

Strategies for sustainable farming: an overview of theories and practices

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Abstract: (maximum 250 words)

The paper aims at developing a conceptual framework for the analysis of primary producer's strategies through the creation of three inventories of the conditions in which they operate, of the possible strategies they can implement, and of the related performances. The inventories and the description of the decision-making process are based on a literature review in which contribution from different research fields are gathered.

Starting from the Porters' model for farm competitiveness (Porter, 1998), farms' internal characters and eight groups of external conditions are identified. The former are gathered into two components: the "Farm" (assets and other elements of the farm as a structure and business, like core business, location, logistics, land, technology); and the "Household" (elements characterising the farmers' household context, like off-farm income sources, familiar composition and needs). External conditions are referred to the whole farms' business environment. They are grouped as follows: Factors, Demand, Regulation & Policy, Finance and risk management, Technological, Socio-institutional, Socio-demographic, Ecological. Then, strategies types are listed, ranging from risks-management contracts to financialisation, from diversification to networking, from multifunctionality to part-time farming. Finally, performances types are identified, ranging from the business-oriented ones to the ones focused on households' welfare and to the broader environmental and social impacts.

This framework can be used as a starting point for the analysis of the complex relations between conditions, strategies and performances characterised by time lags and feedbacks, and to explore opportunities towards producers' sustainability.

1. Introduction

The paper explores primary producers' pathways towards sustainability through a comprehensive inventory of the conditions in which they operate, the strategies they implement and the subsequent performances, which in turn affect farmers' conditions. The work relies on a literature review aiming at integrating rural studies, rural sociology and agricultural economics literature. It aims at providing a conceptual framework for the analysis of primary producers' development trajectories, in relation to the conditions they have to deal with.

In our setting, conditions refer to the whole farms' business environment influencing farmers' behaviours. Strategies are meant to cover the range of actions consciously adopted by the producers in order to achieve given performances with an expected effect on the farm trajectory. Absence of actions, i.e. acceptance of the current states or trends, is also considered as a strategy. The consequences derived from the strategies (that can be also unintended or unexpected) which are relevant for the farm's sustainability are identified as performances. Hence, a reference concept in our work is sustainability: strategies will be identified and described in their aim to contribute to a sustainable development trajectory, first for the farm but also for the farming system as a whole.

The use of this concept is twofold. First, we refer to sustainable finance. As economic agents, primary producers aim at generating a sufficient amount of income, but their financial conditions are highly dependent on public and private actors, such as government regulators (including the EU's agricultural and fisheries policies), the financial sector, suppliers, the food industry, retailers, etc. Second, we refer to the multi-scaling and multi-dimensional notion of sustainable agriculture and fisheries. To deal with it, we rely upon the classic definition of sustainable development as "the capability to achieve today's goals without compromising the future capacity to achieve them" (UN 1987, statement 27).

The concept of "primary producer" is another key element of the framework, which follows a producer-centred approach. Since the decision-making process is at the core of our analysis, by "producer" we refer to the decision maker at the firm level (the firm being an agricultural farm, an aquaculture farm or a fishing company). In other words we refer to any person (or group of persons) who takes substantial decisions regarding the farm management.

Through a producer-centred approach the conditions' impacts on individual strategies selection and implementation can be visualised and organised, to be then assessed case by case through specific researches. This does not deny the relevance of other higher levels of analysis (sector, territory, food-system) where "emergent" features and processes can be highlighted. However, even in this micro approach, those emerging elements (like for example Marshallian economies, or environmental degradation processes) are accounted for, as long as they influence producers' strategies and performances, as it will be shown in the following.

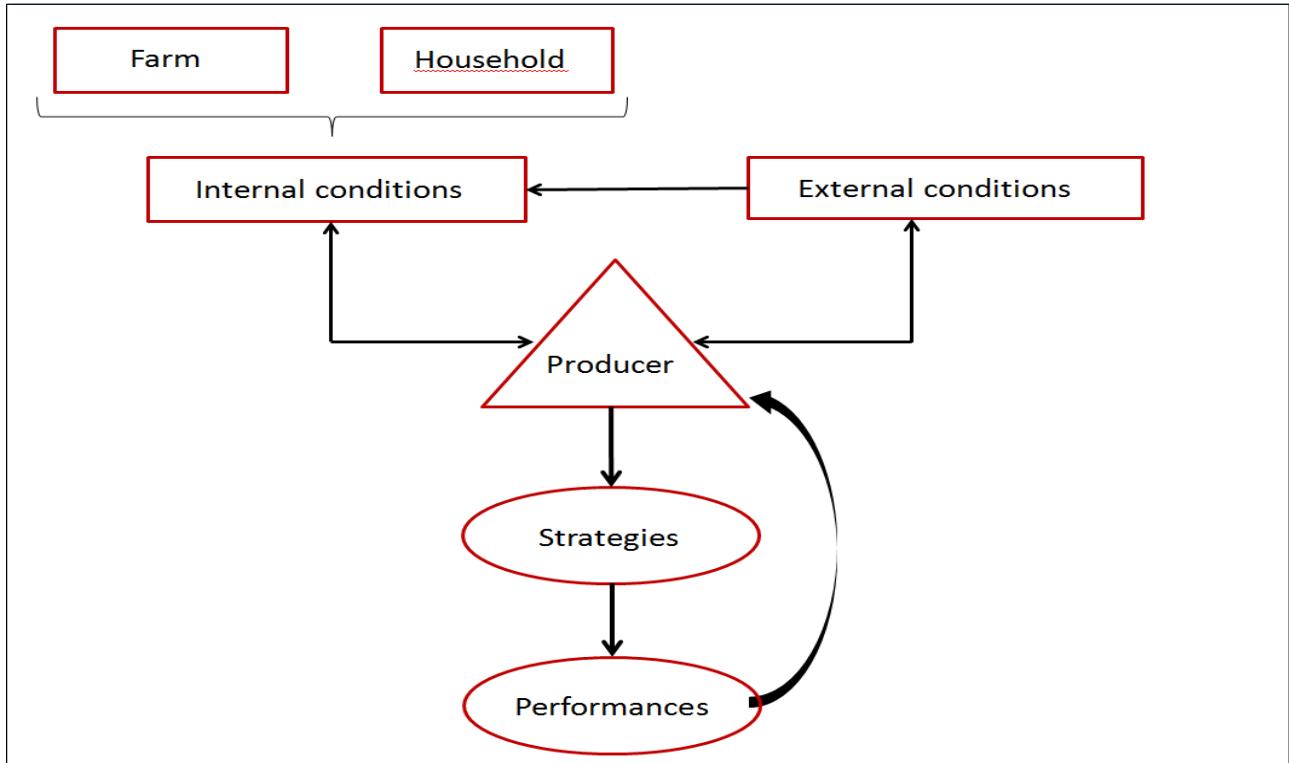
The second section develops the canvas of conditions, strategies and performances (CSP), whereas the last section summarises the outcomes and open the way to possible uses of the framework.

