suppliers (including IT suppliers), experts and investors, to improve agricultural products and business processes and consequently to facilitate access to EU-wide markets. More specifically, a Digital Innovation Hub in Agriculture refers to an ecosystem through which any business including farms can get access to the latest knowledge, expertise and technology for testing and experimenting innovations which are relevant to the products, processes or business models (Final Report of the EIP-AGRI Seminar, 2017). So, the Digital Innovation Hubs in Agriculture are instruments conceived to support businesses, notably Small and Medium-sized Enterprises (SMEs), farmers, agri-cooperatives and non-tech industries, in their digital and business transformation (AIOTI, 2017).

Berti et al. (2017) refer to "digital food hubs" and define them as disruptive business models in the agri-food system shifting away from the unsustainable industrialized and conventional food sector and moving toward a re-localized food and farming pattern. Regional food hubs are businesses or organizations that actively manage the aggregation, distribution, and marketing of source-identified food products from local and regional producers – mainly small and mid-size farms – to strengthen their ability to satisfy individual, wholesale, retail, and institutional demands. In other words, they are new digital business models developed to support SMEs (including farms) with a value focus, forming new ways to leverage the technology as a facilitator for cooperative organizational forms (Berti *et al.*, 2017).

In most of the literature, there is a tendency to restrict the idea of regional food hubs to a physical, distribution center while, with the advent of the Internet, the concept of a regional food hub should be reconsidered, taking into account the e-business as a core dimension of the regional food hubs (Berti *et al.*, 2017). So, Digital technologies can support producers, processors, buyers, and other value chain members in the same locality or regions to connect in two different ways (Berti *et al.*, 2017):

- through virtual meeting places where all the members of the food supply chain including farmers, food producers or processors and buyers connect, exchange ideas, knowledge and experiences and interact. This interaction may lead to improvement of products and processes as well as to business transactions, which is the case of "virtual food hubs",
- through electronic platforms which also facilitate connections between the food supply chain members (including buyers and sellers) in real time and they also offer the capability to place online orders, to carry out payment processing, and to coordinate delivery logistics, which is the case of "e-business food hubs".

In fact, digital technologies make commercial transactions easier, quicker, and cheaper than ever, as well as implementing cost-effective communication, data sharing, and inventory management tools that are tailored to meet specific local needs (Berti & Mulligan, 2016). Digitization should be seen as a means and not as a goal itself, meaning that the Digital Innovation Hubs in Agriculture need to be farmer centered (in terms of easiness of solutions, awareness of rural IT infrastructure, addressing challenge of sector fragmentation, enhancing trust, etc.) and not just technology-centered (Final Report of the EIP-AGRI Seminar, 2017).

Why Digital Innovation Hub is important to the future of agriculture

Huet (2018) presenting the research call DT-ICT-02-2018 (namely Robotics - Digital Innovation Hubs) of the Framework Programme for Research and Innovation (Horizon 2020), highlighted that "the objective is to have at least one world class digital innovation hub in every region in Europe." However, according to the delegates participating at the 2017 EIP-AGRI Seminar, the Digital Innovation Hubs in agriculture are still at an early stage both in terms of conception and development (Final Report of the EIP-AGRI Seminar, 2017). Moreover, it is worth noting that the development of Digital Innovation Hubs is considered a necessary step of the Greek initiative with regard to the development of a suitable structure of the public sector in the field of agriculture. This initiative is considered a part of the Greek National Digital Strategy (Tafilis, 2016).

Both in the academic and the political arenas, it is claimed that the way forward to respond to the existing crisis of conventional agri-food systems and to create a competitive or survival strategy for small family farms is the re-construction of regional and local agri-

food networks (Berti *et al.*, 2017). Pigford *et al.* (2018) note that well-designed and supported innovation niches may facilitate transitions towards sustainable agricultural futures, which may follow different approaches and paradigms such as agroecology, local place-based food systems, vertical farming, bioeconomy, urban agriculture, and smart farming or digital farming.

