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EXECUTIVE SUMMARY

This deliverable provides a “Report on benchmark framework and actual selection of representative Business Models suited to local clusters” within Task 3.2 - “Definition of a benchmark framework to conceptualize and select optimized Business Models suited to local clusters” in WP3 “Enhanced business models and market access strategies” of MED-LINKS project.

The report aims to developing and evaluating alternative Business Models ensuring the production and distribution of value across and beyond three supply chain systems: short food supply chains, export-oriented supply chains, and green public procurement. As a result, new value-creation mechanisms for the three above-mentioned supply chain systems are developed and assessed to understand what facilitates or impedes them from reaching their full potential.

The main contributions to Sustainable Development Goals (SDGs) of the activities performed and the results obtained are outlined at the end of the report.

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1. Introduction

In the present report, we aim to develop and evaluate alternative business models ensuring the production and distribution of value across and beyond three supply chain systems: short food supply chains, export-oriented supply chains, and green public procurement. In so doing, we attempt to design new value-creation mechanisms for the three above-mentioned supply chain systems and understand what facilitates or impedes them from reaching their full potential.

The work we did to produce this report followed a stepwise procedure (Figure 1). In the first step, we developed a theoretical benchmark framework to depict the different dimensions of value emanating through the operation of supply chains. In the second phase, we evaluated a series of criteria determining supply chains' ability to produce value. Then, capitalizing on this evaluation procedure, we developed eight alternative business models (three for short food supply chains, three for export-oriented supply chains, and two for green public procurement schemes) based on digital platforms and involving digital solutions or/and certification schemes. In the final step, using data derived from experts and adopting a mixed research design, we assessed the strengths and weaknesses of the models, identifying in parallel the external parameters that operate as opportunities and threats for the models.

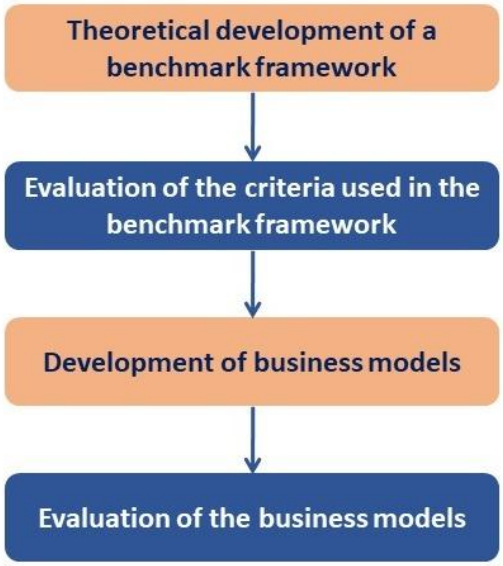

Figure 1. Tasks performed to produce the report

The report follows the structure of our work, starting with our theoretical benchmarking and the analysis of our framework, and continuing with the development and evaluation of alternative business models. We close by presenting our concluding remarks.

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2. Development of a benchmark framework for the performance of supply chain systems

2.1 A generic benchmarking for supply chains: Towards a theoretical framework

In this section, we outline a benchmark framework for conceptualizing the ways through which the business models used in supply chain systems lead to the production of value. Instead of proposing a competitive benchmarking, which is a direct comparison against competitive supply chain systems, we sketch out a generic benchmarking. The aim of such an approach is to identify multifunctional processes that lead to value generation and benchmark them against key-success factors (McAdam and Kelly, 2002) found in the broader literature available (Moreland et al., 2000; Ifill and Molerand, 1999). By adopting this technique, one can sidestep the major disadvantage of competitive or functional benchmarking: the lack of data available on competitors and the processes they are following or the targets they set (Zairi and Leonard, 1994).

Generic benchmarking is a procedure that can be used to propose good practices, not only to uncover differences between a business or system and best-in-industry or best-in-class examples (Peischl, 1995). Hence, through generic benchmark frameworks, researchers can uncover what the current performance of a system is, what the ideal state would be, and how it can be achieved (Pantall, 2001; Moreland et al., 2000). As Zairi and Leonard (1994) explain, generic benchmarking is the latest stage in the evolutionary cycle of benchmark analysis, having the advantage of determining what excellence means and proposing strategies to pursue it.

To build our framework, we performed an extended literature search, collecting sources that refer to supply chain performance and articles that deal with factors affecting value creation through business activities. The literature review led us to the identification of two types of value. The first one concerns the value emanating from supply chain systems' operation and spreading across the supply chain. To describe it, we use the term "primary value." That type of value emerges through four dimensions of supply chain operation: the managerial, which refers to attributes associated with managerial approaches and techniques (Mentzer et al., 2001; Ballou et al., 2000); the relational, which includes factors that define the ways relations are built within supply chain systems (Ramanathan and Gunasekaran, 2014; Zacharia et al., 2009); the economic that comprises variables related to the financial performance of a system

(Lichocik and Sadowski, 2013; Pullman and Wu, 2012); and the organizational dimension, which contains elements referring to the organizational styles and mindsets that prevail in a supply chain system (Hsiao et al., 2008; Kim, 2007; Johnson and Leenders, 2001). These four dimensions form a base upon which the attempts to create value are built (Figure 2).

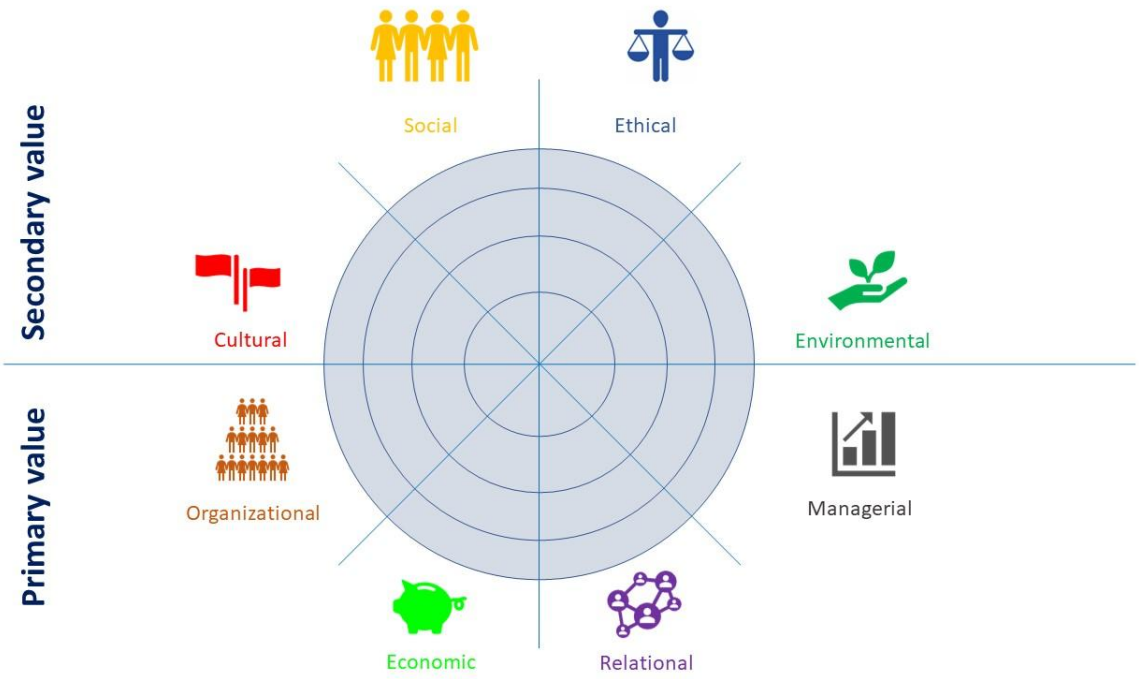

Figure 2. Dimensions of the benchmark framework that determine the ability to produce primary and secondary value

The second type of value – "secondary value" (Lioutas et al., 2019) – is also produced and diffused beyond the boundaries of the supply chain. The relevant literature lends support for a four-dimensional structure that creates the conditions for the production and dissemination of secondary value: a cultural dimension referring to the cultural principles that guide the operation of a supply chain system (Baz et al., 2022; Stone and Glover, 2017); a social dimension, which encompasses social activities and practices that govern the way of doing business within the supply chain (LeBaron and Lister, 2022; Nguyen et al., 2022;

Manteghi et al., 2021); the ethical guides and tenets that characterize the operational philosophy of a supply chain (Simangunsong et al., 2016; Manning et al., 2006); and, finally, the environmental code of practice (Marchi et al., 2019; Lippmann, 1999).

In the following sections, we present these eight dimensions, detailing the criteria that they encompass. To provide a balanced benchmark framework and to facilitate the analysis of the three supply chain systems under consideration (short food supply chains, export-oriented supply chains, green public procurement), we chose to use four criteria for each dimension. To select criteria, we lean upon the literature referring to various supply chain domains, ranging from agrifood to industrial supply chains.

2.2 Dimensions associated with primary value

Among the four dimensions that determine the production of primary value (Table 1), the first includes criteria referring to managerial attributes of supply chain systems. To be effective, such a system should emphasize the quality of the products, including both the technical quality, that is a set of characteristics that a product conveys, and the process-related quality, which refers to the approaches, philosophies, and techniques used during production and delivery (Nilsen-Nygaard et al., 2021; Lang and Conroy, 2022; Van Der Vorst, 2005). However, product quality is inextricably linked to technological (Chen et al., 2020; Rahman et al., 2020; Huang et al., 2019) and process innovation (Aguiar et al., 2020; Biénabe et al., 2011), where the former refers to either first-order (those which facilitate the production procedure, like equipment and devices) or to second-order technologies (that are incorporated into the products, like improved crop varieties, smart packaging, etc.), and the latter to novel ways of producing value, such as certification schemes or alternative distribution ways. Hence, a second criterion relates to the degree to which the system focuses on innovation.

Another critical parameter is the degree of consumer orientation that characterizes each supply chain system (Coley et al., 2010). From a managerial perspective, the tailoring of production and supply processes to consumer demands and preferences is decisive for the success of any system (Sgroi, 2021; Sijtsema et al., 2004). To do so, the development of functional communication channels that permit the two-wave flow of information between food producers and consumers is necessary. The information flow across the supply chain, on the one hand, affects supply chain performance (Vanpoucke et al., 2009), whereas, on the other hand, it represents a key factor for achieving consumer satisfaction (Singh, 1996).

Beyond these managerial attributes, variables defining the relational practices of supply chain systems form a second set of criteria. Plainly put, the relational dimension of our framework refers to the way of doing business in the supply chain. In the inner environment, the operational performance of a supply chain system depends on the quality of the workforce used. To ensure that workers can contribute to the targets set by each system, there are two crucial preconditions. First, the designing of an environment that secures workers' health (Pinto, 2019; Diabat et al., 2014), and, second, their upskilling through the offering of education and/or training opportunities (Patrucco et al., 2022; Agus and Hassan, 2010). The outer environment considers the partnerships and alliances built with co-operating companies and actors (Yu et al., 2002; Christopher and Jüttner, 2000), and the information-sharing networks that enhance transparency (Brun et al., 2020; Minami et al., 2012) and facilitate co-innovation (Bitzer and Bijman, 2015; Tepic et al., 2013).

Table 1. Dimensions determining primary value creation in a supply chain system and relevant criteria

Dimension	Criterion
Managerial	Prioritizes the quality of products
	Pursues innovation
	Listens and responds to consumers' needs and wants
	Uses effective communication channels
Relational	Emphasizes workers' safety
	Offers education/training opportunities to employees
	Develops partnerships and alliances
	Develops information-sharing networks that promote transparent relations
Economic	Uses the available resources in an economically efficient way
	Operates in a way that minimizes costs and maximizes profits
	Offers a fair income to the actors involved
	Leads to economic viability
Organizational	Has an effective organizational structure
	Is able to change when needed
	Is built on democratic decision-making processes

Engages stakeholders and societal groups

The economic dimension consists of criteria related to the economic sustainability of supply chain systems. The first premise of economic viability is the efficient use of the available resources, including both operand and operant resources, to use the distinction made by Vargo and Lusch (2004). The term "operand" refers to natural resources, buildings, and other assets that are essentially static and require other resources (operant) like knowledge, skills, and technologies to produce some results. When efficiently used, these resources offer economic benefits. That is to say, reduce the production cost and/or increase returns. Hence, they can offer the actors involved in supply chains a fair income, which sustains the economic viability of the chain (Charatsari et al., 2020; Berti and Mulligan, 2016).

When looking at the organizational side of supply chain systems, one can see four attributes that affect their performance. Starting with the structure upon which a system is built upon, effectiveness is a pivotal element that determines the capacity of a social entity to evolve and adapt to internal changes and external pressures. Organizational structure speaks of the relations among positions in an organized social unit, subsystems, processes, responsibilities, individuals, groups, and targets pursued (Ahmady et al., 2016; Hinings et al., 1996; Scott, 1975). When such relations are formed in a way that facilitates collaboration and permits seamless communication between different sub-units, there is a high potential for better performance for a variety of reasons (Hao et al., 2012). Efficient structures enhance knowledge sharing behaviors (Gelard et al., 2013), decision speed (Chen and Chang, 2012), the cultivation and maintenance of an appropriate organizational culture (Janićijević, 2013), and the promotion of ethical behaviors (Elman and Pezanis-Christou, 2010). Notably, organizational structures are associated with the second criterion: organizational learning (Koohborfardhaghighi and Altmann, 2017), which is the ability of an organized system to change and adapt to new situations by acquiring new knowledge (Crossan et al., 1999; Fiol and Lyles, 1985). Although this dimension of supply chain systems received limited attention so far, the survival of any organization depends on its ability to learn and change when external disturbances put at stake its existence (Lopez, 2006).

Beyond organizational structuring and learning, the decision-making processes followed within supply chain systems also catalyze their performance. In mainstream supply chains, the concentration of power to middle actors often leads to a centralized decision-making style (Devin and Richards, 2018;

Belaya et al., 2009). Participatory decision-making approaches, on the other hand, represent strategies used by organizations to facilitate goal attainment (Nwanah Chizoba et al., 2019) and increase productivity (Pollock and Colwill, 1987). Hence, it is expected that participative and democratic decision-making will have positive impacts on supply chain performance. Nevertheless, to plot the course for inclusive decision-making processes, a critical step is the engagement of societal groups that often exert pressures (Saeed and Kersten, 2019; Song and Parola, 2015) or co-create sustainable evaluation and verification strategies (Gualandris et al., 2015). Such partnerships – already used by multinational supply chains (Austin, 2000) – lead to various benefits, ranging from the flow of knowledge to the development of reputational capital and the attraction of new resources (Selsky and Parker, 2005).

2.3 Dimensions determining secondary value

The abovementioned dimensions (managerial, relational, economic, and organizational) represent the inner attributes that impact the performance of a supply chain system. In other words, they concern a system's ability to arrange duties, resources, and procedures in a manner that ensures the production of primary value. Nevertheless, supply chains are systems embedded in broader social networks, consisting of actors not directly linked with them, including building blocks (products, services or, in the more general sense, platforms) (Gawer, 2009) or ecosystems (Ketchen et al., 2014), which also interrelate with the society. The connections between supply chains and their external environment allow a secondary value to emerge. Actors not belonging to the structure of a supply chain, absorb and co-create value with supply chain systems (Wooley, 2014; Lepak et al., 2007). The distinction between primary (the value that is included in the system) and secondary value (the extensions of primary value beyond a system) (Lioutas et al., 2019) requires the consideration of dimensions intertwined with societal goals and aspirations. As Sinkovics and Archie-Acheampong (2019) explain, big supply chain players have begun to pay attention to societal needs. Efforts to sustain the cultural (Bayraktar and Cömert, 2018; Maon and Lindgreen, 2015), societal (Barrijal et al., 2021; Murphy et al., 2013), ethical (Turyakira, 2018), and environmental (Llach et al., 2013; Parry, 2012) value produced became more and more evident in current business practices, leading to the reorientation of models and modes of thinking adopted by companies and interfirm networks.

In the present benchmark framework, the cultural dimension includes four criteria (Table 2). The first one refers to the respect of farmers' culture. As research has shown, farm culture is a mix of business and family logic (Knook and Turner, 2020) that heavily affects the organization of food systems (Ang et al., 2021) and, often, is a critical differentiation attribute appreciated by consumers (Tang et al., 2019). Nevertheless, several indications confirm that to effectively operate, a supply chain system should meet a second criterion: its operating paradigm must be based on conditions that meet the local (Stone and Glover, 2017) and/or firm culture (Mariadoss et al., 2016). The next criterion is related to the cultivation of a collaborative culture. Supply chains are systems in which opportunistic behaviors and over-control tactics appear, threatening collaboration (Bezuidenhout et al., 2012). As Barratt (2004) explains, current supply chains lack a culture that supports collaboration. When a collaborative culture prevails, actors easily engage in resource integration, communication, and knowledge co-creation activities (Huang et al., 2020). Finally, the fourth criterion concerns the creation and maintenance of a corporate responsibility culture, that is the commitment of involved nodes to sustainably pursue economic development while, in parallel, respecting employees and local communities (Commission of the European Communities, 2001). Such a culture offers a "cooperative advantage," permitting the formation of sustainable partnerships and trust-based transactions (Strand, 2009).

Viewing supply chain systems through a social responsibility lens, some new concerns emerge. To create social value, a supply chain should operate in a manner that respects human rights and labor (Maloni and Brown, 2006). Beyond individual nodes, supply chains are constellations of actors connected not only through economic transactions but, ideally, via socially laden links. The exchange of social resources through such connections, and the consequent development of social capital, facilitate the diffusion of corporate social standards across the chain (Hiß, 2006), and actors' and chains' commitment to socially responsible behaviors (Russo and Perrini, 2010). Another critical criterion refers to the enhancement of community wellbeing. As Hattersley and Dixon (2013) explain, supply chains may negatively impact the wellbeing of various communities, creating – or sustaining – inequalities and putting at risk the livelihoods of poor groups. A just and fair supply chain system should take actions to prevent such externalities, emphasizing the improvement of other community wellbeing aspects, like the maintenance of community social fabric and the increase of its resilience (Fabinyi and Barclay, 2022).

Table 2. Dimensions determining secondary value creation in a supply chain system and relevant criteria

Dimension	Criterion
Cultural	Respects farmers' culture(s)
	Is compatible with the local culture(s)
	Promotes a culture of collaboration among supply chain nodes
	Builds and is built on a corporate responsibility culture
Social	Respects human rights and workers' health
	Cultivates social capital among supply chain nodes
	Promotes community well-being
	Increases community resilience
Ethical	Creates fairly distributed value
	Is based on fair competitive relations
	Leads to limited food waste
	Promotes ethical consumption
Environmental	Has a reduced environmental footprint
	Is energy efficient
	Uses green practices
	Contributes to the fight against climate change

The ethical dimension is related to the power geometries within supply chains. In the relevant literature, it is more than well-documented that some supply chain players concentrate power through the establishment of monopolistic or monopsonistic practices (Carolan, 2013). Hence, these actors absorb the main part of the value produced (Clapp and Scrinis, 2017). The degree to which that value is fairly distributed among farmers, middle actors, and consumers determines the ethical performance of supply chains. At the next level, the creation of an institutional environment that paves the way for fair competition across the chain is necessary. Actors participating in supply chains collaborate while simultaneously competing with each other. Since temptations to compete beyond ethical boundaries are many (Paine, 1990), some actors use competitive practices that exclude or harm the majority of entities involved in supply chain networks (Hultén and Vanyushyn, 2010).