2. Conditions, strategies, performances

2.1. The decision-making process

The choice of a CSP approach is explained by our aim to unpack the producer's decision-making process, summarized in Figure 1. The central element is the primary producer described above, who reacts to internal and external conditions according to his own characteristics. Internal conditions are composed of characteristics of the farm and the household the producer belongs to, while external conditions are the external environment constraining producer's decision-making. Actions and strategies adopted in response to those conditions lead to performances, whose observation might incentivise the producer to recalibrate his reactions to conditions. The producer has a role on shaping the internal conditions; besides, he can also influence, to a minor extent, the external ones.

Figure 1 - Producers' decision-making process



Following a producer-centred approach we aim at understanding how different individuals react to different conditions with different strategies. Producers' internal characteristics encompass, among others, capabilities, attitudes, beliefs, social and human capital, values and preferences. Hence, the producer is not reduced to its "economic agent" facet that takes decisions based on rational thinking, but is enlarged in order to consider social and cultural aspects that may influence the decision-making process.

Yet, only a reduced share of the conditions with a current or potential influence on the farm system are actually perceived by the producers, who are limited in their capacity to perceive, observe, and interpret messages from outside.

A wide range of individual-based psychological, cultural and social characters are said to influence producers' decisions and strategies, like for example education (McDowell and Sparks, 1989; Wilson, 1996), succession status (Potter and Lobley, 1996), age and length of residency (Wilson, 1996). More abstract categories like values, beliefs and mental models are quite complex concepts, whose semantic richness is well summarized by Mills et al (2013).

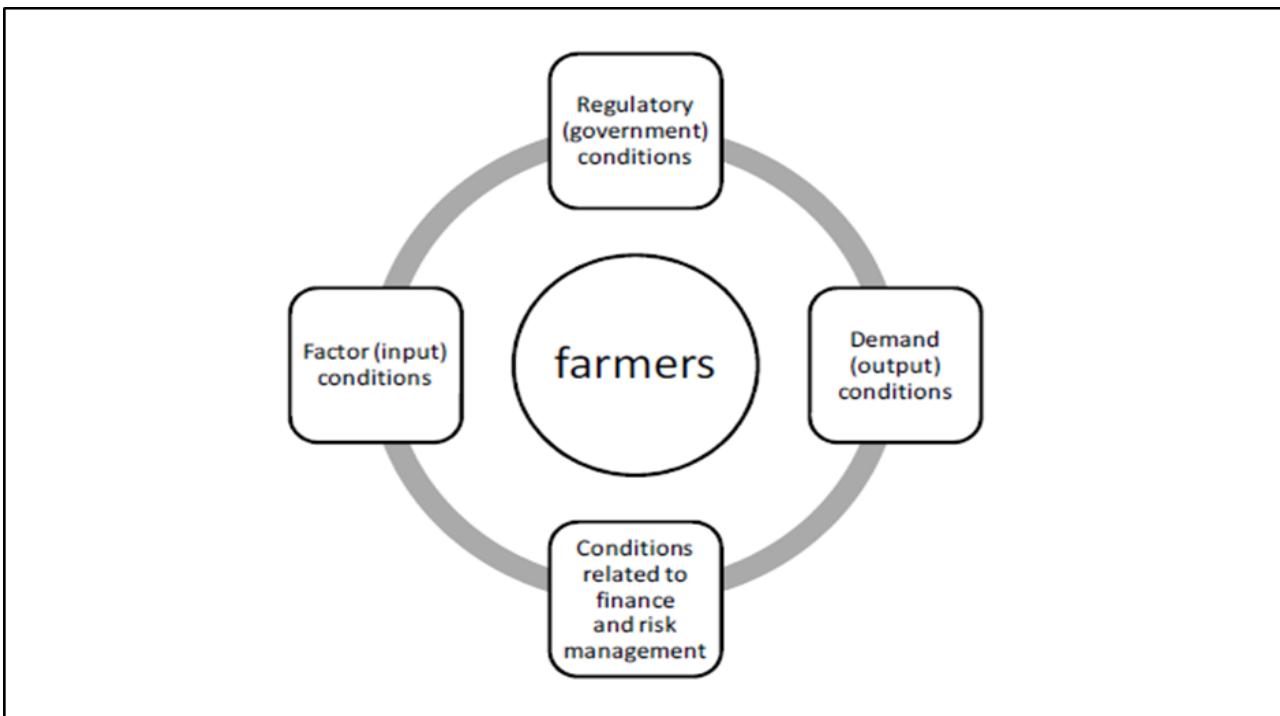
The nature of the interaction between conditions and producer's characteristics lies in what the literature calls "attitudes". The definition of attitudes best suited to be adopted in the analysis of the relation between conditions and strategies is probably given by Ahnstrom et al. (2008), who define "attitude" as a readiness to act, or a mindset that is used by an actor to act and judge in situations of decision-making. The attitude vis-à-vis risk is exemplary in this sense.