The interest on regional food hubs relies on the one hand, on the concerns about the impacts of the conventional and globalized food system on food safety and quality and the social, economic and natural environment, the consequences on which are experienced by individuals, communities and regions (Beckie *et al.*, 2012). On the other hand, regional food hubs overcomes the limits of the new “alternative” food supply chains and networks that try to shift away from the industrialized and conventional food sector and move towards a re-localized food and farming regime (Sonnino & Marsden, 2006).

The strategic values and objectives of the Digital Innovation Hub in agriculture

The **strategy** of the Digital Innovation Hub in agriculture consists of the following dimensions (Berti *et al.*, 2017):

- “Value creation and distribution strategy”, which is focused on product improvement and differentiation along the dimensions of quality, healthiness, sustainability, locality, transparency, democracy, equity, and access.
- “Organizational strategy” that shifts from individual competition to “coopetition” through the development of local “strategic networks” among small size producers.

These dimensions of strategy demonstrate that the Digital Innovation Hub in agriculture should move from the short-term "Economic Profit" to the long-term "Shared Value" through collaborating, connecting, and distributing (Berti *et al.*, 2017). Thus, in the business model of the Digital Innovation Hub, the term “value” is not strictly economic but involves the assemblage of different values such as locality, economic democracy, sustainability, healthiness, and quality. For this purpose, a Digital Innovation Hub actively facilitates strong relationships along local food value chains and seeks to bring added value or “shared value” to farmers and local communities (Berti *et al.*, 2017).

In other words, the Digital Innovation Hub in agriculture is a “**strategic network**” involving all the related members along the food chain from the farm to the fork, collaborating according to different levels of joint endeavor to co-produce “shared value” (as a new form of economic value including socio-environmental values) to be equitably distributed within the network (Berti *et al.*, 2017). It is worth noting that the collaboration and networking among a diversity of actors and members of the supply chain should be both at horizontal and vertical levels (Final Report of the EIP-AGRI Seminar, 2017). In such a case the network has strategic positive economic-social and environmental spill-over effects in the locality (Berti *et al.*, 2017).

The **vision** of the suggested Digital Innovation Hub is to be the most widely known Hub in Greece and a famous Hub in Europe and all over the world, which can be connected with many similar Hubs worldwide. A Hub the operations of which have the maximum practical implications in the agricultural and food sector is also a desire of the suggested Digital Innovation Hub. Improving the characteristics and the marketing profile of the agricultural products of the local region, improving the operational processes of all the members of the food supply chain (e.g. farmers, producers, processors, retailers, etc.), developing all the members involved in the food supply chain and achieving significant advantages for the benefit of the local society are the main intentions of the suggested Hub. These achievements can be reflected in awarded products, companies and the professionals involved in the food supply chain.

The **mission** of the suggested Digital Innovation Hub is, firstly, *human oriented*, which means that all the members of the food supply chain are properly connected for collaboration purposes, stimulated to be actively involved, consulted, educated and surveyed. Secondly, it is *product oriented*, which means that the Hub carries out research studies focusing on the added value and novelty of the agricultural and food products of interest and the suggests ways to increase the usefulness of the agricultural secondary products. Thirdly, it is *business oriented*, which means that the Hub carries out research studies with regard to sustainability, quality management, food safety management, and performance improvement of all business units throughout the food supply chain. Fourthly, it is *market oriented*, meaning that the Hub deals with the product mix of the agricultural products and exploits new market niches. Finally, the mission of the Hub is *socially*

oriented, meaning that the Hub communicates closely (e.g. through tutorial seminars, meetings) with the local and broad community and the business environment as far as the agricultural products and the respective best practices are concerned.

Based on the above it is apparent that the main **objectives** of the Agri-Digital Innovation Hub are the following:

- to develop sustainable agricultural practices of conventional, organic and integrated agricultural systems,
- to develop a food safety management culture as well as a quality management culture within and among the related members of the food supply chain,
- to make the members of the food supply chain as well as the distribution channels more effective in terms of quality, delivery, cost, flexibility, productivity, time, safety and inventory.
- to increase traceability, standardization and certification of agri-food firms.
- to strengthen the position of the existing farmers and firms in the agri-food supply chain and the market,
- to increase the added value of the agricultural products,
- to develop new - innovative products and services,
- to make productive the basic agricultural secondary products,
- to improve the marketing value of the agricultural products,
- to help agricultural firms promote their products and penetrate new markets,
- to increase the willingness of young people to be farmers and actively involved in the food supply chain,
- to hear the voice of all stakeholders (farmers, processors, producers, whole-sellers, retailers, consumer unions, local governmental authorities, etc.) and translate their requirements into process characteristics of the next member of the supply chain,
- to make the members of the supply chain collaborate between each other and in so doing to reduce the distance among them,
- to increase the level of knowledge and know-how of all the members of agri-food supply chain,
- to diffuse the best practices to any interested party (e.g. farmers, processors),