Food waste is another sub-dimension of supply chains' ethical performance. It is generated in all the stages of the supply chain depending on the prevailing standards (Göbel et al., 2015), cosmetic specifications (de Hooge et al., 2018), and the efforts taken to reduce the problem (Aschemann-Witzel et al., 2017). Different types of supply chains produce varying levels of food waste. In particular, shorter supply conduits contribute to the reduction of wasted food (Kiss et al., 2019). In addition, the structure of a supply chain and its prevailing logic determine the quality and effectiveness of information provided to consumers and their involvement in actions supporting fair and sustainable marketing, thus contributing to the promotion of ethical consumption (Hoffmann and Hutter, 2012; Eden et al., 2008).

Finally, there are four criteria related to the environmental performance of food supply chain systems. The first considers the environmental footprint of supply chains. Being based on – and, often, overusing – natural resources and fossil fuel, food supply chains have considerable environmental impacts (Vidergar et al., 2021; Martinez et al., 2019). The second refers to the efficiency of energy needed to produce and distribute food products (Mangmeechai, 2016), which depends on the climatic conditions prevailing in the production area and the geographical distance between the places of production and consumption (Wakeland et al., 2012). Many supply chains use a variety of green practices, ranging from climate labels to the use of renewable energy, to reduce their environmental impacts (Kotzab et al., 2011). The degree to which a supply chain system engages in such practices represents the third criterion. Lastly, the actions taken to prevent or mitigate climate change, like, for instance, participating in climate change initiatives (Dahlmann and Roehrich, 2019), forming coalitions for that purpose (Cory et al., 2021), and innovating in response to global warming (Damert and Baumgartner, 2018), is the fourth criterion.

2.4 From theory to analysis: Evaluating the criteria of the benchmark framework

2.4.1 Methodological approach

2.4.1.1 Scope of analysis

In the previous section, we outlined a benchmark framework that will help the conceptualization and selection of appropriate business models for the three supply chain systems under consideration: short food supply chains, export-oriented supply chains, and green public procurement. Instead of providing a framework based on comparisons between supply chain systems, we designed a generic

framework, which can be used to estimate the distance between the actual performance of the three supply chain systems and the ideal operative paradigm.

Our framework focuses on the value-generating activities, distinguishing primary from secondary value, where the former refers to the value that is produced within supply chains and keeps the system operating and the latter concerns the value extensions beyond the system, i.e., the value absorbed by the society. We identified four dimensions that determine a supply chain system's ability to create primary value, namely managerial attributes, relational characteristics, economic factors, and organizational elements. The other four dimensions (cultural, social, ethical, environmental) constitute the web of factors that permit the secondary value to emerge.

To evaluate the importance of these criteria for three different supply chain systems (short food supply chains, export-oriented supply chains, and green public procurement schemes), we conducted an exploratory study using a sample of experts. The analysis aimed to inform the business model creation process by providing insights into the importance of each criterion and permitting comparisons between the different criteria and dimensions.

2.4.1.2 Instrument and procedure

To assess the developed criteria, we followed an exploratory quantitative approach. We first developed an instrument for evaluating the importance of each criterion included in the theoretical framework for the three supply chain systems under consideration. To measure the importance of these criteria, we used a five-point scale anchored by "of no importance" (1) and "of very high importance" (5). To uncover other potentially important criteria, we added in the questionnaire (Appendix 1) an open-ended question, to which respondents could write down factors that they consider pivotal for value creation. Moreover, we used three questions concerning participants' gender, area of expertise, and level of education.

To recruit participants, we invited experts from 11 institutes located in Italy, Egypt, France, Greece, and Morocco: University of Bologna (Italy), Romagna Tech S.C.p.A. (Italy), University of Cassino (Italy), Heliopolis University for Sustainable Development (Egypt), Isis for Food Industries LTD (Egypt), Sekem Development Foundation (Egypt), Mediterranean Agronomic Institute of Montpellier (France), Aristotle University of Thessaloniki (Greece), International Hellenic University (Greece), University of Cadi

Ayyad (Morocco), University of Moulay Ismail (Morocco). The selected institutes included six universities, a research organization, and private or non-governmental organizations.

To increase the quality of the analysis, a series of inclusion criteria were set up before inviting experts. Eligible participants were considered those who had a proven knowledge base and experience in different types of supply chains, either through their involvement in the chain or through their scientific expertise. By leaning upon persons holding these characteristics, we attempted to collect data from a sample that hosts different types of knowledge, thus permitting a broad and deep reflection over the whole array of issues under question. In addition, such an approach allowed the combination of different points of view by involving actors with heterogeneous positions and backgrounds. Therefore, we paid special attention to the involvement of both actors engaged in the practice of producing and/or distributing food products and individuals with a scientific background. This way, we aspired to ensure the inclusiveness of actors who play a central role in the operation of supply chains.

After identifying and inviting participants, we used a survey administration software to create an electronic version of the questionnaire. The link to the questionnaire was emailed to candidate participants on November 2021. Respondents were instructed to answer only the part(s) of the questionnaire related to the supply chain system to which their expertise pertains. The data collection process lasted two months. To analyze data, we used central tendency measures (mean scores and standard deviations).

2.4.1.3 Participants

The data collection process led to 23 completed questionnaires. Participants were academics (*n*=11), senior (*n*=4) or PhD researchers (*n*=4), and experts not belonging to these categories but having work experience in one or more supply chain systems under consideration (*n*=4). Figure 3 presents the distribution of the sample per country, type of organization, and participants' roles. Among respondents, 8 were women (34.8%), whereas all of them stated that they hold a university degree, with 16 (69.6%) of them being holders of a PhD degree.

Participants stated many different areas of expertise, directly or indirectly relevant to the three supply chain systems under consideration or agrifood innovation and rural development. Among these areas are included agricultural innovation, short food supply chains, agricultural extension, digitalization,

food marketing, agrifood economics, green public procurement, export-oriented supply chains, rural sociology, alternative food networks, common agricultural policy, circular economy, business-to-business marketing, supply chain management, business development, social entrepreneurship, and agricultural cooperatives.

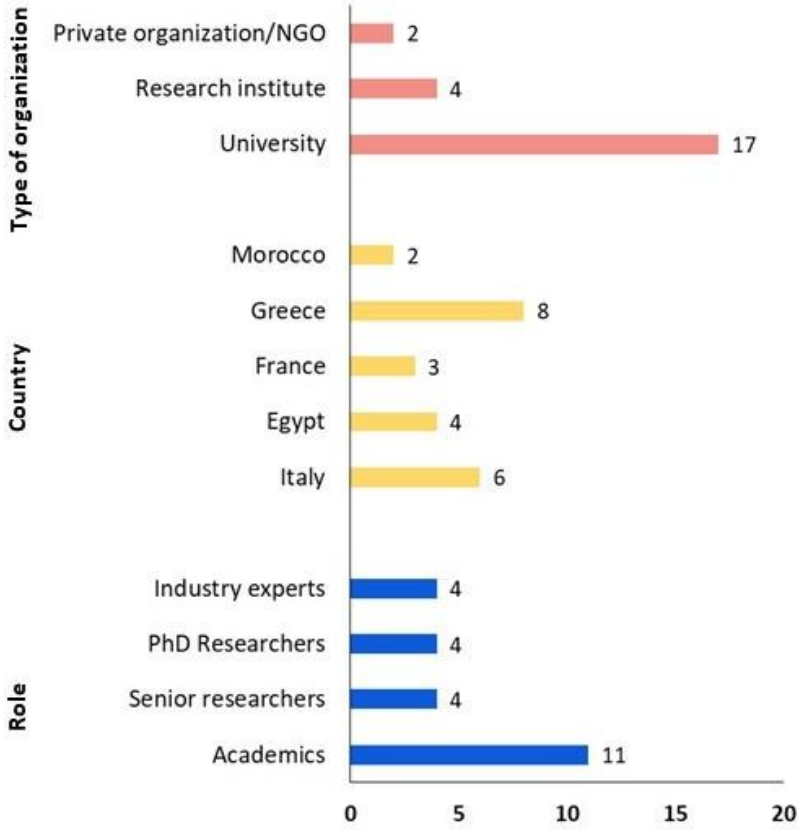

Figure 3. Respondents' profile

2.4.2 Results

2.4.2.1 Short food supply chains

The analysis for short food supply chains was based on data from 21 respondents. Table 3 presents the mean scores and standard deviations for the dimensions of primary value. Among the examined criteria, the highest mean scores were observed for their ability to prioritize products' quality (M=4.33); their customer orientation, as expressed through the targeting of consumers' needs and wants (M=4.24); the seamless flow of information between farmers and consumers, which promote transparent relations (M=4.24); the opportunities that they offer to farmers for earning a fair income (M=4.24); the economic viability of the supply chain system (M=4.10); and the effectiveness of the communication channels used (M=4.05).

Table 3. Mean scores and standard deviations for the criteria referring to primary value of short food supply chains

Dimension	Criterion	Mean score	Standard deviation
Managerial	Prioritizes the quality of products	4.33	0.73
	Pursues innovation	3.10	1.18
	Listens and responds to consumers' needs and wants	4.24	0.70
	Uses effective communication channels	4.05	1.12
Relational	Emphasizes workers' safety	3.67	1.11
	Offers education/training opportunities to employees	3.43	1.25
	Develops partnerships and alliances	3.76	1.00
	Develops information-sharing networks that promote transparent relations	4.24	1.04
Economic	Uses the available resources in an economically efficient way	3.90	1.18
	Operates in a way that minimizes costs and maximizes profits	3.67	1.02
	Offers a fair income to the actors involved	4.24	0.89

	Leads to economic viability	4.10	0.94
Organizational	Has an effective organizational structure	3.71	1.15
	Is able to change when needed	3.81	1.03
	Is built on democratic decision-making processes	3.33	1.28
	Engages stakeholders and societal groups	4.00	1.18

In the case of secondary value, the analysis revealed relatively high mean scores (Table 4). It is worth mentioning that, among the 16 items belonging to the four dimensions, 11 received mean scores equal to or above the value of 4. The compatibility of short supply chain systems with local cultures had the highest mean score (M=4.43), followed by their consistency with farmers' cultures (M=4.29), their limited environmental footprint (M=4.29), their ability to create value that is fairly distributed among actors participating in the chain (M=4.29), to enhance community well-being (M=4.24) and resilience (M=4.19).

Table 4. Mean scores and standard deviations for the criteria referring to secondary value of short food supply chains

Dimension	Criterion	Mean score	Standard deviation
Cultural	Respects farmers' culture(s)	4.29	0.96
	Is compatible with the local culture(s)	4.43	0.81
	Promotes a culture of collaboration among supply chain nodes	4.00	1.05
	Builds and is built on a corporate responsibility culture	3.71	1.06
Social	Respects human rights and workers' health	4.05	1.07
	Cultivates social capital among supply chain nodes	3.86	1.06
	Promotes community well-being	4.24	0.83
	Increases community resilience	4.19	0.93
Ethical	Creates fairly distributed value	4.29	0.78

	Is based on fair competitive relations	3.71	1.23
	Leads to limited food waste	3.86	1.06
	Promotes ethical consumption	4.00	1.14
Environmental	Has a reduced environmental footprint	4.29	0.96
	Is energy efficient	3.57	1.12
	Uses green practices	4.10	1.04
	Contributes to the fight against climate change	4.00	0.89

In total, the cultural (M=4.11) and social (M=4.08) dimensions had the highest mean scores (Figure 4), followed by the environmental (M=3.99) and the economic dimensions (M=3.98). These findings confirm the contribution of short supply chains to sustainability. Nevertheless, in all cases, the scores were higher than 3.71, indicating a remarkable ability of short food supply chain schemes to produce value that extends beyond their limits.

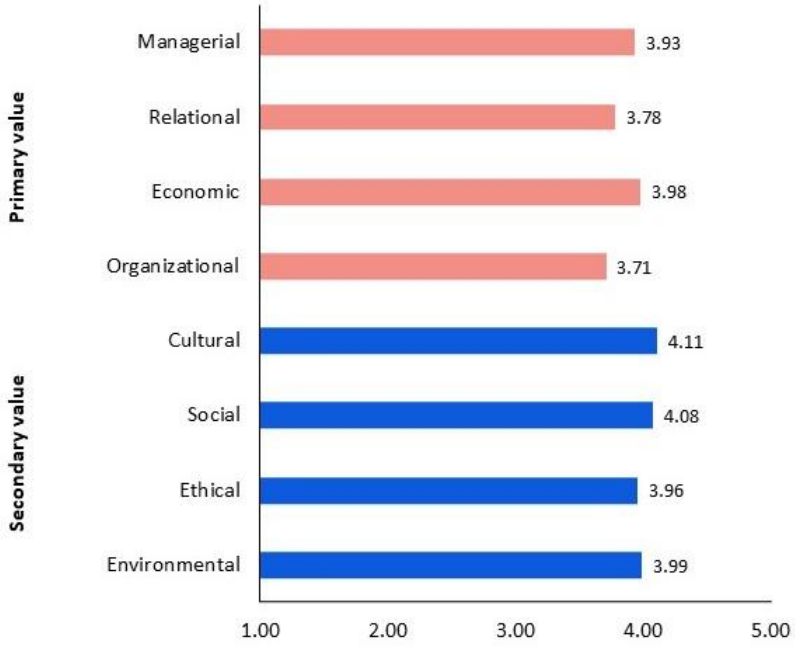

Figure 4. Mean scores for the dimensions of primary and secondary value for short food supply chains

2.4.2.2 Export-oriented supply chains

For export-oriented supply chains, using data from 21 experts, we found that all the criteria belonging to the managerial dimension received mean scores of 4.00 or above (Table 5), while for the economic dimension three out of four criteria had mean scores equal to or above the value of 4. Nevertheless, an exemption was the item "offers a fair income to the actors involved," which had a lower mean score (M=3.57).

The ability of such schemes to exploit effective communication channels (M=4.33) and minimize costs while, in parallel, maximizing profits (M=4.33) received the highest mean scores. Other criteria that were rated highly are the networking capability of export-oriented supply chains that permits the development of partnerships and synergies (M=4.29), the economically efficient use of resources (M=4.14), and their innovation orientation (M=4.14). Notably, two criteria related to the organizational dimension, i.e., the existence of a democratic culture during decision-making procedures and the ability to involve stakeholders in the value creation and distribution process, had the lowest mean scores (M=2.95 and M=3.33, respectively).

Table 5. Mean scores and standard deviations for the criteria referring to primary value of export-oriented supply chains

Dimension	Criterion	Mean score	Standard deviation
Managerial	Prioritizes the quality of products	4.05	1.02
	Pursues innovation	4.14	0.91
	Listens and responds to consumers' needs and wants	4.00	0.77
	Uses effective communication channels	4.33	0.91
Relational	Emphasizes workers' safety	3.71	1.10
	Offers education/training opportunities to employees	3.57	1.16
	Develops partnerships and alliances	4.29	0.96

	Develops information-sharing networks that promote transparent relations	4.00	0.95
Economic	Uses the available resources in an economically efficient way	4.14	0.79
	Operates in a way that minimizes costs and maximizes profits	4.33	0.66
	Offers a fair income to the actors involved	3.57	1.08
	Leads to economic viability	4.00	0.71
Organizational	Has an effective organizational structure	4.10	0.94
	Is able to change when needed	3.76	1.00
	Is built on democratic decision-making processes	2.95	1.32
	Engages stakeholders and societal groups	3.33	1.24

As displayed in Table 6, the criteria associated with the secondary value received mean scores lower than 4.00. The mean scores ranged from 2.95 to 3.67, with the highest values being observed in the protection of human rights and workforce health (M=3.67) and their capacity to generate fairly shared value (M=3.67).

Furthermore, items related to the environmental impact of export-oriented supply chains, such as the use of green practices (M=3.52) and their contribution to the mitigation of climate change's negative effects (M=3.52), had relatively high mean scores. On the contrary, the compatibility of these supply chains with local cultures (M=2.95) and their operation respecting farmers' cultures (M=3.10) are questionable.

Table 6. Mean scores and standard deviations for the criteria referring to secondary value of export-oriented supply chains

Dimension	Criterion	Mean score	Standard deviation
Cultural	Respects farmers' culture(s)	3.10	1.30

	Is compatible with the local culture(s)	2.95	1.28
	Promotes a culture of collaboration among supply chain nodes	3.33	1.24
	Builds and is built on a corporate responsibility culture	3.45	1.23
Social	Respects human rights and workers' health	3.67	1.02
	Cultivates social capital among supply chain nodes	3.25	1.16
	Promotes community well-being	3.33	1.20
	Increases community resilience	3.19	1.29
Ethical	Creates fairly distributed value	3.67	1.20
	Is based on fair competitive relations	3.48	1.21
	Leads to limited food waste	3.24	1.14
	Promotes ethical consumption	3.48	1.36
Environmental	Has a reduced environmental footprint	3.38	1.32
	Is energy efficient	3.48	1.21
	Uses green practices	3.52	1.17
	Contributes to the fight against climate change	3.52	1.29

From Figure 5, it is clear that the dimensions concerning secondary value had lower mean scores than those reflecting the ability of export-oriented supply chains to produce primary value. The mean scores for the four dimensions of secondary value ranged between 3.21 (for cultural value) and 3.48 (for environmental value). Contrariwise, the managerial (M=4.33), economic (M=4.01), relational (M=3.89), and organizational (M=3.53) dimensions received relatively high mean scores. This observation puts in question the ability of such schemes to generate value that spans beyond their limits.

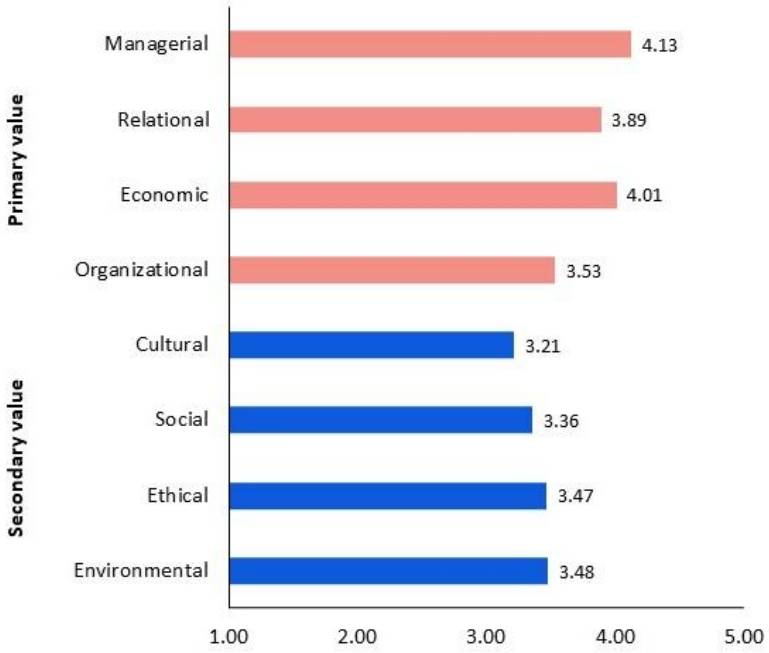

Figure 5. Mean scores for the dimensions of primary and secondary value for export-oriented supply chains

2.4.2.3 Green public procurement schemes

To evaluate the items referring to the ability of green public procurement schemes to produce primary and secondary value, we analyzed data derived from 20 respondents. The prioritization of products' quality (M=4.35) yielded the highest mean score among the criteria belonging to the dimensions of primary value (Table 7). In the second position, with a mean score of 4.20, are ranking two items related to the focus of the scheme on the needs and wants of consumers and the building of networks that facilitate the sharing of information, ensuring transparent relations. Evaluators also attribute high importance to the existence of effective organizational structures in these schemes (M=4.15), while they rated highly the schemes' capacity to create cooperative networks through partnerships and alliances (M=4.10).