2.2. Conditions

Internal conditions

To understand decision making process we start by the identification of the farm's internal conditions. To do so, we rely on an adapted version of a model developed by Porter (1998) that describes the relevant elements to farms' competitiveness.

Figure 2 - Multidimensional framework (Porter 1998, adapted)



The five elements will be disaggregated and adapted to design a model covering the multi-dimensional context in which producers' decision-making processes take place. Internal conditions correspond to the central element of the adapted Porter's framework, i.e. "farmers", renamed as "farm box".

We do not mean to confine the analysis into a reductionist representation of the farm as the sum of its components, neither we consider the farm box as an isolated element immersed in an "external" environment. Such a reductionist representation has been contested from various perspectives (Noe and Alrøe 2012; 2015). There is an increasing awareness of the limits of a representation in which elements are defined per se, in favour of a relational approach where they can only be understood within a certain relational pattern.

The farm box conceptualisation is linked to the Agricultural Household Model (AHM, Singh and Subramanian 1986) which underlines that family farming strategies are not only aimed at business-related objectives, but also at enhancing family welfare. The AHM builds on the assumption that production and consumption decisions cannot be seen separately when they are attributed to the same entity (Taylor and Adelman 2003). How to share the work, the trade-off between self-production and purchase of some goods, the choice between in-farm and off-farm employment, are examples of this interplay. A related feature is the role of farmland, which is not only a space and an asset for the production, but also a guarantee for credit access and an asset to be transmitted to the heirs (Marks-Bielska (2013). The consideration of this "household-focused" dimension is particularly relevant when an effective strategy in business terms reduces household wellbeing, leading to a "maladaptation" to changing conditions that negatively influences the quality of life (Cridge 2012).

Following the AHM, the farm box is a conjunction of two elements: "farm" and "household".

The "farm" represents all the assets, resources and organizational aspects of the farm business. The traditional elements are assets as land and machinery (the so-called "capital"). In line with those, relevant aspects of the endowment to be considered here are the anthropic (settlements, infrastructures, etc) and biophysical characteristics of the farm (soil, water, etc). Labour characteristics is obviously also part of the traditional variables internal to the farm, as well as investment-related characteristics such as credit opportunities, level of debt, sunk costs, scale of production. An important element to be considered here is the farm path dependency which influences the farm's capability to design and to implement new potential strategies. Hence, lock-in effects can also reside in the farm itself given the existence of sunk costs as well as technological and organisational constraining effects influencing the degree of path-dependency of the farm and its ability to adapt to new challenges.

The "household" accounts for the elements conditioning the decision-making process through the fact that the producer belongs to a family. Here are grouped, among others, household's values, interests and wellbeing. Gender composition is also relevant as both entrepreneurship and farming are stereotypically seen as a male domain and rural areas tend to be characterised by unequal power relations and uneven access to resources between men and women (Charatsari 2015). Yet, with the decline of core business incomes and the rise of multifunctional and part-time farming female work becomes more and more relevant for the household budget (Bock 2006).

External conditions

External conditions are the set of elements that cannot be shaped or substantially affected by the producer but that influence strategies (as long as they are perceived by the decision-makers) and performances. The distinction between internal and external conditions is neither always clear nor stable in time and requires an analysis of the specific case.

The inventory of external conditions can be described starting from the adapted Porter's scheme (Figure 2). However, the four groups of conditions surrounding the "farmer" in that scheme do not account for the whole environment in which the producer operates. Hence, we expand the map as shown in Figure 3.

Before describing each element contained in Figure 3 it is worth discussing the different dimensions along which those conditions may vary.