- to make students aware of the results of the Hub's operations,
- to make stakeholders including students adopt the practical implications derived from the operations of the Hub.

Actors and interested parties of the Digital Innovation Hub in agriculture and specific agricultural products the Hub can be focused on.

Given that the suggested Digital Innovation Hub in agriculture is designed to be developed in the Regional Unit of Arta, Epirus and more specifically in the area of Kostakii which is located few kilometers away from the city of Arta, the Hub can be focused on the main agricultural products of crop science of the Regional Unit of Arta, which include olives, olive oil, citrus fruits and kiwi fruits.

The main actor (Competence Centre) of the suggested Digital Innovation Hub can be the Department of Agriculture of the University of Ioannina, while the interested parties include the following:

- the farmers of olives, olive oil, citrus fruits and kiwi fruits,
- agriculturalists of the public and private sector,
- local authorities,
- researchers,
- academics, professors and teachers,
- agri-food firms including processors, producers, wholesalers, retailers, etc.
- consumer unions,
- IT suppliers,
- technology experts,
- business consultants,
- university under-graduates and post graduates, PhD candidates,
- students at secondary schools,
- citizens.

The role of the farming community in the Digital Innovation Hub

The farmers are positioned at the heart of the Digital Innovation Hub. Farmers' needs are the main driver for setting innovation priorities; it is absolutely necessary to align

all the related efforts (e.g. the focus of technology) according to the needs of the farming community, following a bottom-up approach. In the context of a Digital Innovation Hub in agriculture, farmers (and at some extent the agri-cooperatives) will be able to test and assess the effectiveness of a variety of tools and business models (AIOTI, 2017). Moreover, farmers' representatives (i.e. agri-cooperatives) serve as interface between the Digital Innovation Hubs and the farmers in the field, by selecting the most suitable candidates to test ideas, but also selecting projects and partners among the IT community and scientists. They are extremely important on raising awareness among farming community for the projects but also facilitating competitions aiming at showcasing technologies and digital tools. On top of that, they are good partners and facilitators. Finally yet importantly, farmers through the agri-cooperatives, help by creating trust and transparency among partners but also by raising profile for the bottlenecks to implement digital farming (AIOTI, 2017).

The role of the Competence Centre in the Digital Innovation Hub

The Department of Agriculture of the University of Ioannina as the Competence Center of the Digital Innovation Hub will play a key role in its operation. It will provide technical assistance and the facilities needed (labs, infrastructures, etc.) for linking up with the other partners in the innovation chain and supporting the whole food supply chain (Final Report of the EIP-AGRI Seminar, 2017).

To ensure the uptake of technologies in the agriculture sector, it is important the Competence Center to bring end-users (farming community) in the innovation process, linking them between each other and linking also their knowledge and needs with those of the other partners along the innovation chain, and finally ensuring that technologies and innovations are adapted to the specific needs of the end-users. As pointed out by the participants in the 2017 EIP-AGRI Seminar, the activities of the Agri-Digital Innovation Hub are driven by the demand for digital innovations. The approach should be bottom-up (Final Report of the EIP-AGRI Seminar, 2017). Moreover, the Competence Center plays, when building a Digital Innovation Hub for the agricultural sector, a key role in providing advisory services to the end-users, farmers, food company managers, employees and students also, in order to help matching technology developments with the farming community's needs (Final Report of the EIP-AGRI Seminar, 2017).