The criteria regarding the democratic character of the decision-making processes followed in these schemes (M=3.40), their cost-reduction and profit-increase potential (M=3.50), and their ambidexterity, i.e., the ability to change in order to cope with the external or internal conditions (M=3.55) were considered less important by the experts. In addition, although the offering of opportunities to increase employees' knowledge, skills, and competencies through educational and training activities had a higher mean score than in the cases of short supply chains and export-oriented supply chains, the relevant criterion received a moderate evaluation by participants (M=3.70).

Table 7. Mean scores and standard deviations for the criteria referring to primary value of green public procurement schemes

Dimension	Criterion	Mean score	Standard deviation
Managerial	Prioritizes the quality of products	4.35	0.67
	Pursues innovation	3.95	0.76
	Listens and responds to consumers' needs and wants	4.20	0.70
	Uses effective communication channels	4.05	0.83
Relational	Emphasizes workers' safety	3.90	1.07
	Offers education/training opportunities to employees	3.70	0.98
	Develops partnerships and alliances	4.10	0.85
	Develops information-sharing networks that promote transparent relations	4.20	1.01
Economic	Uses the available resources in an economically efficient way	4.05	0.76
	Operates in a way that minimizes costs and maximizes profits	3.50	0.89
	Offers a fair income to the actors involved	4.05	0.89
	Leads to economic viability	3.95	0.95
Organizational	Has an effective organizational structure	4.15	0.81

	Is able to change when needed	3.55	0.89
	Is built on democratic decision-making processes	3.40	1.10
	Engages stakeholders and societal groups	4.00	1.08

Incorporating, by default, a green nature in their modus operandi, green public procurement schemes received high mean scores in all the four items that comprise the environmental dimension of secondary value. The items "Has a reduced environmental footprint" and "Uses green practices" had the highest rankings (M=4.45 in both cases), followed by the capacity of such schemes to fight climate change (M=4.30), and their energy efficiency (M=4.20). Moreover, three of the four criteria that form the ethical dimension have been rated highly with mean scores ranging from 4.15 to 4.35, confirming that green public procurement reduces food waste (M=4.35), ensures the fair distribution of value among actors (M=4.15), and promotes the idea of ethical consumption (M=4.15).

Table 8. Mean scores and standard deviations for the criteria referring to secondary value of green public procurement schemes

Dimension	Criterion	Mean score	Standard deviation
Cultural	Respects farmers' culture(s)	3.80	0.89
	Is compatible with the local culture(s)	3.95	1.00
	Promotes a culture of collaboration among supply chain nodes	3.85	0.93
	Builds and is built on a corporate responsibility culture	4.00	1.00
Social	Respects human rights and workers' health	3.95	0.95
	Cultivates social capital among supply chain nodes	3.74	1.20
	Promotes community well-being	4.05	0.83
	Increases community resilience	3.95	0.89
Ethical	Creates fairly distributed value	4.15	0.99
	Is based on fair competitive relations	3.65	1.14

	Leads to limited food waste	4.35	0.93
	Promotes ethical consumption	4.15	1.14
Environmental	Has a reduced environmental footprint	4.45	0.83
	Is energy efficient	4.20	0.89
	Uses green practices	4.45	1.00
	Contributes to the fight against climate change	4.30	0.87

In general, the mean scores for all eight dimensions of primary and secondary value were relatively high (Figure 6), ranging from 3.78 (for the organizational dimension) to 4.35 (for the environmental dimension). Notably, the ethical dimension received a mean score of 4.08, which was higher than the respective values for short food supply chains and export-oriented supply chains, revealing the importance of the ethical criteria for green public procurement schemes.

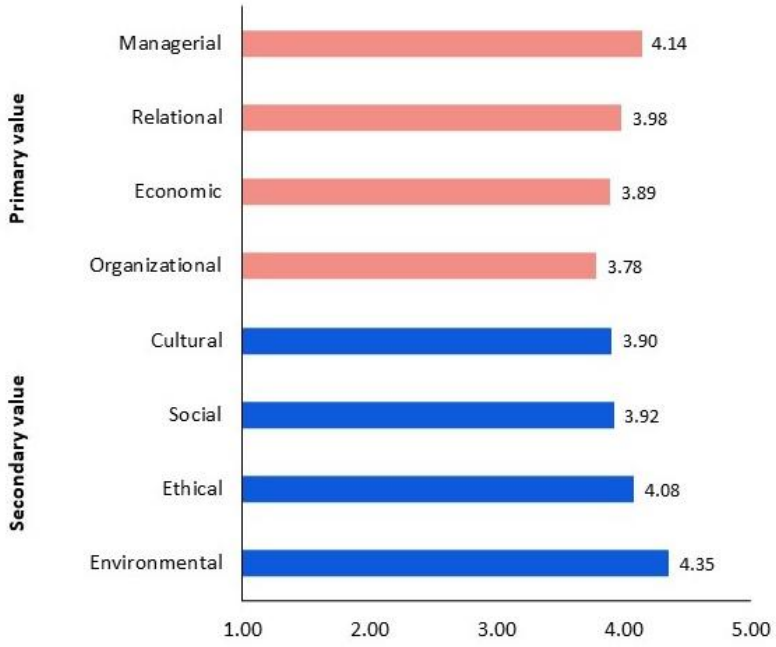

Figure 6. Mean scores for the dimensions of primary and secondary value for green public procurement

3. Development and evaluation of alternative business models

3.1 Approach and procedure

To develop alternative business models, we lean upon the analysis of data collected in the previous step. We constructed three business models for short food supply chains, three for export-oriented supply chains, and two for green public procurement schemes. In all the business models we included the development of a digital platform. Innovative digital solutions were added to four business models (two for short supply chains, one for export-oriented chains, and one for green public procurement). We finally incorporated in five business models the adoption of voluntary certification schemes (two for short supply chains, one for export-oriented chains, and two for green public procurement). In the next section, we present these models.

To evaluate the strengths and weaknesses of the eight models, as well as to assess the opportunities that they can exploit and the threats they are facing, we followed a mixed research design using data from experts. In sections 3.3 and 3.4, we outline the methods employed and the results of our analysis.

3.2 Description of the business models

3.2.1 Short food supply chains

3.2.1.1 Business Model No 1: Combinations of facilitating digitally-enabled solutions and voluntary certification schemes in short food supply chains

To develop the first business model, we focused our interest on the criteria referring to the primary value that received mean scores of 4 or above. These criteria are the following:

- Prioritizes the quality of products (M=4.33).
- Listens and responds to consumers' needs and wants (M=4.24).
- Develops information-sharing networks that promote transparent relations (M=4.24).
- Offers a fair income to the actors involved (M=4.24).
- Leads to economic viability (M=4.10).
- Uses effective communication channels (M=4.05).

- Engages stakeholders and societal groups (M=4.00).

The above-mentioned criteria were combined to create a business model that summarizes all the criteria catalyzing short food supply chains' ability to produce primary and secondary value. In this vein, different dimensions of value were incorporated into the model.

The model refers to (i) the creation and exploitation of a set of digital solutions that can facilitate the economic monitoring of the farms, (ii) a digital platform promoting consumer engagement in short food supply chain governance, and (iii) the adoption of voluntary certification schemes, which can guarantee and enhance the quality of the distributed products (Box 1).

Box 1. Description of the Business Model No 1

Combinations of facilitating digitally-enabled solutions and voluntary certification schemes in short food supply chains

In the first business model, digital solutions are used to store information on farmers' partners (e.g., suppliers), amounts of products sold per distribution channel (e.g., farmers' markets, direct sales in local restaurants), prices, costs, and revenues. These solutions are expected to facilitate the economic monitoring of farms, thus helping farmers make informed decisions, reduce their costs, select partners, and choose the most suitable distribution routes. Hence, farmers can increase their income and enhance the viability of their farms.

A digital platform will serve as a bridge, connecting farmers and consumers, thus offering producers the opportunity to understand their customers' needs and wants. The platform can also be used as a space for the engagement of societal groups with short food supply schemes.

In parallel, voluntary certification schemes will be adopted by local short food supply chains to ensure the high quality of the products. The term quality can refer to the characteristics of the products, the production process, the environmentally friendly character of the production/distribution activities, the social performance of the chains, or combinations of the above-mentioned parameters.

3.2.1.2 Business Model No 2: Digitally-supported certification in short food supply chains

The second business model involves the four dimensions that refer to the secondary value - i.e., the cultural, social, environmental, and ethical dimensions. As our analysis showed, these dimensions

received the highest scores. The business model refers to the creation of digital synergies along the supply chain, which promote the social and environmental sustainability of the chains, also permitting the emergence of a new culture and guaranteeing the ethical standards of food production and distribution through the support of a certification scheme.

In particular, producers will adopt a certification scheme verifying compliance with environmental, social, ethical, and cultural sustainability standards. An open negotiation strategy will be used to promote public engagement in the scheme's development process. Hence, the certification will reflect the interests of consumers and societal actors.

The environmental, social, ethical, and cultural performance of short food supply chains participating in the scheme will be sorted in a digital platform. Hence, both farmers and consumers having access to the platform could be informed about the degree to which each supply chain approaches sustainability.

Box 2. Description of the Business Model No 2

Digitally-supported certification in short food supply chains

In the second business model, a certification scheme that is built upon four pillars will be adopted by members of short food supply chains. The pillars refer to the social, environmental, ethical, and cultural sustainability of the chain. According to the scenario, the certification scheme will be developed through an open negotiation process in which members of short food supply chains will be involved (farmers and producers organizations distributing products through short supply schemes, consumers). Local authorities and experts will also provide insights into the suitability of the different certification schemes. A digital platform will serve as a space for promoting public engagement in the negotiation process. The outcome of that procedure will be a certification scheme suitable to the specific culture of each short supply chain.

The platform will continue its operation after developing the certification scheme, storing information about the environmental, social, and ethical performance of the short supply chains, also facilitating the nurturing of a culture of belongingness among supply chain members (farmers and consumers).

3.2.1.3 Business Model No 3: Developing responsible marketing schemes through digital solutions in *short food supply chains*

The third model refers to responsible marketing through digitally-enabled short food supply chains. For this model, we paid attention to the primary and secondary value criteria with a mean score of 4.2 or above, namely:

- The attribution of priority to products' quality (M=4.33).
- The adaptation of the supply chain to consumers' needs and desires (M=4.24).
- The development of transparent relations within information-sharing networks (M=4.24).
- The emphasis on offering a fair income to farmers (M=4.24).
- The compatibility with (M=4.43) and the respect for local cultures (M=4.29).
- The creation of value that is fairly distributed between farmers and consumers (M=4.29).
- The promotion of community well-being (M=4.24).
- The mitigation of the supply chain's environmental footprint (M=4.29).

In working this way, we attempted to develop a business model linking high-priority criteria and aiming at instilling responsibility – in terms of environmental accountability and social well-being – also emphasizing products' quality (Box 3).

Box 3. Description of the Business Model No 3

Developing responsible marketing schemes through digital solutions in short food supply chains

The central premise of the third business model is that the value emerging from the distribution of products within short food supply chains has to improve the well-being of farmers, consumers, and society as a whole. Therefore, the model aims to reduce any significant negative effect of short food supply chains' performance by simultaneously increasing the positive impacts of these schemes.

A responsible supply chain approach is based on the tetraptych: anticipation, reflexivity, inclusion, and responsiveness. A digital platform connecting producers and consumers will serve as an open space for anticipating the potential impacts of digital innovations on the well-being of farmers and buyers participating in short supply chains, as well as of the broader communities to which they belong. After evaluating the impacts through an open and inclusive process, members of the participating supply chains will adopt those innovations that better suit their needs, respect their cultural backgrounds,

offer a fair income to farmers, and ensure the increase/mitigation of positive/negative societal and environmental impacts. The platform will continue its operation, hosting up-to-date data on supply chains' social, environmental, and economic performance, thus ensuring transparent relations among farmers and consumers. Hence, the platform will serve as a public space for reflecting upon the innovation process through monitoring activities and public negotiation. Responsive actions will be taken to correct innovation paths when needed.

3.2.2 Export-oriented supply chains

3.2.2.1 Business Model No 4: Digitally-enabled management of export-oriented supply chains

For export-oriented supply chains, as it was presented in Section 2.4.2.2, respondents evaluated the dimensions referring to the primary value as of high importance. Hence, to develop business models, in the first step, we selected criteria referring to the value that extends across supply chains, with mean scores that surpass the level of 4. These are the following:

- Uses effective communication channels (M=4.33).
- Operates in a way that minimizes costs and maximizes profits (M=4.33).
- Develops partnerships and alliances (4.29).
- Pursues innovation (M=4.14).
- Uses the available resources in an economically efficient way (M=4.14).
- Has an effective organizational structure (M=4.10).
- Prioritizes the quality of products (M=4.05).
- Listens and responds to consumers' needs and wants (M=4.00).
- Develops information-sharing networks that promote transparent relations (M=4.00).
- Leads to economic viability (M=4.00).

Plainly put, our business models mainly concentrate on the ability of export-oriented supply chains to produce value within their limits. The first one (Box 4) relates to developing digital solutions that can facilitate the management of the chains under consideration. The proposed solutions should have the ability to facilitate communication between adjacent nodes of supply chains and across the whole supply chain constellation (M=4.33), promote further innovation (M=4.14), put emphasis on the quality of

produced and distributed products (M=4.05), and offer supply chain actors the ability to understand and respond to consumers' needs and wants (M=4.00).

Box 4. Description of the Business Model No 4

Digitally-enabled management of export-oriented supply chains

A bundle of innovative digital solutions will be developed to improve the managerial dimensions of export-oriented supply chains. The basis of that bundle will be a digital platform for exchanging information between nodes of the supply chains (farmers, processors, exporters, transportation companies, wholesalers, retailers, consumers). Information about the quantities and the quality of the products can be stored in the platform, and relationships between quality, price, and demand can be extracted. Hence, actors can make informed decisions concerning the distribution channels and strategies they are following, the amounts of products to be sold/purchased in and for different markets, and the responses on the part of consumers under varying situations and for different product characteristics. By offering actors the ability to access information on consumers' acceptance of the distributed products and their price sensitivity, the platform will serve as a tool for improving the effectiveness of the management within supply chains.

3.2.2.2 Business Model No 5: Platforming for increasing the economic performance of export-oriented supply chains

To develop the next business model for export-oriented supply chains (Box 5), we focused our attention on the remaining criteria that received mean scores higher than 4. The model is built upon a digital platform enabling the development of partnerships and alliances among actors operating across supply chains (M=4.29), offering data that permit the flow of information among them, ensuring transparency (M=4.00). The platform will store financial data to guarantee that actors will reduce costs and/or increase profits (M=4.33), and efficiently exploit the available resources (M=4.14). The aim of the platform will be to create effective organizational structures within supply chains (M=4.10) and to help actors – especially small-scale farmers – achieve their economic viability (M=4.00).

Box 5. Description of the Business Model No 5

Platforming for increasing the economic performance of export-oriented supply chains

The core of the business model is a digital platform in which actors participating in export-oriented supply chains will voluntarily add financial data. User-friendly applications will help small-scale actors (who do not always have the expertise needed to design and perform proper economic plans) make sense of the economic performance of their enterprises and understand factors that increase costs, reduce profits, and decrease the efficient exploitation of resources.

In addition, actors can add content to the platform, exchanging information related to their partners' performance, thus allowing others to compare potential collaborators and make better decisions. The user-generated content of the platform can be available to all users or only to those being authenticated, thus preventing unsubstantiated evaluations. The process is expected to strengthen the exchange of transparent information among supply chain actors, facilitating, in parallel, the reorganization of supply chains.

3.2.2.3 Business Model No 6: Enabling primary and secondary value creation in export-oriented supply chains through certification and digitalization

The final model for export-oriented supply chains (Box 6) refers to a combination of efforts to increase the primary and secondary value that emerged through the operation of export-oriented supply chains. Since, according to the data, experts attribute high importance to primary value, the model presupposes the existence of a data-storing platform for recording information on management decisions, relations among actors and within enterprises, and statistics related to financial issues and products' quality.

In this vein, the platform will increase transparency within supply chains and facilitate the development of a voluntary certification scheme that will guarantee compliance with environmental, ethical, cultural, and social standards. Hence, although the model focuses on primary value, its application is expected to have direct positive impacts on all the dimensions of secondary value.

Box 6. Description of the Business Model No 6

Enabling primary and secondary value creation in export-oriented supply chains through certification and digitalization

A certification scheme that guarantees compliance with environmental, ethical, cultural, and social standards will be developed. Actors participating in export-oriented supply chains will voluntarily adopt the certification scheme. Data on actors' environmental, ethical, cultural, and social performance will be stored in a digital platform, offering potential partners and customers the capability to understand the contribution of each actor in achieving sustainable goals.

The platform will also be used as a tool for storing information related to the way of doing business, like management decisions (e.g., ways of choosing partners and/or distribution channels), relational data (levels of loyalty, repeated purchases), and data on the quantities and qualities of products sold. This way, the platform will serve a dual purpose: on the one hand, it will be a tool enabling actors to monitor their performance; on the other hand, it will facilitate their compliance with environmental, ethical, cultural, and social standards. Hence, the platform will become an enabler of primary and secondary value creation.

3.2.3 Green public procurement

3.2.3.1 Business Model No 7: Connecting farmers to the public sector through digital platforms and voluntary certification schemes

For green public procurement schemes, the analysis (Section 2.4.2.3) indicated that the environmental dimension of the benchmark framework received the highest mean score (M=4.35), followed by the managerial (M=4.14) and the ethical dimension (M=4.08). Hence, the first business model developed for green public procurement (Box 7) focuses on these three dimensions, involving efforts to promote secondary value through certification schemes.

Such schemes can promote environmentally friendly production and supply of food products, guarantee the "ethicalness" of food production and distribution, and facilitate the exploitation of digital tools that can improve the management of farm enterprises and middle-scale actors. The model emphasizes the reduction of food waste and the cultivation of an "ethical competitiveness" culture among farmers who distribute their products through green public procurement conduits. As in the previous models, a digital platform will be developed to serve as a space for bringing together certified farmers and public sector organizations, therefore facilitating their communication and information exchange.