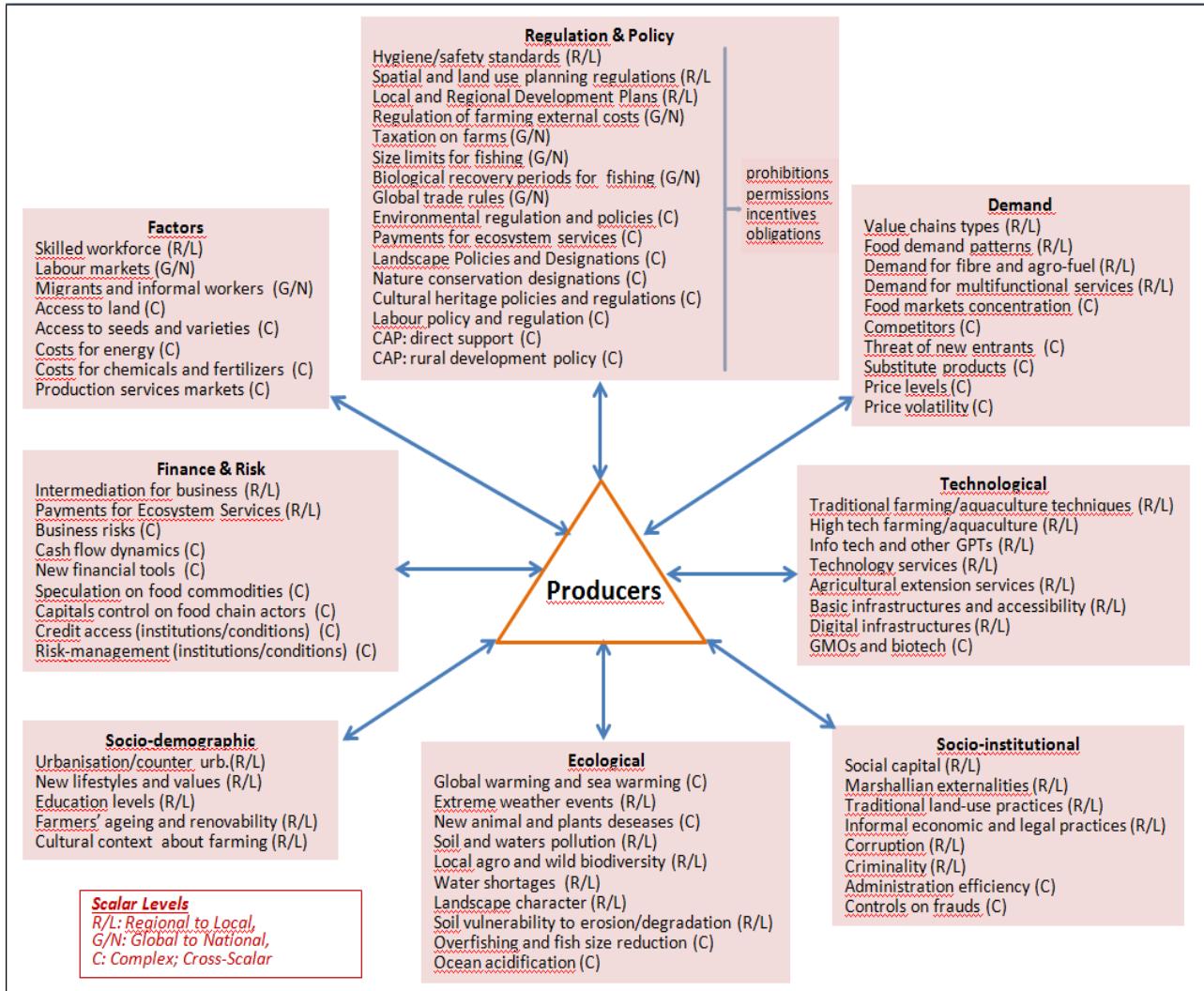
- Conditions vary with the politico-geographical level at which they are defined. Some conditions are relevant to the local level, others act at a national or even global scale. Yet, a univocal label can rarely be applied to each condition in this regard. Figure 3 contains a tentative identification of the most pertinent level for each condition, to be then assessed case by case. The geographical scale is also relevant for the consideration of producers' capability to influence its environment, which tends to be higher at the local/regional scale than at larger scales.
- Conditions' impacts on farms and their influence on producers' decision-making processes are sometimes direct, but they can also result from longer tortuous causal chains.
- Conditions change and to evolve over time. Some of them can be regarded as "stable" conditions, which define the current context of action; but in some cases what influences producers' choices are changing conditions (like a CAP reform, or global warming). In this case they represent shocks or stressors the producer has to face, as well as new opportunities.

When changes in the conditions are particularly deep and unexpected, they may result in a "trauma" or "traumatogenic change" (Sztompka 2004), which leads to a disorganization of the actor's representation of the world and to a consequent psychological and/or cultural disorientation. The re-organisation needed to cope with the traumas can be complex and not immediate.

These considerations lead to reconsider the scheme in dynamic terms. Following Porters' description of his diamond as a dynamic system (Porter 1991) it is possible to consider Figure 3 in terms of a set of mutually influencing conditions, in which one determinant depends on the state of others, and changes in some conditions influences others. For example, mobile factors (skilled workforce, specialised services) may tend to concentrate in certain areas where regulation, policies and infrastructures look promising. This can create a cumulative agglomeration effect which, in turn, may lead to negative consequences like costs raising and displacement of local actors. Farms' strategies and performances themselves, far from being confined within the farm borders, are also crucial elements of this dynamic vision.

Figure 3 shows a wide-ranging, yet not exhaustive, lists of external conditions and their mutual influence on producers' decisions. Obviously not all conditions are relevant for each and every contexts: the intensity of their influence varies according to geography and sector.