Given that the Competence Center (the Department of Agriculture of the University of Ioannina) is the "heart" of the Digital Innovation Hub, an organizational structure should be developed for the successful and effective management of the operations of the Hub and the people who are actively involved. So, it is suggested the Center authorize Professors to manage the Hub's operations. Since the principle of the Hub is the team-based management and working, a team of Professors of the Department of Agriculture of the University of Ioannina should take the full responsibility for managing the Hub. Few teams should also be developed and work under the instructions of the top management team. These teams should deal with recording the current status of the agri-food supply chain, recording the voice of the members of the agri-food supply chain and translating it to useful information, designing and organizing training programmes, exploring the market, providing consulting services, designing and conducting research studies, organizing meetings throughout the local area and connecting the members of the agri-food hub.

The role of National and regional authorities

National and regional authorities not only need to provide investment for the Digital Innovation Hub, but they also need to stimulate and facilitate their own local innovation ecosystems. Regions could find mechanisms for combining and scaling up different funding sources, and foster the creation of the 'investment triangle': region-technology-funding (Final Report of the EIP-AGRI Seminar, 2017).

Specific needs and barriers to consider for developing Digital Innovation Hubs for agriculture.

According to the Final Report of the EIP-AGRI Seminar (2017), the specific needs and barriers that should be considered while developing a Digital Innovation Hub in agriculture are the following:

1. *The overall structure and governance of Digital Innovation Hubs.* A balance of power among the different stakeholders, with special attention to the farmers, should be guaranteed. This includes ensuring a balanced share of value propositions and risks both among the different players and along the agri-food chain. It is important to define a proper strategic approach of the Digital Innovation Hub - goals, mission and vision - as well as a long-term commitment of its activities. This strategy should take into account the

frequently different timeframes of political, agricultural, start-up and research horizons. Networking is fundamental to strengthen the relationship between the actors involved. The Digital Innovation Hub should be connected at regional, national and EU level with other hubs available. Digital Innovation Hubs should be open and accessible for all agents and overcome the potential lack of engagement of key stakeholders.

2. The need of promoting an environment of *trust among the members of Digital Innovation Hubs and between the hub and society* is a key ingredient and it should be the basis for sound governance of the Digital Innovation Hub. Therefore the human factor becomes as central as the technological dimension. Respect and competence are identified as important ingredients for trust building.

3. A good *mapping of existing infrastructures/networks/hub-like initiatives* is needed at the very starting phase of the Digital Innovation Hub. A good start also demands the right mix of skills and competences, technical capacity from the supply side, and the need for farmers to be acquainted with new technologies and their potential added value. Time, financial and management constraints at farm level are perceived as potential barriers for this. Adapted facilitation for the farmers' involvement is of great importance. Innovative farmers who have already adopted IT technologies could support this facilitation. This assistance should consider the existing gap between the agri-food and IT sectors.

4. *Suitable IT infrastructure* is fundamental too: rural broadband reaching all regions including marginal areas, access to supercomputing centers, development of competence centers for technologies and other physical infrastructure, etc. are requirements identified to develop a Digital Innovation Hub in agriculture.

5. *The way the Digital Innovation Hub operates*. There is a need for the Digital Innovation Hub to have a clear, practical orientation, to be "hands-on". There is a need to develop pilot cases/user cases that are properly validated in real conditions, living labs, demonstration farms, etc. The Digital Innovation Hub should develop a clear and simple language, avoiding technical jargon that could hamper communication and pay special attention to mutual understanding. This also relates to the need for transparency at the strategic and operational levels and the accountability of the Digital Innovation Hub when assessing its results.

6. The activities to be developed by the Digital Innovation Hub will be very much influenced by *data governance* conditions and *availability and quality of IT infrastructure*. The Digital Innovation Hub could play an important role in defining a clearer data governance and improving framework conditions for data sharing and re-use.