Box 7. Description of the Business Model No 7

Connecting farmers to the public sector through digital platforms and voluntary certification schemes

To ensure the environmentally friendly character of the production and distribution within green public procurement, relevant voluntary certification schemes will be developed/adopted. Farmers and other actors involved in the supply of food products to the public sector will develop or choose a certification system that will emphasize: (i) the production and distribution of food products with a focus on the mitigation of environmental footprint and the reduction of climate change impacts, (ii) the use of green and energy-saving practices during production and distribution of products, (iii) the promotion of ethical consumption on the part of the public sector, (iv) the reduction of food waste, (v) the fair distribution of value among the participating actors (i.e., the assurance of a fair income for farmers and fair prices for the public sector, the compliance with specific safety standards), (vi) the acceptance of and commitment to "ethical competition" rules.

A digital platform will be used to store information on product quality, public sector needs, and their evolution over time. Through the platform, certified producers will asynchronously communicate with public organizations, which can add information on their present and future needs. Hence, the platform will serve as a space for connecting certified farmers (and other supply chain actors, like transporters) with public organizations.

3.2.3.2 Business Model No 8: Responsible green public procurement

In order to develop the final business model (Box 8), we used all eight dimensions. Hence, the proposed business model emphasizes the development of both primary and secondary value. The first type of value is expected to emerge through a set of innovative digital solutions, which will improve the economic, managerial, and organizational performance of green public procurement schemes, also toning up the relationships between actors participating in them.

The second type refers to the responsible operation of green public procurement schemes, i.e., the shift to a mode of producing and supplying food products by following environmental and ethical principles while respecting socio-cultural backgrounds and contexts. The implementation of responsible practices concerns not only farmers but also public organizations and other actors involved in the process of green public procurement. The model is based on the adoption of innovative digital tools, which can

help satisfy standards related to the sustainability performance of these schemes, and the creation of a voluntary certification scheme that guarantees the compliance of farmers and public organizations with responsibility principles.

Box 8. Description of the Business Model No 8

Responsible green public procurement

The business model points out the need to ensure that green public procurement schemes have a value that extends beyond their limits, positively impacting society. In this vein, a responsible green public procurement model will be developed to reduce the potential negative side effects of green public procurement schemes and enhance their positive impacts. Since that scheme is green by nature and, consequently, dedicated to reducing the environmental externalities of food production and distribution to public organizations, the emphasis turns to ethically, culturally, and socially responsible public procurement. The basis of the model is a digital platform that will serve as a space for proposing, forming, and adopting digital innovations, which, after a public negotiation process, will be selected as tools that can help farmers, public organizations, and actors participating in the scheme meeting relevant standards. Depending on the national legislation and the available resources, farmers and public organizations can develop a relevant certification scheme (e.g., Responsible Green Public Procurement), setting forth clear rules for both ends of the chain. While adopting digital innovations aiming at improving the economic, managerial, relational, and organizational performance of green public procurement, actors will continue to take responsive actions when needed and collaboratively develop solutions to emerging problems, taking into consideration the societal well-being and the wealth of local communities.

3.3 Methods used for evaluating business models

3.3.1 Instrument used

To evaluate the developed business models, we followed a mixed research design involving the simultaneous use of quantitative and qualitative approaches, with the quantitative strand occupying an explanatory role. In such a simultaneous research design, the qualitative data are used to provide extra

insights into the results of the qualitative analysis (Johnson and Onwuegbuzie, 2004). To build our quantitative part of the analysis, we used the framework of SWOT analysis. SWOT, standing for Strengths, Weaknesses, Opportunities, and Threats, is an analytical framework designed to uncover how internal (namely, its strengths and weaknesses) and external factors of an organization or model (i.e., opportunities and threats) affect its ability to achieve the desired objectives (Sarsby, 2016).

To create our evaluation instrument (Appendix 2), we included ten factors representing the strengths or weaknesses of each business model and ten parameters that can be considered as opportunities or threats. In so doing, we assessed the influence of variables that might operate as facilitators for some models and inhibitors for others. The ten factors used to evaluate strengths and weaknesses are:

- The compatibility of the model with the supply chain under consideration (variable: compatibility).
- The degree to which farmers have the expertise needed to exploit the model (variable: farmers' expertise).
- The level to which participating actors in the supply chain under study are ready to adopt the model (variable: adoption readiness).
- The impacts of the business model on the quality of collaboration among supply chain actors (variable: quality of collaboration).
- The degree to which actors-members of the supply chain have the experience required to exploit the model (variable: experience to exploit the model).
- Actors' willingness to adopt the proposed business model (willingness to adopt the model).
- The impacts of the model on the supply chain's economic, social, environmental, and cultural performance (variables: economic performance, social performance, environmental performance, cultural appropriateness).

For evaluating opportunities and threats, we assessed the following factors:

- The impact of agricultural policies on the implementation of the business model (variable: agricultural policies).
- The effects that national legislation could have on the business model (variable: national legislation).

- The support that academic/research/policy institutes can offer to the model (variable: institutional support).
- The economic conditions prevailing in each country (variable: economic situation).
- The role of technology development in facilitating the exploitation of the model (variable: technology development).
- The level to which the competition in the agrifood sector impedes or fortifies the implementation of the business model (variable: competition).
- The effect that the change of consumers' mindsets can have on the successful exploitation of the model (variable: consumers' mindsets).
- The degree of support from societal actors and communities to the business model (variable: societal support).
- The level of the business model's public acceptance (variable: public acceptance).
- The number of funding opportunities (variable: funding opportunities).

For each one of the above-mentioned factors, we developed an item. To measure the 20 items, we used a semantic differential scale ranging from -5 to 5. Such scales are easy to score, less time-consuming, and minimize the possibility of "halo" effects or other response biases (Osgood et al., 1975). Participants were requested to carefully read the description of each business model and then answer the semantic differential items. After each item, we added an open-ended "Why?" question to elicit more information from participants on the respective factor.

3.3.2 Participants and procedure

After the development of the instrument, we invited experts from Italy, France, Egypt, Morocco, and Greece to participate in the evaluation process. Those who expressed interest in contributing data to the project received the instrument by email. The procedure of data collection lasted four months (June 2022 - August 2022). In total, we collected 23 completed questionnaires (Table 9): eight for the business models referring to short food supply chains (one from Italy, three from Morocco, one from Egypt, and three from Greece), nine for export-oriented supply chains (three from Italy, three from Egypt, and three from Greece), and six for green public procurement (three from France and three from Italy).

Respondents (73.9% men) represented a wide range of expertise (supply chain management, logistics, operations management, short food supply chain coordination, farmers markets management, farm advisory services, quality management, food export, economic policy, agricultural development), whereas all of them hold a university degree. About half of the participants (47.8%) belonged to the age cohort of 41-60 years, while 43.5% were between 21-40 years old, and 8.7% of them were older than 60 years old.

Table 9. Distribution of respondents per country and supply chain system

Supply chain system	Country					Total
	Italy	France	Morocco	Egypt	Greece	
Short food supply chain	1	-	3	1	3	8
Export-oriented supply chain	3	-	-	3	3	9
Green public procurement	3	3	-	-	-	6
Total	7	3	3	4	6	23

3.3.3 Data analysis process

To analyze data, we used mean scores and standard deviations. Negative mean scores were used to classify items as weaknesses or threats, while items with positive mean scores were categorized as strengths or opportunities. To provide a more detailed classification, we divided strengths, weaknesses, opportunities, and threats into major and minor, depending on the value of the mean scores they received. The classification that we followed is presented below.

$M>2.5$: major strength or opportunity

$0<M\leq 2.5$: minor strength or opportunity

$-2.5<M\leq 0$: minor weakness or threat

$M\leq -2.5$: major weakness or threat

For the qualitative data, we employed a conventional content analysis (Hsieh and Shannon, 2005).

3.4 Results

3.4.1 Business models for short food supply chains

Business model No 1

For the first business model, the analysis classified economic (M=2.88), social (M=2.63), cultural (M=2.63), and environmental performance (M=2.38) as major strengths. According to the answers given by respondents to the relevant open-ended questions, the model can reduce the distribution cost and increase price transparency while strengthening the relationship between farmers and consumers and contributing to the fair distribution of value between farmers and consumers. Nevertheless, participants' opinions are not uniform. As a respondent stated, the model "is against the culture of short supply chains." Minor strengths include the adoption readiness (M=2.13), the model's ability to improve the quality of collaboration between supply chain nodes (M=1.75), its compatibility with short food supply chains (M=1.38), and actors' willingness to adopt the model (M=0.50).

As Table 10 illustrates, experts evaluated producers' experience (M=-0.50) and expertise (M=-0.13) as minor weaknesses of the model. Participants stressed that the lack of farmers' digital skills, their low capacity to exploit digital tools, and their deficits in managerial and entrepreneurial competencies, along with the illiteracy of some producers, are critical for shaping their levels of experience and expertise. Notably, the model was not found to have major weaknesses.

Table 10. Summary statistics of the SWOT analysis for Business Model No 1

Strengths and Weaknesses			**Opportunities and Threats**		
Aspect	**Mean score**	**S.D.**	**Aspect**	**Mean score**	**S.D.**
Compatibility	1.38	2.67	Agricultural policies	1.50	2.00
Farmers' expertise	-0.13	3.09	National legislation	1.63	2.20
Adoption readiness	2.13	2.17	Institutional support	2.00	2.20
Quality of collaboration	1.75	2.25	Economic situation	2.63	1.77
Experience to exploit the model	-0.50	2.20	Technology development	2.75	2.76

Willingness to adopt the model	0.50	2.00	Competition	1.63	2.97
Economic performance	2.88	0.99	Consumers' mindsets	3.75	1.16
Social performance	2.63	1.69	Societal support	2.00	1.07
Environmental performance	2.38	2.77	Public acceptance	2.63	1.30
Cultural appropriateness	2.63	2.26	Funding opportunities	-0.13	3.72

Concerning the external factors that affect the success of the business model, the change in consumers' mindsets (M=3.75) emerged as a major opportunity (Figure 7). The experts emphasized in their open answers the positive impacts that consumers' convenience and quality seeking can have on the model, as well as the possibilities that it offers for estimating the price/quality ratio of food products. Some characteristic comments are presented below.

"Consumers are looking for convenience and quality."

"Such a model guarantees the quality of agri-food products."

The factors of technology development (M=2.75), public acceptance (M=2.63), and the economic situation prevailing in each country (M=2.63) were classified in the category of major opportunities. It is important to note that although data were derived from four countries, no negative values were observed regarding the latter factor. We noticed the same pattern of answers for the item referring to public acceptance. The reasons behind participants' perceptions of the model's positive public reception revolve around its ability to ensure price transparency and higher product quality.

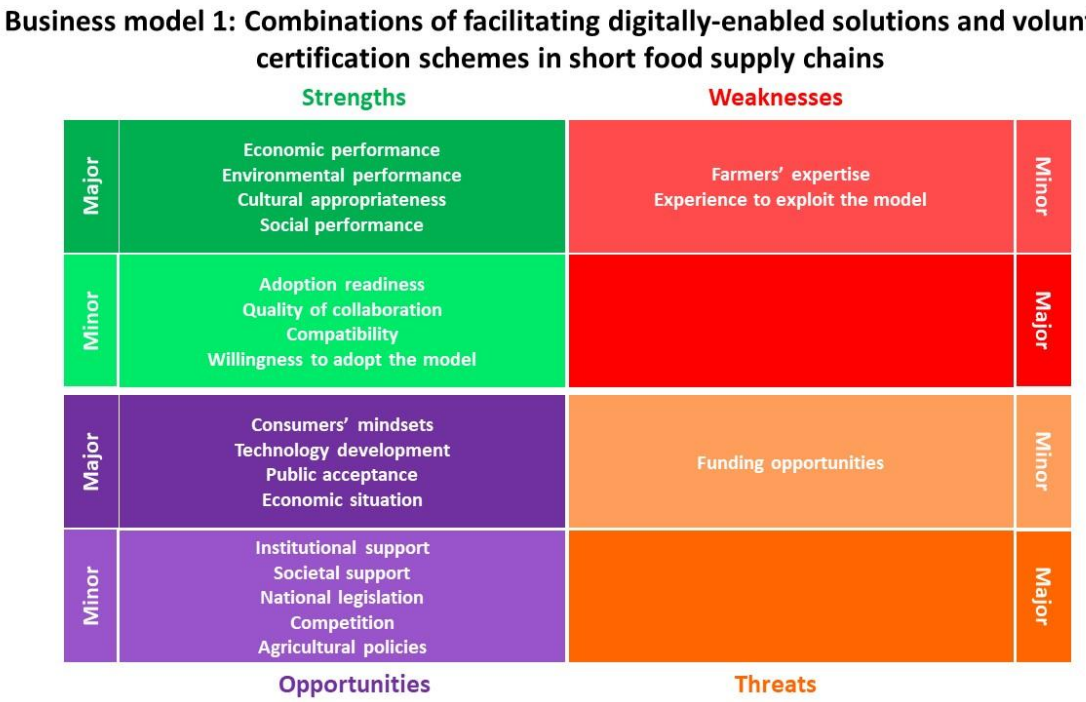

Figure 7. SWOT analysis for Business Model No 1

Support from institutes (M=2.00) and societal actors (M=2.00), national legislations (M=1.63), and the competition in the agrifood sector (M=1.63), as well as the existing agricultural policies (M=1.50), represent minor opportunities. Interestingly, the European Union's Common Agricultural Policy and policies implemented in African Mediterranean countries facilitate the implementation of the model, albeit for different reasons. For example, a participant from Greece mentioned that "CAP promotes digitalization," whereas a Moroccan respondent underlined that national policy in the country, due to its focus on entrepreneurship, will expedite the business model.

The only threat identified for the model was the lack of funding opportunities (M=-0.13). Nevertheless, participants from Morocco and Egypt gave positive ratings to the factor (M=2.50), indicating substantial differences between countries. As a respondent explained, "in Morocco, several financing programs are available, especially for innovative enterprises."

Business model No 2

The mean scores for the 20 factors integrated into the SWOT analysis for the second business model ranged from 2.00 to 3.50 for the variables referring to strengths or weaknesses, and from 1.38 to 3.50 for those reflecting opportunities or threats (Table 11). Hence, the analysis did not reveal any weaknesses or threats.

Table 11. Summary statistics of the SWOT analysis for Business Model No 2

Strengths and Weaknesses			**Opportunities and Threats**		
Aspect	**Mean score**	**S.D.**	**Aspect**	**Mean score**	**S.D.**
Compatibility	3.50	1.41	Agricultural policies	3.25	1.49
Farmers' expertise	2.38	3.16	National legislation	2.25	1.67
Adoption readiness	3.00	1.93	Institutional support	2.75	1.58
Quality of collaboration	3.25	1.16	Economic situation	3.00	1.51
Experience to exploit the model	2.00	2.62	Technology development	3.38	1.51
Willingness to adopt the model	3.00	1.60	Competition	1.38	2.88
Economic performance	3.50	1.20	Consumers' mindsets	3.00	1.31
Social performance	3.50	1.07	Societal support	3.00	1.07
Environmental performance	2.50	2.88	Public acceptance	3.50	1.20
Cultural appropriateness	2.88	1.81	Funding opportunities	1.75	2.38

The major strengths of the model (Figure 8) include its compatibility with short food supply chains (M=3.50), economic (M=3.50) and social performance (M=3.50), the capacity to promote effective collaboration between supply chain nodes (M=3.25), supply chain members' willingness (M=3.00) and readiness to adopt the model (M=3.00), and model's cultural appropriateness for short supply chains (M=2.88). Experts' comments clearly highlight that the model is considered compatible with the nature of

short supply chain schemes and the particular culture that such chains host. Some illustrative examples are the following:

"The model is very close to the way of doing business in short supply chains."

"This model will strengthen the cultural identity of short supply chains by creating a spirit of trust between actors."

"The culture of ownership of the supply chain will be increased."

The category of minor strengths comprises the environmental performance of the model (M=2.50), farmers' expertise (M=2.38), and experience to exploit the model (M=2.00). Although some respondents did not view expertise as a prerequisite for implementing and using the model (illustrative comment: "*No specific expertise needed*"), others seem to regard it as an essential resource for benefiting from the model. As a participant put it, "*the majority of farmers are familiar with social networks but not with digital solutions*."

Business model 2: Digitally-supported certification in short food supply chains

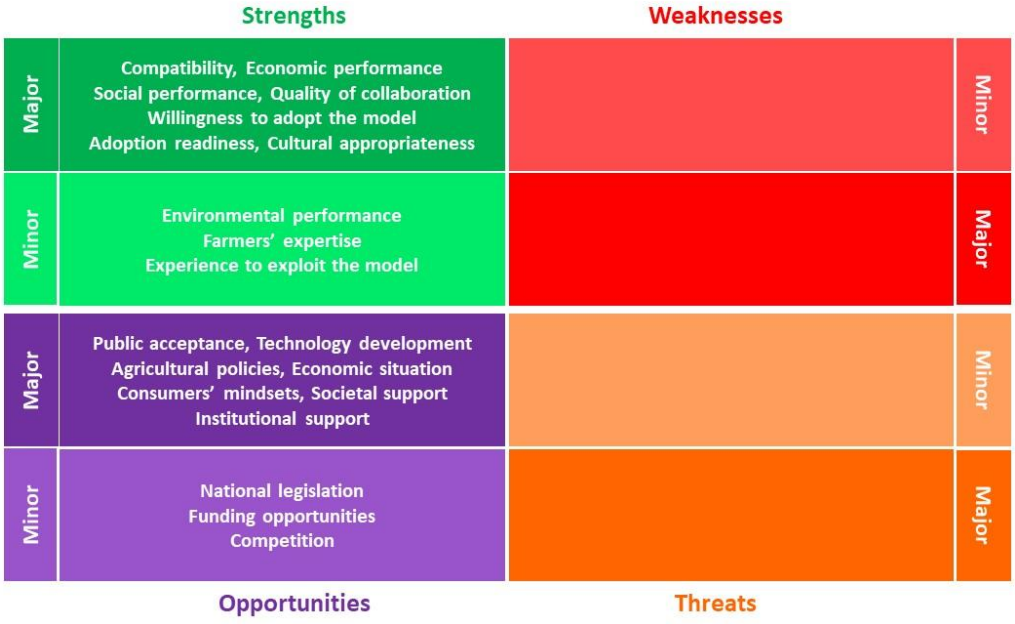

Figure 8. SWOT analysis for Business Model No 2

The category of major opportunities consists of seven factors, namely the expected public acceptance of the model (M=3.50), the level of technological development (M=3.38), the existence of supportive agricultural policies (M=3.25), the prevailing economic situation (M=3.00), the change in consumers' mindsets (M=3.00), and the expected support that societal actors, communities (M=3.00), and academic, research or policy institutes (M=2.75) will give to the model. National legislation (M=2.25), funding opportunities (M=1.75), and competition in the agrifood sector (M=1.38) form the category of minor opportunities.

Participants' answers revealed that the model is in line with the recent policies that pay attention to the creation of spaces for improving market information for agrifood products, as evidenced in the following comments:

"*Policies promoting transparency and certification are in the same direction.*"

"The new agricultural strategy encourages innovation in agricultural projects."

That can explain why participants gave such high scores in the aspects of public acceptance and institutional support. Their answers to the open-ended questions made clear that the public shows an intense interest in products and supply chain schemes that increase the flow of information offered to consumers, also ensuring high-quality (certified) products.