Figure 3 - External conditions



External conditions are aggregated into eight groups, briefly described below, yet not pretending to exhaustiveness.

The *Factors* box regards the conditions at which the farm can manage, that is, acquire, trade, land, use, the factors and assets used for its activities. Hence, this category describes the external conditions imposed to the factors used within the farm itself. In particular, the availability of those factors at the local/regional level is a key feature of the farms' business environment.

The *Demand* box represents the conditions influencing the demand for the goods and services the farm does (or could) produce or deliver. We refer first of all to the demand patterns for food, fiber, biofuel. We also consider the increasing demand for multifunctional and green services, that plays a fundamental role for farms' survival in many contexts, and that has been investigated by the literature on post-productionism (Wilson 2008), and rural development (Ploeg et al. 2000). Demand conditions go beyond the mere neo-classical perspective, to encompass the differences between value chain typologies (Gereffi et al. 2005) and their effects on power relations and the distribution of value added. To better describe demand markets conditions in dynamic terms, three elements derived from Porters' analysis of the forces shaping competitive business environments are also considered: competitors, threat of new entrants, threat of substitute products/services (Porter 1979). Bargaining power by suppliers and customers are accounted for by the analysis of value chain types.

Regulation & Policy issues relate to various areas of concern, which sometimes overlap. Farmers have to comply with many regulations defined at different institutional levels and acting on several aspects of business management, such as labour, land use, trade rules, environmental impacts. However, agricultural policy also tremendously facilitate farmer's work given the huge financial help it provides. As far as the fishing sector is

concerned, regulation is particularly relevant given the need for well-defined property rights in order to avoid over-fishing and to preserve the biological recovery circle. Furthermore, incentivizing primary producers to contribute to ecosystem services provision (Guthman 2007) is another field of intervention for regulations and policies.

Finance and risk markets play a decisive role in producers' sustainability. First, this role takes the form of credit provision. As argued by Benjamin et al. (2002) different credit markets structures have significant effects on farms' investments decisions. Second and at a broader level, the financialisation of the agro-food sector is observed and defined by Magnan (2015, p.1) as "the process whereby finance capital and financial logics exercise increasing influence over food production and distribution". In the same vein, Burch and Lawrence (2013) describe the increasing control by finance capital over the retail sector, and Clapp (2014) analyses its implications for food policy. Third, risk management is a key aspects of farming. Authors like Hardaker et al. (1997), Pennings and Leuthold (2000), Meuwissen et al. (2001), Bergfjord (2007) analyse the risks associated to the primary sector and the related forms of insurance, risk-shifting or risk-sharing contracts.

Technology is a major issue to discuss in relation to changing business environment and farm development trajectories. Technological conditions refer here to the continuously evolving array of technological devices and methods available in that context. Available technology will then be adopted or not according to farm's sectors, sizes, skills, budgets, and attitudes. Traditional technologies and skills should also be considered as relevant factors in themselves (when they are still applied) and as part of the farm context). Access to technology has a territorial dimension (availability on the area of technological services and products), yet less relevant for web-based innovation. Innovation adoption should not be seen as a linear unidirectional process: farms adapt technologies to their characters and context. In doing so, they create new knowledge and technology.

Socio-institutional factors account for social elements embedded in formal and informal institutions with a strong spatial dimension. Among the key features we can mention public administration efficiency, social capital (also in terms of networks and attitudes to cooperation) and - in some areas - the presence of corruption and criminality. Agglomeration, or "Marshallian", externalities describe the beneficial effects that spatial concentration of production brings to the firms in that location (for example in terms of knowledge spillover and of availability of specialised workers and suppliers). As mentioned with regard to the technological conditions, a co-evolutionary perspective grasps a key aspect of farms' interaction with their socio-institutional context: the capability they have to encourage the development of institutions capable to support their needs. The Window of Locational Opportunity approach (Scott and Storper 1987) underlines how "industries have the capability to generate or attract their own conditions of growth: new industries produce space through their own growth and development in places" (Borschma 2007, p.43).

Socio-demographic trends' role is relevant yet often indirect, since demographic and lifestyles changes are relevant for the farms as long as they influence their market and regulatory context. For example, urbanisation or counter-urbanisation trends may influence land prices, whereas migrations have an impact on job availability and costs. On the other side of the chain, new social expectations on food (asked to be local, organic, fairly traded, etc.) and farms (expected to preserve agro and marine ecosystems, to protect the landscape, to provide green spaces and facilities for leisure time, etc) influence the demand producers have to meet or can profit of, as seen in the "Demand" box.

The *ecological* context in which the farm operates, in relations to the various geographical scales, influences farms strategies as it interferes with the eco-systemic and metabolic processes primary production relies upon. Fishery presents some specificities, as it is based on natural resources extraction (like hunting or mining) more than primary production is. Yet similarities prevails on differences: for example overfishing is a matter of excessive extraction, as well as, *mutatis mutandis*, intensive farming and overgrazing. The ecological context can also be read in terms of opportunities for the farm to develop new/green production methods and to deliver ecosystem services (Swinton et al. 2007), in a multifunctional perspective.