Operations of the Digital Innovation Hub

The Digital Innovation Hub functions as a bridge connecting those stakeholders (e.g. farmers, producers and processors, wholesalers, retailers) which are fragmented and dispersed throughout the Regional Unit of Arta. The operations of the suggested Digital Innovation Hub can be grouped along the following directions:

- An overview of the current status of the agri-food supply chain should be always available and updated. This is one of the most significant tasks of the suggested Hub. The primary, secondary and tertiary sector of the agri-food supply chain should be well recorded. This means that the Hub should have recorded all the available professional farmers and respective associations, producers, processors, wholesalers and retailers which constitute the supply chain of the region of interest, meaning the Regional Unit of Arta. Moreover, all professionals providing respective consulting services (e.g. agriculturalists of the private sector) to the members of the food supply chain (e.g. farmers) should be recorded. More specifically, full contact details (e.g. working area, mobile phone numbers, email accounts and Skype accounts), the products and services provided and the hectares used are among the basic information that should be initially collected and frequently updated. Useful sources that can be used for the collection of this information are the Administration Services of the Regional Unit of Arta and the Municipalities of the Regional Unit of Arta. For this purpose, all the contact details of the Administrative Services and the respective public servants should be available in a database of the Hub. Alternatively, the interested parties can be invited by the Hub itself to complete a form including their details which can be send to the Hub either in an electronic copy or a hard copy. It is recommended the Hub be informed with regard to the Sectoral and Regional Operational Programmes announced in the context of the Partnership Agreement (PA) 2014-2020 (calls for proposals, deadlines, requirements, etc.). It is worth noting that the Digital Innovation Hub cannot and should not substitute

the Administration Services of the Public sector (meaning the Regional Unit or Municipalities), but its role is to inform interested farmers, businessmen or individuals with regard to the available programmes, stimulate them to apply for the programmes and recommend the respective administrative public services and consultants which can be addressed for application purposes. Furthermore, the list of other similar Innovation Hubs that have already been founded should also be available in the database of the suggested Digital Innovation Hub. Finally, it is worth noting that the database of the Digital Innovation Hub should also include a list of the available laboratories providing quality control or any other technical control of the agricultural products as well as a list of those companies which provide solutions for processing agri-food secondary products. Given that all the above mentioned information will be available in the database of the Hub and directly accessed by the interested parties (through the digital platform - website page of the Hub), the connection of the members of the food supply chain between each other or between them and the Hub or any other useful party or organization, will be direct.

- The suggested Digital Innovation Hub should provide the base upon which the ideas, needs, requirements, desires and expectations of consumers and the members (internal customers) of the agri-food supply chain should be frequently recorded. For this purpose, either electronically or in a hard copy, all interested parties should complete respective questionnaires providing primary data. The use of experts' knowledge to construct the House of Quality or the first matrix of Quality Function Deployment allows the translation of customers' requirements into specific practices of the next supplier that mostly contribute to satisfy these requirements. The article of Sayadi et al. (2017) titled "Translating consumer's olive-oil quality-attribute requirements into optimal olive-growing practices: A quality function deployment (QFD) approach", can be used as a useful guide for this methodology.
- The educational role of the suggested Digital Innovation Hub is of high importance. The educational character of the Competence Center of the Digital Innovation Hub (the Department of Agriculture of the University of Ioannina) helps in this direction. This means that there already exist all the necessary infrastructures needed for the training programmes (classrooms, internet connection, projectors, etc.). The curriculum

provided by the Department of Agriculture of the University of Ioannina as well as the Professors of this Department (which is located in Arta) can certainly be the base upon which the training programme can be designed. However, based on the needs of the trainees (farmers, producers, processors, should frequently make suggestions for training subjects), the list of the training subjects and the trainers can be enhanced. The Departments of the University of Ioannina (located in Ioannina which is nearby the city of Arta) as well as the Department of Business Administration of Food and Agricultural Enterprises of the University of Patras (located in Agrinio, which is also nearby the city of Arta) can also provide the basis for selecting the training subjects and the trainers. However, this does not mean that the list of trainers cannot be enhanced using external adjunct trainers. So, specific annual training programmes should be well designed and developed by the Competence Center inviting all interested parties including farmers, producers, processors, wholesalers, retailers, students and consumers also to participate and be trained. The training programmes should refer to a specific member of the food supply chain (for example a training programme specifically designed for farmers). The subject of the training programme should be determined accordingly. For example, the farmers can be trained in sustainable quality agricultural practices of conventional, organic and integrated quality agricultural systems; the producers, processors, wholesalers and retailers in establishing, maintaining and certifying a food safety management system, a quality management system and an environmental management system. The farmers, producers and processors, wholesalers and retailers can also be trained in performance improvement parameters such as quality, delivery, cost, flexibility, productivity, time, safety, and inventory. Training programmes of all members of the agri-food supply chain in IT skills is of utmost priority. For training purposes, the Digital Innovation Hub can include in the training programmes, visits to excellent farms, agricultural plants, companies which are already acknowledged in the local area or all over Greece or they have been awarded for their excellent products/services or the practices they implement. In so doing, the effectiveness of the training programme will be enhanced. To the best of author's knowledge, in the local area of the Regional Unit of Arta or the Region of Epirus, there are many well known farms, agricultural firms, producers and processors which are export oriented and