Business model No 3

The SWOT analysis for the third business model led to a relatively positive evaluation (Table 12). Among the factors that concern the internal properties of the model, only farmers' expertise (M=-0.13) and experience in exploiting the model (M=-0.13) emerged as minor weaknesses. The qualitative strand of the analysis showed that it is the innovative nature of the business model that generates concerns about farmers' ability to make full use of it. Such a perception is highlighted in the following comments:

"There is a lack of experience given the originality of the model."

"This will be the first test of the model, with no previous experience."

Nevertheless, other participants emphasize the lack of digital skills and competencies on the part of farmers. This perception seems to be consistent across countries, with Greek and Moroccan experts pointing out relevant shortcomings. For instance, a respondent from Greece stated that "*Farmers do not*

have the skills to effectively use digital innovations," while an expert from Morocco noticed that "*Farmers have never been involved in the implementation of digital solutions*."

According to their mean scores, the social (M=3.25), environmental (M=3.25), and economic performance of the model (M=3.00), along with its compatibility with short supply chains (M=2.71) were classified as major strengths (Figure 9). However, a participant expressed concerns about the degree to which the responsible, and, hence, directed introduction of digital solutions into short distribution schemes is in line with the modus operandi of such chains. As he mentioned, "*Controlling innovations is not suitable for short supply chains operation. It is against the central philosophy of these chains*."

The category of minor strengths includes the involved actors' willingness to adopt the model (M=2.50), the potential improvement of the collaboration between supply chain nodes (M=2.13), the positive expected impacts of the model on the cultural identity of the scheme (M=1.75), and chain's readiness to adopt the model (M=1.13). In complementing these quantitative findings, our qualitative analysis uncovered that a transitional phase is necessary to increase farmers' willingness to adopt the model and to help them efficiently operate it (illustrative comment: "*A transitional phase is needed during the implementation of the model*").

Table 12. Summary statistics of the SWOT analysis for Business Model No 3

Strengths and Weaknesses			**Opportunities and Threats**		
Aspect	**Mean score**	**S.D.**	**Aspect**	**Mean score**	**S.D.**
Compatibility	2.71	1.60	Agricultural policies	2.63	2.26
Farmers' expertise	-0.13	3.00	National legislation	2.13	2.03
Adoption readiness	1.13	2.03	Institutional support	3.00	1.07
Quality of collaboration	2.13	1.81	Economic situation	1.75	2.25
Experience to exploit the model	-0.13	2.70	Technology development	3.00	1.51
Willingness to adopt the model	2.50	1.77	Competition	1.25	3.15
Economic performance	3.00	1.31	Consumers' mindsets	2.38	2.39

Social performance	3.25	1.39	Societal support	1.63	1.41
Environmental performance	3.25	1.28	Public acceptance	1.63	1.92
Cultural appropriateness	1.75	2.38	Funding opportunities	1.13	2.85

The answers that were given by respondents to the open-ended questions brought to the fore the supportive role that academic, research, and policy institutes can play during the implementation of the model. The emphasis put by the model on the responsible adoption of innovations can promote the engagement of research organizations in the process of exploiting the model. As a participant highlighted:

"Academic and research institutes will support such a model because they have the expertise and are inclined toward responsible innovation."

Such support, according to experts, can be offered either through technical advice *("[institutes] can offer technical support on how to perform the responsible innovation procedure*") or by disseminating the model ("*Academic institutes and other research organizations can popularize the benefits of the model*"). In general, the content analysis confirmed that the responsibility dimension of the model is consistent with the recent policy emphasis on responsible digitalization and public engagement in the process of innovation. The following comments exemplify this argument:

"EU policies promote public engagement. So, yes, policies will facilitate the model's implementation."

"Policy is an ally because the model promotes transparency."

"Agricultural policies, by creating proximity markets and promoting direct sales, facilitate the implementation of the business model."

Business model 3: Developing responsible marketing schemes through digital solutions in short food supply chains

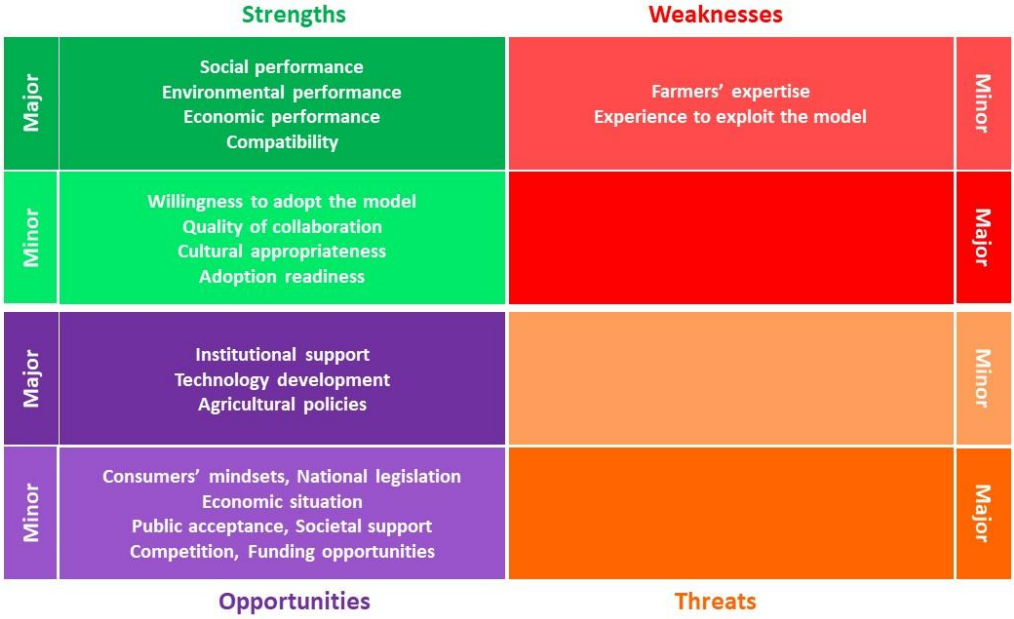

Figure 9. SWOT analysis for Business Model No 3

Hence, it is not surprising that institutional support (M=3.00) and the relevant agricultural policies (M=2.63), along with the recent technological progress (M=3.00), were categorized as major opportunities for the model. As Figure 9 shows, no potential threats were identified. The remaining factors – consumers' mindsets (M=2.38), national legislation (M=2.13), economic situation (M=1.75), public acceptance (M=1.63), societal support (M=1.63), competition (M=1.25), and funding opportunities (M=1.13) – were classified as minor opportunities.

Participants' reflections indicate that – being oriented toward promoting transparency and enhancing consumers' engagement in short supply chains – the model is expected to enjoy the appreciation and support of societal actors and communities. Nevertheless, experts seem to disagree about the impact of competition on the model. Based on their responses, competition is both an enabling factor because it may urge some actors to adopt the model and a hindering parameter since it can cause problems to the openness of the process.

3.4.2 Business models for export-oriented supply chains

Business model No 4

It is remarkable that the fourth business model does not have major strengths, while there are no factors that can open up major opportunities for reaching its full potential. On the contrary, the lack of farmers' expertise needed to exploit the digital solutions involved in the model emerged as a major weakness (M=-2.50) of the model. All the participants referred to the lack of skills and knowledge on the part of farmers as a barrier to adopting and utilizing the digital platform. One of the participants summarizes these concerns in the following quote:

"*Farmers do not have relevant skills and knowledge on how to manage digital instruments. Especially older and less educated farmers may have difficulties and problems in interacting with digital technologies.*"

Stakeholders' willingness (M=0.00) and readiness to adopt the digitally-enabled management practices (M=-0.44) represent minor weaknesses of the model (Table 13). Respondents' answers to open-ended questions centered around farmers' limited internet access in some regions (e.g., Egypt) and actors' endorsement of and familiarity with the data-sharing philosophy, which requires building trust between them. Since trust cannot be taken for granted, engaging actors in the model is a long-way process. An expert aptly put it: "*It takes time and effort to be understood and applied*."

The remaining seven aspects that concern internal attributes of the model received mean scores between 0.76 and 2.11 and, hence, were classified as minor strengths (Figure 10). Among them, the social and economic performance of the model had the highest ratings (M=2.11 in both cases). The creation of new job positions and their impacts on local employment was mentioned as antecedents of increased social performance. Another dimension that arose from our content analysis was the engagement of small-scale farmers in market systems. This finding is depicted in the following answer:

"*[The model] can help small-scale actors by involving them in the marketing of the products.*"

Nonetheless, three respondents focused on the negative influence of the model on interactor communication. By decreasing proximity and reducing face-to-face interaction, the model might be less functional compared to the conventional export-oriented supply chains.

Furthermore, participants described a variety of reasons justifying increased economic performance, including information sharing, matching of products' supply and demand, farmers' access

to new consumers, and improved decision-making. Nevertheless, three of them underscored the importance of efficient collaboration for achieving the expected economic benefits.

Table 13. Summary statistics of the SWOT analysis for Business Model No 4

Strengths and Weaknesses			Opportunities and Threats		
Aspect	**Mean score**	**S.D.**	**Aspect**	**Mean score**	**S.D.**
Compatibility	0.70	2.75	Agricultural policies	2.11	1.36
Farmers' expertise	-2.50	0.93	National legislation	0.75	1.16
Adoption readiness	-0.44	1.51	Institutional support	1.50	1.41
Quality of collaboration	0.56	2.19	Economic situation	1.00	1.85
Experience to exploit the model	0.67	2.50	Technology development	1.11	2.85
Willingness to adopt the model	0.00	1.87	Competition	-0.50	2.62
Economic performance	2.11	1.05	Consumers' mindsets	2.38	1.92
Social performance	2.11	1.69	Societal support	1.22	1.92
Environmental performance	1.00	2.00	Public acceptance	1.78	1.99
Cultural appropriateness	1.63	1.19	Funding opportunities	0.56	2.01

The rest of the factors that belong to the minor strengths are the model's cultural appropriateness with export-oriented supply chains (M=1.63), its environmental performance (M=1.00), the compatibility between the model and the specific type of supply chain (M=0.70), the experience on the part of farmers and other actors to exploit the model (0.67), and the positive impacts of the model on the quality of collaboration within the supply chain (M=0.56). However, participants raised some concerns about the intentions of some actors, which can have substantial effects on the quality of collaboration when the model will move into full use. For example, a participant referred to the unwillingness of "*big companies*

to share their power with other actors." Others stressed the need to promote shifts in the mentality of some supply chain players to fairly exploit the model.

Business model 4: Digitally-enabled management of export-oriented supply chains

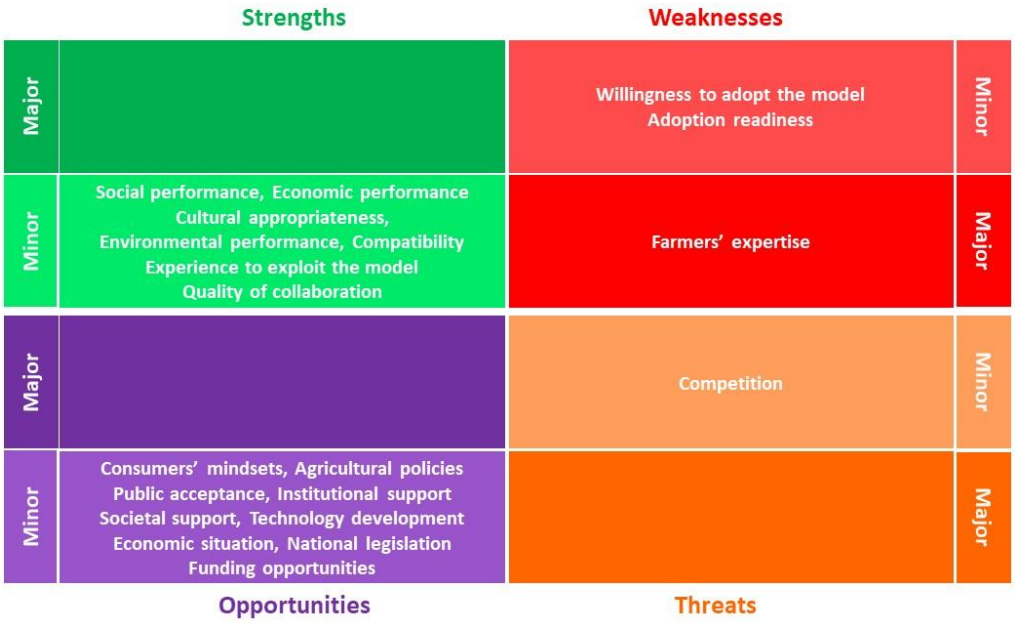

Figure 10. SWOT analysis for Business Model No 4

Concerning the factors external to the business model, the analysis classed the competitive relationships within agrifood sectors as a minor threat (M=-0.50). Again, experts' opinions were not uniform since some viewed competition as a "*crucial problem*," and others pointed out the potential motivating power of a competitive environment.

The other nine aspects, having mean scores between 0.56 and 2.38, were categorized as minor opportunities. The change in consumers' mindsets received the highest rating (M=2.38), with three experts emphasizing in their open answers the buyers' intense interest in having information on the food products available. As stated by a respondent, "*Today, consumers care strongly about the food they buy. They are ready to support any progress leading to more and easily accessible information.*"

Other aspects representing minor opportunities include the existence of relevant agricultural policies (M=2.11), the positive reaction of the public towards the model (M=1.78), and the support that it is expected to have by academic, research and policy institutes (M=1.50) or societal actors (M=1.22), the current state of technology (M=1.11) and economy (M=1.00) and the existence of supportive national legislations (M=0.75) and funding opportunities (M=0.56). Notably, the evaluation of potential funding opportunities seems to be country-depended since Greek and Italian experts gave a positive mean score on the item, while their Moroccan counterparts negatively rated the same parameter.

Business model No 5

Our descriptive analysis of the fifth business model (Table 14) uncovered that its major strength is the ability to generate positive economic outcomes (M=2.89). The model, as a respondent posited, "*is, by default, oriented toward that purpose*." Indeed, the aspect of economic performance did not receive negative ratings from none of the eight experts.

The category of minor strengths comprises factors referring to the environmental (M=1.00) and social performance of the model (M=1.00), as well as its compatibility with export-oriented supply chains (M=0.56). Nevertheless, although there was consensus among experts on the positive impacts of the model on the natural environment, some of them questioned the ability of the model to produce positive social outcomes within the supply chains. The qualitative strand of the analysis indicated that the main concern of the respondents who rated the dimension of social performance with negative scores was the lack of direct communication between actors.

As in the previous model, farmers' limited expertise (M=-2.89) emerged as the only major weakness of the model (Figure 11). The category of minor weaknesses includes four factors concerning the willingness (M=-1.67) and readiness (M=-1.44) on the part of actors participating in export-oriented supply chains to adopt the model, the model's ability to improve collaboration across these chains (M=-0.22), and its cultural appropriateness for the specific type of food distribution networks (M=0.00). Experts expressed doubts about the willingness of all actors to collaborate and share information as suggested in the model's description (illustrative comment: "*Some players are not ready to share information*") and stated that the model is against the very culture of these chains, although it has the potential to produce a positive cultural shift. The following comments summarize this argument:

"[The model] does not fit the culture of export-oriented chains, but it can help create a new collaborative culture."

"[The model] can create a better culture within such chains."

Table 14. Summary statistics of the SWOT analysis for Business Model No 5

Strengths and Weaknesses			**Opportunities and Threats**		
Aspect	**Mean score**	**S.D.**	**Aspect**	**Mean score**	**S.D.**
Compatibility	0.56	3.00	Agricultural policies	2.11	1.69
Farmers' expertise	-2.89	1.27	National legislation	1.44	1.33
Adoption readiness	-1.44	1.88	Institutional support	1.89	1.36
Quality of collaboration	-0.22	1.79	Economic situation	0.67	1.12
Experience to exploit the model	1.00	2.50	Technology development	2.11	2.57
Willingness to adopt the model	-1.67	2.96	Competition	-0.11	3.82
Economic performance	2.89	1.27	Consumers' mindsets	2.22	2.64
Social performance	1.00	1.07	Societal support	1.11	1.76
Environmental performance	1.00	2.00	Public acceptance	1.44	1.59
Cultural appropriateness	0.00	0.76	Funding opportunities	0.88	1.81

Concerning the external forces that catalyze the successful implementation of the model, the quantitative analysis classified competition as the only minor threat (M=-0.11). The intensive competition, according to the results of our content analysis, is an obstacle to data sharing, thus putting at risk the exploitation of the model. The following quotes epitomize experts' perception of the negative impact that competitive relations within export-oriented supply chains might have on the implementation of and value extraction from the business model:

"Supply chains of this type are sensitive to competition. Even adjacent nodes are in competition."

"[Competition] is the main obstacle. Do, really, actors want to share important information?"

The model does not present major strengths since all the remaining nine external factors had mean scores lower than 2.5. Hence, the minor opportunities associated with the model are the changing consumers' mindsets (M=2.22), the level of technological development (M=2.11), the relevant agricultural policies (M=2.11), the expected support from institutes operating in the areas of the academy, research or policy (M=1.89), the positive acceptance of the model by the public (M=1.44), the existence of favorable national legislations (M=1.44), the expected positive reaction towards the model on the part of societal actors and communities (M=1.11), the existence of funding opportunities (M=0.88), and the prevailing economic situation (M=0.67).

Business model 5: Platforming for increasing the economic performance of export-oriented supply chains

Figure 11. SWOT analysis for Business Model No 5

Business model No 6

The sixth business model received a relatively positive evaluation from experts (Table 15). Among the ten aspects concerning internal properties, five were classified as major strengths. These are the

model's social (M=3.67) and economic performance (M=3.11), stakeholders' willingness to adopt the model (M=2.89), the compatibility between the model and the chain (M=2.56), and the environmental performance (M=2.56). The high mean scores of the dimensions referring to social, economic, and environmental performance reveal that, for experts, the model can secure the sustainability of export-oriented supply chains. According to the respondents, the economic benefits are mainly associated with the certification process and the associated data-sharing practices, as the following comment illustrates:

"*Certification will improve the economic performance. Managerial data will also improve decision-making.*"

Moreover, the certification is expected to generate both environmental and social benefits since it can increase compliance with environmental, ethical, and social criteria. The positive effects that the integration of multiple dimensions into the certification procedure can have on the model are summarized in these two quotes:

"The proposed certification involves environmental and ethical criteria. It, therefore, can improve environmental performance."

"[Social performance will be increased] because ethics and social sustainability are part of the certification process."