2.3 Strategies

Overall view

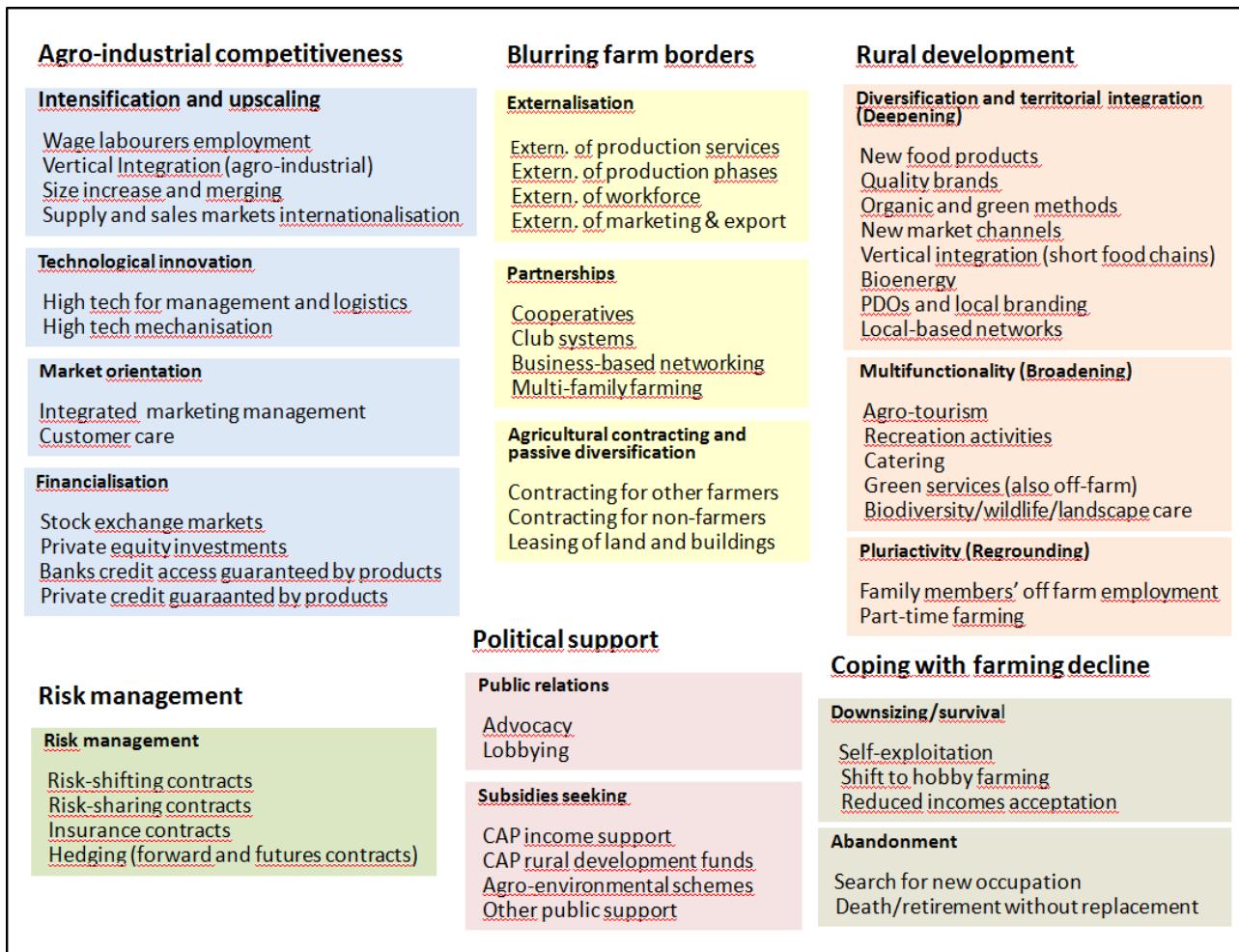
Producers select their strategies in specific multidimensional, multi-scale and evolving contexts. Yet, similar conditions do not necessarily lead to the choice of the same strategies for different producers. Understanding why similar contexts lead to different strategies requires in-depth case specific analysis.

Strategies range from the more farm- and farming-oriented, to others that involve off-farm (ex. shift to part-time farming) or extra-farming (ex. leasing of buildings) activities. As suggested by the AHM, they can be aimed at improving farms' business, as well as at enhancing households' welfare. From another perspective strategies can be aimed at avoiding or limiting the effects of potentially harmful changes but also at profiting of new opportunities. Resistance to change and adaptive renewal (Darnhofer 2010) are two poles, within which intermediate and cross-cutting strategies can be identified. The decision-making process often entails a choice between long term adaptive capacity to cope with stresses and shocks and short term profitability, as well as between adaptation and new development trajectories. Different strategies can certainly be alternative (as in the case of the choice between intensification and extensification). Yet in most of the cases they are not mutually exclusive. A producer may implement more than one action at the same time, as complementary aspects of a diversified development trajectory. Finally, most of the strategies can be implemented by a single farm, some others are collective (i.e. the creation of a territorial brand).

Several inventories of strategies have been suggested in the scientific literature, variously named (with slight different meaning) as "adaptation", "survival", "adjustment" and "development" strategies (Marsden et al. 1989, Munton 1990, Moran et al. 1993, Ilbery 2001, Evans 2009, Mills et al. 2013, Andrade 2015) and at various levels of aggregation. For the definition of this inventory, shown in Figure 4, we mainly referred the mentioned authors. The base was given by the classifications made by Moran et al. (1993) (six development paths classified according to the resources use), and Munton (1990) (seven elements of change in farms' adjustment strategies), that were updated following the more recent literature and better detailed with regard to the less pro-active and more survival-aimed strategies thanks to Andrade (2015). Each box describes one strategy that is below articulated in its various forms and tools.