provide all the agricultural products of interest. These can be certainly used as excellent paradigms for training purposes. The students of high schools and the University undergraduates, postgraduates and PhD candidates can also be trained in the best agricultural, industrial and retail practices. The presentations of each training programme can be provided electronically in the digital platform - website page of the Digital Innovation Hub. Finally, it is worth noting that the trainees will evaluate the training programme through structured questionnaires, which will give a useful feedback for continuous improvement of the training programme.

- Exploring the market arena both the national and the international and determining new possible market avenues can also be included in the operations of the Hub. The role of the Hub is just to detect new market niches, perhaps more profitable and accessible, and provide this information to the interested firms of the supply chain, including the farmers. Based on the internet services, the Hub can easily detect possible markets of interest for the benefit of the local firms. The connection of the firm with these new markets is a full responsibility of the firm itself. From the marketing point of view, the Digital Innovation Hub can also be the means by which all the agri-food products provided by the local firms including farmers can be presented and promoted to the local community and businesses through local exhibitions that can be organized in the location area of the Competence Center or alternatively in exhibitions centers of the Regional Unit of Arta or other Regional Units of Epirus, which are nearby the city of Arta. The products can also be presented in the digital platform - website page of the Digital Innovation Hub.
- The suggested Digital Innovation Hub can significantly contribute to the improvement of the members of the agri-food supply chain by providing consulting services. These services should be provided by experts in the field of farming, producing, processing, retailing of the agricultural products of interest. The management of the respective agri-businesses and the marketing of the agricultural products are also fields which can be the subject of consultation provided by the Hub to any interested party of the food supply chain. A pool of consultants can be created based on the Professors of the Departments of the University of Ioannina, the agriculturalists of the Public sector working at the Administration Services of the Regional Unit of Arta, the agriculturalists of the private

sector which provide their services all around the Regional Unit of Arta, as well as any interested party of the food supply chain who can provide advisory information. A list of the available consultants should be provided in the digital platform - website page of the Digital Innovation Hub. It is worth noting that a member of the agri-food supply chain who is interested in consultation due to a problem that he faces, can approach the Digital Innovation Hub, either physically or electronically and ask for an expert to talk about the specific problem.

- Conducting research studies constitutes a major contribution of the Digital Innovation Hub to the academic and business community and society also. The Department of Agriculture of the University of Ioannina as the Competence center already provides all the infrastructures (tangible, meaning for example laboratories, glasshouses, greenhouses, material, equipment, computers, etc. and in-tangible such as research methodologies, knowhow, etc.) which are necessary for research purposes. The above mentioned as well as the years' experience of this Competence center in research projects, the academic teaching and research staff which is of high quality and the close collaboration of this University Department with many Departments of the University of Ioannina and other Universities all over Greece or worldwide, guarantee the success of the research studies yielding significant practical implications for the agri-food businesses of the supply chain and the society. Innovative products, processes, marketing and management methods for all the members of the food supply chain (farmers, producers, processors, wholesalers, retailers) can be among the research findings of these studies. These findings can be up-loaded in the digital platform - website page of the Digital Innovation Hub in order to be available to any interested party.
- Organizing frequently meetings inviting the members of the agri-food supply chain and other interested parties including citizens, students, professionals of the Regional Unit of Arta, is also a task of the suggested Digital Innovation Hub. A main objective of these meetings is the presentation of the activities of the Hub, the connection of all stakeholders as well as the communication of the contributions of the Hub to society. In so doing, the practical implications of the activities of the Hub will be clear to the

community and widely adopted. Short presentations of the meetings can also be available in the digital platform - website page of the Digital Innovation Hub.