Table 15. Summary statistics of the SWOT analysis for Business Model No 6

Strengths and Weaknesses			**Opportunities and Threats**		
Aspect	**Mean score**	**S.D.**	**Aspect**	**Mean score**	**S.D.**
Compatibility	2.56	1.81	Agricultural policies	2.11	1.96
Farmers' expertise	-1.56	1.88	National legislation	0.89	2.26
Adoption readiness	1.44	3.00	Institutional support	1.71	1.50
Quality of collaboration	2.33	1.94	Economic situation	1.56	1.67
Experience to exploit the model	2.33	1.50	Technology development	1.67	2.18
Willingness to adopt the model	2.89	0.93	Competition	1.22	3.27

Economic performance	3.11	0.93	Consumers' mindsets	2.11	1.36
Social performance	3.67	0.71	Societal support	2.00	1.41
Environmental performance	2.56	1.59	Public acceptance	2.44	0.73
Cultural appropriateness	1.14	1.68	Funding opportunities	1.00	1.94

In the category of minor strengths were classed models' ability to improve the quality of collaboration among supply chain nodes (M=2.33), actors' experience in the procedures involved in the model (M=2.33), their readiness to adopt the model (M=1.44), and the cultural appropriateness of the model for export-oriented supply chains (M=1.14). Nevertheless, it is worth noting that four out of the nine experts rated the latter item using the value of zero. As one of them argued, "*these chains have different cultural identities*," hence, any impact of the model on supply chains' identities is context-specific.

As Figure 12 shows, the model does not face major or minor threats. However, the analysis did not uncover major opportunities that could be exploited. All the ten aspects incorporated into the SWOT analysis were categorized as minor opportunities, receiving mean scores lower than 2.50. Among them, the positive public acceptance of the model had the highest rating (M=2.44), followed by the dimensions referring to consumers' mindsets (M=2.11) and agricultural policies (M=2.11). In their open answers, participants explained that the consumers are expected to support the model since it is built upon a social responsibility dimension and promotes sustainable production and consumption (illustrative comment: "*The reaction of consumers is expected to be positive because they have high levels of awareness of sustainability-related issues*"). However, keeping the product prices low is a critical precondition to receiving public support. As a respondent explained, "*the public will support the model as long as the price of the products will remain affordable*." Furthermore, agricultural policies emphasizing food traceability, food safety, and responsible farm production can play supportive roles in the model.

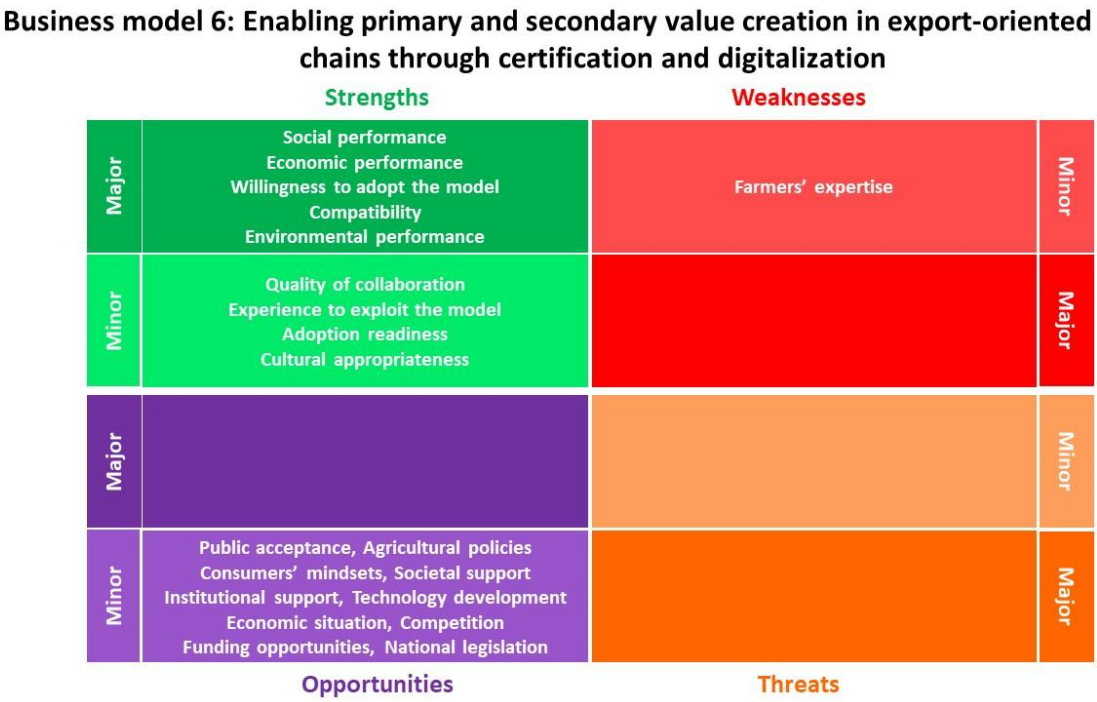

Figure 12. SWOT analysis for Business Model No 6

The remaining seven aspects received lower yet positive mean scores. The model is expected to have the support of social actors, communities (M=2.00), and institutes (M=1.71), while it can exploit technological advancements (M=1.67). Nevertheless, an Italian expert raised concerns about the potential negative role that the digital divides between regions can play in this respect. The prevailing economic situation received a mean score of 1.56, with respondents from Italy giving a negative rating (-1 in both cases) to the item.

The lowest mean scores were observed for the aspects of competition (M=1.22), funding opportunities (M=1.00), and national legislation (M=0.89). Remarkably, competition was deemed both a facilitating and an impeding variable. Although most of the participants positively rated the relevant item, others appeared to view competition as an obstacle to the adoption and exploitation of the model. This perception is highlighted in the following sentences:

"Competition may be a problem during the operation of the model. Some actors may don't want to share information with partners, or information can be biased."

3.4.3 Business models for green public procurement

Business model No 7

For the seventh business model, our SWOT analysis (Table 16) uncovered three major strengths, namely, the economic (M=3.17) and social performance (M=3.00) of the model and its compatibility with green public procurement (M=3.00). As claimed by respondents, the improvement of the communication between stakeholders due to the digital platform and the expected increase in employment opportunities can promote the social performance of the model. In addition, the adoption of voluntary certification schemes will bring economic benefits. A participant underscored this possibility through this statement:

"The adoption of new quality standards could improve the economic performance."

As minor strengths, seven options were classified (Figure 13). Among them, environmental performance ranked first (M=2.50), followed by the model's ability to improve the quality of collaboration between supply chain nodes (M=2.00). However, as an Italian expert put it:

"The model is likely to work well after an adequate training of farmers and public officers."

From that comment, knowledge emerges as a pivotal resource for exploiting both digital platforms and voluntary certification schemes. That is also illustrated in the relatively low mean score of the aspect "farmers' expertise" (M=1.50). Our content analysis suggests that some farmers lack the expertise required to extract value from the model. "*Specific courses to train farmers will be needed*," commented a participant.

The cultural appropriateness of the model received a mean score of 1.33. Nevertheless, we noticed a difference between French (M=0.00) and Italian participants (M=2.67), indicating that the culture prevailing in green public procurement schemes might have significant differences between countries, thus making the application of the model case-specific. This conclusion is strengthened by the observation that experts showed high variability in their perceptions of actors' willingness (M=0.50), readiness (M=0.33), and experience to adopt the model (M=0.20). To condense the differences among actors and chains, a respondent noted that willingness:

"Depends on the situation. Some actors are open-minded and willing to enter the digital era, other actors are not willing to adopt digital solutions, as they don't see its usefulness."

Table 16. Summary statistics of the SWOT analysis for Business Model No 7

Strengths and Weaknesses			Opportunities and Threats		
Aspect	**Mean score**	**S.D.**	**Aspect**	**Mean score**	**S.D.**
Compatibility	3.00	1.10	Agricultural policies	3.83	1.17
Farmers' expertise	1.50	2.88	National legislation	2.33	1.75
Adoption readiness	0.33	3.08	Institutional support	3.00	1.55
Quality of collaboration	2.00	2.00	Economic situation	2.67	1.86
Experience to exploit the model	0.20	2.95	Technology development	3.00	1.67
Willingness to adopt the model	0.50	2.35	Competition	0.67	2.16
Economic performance	3.17	1.17	Consumers' mindsets	2.83	1.33
Social performance	3.00	1.55	Societal support	2.50	1.38
Environmental performance	2.50	1.64	Public acceptance	3.00	1.67
Cultural appropriateness	1.33	2.16	Funding opportunities	1.83	2.32

In general, the lack of threats underlines experts' positive evaluation of the business model. The analysis divided opportunities into major and minor, with the first category containing agricultural policies (M=3.83), technology development (M=3.00), institutional support (M=3.00), public acceptance (M=3.00), changing consumers' mindsets (M=2.83), and the prevailing economic situation (M=2.67). Regarding policy, the incentives offered to follow the agricultural digitalization process were mentioned as a crucial facilitator of the model's promotion. In addition, the existence of "*several functional platforms*" was referred to by a participant as proof that the model can be set up on current and already validated technologies. Another interesting finding was that all experts evaluated positively the support the model can receive from customers. Some representative comments are presented below.

"Consumption habits are in the same direction."

"The trend towards online shopping would stimulate the sales also at the upstream."

Among minor opportunities, experts' answers prioritize societal support (M=2.50). Indeed, in their open answers, there is a clear reference to the influence that communities can have on the success of the model, as evidenced below:

"[societal actors and communities] play a significant role in creating new dynamics of consumption."

"The provision of local food through green public procurement supply chains may be boosted by local communities."

Business model 7: Connecting farmers to the public sector through digital platforms and voluntary certification schemes

Figure 13. SWOT analysis for Business Model No 7

For French participants, national legislation is considered a catalyst for the value-generating capacity of the model. The "Egalim Law" was mentioned by two experts as a potential force shaping the dynamics of the model. Nevertheless, as the following quote highlights, there is still some way to go before legislation will be fully ready to support the transition to a digitally enabled procurement of certified green food products.

"The concept of sustainable product elaborated in Egalim law (French legislation of 50% of products procured by public restaurants should comply with defined categories) should be expanded to what has been defined in this model concerning the VSS."

The overall mean score for national legislation was 2.33. The two remaining factors – funding opportunities and competition – received lower mean values (M=1.83 and M=0.67, respectively), while marked by some regional differences. In particular, experts from Italy gave higher scores on the aspect of external funding compared to their French counterparts. A respondent from France commented that "*There is a difficulty to finance either the platform or certification,"* whereas an Italian participant noted that funding can be derived through the Common Agricultural Policy 2023-2027.

Business model No 8

Experts evaluated the eighth business model as compatible with the philosophy of green public procurement (M=3.33). Apart from compatibility, the category of major strengths includes social (M=3.00) and economic (M=2.67) performance. The potential economic benefits concern specific regions, as a participant noted:

"In the local area of Lazio [Italy], it is a great opportunity."

In the cluster of minor strengths were classified the environmental performance of the model (M=2.17), the degree to which farmers and public organizations are ready to adopt the model (M=1.80), the model's ability to strengthen the cultural identity of the supply chain (M=1.67) and the effective collaboration between stakeholders (M=1.50), farmers' expertise (M=1.33) and actors' willingness to adopt the model (M=1.00). Our content analysis further interprets these quantitative results, indicating that the adoption readiness is conditioned by the size of the farm enterprise. A respondent explained that:

"It would be hard for small-scale farmers."

Notwithstanding the high score of the aspect "quality of collaboration" (Table 17), in open-ended questions, the experts mentioned either positive or negative potential outcomes. A concern expressed by a participant referred to the problems that may arise during negotiations of price:

"Some difficulties might emerge at the time of price negotiations."

Another worry focuses on farmers' competencies to deal with digital innovations, effectively exploit the digital platform and successfully implement the proposed certification scheme. Comparing the

business model with the previous one, a respondent concluded that responsible green public procurement is more knowledge-intensive. As he stated:

"My only doubt is that comparing it with the previous solution, this one may increase the level of digital skills required."

Table 17. Summary statistics of the SWOT analysis for Business Model No 8

Strengths and Weaknesses			**Opportunities and Threats**		
Aspect	**Mean score**	**S.D.**	**Aspect**	**Mean score**	**S.D.**
Compatibility	3.33	1.75	Agricultural policies	2.50	1.52
Farmers' expertise	1.33	2.73	National legislation	2.17	1.47
Adoption readiness	1.80	1.10	Institutional support	2.83	1.47
Quality of collaboration	1.50	1.05	Economic situation	2.33	1.63
Experience to exploit the model	-0.50	2.59	Technology development	2.67	1.86
Willingness to adopt the model	1.00	2.68	Competition	0.00	1.67
Economic performance	2.67	1.86	Consumers' mindsets	2.00	2.19
Social performance	3.00	1.10	Societal support	2.33	1.51
Environmental performance	2.17	1.94	Public acceptance	2.33	1.51
Cultural appropriateness	1.67	2.07	Funding opportunities	0.83	2.04

The analysis also revealed several antecedents of actors' willingness to engage in the proposed model, including the opportunity to access new markets (illustrative comment: "*If that helps them to be included in the public market, why not*"), the prevailing contextual factors, and farmers' mindsets (illustrative comment: "*it depends on the context and farmer's mindset*"). In general, the contexts within which supply chains operate seem to catalyze the identity of green public procurement schemes and, consequently, the cultural appropriateness of the model. Indeed, the opinions of the impacts that the

business model can have on the cultural identity of these chains differ between French and Italian experts, as it is evidenced by the mean scores (M=0.00 and M=3.33, respectively) that they attributed to the specific aspect of the SWOT analysis.

The only aspect categorized as a minor weakness (Figure 14) is the actors' experience to exploit the business model (M=-0.50). Again, respondents emphasized the pivotal role that education and training can play in improving actors' capacity to generate value through the model. An expert pointed out that:

"They don't have enough skills, there is a need for training."

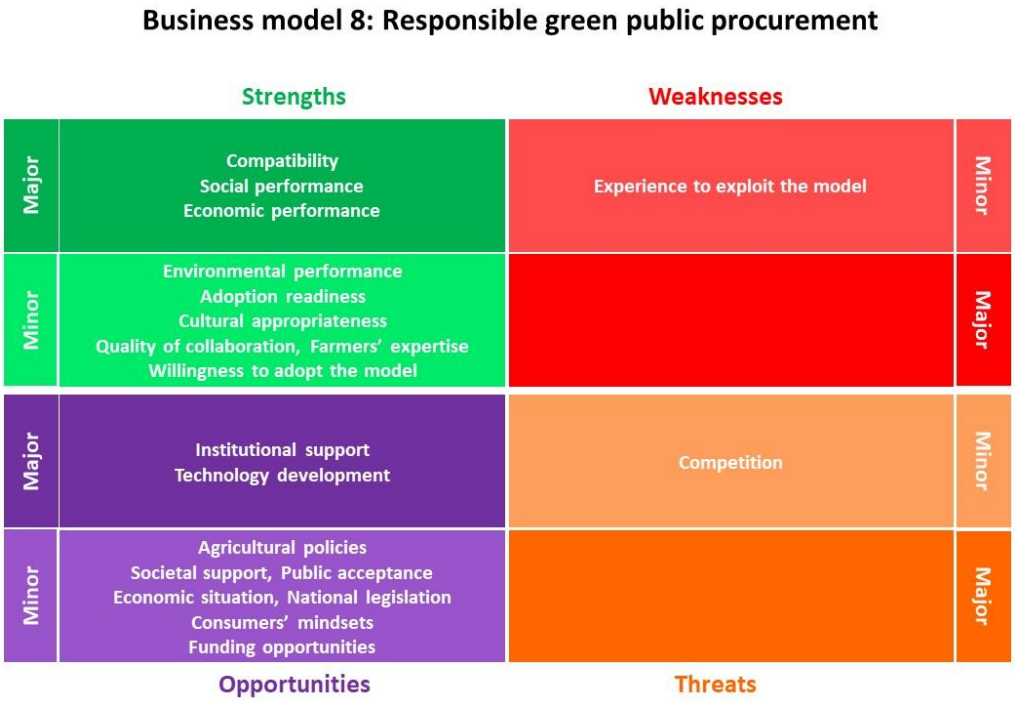

Figure 14. SWOT analysis for Business Model No 8

Furthermore, two external factors received mean scores higher than 2.50 and, hence, were classified as major opportunities. Institutional support had a mean score of 2.83, followed by technology development (M=2.67). Nevertheless, through the qualitative analysis, we discovered that participants express different perceptions of the support that the model may have from research institutes. The following quotes present these varying opinions:

"The research has little interest, while the authorities are more interested in these tools."

"Many researchers are focusing on digital solutions. So, they will support the model."

"As long as it is not inconsistent with the rules of the public market, I don't think that the tool would bother."

Among minor opportunities, agricultural policies (M=2.50), societal support (M=2.33), and public acceptance (M=2.33) ranked in the first three positions. The public reception of the model gathered positive reactions from experts. As an Italian respondent summed it up:

"*The provision of local food through digitalized green public procurement supply chains is expected to raise social acceptance.*"

However, a French respondent claimed that the model cannot generate positive or negative public responses. As she argued:

"As we are talking about a tool, I don't think they [the public] would care. […] Consumers will not learn about its existence"

Such a different point of view can be attributed to the extent to which the emphasis is laid on the digital platform or on the model as a whole. Giving prominence to the tools upon which the model is built, the participant who made that comment scored both public acceptance and social support with a value of zero, while the average of other experts' evaluations was 2.80 for the two cases. Interestingly, between French and Italian respondents, no differences in the mean scores were observed (M=2.33).

The category of minor opportunities also includes economic situation (2.33), national legislation (2.17), consumers' mindsets (2.00), and funding opportunities (0.83). It is noteworthy that funding opportunities can be country-dependent since the mean score yielded a value of -0.67 by the French experts, while the respective value for Italy was 2.33. On the other hand, competition – which emerged as the only minor threat – received the same mean score in both countries (M=0.00), indicating a moderate valence of potential impacts on the model.

4. Concluding remarks

In the present report, after developing a benchmark framework including a series of criteria determining the value-generating capacity of three supply chain systems (short food supply chains, export-oriented supply chains, and green public procurement schemes) and assessing the importance of these criteria, we developed and evaluated eight business models. Our benchmark framework divides value into primary and secondary. The first type refers to four dimensions describing the value that spreads across the chain, namely the managerial, relational, economic, and organizational dimensions. The secondary value consists of ethical, environmental, social, and cultural dimensions. Hence, it includes all the dimensions of value that extend beyond supply chains, producing positive outcomes for society.

After collecting data from Italian, French, Moroccan, Egyptian, and Greek experts in the three supply chain systems, we evaluated the importance of the eight identified dimensions. The analysis revealed the importance of primary value for export-oriented supply chains, the pivotal role that secondary value plays for short supply chains, and the pivotal function of managerial, ethical, and environmental dimensions for green public procurement schemes.

Based on these results and taking into consideration the importance attributed to different criteria, we developed eight alternative business models for the three supply chains under consideration. We developed eight business models: three for short supply chains, three for export-oriented supply chains, and two for green public procurement. The key innovations that dominated the business models were innovative digital solutions, a digital platform, and voluntary certification schemes. All the developed models were based on the exploitation of a digital platform to achieve higher and easier networking than in conventional models used in supply chains. In four business models (business models No 1, 3, 4, 8), we incorporated innovative digital solutions, like applications serving as pools of information that will receive input from farmers and other actors. Furthermore, we added the adoption of voluntary certification schemes as another alternative value-creation strategy in five business models (business models No 1, 2, 6, 7, 8). Finally, as an organizational innovation, we added in business models No 3 and No 8, the dimension of responsible digital transition, emphasizing the need to follow principles of responsible innovation while moving towards new value-generation paths.