Strategies are indicatively grouped according to their similarities in the harvesting/organisation/use of resources and/or main aims, in order to give a reader-friendly landscape of the possible strategies. These grouping is merely indicative, aimed at readiness and rapid appraisal of main strategies typologies.

Figure 4 - Farms' strategies groups



Description of strategies groups

Agro-industrial competitiveness

This first group of strategies is focused on three innovation levels: technology, marketing and finance, all elements which are relevant also in other types of strategy, but that are here considered in a classic industrial/market competition perspective. Some strategies aim at increasing competitiveness on the global agro-food markets, enlarging the business size in order to achieve a critical mass of budget and market shares and to profit of scale economies. Other strategies focus on market positioning and relations with customers. The so-called market orientation paradigm (Kohli and Jaworski 1990) expands the traditional scope of marketing activities to encompass the whole production process to be designed according to the activity of acquisition and use of information (marketing intelligence) about consumers' expectations. The last strategy type in this group is financialisation. In some sectors farms with certain requirements in terms of size, accountability, attractiveness, can harvest funds in the financial markets through asset management companies, private equity consortia or other financial instruments (Burch and Lawrence 2013) with processes that also influence the core business of the firm, with financial ends potentially prevailing on the productive ones.

Blurring farm borders

High tech and financialisation are not always the most appropriate or suitable solution, and size increase can even be counter-effective: in some contexts producers opt for a more flexible or efficient organisation of resources by focusing on some activities and externalising others, or by establishing strategic partnerships and networks. These strategies represent different ways to blur farm borders to increase efficiency and effectiveness. The choice between internal implementation and externalisation of parts of the farm labour

process is complex and rich of implications in terms of degree of specialisation, flexibility and resilience, relation between fix and variable costs and control on the processes. Due to asymmetric information (Hart, 1995); bounded rationality (Hobbs 2003) and ex-ante or ex-post opportunistic behaviour (Williamson, 2000), efficient strategies are chosen in function of associated transaction costs. If transactions were without costs, it would make little difference, at least in strictly economic terms, whether factors of production were purchased on the market or produced internally (Ventura and Milone 2004), and the same could be argued with regard to production phases.

Rural development

These strategies, often implemented in synergy with each other, represent the wave of re-grounding of farming into the territories and the re-valorisation of small scale and proximity. They range from the re-discovery of abandoned varieties to the adoption of environmentally friendly production methods, and extend their scope to cover a range of multifunctional activities and services that farms can provide for the consumers and the society as a whole. Through these strategies the products can be valorised and extra value added can be both produced (through the price premiums customers accept to pay) and retained by primary producers (when short chains reduce the intermediary steps and reduce or exclude the role of large retailers).

Risk management

The strategies to cope with production, business, productive, and environmental risks are mainly based on contracts and legal arrangements through which risks can be shared among partners, or partially or completely shifted to others. The more traditional solution is to rely upon insurance markets where risks are shifted through payment of a fee. Insurance contracts are still widely used to protect from the consequences of extreme weather events. Yet financial markets are gaining relevance, with hedging increasingly being used by producers to protect from price risks. Forward and futures contracts are well established tools in this arena. Production contracts represent an additional strategy to share risk with up-stream or downstream chain actors (Bogetoft and Olesen, 2004).

Political support

All outlined strategies aim, with different approaches and visions, at strengthening farms in a competitive market environment. Yet, most of the farms are highly influenced on public support, as public support influences farms' capability to invest and to cope with risks (Kondouri et al. 2009; Sckokai and Moro 2009), but also because it can be the dominant income source. In some cases this reliance assumes the importance of a true strategy; this is why a specific typology is here identified.