Adopting the Lean approach in the operations of the Digital Innovation Hub.

Defining Lean

Lean means using less of everything: half the human effort, half the space needed, half the investment in tools, and half the hours needed to provide the product/service (Anvari *et al.*, 2013). In other words, the central theme of Lean is to have the right items of the right quality and quantity in the right place and at the right time (Nawanir *et al.*, 2013). By consuming the least amount of the available resources and utilizing them more effectively, customer requirements are satisfied at minimum cost (Hodge *et al.*, 2011).

Authors define Lean as a socio-technical system, highlighting its twofold content (Gamage *et al.*, 2016). For example, Taj (2005) stresses the two important aspects in Lean, the human and the nonhuman. The nonhuman aspect is the design of the production process of products/services dealing with the layout, scheduling, supply chain, and others. The human aspect, which is also of equal importance, is the organizational design. This aspect deals with the organization type, job security, personnel turnover, team activity and training.

According to Womack and Jones (1996), Lean principles are the following: define value precisely from the perspective of the end customer in terms of a specific product/service with specific capabilities offered at a specific price and time; identify the entire value stream for each product/service and eliminate waste; create flow within the value stream; design and provide what the customer wants only when the customer wants it; and pursue perfection. There is a consensus among researchers that the variety of principles and tools/techniques involved with Lean have the same ultimate goal: to eliminate all types of waste (Sangwan *et al.*, 2014; Gamage *et al.*, 2016; Nawanir *et al.*, 2016) and the non-value-added activities at every process (Hodge *et al.*, 2011; Yang *et al.*, 2011; Jasti and Kodali, 2016). Moreover, the improvement of all the value-added processes throughout the organization is an objective of Lean (Karim and Arif-Uz-Zaman, 2013).

The application of Lean in services

For the last two decades, Lean has been primarily used to improve manufacturing processes (Alsmadi *et al.*, 2012). However, Lean principles should not be limited to manufacturing operations, organizations also have to apply them in organizing service processes (Losonci and Demeter, 2013), given that the more abstract, generic, and less context-dependent concept of Lean, enables its application to other sectors and fields, such as services (Carlborg *et al.*, 2013). Thus, Lean is now increasingly applied to a wide range of service operations (Alsmadi *et al.*, 2012). It is worth noting that there are potentially more benefits to be accomplished in this sector rather than in traditional manufacturing, where decades of good work have already paid off (Alsmadi *et al.*, 2012).

Service organizations where Lean has been implemented are the following: airlines, IT companies, fast food companies, housing and care services, legal sector (Moyano-Fuentes and Sacristan-Díaz, 2012), healthcare organizations (Moyano-Fuentes and Sacristan-Díaz, 2012; Arlbjørn and Freytag, 2013; Dibia *et al.*, 2014; Jasti and Kodali, 2015; Langstrand and Drotz, 2016), public administration (Moyano-Fuentes and Sacristan-Díaz, 2012; Arlbjørn and Freytag, 2013; Jasti and Kodali, 2015), financial services (Dibia *et al.*, 2014), local government, non-profit organisations (Langstrand and Drotz, 2016), and tourism organizations (Jasti and Kodali, 2015).

The application of Lean in the Digital Innovation Hub

Based on the above it is apparent that the implementation of Lean in the operations of the Digital Innovation Hub is a challenge. In order the principles of Lean to be embodied in the operations of the Hub, the following managerial practices should be implemented (Alsmadi *et al.*, 2012; Carlborg *et al.*, 2013; Malmbrandt and Ahlstrom, 2013; Leyer and Moormann, 2014; Gupta *et al.*, 2016):

- *Understanding the needs of the food supply chain members and the society* (surveying and sharing to those involved in the daily operations of the Hub the needs, requirements, expectations, and satisfaction of the food supply chain members and the society; transforming these requirements into service characteristics; and satisfying these requirements).
- *Involvement of the food supply chain members and the society in the operations of the Hub* (participating in the initial design process and service development, setting

standards, giving feedback on quality and service performance, sharing current and future demand information).

- *Establishment of value streams* (drawing and improving value stream maps of the service processes, identifying value-added and non value-added activities, setting key performance indicators for the activities).
- *Creating flows within the value streams* (avoiding a backlog of work, continuous flow of families of services, flow oriented equipment layout, removing bottlenecks/constraints).
- *Using cells* (creating groups-families of services with similar processing, grouping equipment into work centers-cells based on product families).
- *Application of the pull approach* (providing services is 'pulled' by the demand of the food supply chain members and the society).
- *Providing the services Just in Time* (small number and variety of services provided each time; JIT information sharing, synchronization of processes, providing services every day).
- *Management commitment and involvement to Lean approach* (the team of Professors of the Department of Agriculture of the University of Ioannina who have the full responsibility to manage the Hub, coordinate and set clear objectives, translate value into measurable service attributes and performance specifications, accept responsibility for quality, evaluate management based on quality, communicate with stakeholders, create and communicate a vision focused on quality, are personally involved in quality improvement, identify exceptional people with excellent skills, support team management for decision making, support management by encouraging, helping, coaching and listening).
- *Continuous improvement and value perfection* (continuous improvement throughout the year; regular meetings to discuss the actions to avoid problems; improving all aspects of processes and services; tracking, communicating and measuring objectively the results and improvement changes; sharing ideas and best practices throughout the organisation; establishing circles of continuous improvement; checking work results in detail; goal achievement).

- *Total Productive Maintenance* (routine maintenance and cleaning of all equipment and workspaces, following standardised procedures; maintaining records of maintenance; incorporating safety improvement programs in maintenance activities; monitoring the performance of equipment).
- *Work standardisation* (jobs, tasks, work instructions and training are specified in standard operating procedures, used in day-to-day work and updated regularly; job observation and checklists are used to check compliance with work standards).
- *Use of quality tools and techniques* (using charts of defect rates, fish bone type diagrams, the 7 quality tools to identify causes of quality problems and determine whether the processes are in control).
- *Visual management* (control board which is visible to all and displays planned and undertaken activities, quality related metrics).
- *Process management* (processes adding value for the food supply chain members by reducing all kind of waste, focusing on quality tools to enhance the success of activities, reviewing and designing processes to be preventive-oriented, determining and documenting expected performance of all processes, re-arranging process modules for customization purposes).
- *Quality designed into the service* (the food supply chain members' involvement in service design and development taking into consideration their requirements).
- *Quality problem-solving* (root cause problem solving, formulating cross-functional small teams to solve problems, stopping the services provided to deal with the roots of the problem, dealing with the problems immediately, inspecting the quality of work).
- *Development and training of leaders and all who are involved* (providing training annually, in a clear concise manner with practical examples and quantifiable achievements; training in process, improvement initiatives, problem-solving, adopting “learning-by-doing”; rewarding for learning new skills).
- *Multifunctionality of those involved and teams and cross-training* (all those involved in the operations of the Hub are rotated among jobs frequently and cross-trained to perform a variety of activities; many tasks are performed by teams; cross-project interaction and exchange of information; cooperation and intensive communication between cross-functional teams).

- *Decentralization* (authority, responsibility and power are delegated at different levels, communicated and published; workload is equally distributed at different levels).
- *Responsibility* of those involved in the operations of the Hub (for noticing anything odd about functionality, participating in problem-solving process) and autonomy (to control process and service variability, stop services if abnormalities - quality problems occur).
- *Involvement in quality management* (all those involved in the operations of the Hub should root out lean and green waste, explore new ways and suggest innovative ideas, design processes, participate in problem-solving teams, eliminate problems, lead process improvements, drive suggestion programs).
- *Information exchange between the Hub and partners and similar Hubs* (timely, accurate, complete, adequate and reliable information exchange regarding service schedule, cost, changing needs, knowledge of core service processes and planning).
- *Development of similar Hubs* (technological assistance, training in quality issues, improving capabilities) *and evaluation* (on the basis of total cost, quality and delivery).
- *Partnership with similar Hubs* (visits to and from similar Hubs frequently, long-term cooperative relationships, mutual trust, joint investments, strategic alliances with few high quality Hubs) *and involvement* of similar Hubs (in problem solving, quality improvement, planning and goal setting, new service development, lean initiatives, plans).

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