To evaluate our eight models, we developed a series of SWOT instruments consisting of 20 items referring to the potential strengths and weaknesses of each business model, and items related to

opportunities and threats. We followed a mixed research design, in which a qualitative strand served as an explanatory tool, aiming at interpreting the quantitative findings. Using a semantic differential scale for each question, we performed a classification exercise through which our items were grouped into major or minor strengths, weaknesses, opportunities, and threats. Additional "Why?" questions after each item allowed us to enrich our data.

The analysis of data gathered from 23 experts (from Italy, France, Morocco, Egypt, and Greece) led to the development of SWOT maps for each business model. In all three models referring to short food supply chains, economic and social performance emerged as major strengths, while technology development was classified as a major opportunity. In the next three models focused on export-oriented supply chains, the analysis did not reveal any major opportunity, whereas model No 4 also lacks major strengths. Nevertheless, none of these models faces major threats. In the case of green public procurement, both models have as major strengths their compatibility with the specific supply chain and their ability to enhance the economic and social performance of the chain. Moreover, despite some differences between countries, the models share two major opportunities: the development of technology and the expected support by academic, research, and policy institutes.

However, the analysis uncovered that farmers' limited expertise and experience in exploiting digital solutions can weaken the efficiency of the business models, revealing that knowledge constitutes a key input, as also emerged from our content analysis. In addition, the findings indicate that competition jeopardizes the success of business models 4, 5, and 8, functioning as a threat. Turning competition into an opportunity represents a challenging task left for future work within the framework of the MED-LINKS project. Nevertheless, the work done for the purposes of this report – building alternative business models and identifying their strengths, weaknesses, opportunities, and threats – opens up an avenue for developing innovative solutions to enhance value creation in short food supply chains, export-oriented supply chains, and green public procurement schemes.

5. Contribution to Sustainable Development Goals (SDGs)

This deliverable makes a significant contribution to several Sustainable Development Goals (SDGs) by leveraging its comprehensive analysis and application of representative business models suited to local clusters. The following SDGs are addressed:

1. **SDG 8 Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all:** By identifying and benchmarking representative business models tailored to the Mediterranean context, the deliverable promotes economic resilience and growth among small and medium enterprises (SMEs). Specifically, the focus on local clusters within supply chain systems supports their ability to operate effectively and enhances their capacity to create decent work opportunities. This work enables SMEs to better compete in local and international markets, addressing systemic inefficiencies that have traditionally hindered economic progress in the region.
2. **SDG 9 Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation:** The deliverable supports the development of resilient business practices by proposing models that integrate innovative approaches for production and distribution. For example, the benchmark framework incorporates modern business tools that improve coordination among supply chain actors, encouraging a transition toward more inclusive and efficient industrial ecosystems.
3. **SDG 10: Reduce inequality within and among countries:** By focusing on clusters in diverse Mediterranean countries, the deliverable addresses inequalities in economic participation and development. Tailored business models were designed to meet the specific needs of local producers, including those operating in disadvantaged areas, thus enabling them to access higher-value markets and improve their economic prospects.
4. **SDG 12: Ensure sustainable consumption and production patterns:** The framework aligns with sustainable production goals by identifying business models that prioritize resource efficiency, reduced waste, and environmentally responsible practices. Examples include encouraging low-input agricultural practices and fostering shorter supply chains that align with consumer preferences for locally produced goods.
5. **SDG 13: Take urgent action to combat climate change and its impacts:** The deliverable addresses climate challenges by integrating sustainability-focused strategies into the identified business

models. These include reducing the environmental footprint of production, minimizing energy consumption, and incorporating climate-smart approaches, such as carbon-neutral production techniques and reduced use of chemical inputs.

6. **SDG 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development:** Through collaboration between Mediterranean project partners, industry experts, and local stakeholders, this deliverable strengthens global partnerships. It fosters knowledge-sharing and co-creation of innovative solutions that can be applied both locally and beyond, supporting broader sustainable development goals.

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Appendix 1

Questionnaire for the identification of selection and evaluation criteria defining the performance of business models in three supply chain systems: Short food supply chains, export-oriented supply chains, and green public procurement

PRIMA PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA
The PRIMA programme is an Art. 185 initiative supported and founded under Horizon 2020, the European Union's Framework Programme for Research and Innovation
MED-LINKS

Instructions

Below, you can see some criteria that affect the performance of the business models used in supply chain systems. Please, rate the importance of each criterion, using a scale from 1 to 5, where 1 means "of no importance" and 5 "of very high importance." Please, rate the criteria referring to supply chain system(s) that your institute will study within the framework of the "Med-Links" project.

1. The following list, refers to **Short Food Supply Chains**:

Dimension	Criterion	Rating
Managerial	Prioritizes the quality of products	
	Pursues innovation	
	Listens and responds to consumers' needs and wants	
	Uses effective communication channels	
Relational	Emphasizes workers' safety	
	Offers education/training opportunities to employees	
	Develops partnerships and alliances	
	Develops information-sharing networks that promote transparent relations	
Economic	Uses the available resources in an economically efficient way	
	Operates in a way that minimizes costs and maximizes profits	
	Offers a fair income to the actors involved	
	Leads to economic viability	
Organizational	Has an effective organizational structure	
	Is able to change when needed	
	Is built on democratic decision-making processes	

	Engages stakeholders and societal groups	
Cultural	Respects farmers' culture(s)	
	Is compatible with the local culture(s)	
	Promotes a culture of collaboration among supply chain nodes	
	Builds and is built on a corporate responsibility culture	
Social	Respects human rights and workers' health	
	Cultivates social capital among supply chain nodes	
	Promotes community well-being	
	Increases community resilience	
Ethical	Creates fairly distributed value	
	Is based on fair competitive relations	
	Leads to limited food waste	
	Promotes ethical consumption	
Environmental	Has a reduced environmental footprint	
	Is energy efficient	
	Uses green practices	
	Contributes to the fight against climate change	

2. Add criteria if necessary:

Criterion

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3. The following list, refers to **Export-oriented Supply Chains**:

Dimension	Criterion	Rating
Managerial	Prioritizes the quality of products	
	Pursues innovation	
	Listens and responds to consumers' needs and wants	
	Uses effective communication channels	
Relational	Emphasizes workers' safety	
	Offers education/training opportunities to employees	
	Develops partnerships and alliances	
	Develops information-sharing networks that promote transparent relations	
Economic	Uses the available resources in an economically efficient way	
	Operates in a way that minimizes costs and maximizes profits	
	Offers a fair income to the actors involved	
	Leads to economic viability	
Organizational	Has an effective organizational structure	
	Is able to change when needed	
	Is built on democratic decision-making processes	
	Engages stakeholders and societal groups	
Cultural	Respects farmers' culture(s)	
	Is compatible with the local culture(s)	
	Promotes a culture of collaboration among supply chain nodes	
	Builds and is built on a corporate responsibility culture	
Social	Respects human rights and workers' health	
	Cultivates social capital among supply chain nodes	
	Promotes community well-being	

	Increases community resilience	
Ethical	Creates fairly distributed value	
	Is based on fair competitive relations	
	Leads to limited food waste	
	Promotes ethical consumption	
Environmental	Has a reduced environmental footprint	
	Is energy efficient	
	Uses green practices	
	Contributes to the fight against climate change	

4. Add criteria if necessary:

Criterion

5. The following list, refers to **Green Public Procurement**:

Dimension	Criterion	Rating
Managerial	Prioritizes the quality of products	
	Pursues innovation	
	Listens and responds to consumers' needs and wants	
	Uses effective communication channels	
Relational	Emphasizes workers' safety	
	Offers education/training opportunities to employees	
	Develops partnerships and alliances	
	Develops information-sharing networks that promote transparent relations	
Economic	Uses the available resources in an economically efficient way	
	Operates in a way that minimizes costs and maximizes profits	
	Offers a fair income to the actors involved	
	Leads to economic viability	
Organizational	Has an effective organizational structure	
	Is able to change when needed	
	Is built on democratic decision-making processes	
	Engages stakeholders and societal groups	
Cultural	Respects farmers' culture(s)	
	Is compatible with the local culture(s)	
	Promotes a culture of collaboration among supply chain nodes	
	Builds and is built on a corporate responsibility culture	
Social	Respects human rights and workers' health	
	Cultivates social capital among supply chain nodes	
	Promotes community well-being	

	Increases community resilience	
Ethical	Creates fairly distributed value	
	Is based on fair competitive relations	
	Leads to limited food waste	
	Promotes ethical consumption	
Environmental	Has a reduced environmental footprint	
	Is energy efficient	
	Uses green practices	
	Contributes to the fight against climate change	

6. Add criteria if necessary:

Criterion

Participant-related data

7. Please, indicate the institute with which you are affiliated:

UNIBO	
ROTECH	
UNICAS	
HUSD	
ISIS	
SDF	
CIHEAM-IAMM	
AUTH	
IHU	
UCA	
UMI	

8. Position in the institute:

Academic	
Researcher	
PhD student	
MSc student	
Other	

9. Please, describe your area of expertise

10. Please, indicate your level of education:

Secondary education	
University education	
MSc	
PhD	

11. Gender:

Man	
Woman	

Thank you for your participation!

Appendix 2

Questionnaire for the evaluation of strengths, weaknesses, opportunities and threats of alternative business models

The PRIMA programme is an Art. 185 initiative supported and founded under Horizon 2020, the European Union's Framework Programme for Research and Innovation

Questionnaire A - Short food supply chains

General information

1. Country (circle the answer that best applies to you)

Italy	1
France	2
Morocco	3
Egypt	4
Greece	5

2. Area of expertise

3. Gender (circle the answer that best applies to you)

Man	1
Woman	2

4. Age (circle the answer that best applies to you)

<20	1
21-40	2
41-60	3
>60	4

5. Level of education (circle the answer that best applies to you)

Some schooling	1
Primary education	2
Secondary education	3
Post-secondary education	4

Tertiary education	5

Instructions

Below you can see descriptions of three business models that can be applied to short food supply chains. After carefully reading each model, please answer the questions that follow.

Tick the box that best describes your opinion of the numbered statements.

For the open-ended questions, please try to explain the reason behind your response.

Business model 1:

Combinations of facilitating digitally-enabled solutions and voluntary certification schemes in short food supply chains

In the first business model, **digital solutions** are used to store information on farmers' partners (e.g., suppliers), amounts of products sold per distribution channel (e.g., farmers' markets, direct sales in local restaurants), prices, costs, and revenues. These solutions are expected to facilitate the economic monitoring of farms, thus helping farmers make informed decisions, reduce their costs, select partners, and choose the most suitable distribution routes. Hence, farmers can increase their income and enhance the viability of their farms.

A **digital platform** will serve as a bridge, connecting farmers and consumers, thus offering producers the opportunity to understand their customers' needs and wants. The platform can also be used as a space for the engagement of societal groups with short food supply schemes.

In parallel, **voluntary certification schemes** will be adopted by local short food supply chains to ensure the high quality of the products. The term quality can refer to the characteristics of the products, the production process, the environmentally friendly character of the production/distribution activities, the social performance of the chains, or combinations of the above-mentioned parameters.

Below, you can see some statements referring to the model described above. Please, circle the number which best reflects your opinion.

Strengths-Weaknesses

1.1.1 The business model is…

Incompatible with the specific supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Compatible with the specific supply chain

Please explain why:

1.1.2 Farmers…

Do not have the expertise to exploit the digital solutions	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the expertise needed to exploit the digital solutions

Please explain why:

1.1.3 The specific supply chain is…

Not ready to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Ready to adopt the business model

Please explain why:

1.1.4 The nodes of the specific supply chain…

Will have collaboration problems due to the new business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Will collaborate more effectively after adopting the new business model

Please explain why:

1.1.5 The actors participating in the specific supply chain…

Do not have the experience needed to exploit the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the experience needed to exploit the business model

Please explain why:

1.1.6 The actors participating in the specific supply chain…

Are not willing to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are willing to adopt the business model

Please explain why:

1.1.7 The business model can…

Decrease the economic performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the economic performance of the supply chain

Please explain why:

1.1.8 The business model can…

Decrease the environmental performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the environmental performance of the supply chain

Please explain why:

1.1.9 The business model can…

Decrease the social performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the social performance of the supply chain

Please explain why:

1.1.10 The business model can…

Undermine the cultural identity of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Reinforce the cultural identity of the supply chain

Please explain why:

Opportunities-Threats

1.2.1 Agricultural policies…

Are a barrier for the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

1.2.2 National legislation…

Puts obstacles to the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Creates opportunities for the implementation of the business model

Please explain why:

1.2.3 Academic/research/policy institutes…

Are not ready to support the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are ready to support the business model

Please explain why:

1.2.4 The economic conditions in the country…

Impede the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

1.2.5 Technology development…

Impedes the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitates the implementation of the business model

Please explain why:

1.2.6 The competition in the agrifood sector…

Is an obstacle for the exploitation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Can fortify the exploitation of the business model

Please explain why:

1.2.7 The change of consumers' mindsets…

Jeopardizes the success of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Puts the basis for the success of the business model

Please explain why:

1.2.8 Societal actors and communities…

Are expected to criticize the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are expected to support the business model

Please explain why:

1.2.9 The public acceptance of the business model…

Is expected to be low	-5	-4	-3	-2	-1	0	1	2	3	4	5	Is expected to be high

Please explain why:

1.2.10 Possible funding opportunities…

Are limited	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are many

Please explain why:

Business model 2:

Digitally-supported certification in short food supply chains

In the second business model, a certification scheme that is built upon four pillars will be adopted by members of short food supply chains. The pillars refer to the social, environmental, ethical, and cultural sustainability of the chain. According to the scenario, the certification scheme will be developed through an open negotiation process in which members of short food supply chains will be involved (farmers and producers organizations distributing products through short supply schemes, consumers). Local authorities and experts will also provide insights into the suitability of the different certification schemes. A **digital platform** will serve as a space for promoting public engagement in the negotiation process. The outcome of that procedure will be a **certification scheme** suitable to the specific culture of each short supply chain.

The platform will continue its operation after developing the certification scheme, storing information about the environmental, social, and ethical performance of the short supply chains, also facilitating the nurturing of a culture of belongingness among supply chain members (farmers and consumers).

Below, you can see some statements referring to the model described above. Please, circle the number which best reflects your opinion.

Strengths-Weaknesses

2.1.1 The business model is…

Incompatible with the specific supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Compatible with the specific supply chain

Please explain why:

2.1.2 Farmers…

Do not have the expertise to exploit the digital solutions	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the expertise needed to exploit the digital solutions

Please explain why:

2.1.3 The specific supply chain is…

Not ready to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Ready to adopt the business model

Please explain why:

2.1.4 The nodes of the specific supply chain…

Will have collaboration problems due to the new business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Will collaborate more effectively after adopting the new business model

Please explain why:

2.1.5 The actors participating in the specific supply chain…

Do not have the experience needed to exploit the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the experience needed to exploit the business model

Please explain why:

2.1.6 The actors participating in the specific supply chain…

Are not willing to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are willing to adopt the business model

Please explain why:

2.1.7 The business model can…

Decrease the economic performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the economic performance of the supply chain

Please explain why:

2.1.8 The business model can…

Decrease the environmental	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the environmental

performance of the supply chain											performance of the supply chain

Please explain why:

2.1.9 The business model can…

Decrease the social performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the social performance of the supply chain

Please explain why:

2.1.10 The business model can…

Undermine the cultural identity of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Reinforce the cultural identity of the supply chain

Please explain why:

Opportunities-Threats

2.2.1 Agricultural policies…

Are a barrier for the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

2.2.2 National legislation…

Puts obstacles to the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Creates opportunities for the implementation of the business model

Please explain why:

2.2.3 Academic/research/policy institutes…

Are not ready to support the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are ready to support the business model

Please explain why:

2.2.4 The economic conditions in the country…

Impede the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

2.2.5 Technology development…

Impedes the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitates the implementation of the business model

Please explain why:

2.2.6 The competition in the agrifood sector…

Is an obstacle for the exploitation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Can fortify the exploitation of the business model

Please explain why:

2.2.7 The change of consumers' mindsets…

Jeopardizes the success of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Puts the basis for the success of the business model

Please explain why:

2.2.8 Societal actors and communities…

Are expected to criticize the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are expected to support the business model

Please explain why:

2.2.9 The public acceptance of the business model…

Is expected to be low	-5	-4	-3	-2	-1	0	1	2	3	4	5	Is expected to be high

Please explain why:

2.2.10 Possible funding opportunities…

Are limited	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are many

Please explain why:

Business model 3:

Developing responsible marketing schemes through digital solutions in short food supply chains

The central premise of the third business model is that the value emerging from the distribution of products within short food supply chains has to improve the well-being of farmers, consumers, and society as a whole. Therefore, the model aims to reduce any significant negative effect of short food supply chains' performance by simultaneously increasing the positive impacts of these schemes.

A responsible supply chain approach is based on the tetraptych: anticipation, reflexivity, inclusion, and responsiveness. A **digital platform** connecting producers and consumers will serve as an open space for anticipating the potential impacts of **digital innovations** on the well-being of farmers and buyers participating in short supply chains, as well as of the broader communities to which they belong. After evaluating the impacts through an open and inclusive process, members of the participating supply chains will adopt those innovations that better suit their needs, respect their cultural backgrounds, offer a fair income to farmers, and ensure the increase/mitigation of positive/negative societal and environmental impacts. The platform will continue its operation, hosting up-to-date data on supply chains' social, environmental, and economic performance, thus ensuring transparent relations among farmers and consumers. Hence, the platform will serve as a public space for reflecting upon the innovation process through monitoring activities and public negotiation. Responsive actions will be taken to correct innovation paths when needed.

Below, you can see some statements referring to the model described above. Please, circle the number which best reflects your opinion.