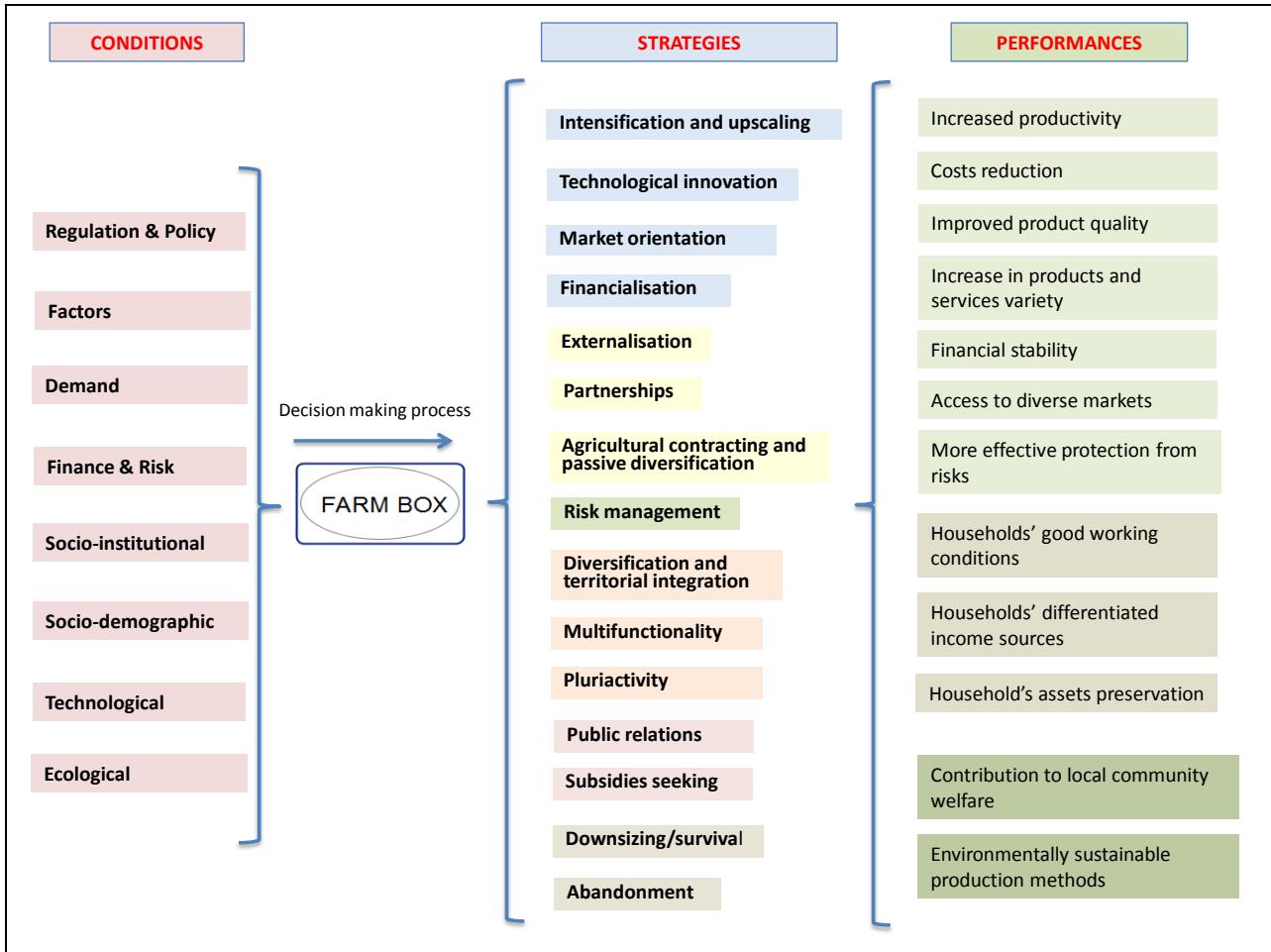
Coping with farming decline

A final set of strategies describes those situations in which a farm "merely" copes with the decline of its activity, finding solutions for the household's survival with or without a central role being played by the farm business.

2.4 Farm's performances and the whole canvas of CSP

In Figure 5 the whole sets of conditions and strategies are summarised, and performances added on the right side.

Figure 5 - Conditions, strategies, performances



Performances, whose identification is rooted in the same literature analysed in relation to conditions and strategies, have been indicatively gathered into three groups.

The business-oriented ones (in light green) are investigated in the agricultural economic literature. They range from increased efficiency to improved quality, from diversification to financial stability. These performances are relevant as they are deemed to lead to the achievement of economic goals like higher profitability and increased business resilience.

The household welfare-oriented (in light gray) are mostly considered in the literature following the AHM or in the field of rural sociology. Again, a combination of actual wellbeing and resilience/adaptability through differentiation can be seen as the ultimate goal to which these performance may lead.

Finally the outward-oriented performances, in green, represent impacts on society and environment (for example: community involvement, local biodiversity preservation, animal welfare). They witness the nature of the farm as a socio-ecological system and reflect social expectations about farms and farming. They can be pursued by producers willing to meet those expectations per se, but also as a mean to achieve other objectives: the business-oriented (when they become a marketing lever), and the household-oriented performances (when they contribute to improve family welfare).

The performances connect farm's strategic choices with the sustainability concepts mentioned in the introduction. Sustainable finance can be pursued through actions that lead to the economic performances listed above (as well as by the outward-oriented ones as long as they contribute to economic and financial gains). In a broader view, agriculture and fisheries sustainability is strengthened by strategies leading to households' wellbeing and resilience, but also by the farm's capability to positively address the social and environmental concerns listed at the bottom of the list.

3. Conclusions

The paper presents a first outline of a Conditions-Strategies-Performance approach to the analysis of primary producers' strategic behaviour towards sustainability. Inventories of the three categories have been developed, in the aim to provide a base for subsequent specific investigations whose findings will deepen and integrate these lists. Similarly, reflections on the links between the three categories (for example: why under certain similar conditions different producers chose different strategies, or why similar strategies lead to diversified performance) can be further developed.

The work witnesses the wide range of internal characters, external conditions, strategies and performances that are being identified in the literature, and gives insights into the various ways in which this diversity can be typified and organised.

This framework can be applied to support more in-depth analyses of the conditions influencing farmers' strategies, and to identify areas of interventions for the creation of a more supportive environment for the development of successful and sustainable farms. In particular, analyses of market imperfections and policy requirements can be developed, with attention to their mutual interactions and their connections to other conditions. A comprehensive and systematic view on the conditions-strategies-performances can also help the researchers to understand and analyse the rational of apparently inconsistent or incomprehensible strategies.

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