Strengths-Weaknesses

3.1.1 The business model is…

Incompatible with the specific supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Compatible with the specific supply chain

Please explain why:

3.1.2 Farmers…

Do not have the expertise to exploit the digital solutions	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the expertise needed to exploit the digital solutions

Please explain why:

3.1.3 The specific supply chain is…

Not ready to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Ready to adopt the business model

Please explain why:

3.1.4 The nodes of the specific supply chain…

Will have collaboration problems due to the new business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Will collaborate more effectively after adopting the new business model

Please explain why:

3.1.5 The actors participating in the specific supply chain…

Do not have the experience needed to exploit the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the experience needed to exploit the business model

Please explain why:

3.1.6 The actors participating in the specific supply chain…

Are not willing to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are willing to adopt the business model

Please explain why:

3.1.7 The business model can…

Decrease the economic performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the economic performance of the supply chain

Please explain why:

3.1.8 The business model can…

Decrease the environmental performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the environmental performance of the supply chain

Please explain why:

3.1.9 The business model can…

Decrease the social performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the social performance of the supply chain

Please explain why:

3.1.10 The business model can…

Undermine the cultural identity of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Reinforce the cultural identity of the supply chain

Please explain why:

Opportunities-Threats

3.2.1 Agricultural policies…

Are a barrier for the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

3.2.2 National legislation…

Puts obstacles to the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Creates opportunities for the implementation of the business model

Please explain why:

3.2.3 Academic/research/policy institutes…

Are not ready to support the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are ready to support the business model

Please explain why:

The PRIMA programme is an Art. 185 initiative supported and founded under Horizon 2020, the European Union's Framework Programme for Research and Innovation

3.2.4 The economic conditions in the country…

Impede the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

3.2.5 Technology development…

Impedes the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitates the implementation of the business model

Please explain why:

3.2.6 The competition in the agrifood sector…

Is an obstacle for the exploitation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Can fortify the exploitation of the business model

Please explain why:

3.2.7 The change of consumers' mindsets…

Jeopardizes the success of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Puts the basis for the success of the business model

Please explain why:

3.2.8 Societal actors and communities…

Are expected to criticize the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are expected to support the business model

Please explain why:

3.2.9 The public acceptance of the business model…

Is expected to be low	-5	-4	-3	-2	-1	0	1	2	3	4	5	Is expected to be high

Please explain why:

3.2.10 Possible funding opportunities…

Are limited	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are many

Please explain why:

Questionnaire B – Export-oriented supply chains

General information

1. Country (circle the answer that best applies to you)

Italy	1
France	2
Morocco	3
Egypt	4
Greece	5

2. Area of expertise

3. Gender (circle the answer that best applies to you)

Man	1
Woman	2

4. Age (circle the answer that best applies to you)

<20	1
21-40	2
41-60	3
>60	4

5. Level of education (circle the answer that best applies to you)

Some schooling	1
Primary education	2
Secondary education	3
Post-secondary education	4

Tertiary education	5

Instructions

Below you can see descriptions of three business models that can be applied to export-oriented supply chains. After carefully reading each model, please answer the questions that follow.

Tick the box that best describes your opinion of the numbered statements.

For the open-ended questions, please try to explain the reason behind your response.

Business model 4:

Digitally-enabled management of export-oriented supply chains

A bundle of innovative **digital solutions** will be developed to improve the managerial dimensions of export-oriented supply chains. The basis of that bundle will be a **digital platform** for exchanging information between nodes of the supply chains (farmers, processors, exporters, transportation companies, wholesalers, retailers, consumers). Information about the quantities and the quality of the products can be stored in the platform, and relationships between quality, price, and demand can be extracted. Hence, actors can make informed decisions concerning the distribution channels and strategies they are following, the amounts of products to be sold/purchased in and for different markets, and the responses on the part of consumers under varying situations and for different product characteristics. By offering actors the ability to access information on consumers' acceptance of the distributed products and their price sensitivity, the platform will serve as a tool for improving the effectiveness of the management within supply chains.

Below, you can see some statements referring to the business model described above. Please, circle the number which best reflects your opinion.

Strengths-Weaknesses

4.1.1 The business model is…

Incompatible with the specific supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Compatible with the specific supply chain

Please explain why:

4.1.2 Farmers…

Do not have the expertise to exploit the digital solutions	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the expertise needed to exploit the digital solutions

Please explain why:

4.1.3 The specific supply chain is…

Not ready to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Ready to adopt the business model

Please explain why:

4.1.4 The nodes of the specific supply chain…

Will have collaboration problems due to the new business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Will collaborate more effectively after adopting the new business model

Please explain why:

4.1.5 The actors participating in the specific supply chain…

Do not have the experience needed to exploit the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the experience needed to exploit the business model

Please explain why:

4.1.6 The actors participating in the specific supply chain…

Are not willing to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are willing to adopt the business model

Please explain why:

4.1.7 The business model can…

Decrease the economic performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the economic performance of the supply chain

Please explain why:

4.1.8 The business model can…

Decrease the environmental performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the environmental performance of the supply chain

Please explain why:

4.1.9 The business model can…

Decrease the social performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the social performance of the supply chain

Please explain why:

4.1.10 The business model can…

Undermine the cultural identity of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Reinforce the cultural identity of the supply chain

Please explain why:

Opportunities-Threats

4.2.1 Agricultural policies…

Are a barrier for the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

4.2.2 National legislation…

Puts obstacles to the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Creates opportunities for the implementation of the business model

Please explain why:

The PRIMA programme is an Art. 185 initiative supported and founded under Horizon 2020, the European Union's Framework Programme for Research and Innovation

4.2.3 Academic/research/policy institutes…

Are not ready to support the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are ready to support the business model

Please explain why:

4.2.4 The economic conditions in the country…

Impede the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

4.2.5 Technology development…

Impedes the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitates the implementation of the business model

Please explain why:

4.2.6 The competition in the agrifood sector…

Is an obstacle for the exploitation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Can fortify the exploitation of the business model

Please explain why:

4.2.7 The change of consumers' mindsets…

Jeopardizes the success of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Puts the basis for the success of the business model

Please explain why:

4.2.8 Societal actors and communities…

Are expected to criticize the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are expected to support the business model

Please explain why:

4.2.9 The public acceptance of the business model…

Is expected to be low	-5	-4	-3	-2	-1	0	1	2	3	4	5	Is expected to be high

Please explain why:

4.2.10 Possible funding opportunities…

Are limited	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are many

Please explain why:

Business model 5:

Platforming for increasing the economic performance of export-oriented supply chains

The core of the business model is a **digital platform** in which actors participating in export-oriented supply chains will voluntarily add financial data. User-friendly applications will help small-scale actors (who do not always have the expertise needed to design and perform proper economic plans) make sense of the economic performance of their enterprises and understand factors that increase costs, reduce profits, and decrease the efficient exploitation of resources.

In addition, actors can add content to the platform, exchanging information related to their partners' performance, thus allowing others to compare potential collaborators and make better decisions. The user-generated content of the platform can be available to all users or only to those being authenticated, thus preventing unsubstantiated evaluations. The process is expected to strengthen the exchange of transparent information among supply chain actors, facilitating, in parallel, the reorganization of supply chains.

Below, you can see some statements referring to the business model described above. Please, circle the number which best reflects your opinion.

Strengths-Weaknesses

5.1.1 The business model is…

Incompatible with the specific supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Compatible with the specific supply chain

Please explain why:

5.1.2 Farmers…

Do not have the expertise to exploit the digital solutions	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the expertise needed to exploit the digital solutions

Please explain why:

5.1.3 The specific supply chain is…

Not ready to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Ready to adopt the business model

Please explain why:

5.1.4 The nodes of the specific supply chain…

Will have collaboration problems due to the new business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Will collaborate more effectively after adopting the new business model

Please explain why:

5.1.5 The actors participating in the specific supply chain…

Do not have the experience needed to exploit the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the experience needed to exploit the business model

Please explain why:

5.1.6 The actors participating in the specific supply chain…

Are not willing to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are willing to adopt the business model

Please explain why:

5.1.7 The business model can…

Decrease the economic performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the economic performance of the supply chain

Please explain why:

5.1.8 The business model can…

Decrease the environmental	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the environmental

performance of the supply chain											performance of the supply chain

Please explain why:

5.1.9 The business model can…

Decrease the social performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the social performance of the supply chain

Please explain why:

5.1.10 The business model can…

Undermine the cultural identity of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Reinforce the cultural identity of the supply chain

Please explain why:

Opportunities-Threats

5.2.1 Agricultural policies…

Are a barrier for the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

5.2.2 National legislation…

Puts obstacles to the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Creates opportunities for the implementation of the business model

Please explain why:

5.2.3 Academic/research/policy institutes…

Are not ready to support the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are ready to support the business model

Please explain why:

The PRIMA programme is an Art. 185 initiative supported and founded under Horizon 2020, the European Union's Framework Programme for Research and Innovation

5.2.4 The economic conditions in the country…

Impede the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

5.2.5 Technology development…

Impedes the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitates the implementation of the business model

Please explain why:

5.2.6 The competition in the agrifood sector…

Is an obstacle for the exploitation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Can fortify the exploitation of the business model

Please explain why:

5.2.7 The change of consumers' mindsets…

Jeopardizes the success of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Puts the basis for the success of the business model

Please explain why:

5.2.8 Societal actors and communities…

Are expected to criticize the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are expected to support the business model

Please explain why:

5.2.9 The public acceptance of the business model…

Is expected to be low	-5	-4	-3	-2	-1	0	1	2	3	4	5	Is expected to be high

Please explain why:

5.2.10 Possible funding opportunities…

Are limited	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are many

Please explain why:

Business model 6:

Enabling primary and secondary value creation in export-oriented supply chainsthrough certification and digitalization

A **certification scheme** that guarantees compliance with environmental, ethical, cultural, and social standards will be developed. Actors participating in export-oriented supply chains will voluntarily adopt the certification scheme. Data on actors' environmental, ethical, cultural, and social performance will be stored in a **digital platform**, offering potential partners and customers the capability to understand the contribution of each actor in achieving sustainable goals.

The platform will also be used as a tool for storing information related to the way of doing business, like management decisions (e.g., ways of choosing partners and/or distribution channels), relational data (levels of loyalty, repeated purchases), and data on the quantities and qualities of products sold. This way, the platform will serve a dual purpose: on the one hand, it will be a tool enabling actors to monitor their performance; on the other hand, it will facilitate their compliance with environmental, ethical, cultural, and social standards. Hence, the platform will become an enabler of primary and secondary value creation.

Below, you can see some statements referring to the business model described above. Please, circle the number which best reflects your opinion.

Strengths-Weaknesses

6.1.1 The business model is…

Incompatible with the specific supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Compatible with the specific supply chain

Please explain why:

6.1.2 Farmers…

Do not have the expertise to exploit the digital solutions	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the expertise needed to exploit the digital solutions

Please explain why:

6.1.3 The specific supply chain is…

Not ready to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Ready to adopt the business model

Please explain why:

6.1.4 The nodes of the specific supply chain…

Will have collaboration problems due to the new business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Will collaborate more effectively after adopting the new business model

Please explain why:

6.1.5 The actors participating in the specific supply chain…

Do not have the experience needed to exploit the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the experience needed to exploit the business model

Please explain why:

6.1.6 The actors participating in the specific supply chain…

Are not willing to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are willing to adopt the business model

Please explain why:

6.1.7 The business model can…

Decrease the economic performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the economic performance of the supply chain

Please explain why:

6.1.8 The business model can…

Decrease the environmental performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the environmental performance of the supply chain

Please explain why:

6.1.9 The business model can…

Decrease the social performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the social performance of the supply chain

Please explain why:

6.1.10 The business model can…

Undermine the cultural identity of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Reinforce the cultural identity of the supply chain

Please explain why:

Opportunities-Threats

6.2.1 Agricultural policies…

Are a barrier for the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

6.2.2 National legislation…

Puts obstacles to the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Creates opportunities for the implementation of the business model

Please explain why:

6.2.3 Academic/research/policy institutes…

Are not ready to support the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are ready to support the business model

Please explain why:

The PRIMA programme is an Art. 185 initiative supported and founded under Horizon 2020, the European Union's Framework Programme for Research and Innovation

6.2.4 The economic conditions in the country…

Impede the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

6.2.5 Technology development…

Impedes the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitates the implementation of the business model

Please explain why:

6.2.6 The competition in the agrifood sector…

Is an obstacle for the exploitation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Can fortify the exploitation of the business model

Please explain why:

6.2.7 The change of consumers' mindsets…

Jeopardizes the success of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Puts the basis for the success of the business model

Please explain why:

6.2.8 Societal actors and communities…

Are expected to criticize the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are expected to support the business model

Please explain why:

6.2.9 The public acceptance of the business model…

Is expected to be low	-5	-4	-3	-2	-1	0	1	2	3	4	5	Is expected to be high

Please explain why:

6.2.10 Possible funding opportunities…

Are limited	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are many

Please explain why:

Questionnaire C – Green public procurement

General information

1. Country (circle the answer that best applies to you)

Italy	1
France	2
Morocco	3
Egypt	4
Greece	5

2. Area of expertise

3. Gender (circle the answer that best applies to you)

Man	1
Woman	2

4. Age (circle the answer that best applies to you)

<20	1
21-40	2
41-60	3
>60	4

5. Level of education (circle the answer that best applies to you)

Some schooling	1
Primary education	2
Secondary education	3
Post-secondary education	4

Tertiary education	5

Instructions

Below you can see descriptions of three business models that can be applied to green public procurement schemes. After carefully reading each model, please answer the questions that follow.

Tick the box that best describes your opinion of the numbered statements.

For the open-ended questions, please try to explain the reason behind your response.

Business model 7:

Connecting farmers to the public sector through digital platforms and voluntary certification schemes

To ensure the environmentally friendly character of the production and distribution within green public procurement, relevant voluntary **certification schemes** will be developed/adopted. Farmers and other actors involved in the supply of food products to the public sector will develop or choose a certification system that will emphasize: (i) the production and distribution of food products with a focus on the mitigation of environmental footprint and the reduction of climate change impacts, (ii) the use of green and energy-saving practices during production and distribution of products, (iii) the promotion of ethical consumption on the part of the public sector, (iv) the reduction of food waste, (v) the fair distribution of value among the participating actors (i.e., the assurance of a fair income for farmers and fair prices for the public sector, the compliance with specific safety standards), (vi) the acceptance of and commitment to "ethical competition" rules.

A **digital platform** will be used to store information on product quality, public sector needs, and their evolution over time. Through the platform, certified producers will asynchronously communicate with public organizations, which can add information on their present and future needs. Hence, the platform will serve as a space for connecting certified farmers (and other supply chain actors, like transporters) with public organizations.

Below, you can see some statements referring to the business model described above. Please, circle the number which best reflects your opinion.

Strengths-Weaknesses

7.1.1 The business model is…

Incompatible with the specific supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Compatible with the specific supply chain

Please explain why:

7.1.2 Farmers…

Do not have the expertise to exploit the digital solutions	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the expertise needed to exploit the digital solutions

Please explain why:

7.1.3 The specific supply chain is…

Not ready to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Ready to adopt the business model

Please explain why:

7.1.4 The nodes of the specific supply chain…

Will have collaboration problems due to the new business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Will collaborate more effectively after adopting the new business model

Please explain why:

7.1.5 The actors participating in the specific supply chain…

Do not have the experience needed to exploit the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the experience needed to exploit the business model

Please explain why:

7.1.6 The actors participating in the specific supply chain…

Are not willing to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are willing to adopt the business model

Please explain why:

7.1.7 The business model can…

Decrease the economic performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the economic performance of the supply chain

Please explain why:

7.1.8 The business model can…

Decrease the environmental performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the environmental performance of the supply chain

Please explain why:

7.1.9 The business model can…

Decrease the social performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the social performance of the supply chain

Please explain why:

7.1.10 The business model can…

Undermine the cultural identity of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Reinforce the cultural identity of the supply chain

Please explain why:

Opportunities-Threats

7.2.1 Agricultural policies…

Are a barrier for the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

7.2.2 National legislation…

Puts obstacles to the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Creates opportunities for the implementation of the business model

Please explain why:

7.2.3 Academic/research/policy institutes…

Are not ready to support the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are ready to support the business model

Please explain why:

7.2.4 The economic conditions in the country…

Impede the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

7.2.5 Technology development…

Impedes the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitates the implementation of the business model

Please explain why:

7.2.6 The competition in the agrifood sector…

Is an obstacle for the exploitation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Can fortify the exploitation of the business model

Please explain why:

7.2.7 The change of consumers' mindsets…

Jeopardizes the success of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Puts the basis for the success of the business model

Please explain why:

7.2.8 Societal actors and communities…

Are expected to criticize the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are expected to support the business model

Please explain why:

7.2.9 The public acceptance of the business model…

Is expected to be low	-5	-4	-3	-2	-1	0	1	2	3	4	5	Is expected to be high

Please explain why:

7.2.10 Possible funding opportunities…

Are limited	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are many

Please explain why:

Business model 8:

Responsible green public procurement

The final business model points out the need to ensure that green public procurement schemes have a value that extends beyond their limits, positively impacting society. In this vein, a responsible green public procurement model will be developed to reduce the potential negative side effects of green public procurement schemes and enhance their positive impacts. Since that scheme is green by nature and, consequently, dedicated to reducing the environmental externalities of food production and distribution to public organizations, the emphasis turns to ethically, culturally, and socially responsible public procurement.

The basis of the model is a **digital platform** that will serve as a space for proposing, forming, and adopting **digital innovations,** which, after a public negotiation process, will be selected as tools that can help farmers, public organizations, and actors participating in the scheme meeting relevant standards. Depending on the national legislation and the available resources, farmers and public organizations can develop a relevant **certification scheme** (e.g., Responsible Green Public Procurement), setting forth clear rules for both ends of the chain. While adopting digital innovations aiming at improving the economic, managerial, relational, and organizational performance of green public procurement, actors will continue to take responsive actions when needed and collaboratively develop solutions to emerging problems, taking into consideration the societal well-being and the wealth of local communities.

Below, you can see some statements referring to the business model described above. Please, circle the number which best reflects your opinion.

Strengths-Weaknesses

8.1.1 The business model is…

Incompatible with the specific supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Compatible with the specific supply chain

Please explain why:

8.1.2 Farmers…

Do not have the expertise to exploit the digital solutions	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the expertise needed to exploit the digital solutions

Please explain why:

8.1.3 The specific supply chain is…

Not ready to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Ready to adopt the business model

Please explain why:

8.1.4 The nodes of the specific supply chain…

Will have collaboration problems due to the new business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Will collaborate more effectively after adopting the new business model

Please explain why:

8.1.5 The actors participating in the specific supply chain…

Do not have the experience needed to exploit the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Have the experience needed to exploit the business model

Please explain why:

8.1.6 The actors participating in the specific supply chain…

Are not willing to adopt the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are willing to adopt the business model

Please explain why:

8.1.7 The business model can…

Decrease the economic performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the economic performance of the supply chain

Please explain why:

8.1.8 The business model can…

Decrease the environmental performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the environmental performance of the supply chain

Please explain why:

8.1.9 The business model can…

Decrease the social performance of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Increase the social performance of the supply chain

Please explain why:

8.1.10 The business model can…

Undermine the cultural identity of the supply chain	-5	-4	-3	-2	-1	0	1	2	3	4	5	Reinforce the cultural identity of the supply chain

Please explain why:

Opportunities-Threats

8.2.1 Agricultural policies…

Are a barrier for the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

8.2.2 National legislation…

Puts obstacles to the proposed business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Creates opportunities for the implementation of the business model

Please explain why:

8.2.3 Academic/research/policy institutes…

Are not ready to support the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are ready to support the business model

Please explain why:

8.2.4 The economic conditions in the country…

Impede the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitate the implementation of the business model

Please explain why:

8.2.5 Technology development…

Impedes the implementation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Facilitates the implementation of the business model

Please explain why:

8.2.6 The competition in the agrifood sector…

Is an obstacle for the exploitation of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Can fortify the exploitation of the business model

Please explain why:

8.2.7 The change of consumers' mindsets…

Jeopardizes the success of the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Puts the basis for the success of the business model

Please explain why:

8.2.8 Societal actors and communities…

Are expected to criticize the business model	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are expected to support the business model

Please explain why:

8.2.9 The public acceptance of the business model…

Is expected to be low	-5	-4	-3	-2	-1	0	1	2	3	4	5	Is expected to be high

Please explain why:

8.2.10 Possible funding opportunities…

Are limited	-5	-4	-3	-2	-1	0	1	2	3	4	5	Are many

Please explain why: