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Scenarios of the organic food market in Europe

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ABSTRACT

Scenario analysis is a qualitative tool for strategic policy analysis that enables researchers and policymakers to support decision making, and a systemic analysis of the main determinants of a business or sector. In this study, a scenario analysis is developed regarding the future development of the market of organic food products in Europe. The scenario follows a participatory approach, exploiting potential interactions among the relevant driving forces, as selected by experts. Network analysis is used to identify the roles of driving forces in the different scenarios, and the results are discussed in comparison with the main findings from existing scenarios on the future development of the organic sector.

Introduction

The European organic food market is emerging from its pioneering phase, and in some countries at least, it is growing into maturity. Demand for organic food in EU and North America, the two main organic food markets, has nearly doubled over the last decade (Willer and Kilcher, 2011). The increasing importance of the organic food business is probably a result of greater interest in both a healthier and safer diet and a better environment (Squires et al., 2001; Zanoli, 2004; Knudson, 2007). However, anticipating future development of the organic food market is a difficult task, given the almost total lack of time-series data on production volumes, and other market information, such as domestic and foreign trade. The sector expansion in the first decade of this century and the recent developments of agricultural policy have contributed to the increase in the uncertainty regarding how the sector will shape its own future in the light of past growth, current and future economic cycles, and policy changes.

Recognising this lack of data and the lack of sufficient consensus among scholars (Zanoli et al., 2000a,b; Gambelli and Zanoli, 2004) on what could impact upon the future of the organic sector, an explorative 'managerial' approach to scenario analysis has been adopted. This relies on intuitive logic and subjective assessments and judgements of a selected group of experts who are chosen from among influential organic sector stakeholders and researchers (van der Heijden, 1996; van der Heijden et al., 2002). There is a growing body of evidence that econometric models are not a great help in the business of prediction (Makridakis et al., 1982, 1993; Taleb, 2010) while it has been said that "statistical sophisticated methods or complex methods do not necessarily provide more accurate forecasts than simpler ones" (Makridakis and Hibon, 2000). The fact is that "the predictability of practically all complex systems affecting our lives is low, while the uncertainty surrounding our predictions cannot be reliably assessed" (Makridakis and Taleb, 2009a,b). Human judgement can be demonstrated to provide a significant benefit to *forecasting* accuracy but it can also be subject to wide bias, which tends to be reduced when forecasting is performed as a group (Sniezek, 1989, 1990; Ang and O'Connor, 1991). However, there is vast evidence that shows that judgemental forecasting can be as bad as the more mechanistic statistical models (Makridakis and Taleb, 2009a,b).

Compared to the high level of fallacy associated with all forms of point or probability forecasting, scenario analysis provides a redundant, systematic approach that – when some conditions are met – can be much less prone to what Orrel and McSharry (2009) called the "comforting illusion of control". Scenario analysis does not attempt to provide forecasts, but simply produces descriptive, redundant narratives that try to consider the impact of low probability, high-impact events, that can turn out to be highly dangerous, as was shown by the 2007/2008 subprime and credit crunch. (Wright and Goodwin, 2009)

The aim of this study is to investigate the possible pathways of evolution of the organic food market in Europe by 2015, in order to gain insight to inform public policies and provide organic market actors with a framework for decision making.

The structure of the study is as follows. The next section presents a short review of scenario analysis and planning; Section 3 focuses particularly on scenarios referring to the agricultural

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sector; Section 4 describes in detail the methodology followed in this study; Section 5 presents the results of this scenario analysis in terms of narratives; Section 6 discusses the results on the basis of evidence and findings from other scenario analyses relating to the organic sector; and finally our conclusions section summarises the main findings and issues arising from this study.

Scenario analysis: a review

Definition and aims of scenario analysis

Scenario analysis was originally developed for strategic military purposes (Kahn and Wiener, 1968). Starting from the early 1970s, scenario analysis has been variously used as a forecasting tool by some multinational companies, mainly for investment strategies and long-term planning. Schnaars (1987) argued that most of the scenario techniques available at the time of the publication of his study were still based on those developed by the Rand Corporation during the 1950s. At that time, Herman Kahn and Olaf Helmer were employed by the Rand Corporation as analysts for military defence projects development. Kahn's approach was mainly qualitative, as it emphasised subjective aspects in particular, while Helmer's approach was a more methodological character.

In a 1971 study, Chambers et al. (1971) referred to scenarios as "visionary forecasts". The scenario approach was considered quite inexpensive, although also unsatisfactory. More than a decade later, Georgoff and Murdick (1986) showed an appreciation of scenario analysis, particularly for its requirement for little time-series data and the low mathematical formalisation, amongst other aspects.

The qualitative approach (intuitive logic) has been the most used in scenario analysis, while more formalised methods (trend impact analysis, cross impact analysis) have been less popular, in particular in the early years. This was mainly due to a lack of affordable computing tools (for a review of these methodological approach, see (Zanoli et al., 2000a).

A scenario describes (textually or graphically) a set of events that might reasonably take place (Schnaars, 1987; Jarke, 1999). Scenarios can be considered as hypothetical images of the future, which describe the functioning of a system under different conditions with a certain degree of uncertainty. Kahn and Wiener (1968) originally defined scenarios as "... hypothetical sequences of events constructed for the purpose of focusing attention on causal processes and decision points". Fundamentally, scenario analysis enables a number of possible alternative futures to be imagined, described, and eventually evaluated. It is not a single, well defined approach to policy evaluation, but a spectrum of techniques that range from a highly qualitative 'intuitive logics' style of exploration, through to more formal mathematical modelling procedures that allow for minor judgmental adjustments (see Bunn and Salo, 1993 for reviews, see Schwartz, 1992 for a general description of scenario analysis for business purposes, and see Bertrand et al., 2000 for a contemporary overview of scenarios of European development).

As noted by Athey (1987) and Chambers et al. (1971), scenario models depend on intuitive judgment rather than on rigorous models, since "no hard data about the future exists". In this respect, practitioners claim that one of the main advantages of scenario analysis with respect to standard statistical forecasting techniques is that it can be used to consider the impact of future exogenous shocks and major structural changes in the system under analysis. This derives from the use of qualitative information that is usually provided by expert assessments, which is used for envisioning rather than just extrapolating (Georgoff and Murdick, 1986; Bunn and Salo, 1993).

Scenario analysis differs from other forecasting approaches in two important ways. First, it usually provides a more qualitative and contextual description of how the present will evolve into the future, rather than a description that seeks numerical precision. Second, scenario analysis is generally used to identify a set of possible futures, where the occurrence of each is plausible, but none is assured (Kahn and Wiener, 1968; Jarke, 1999) In this way, scenario analysis can be seen as a process of understanding, analysing and describing the behaviours of complex systems in a consistent and, as far as possible, complete way. In this context, all scenario types have to identify the driving forces and their trends. This can define the framework for the evolution of the investigated system over the given time horizon.

The literature on scenarios focuses on the use of scenarios as tools for learning (Kahn and Wiener, 1968; Bradfield, 2008); in other words, scenarios force individuals to examine their perceptions and to develop a shared view of uncertainty, all of which leads to increased confidence in their decision making, and moves the organisation towards becoming a learning organisation.

In this context, scenarios are tools for strategic analysis, and summarise different sources of information concerning the future, with special attention to actors, aims, mechanisms, and causes and effects of change. According to Porter (1985), they cannot properly be considered as forecasts, but rather as consistent representations of the different possible states of the future.

The basic aim of scenario analysis is not forecasting the future, or fully characterising its uncertainty, but rather bounding this uncertainty. In this sense, scenarios can be seen as complementary to traditional forecasting and simulation techniques, in order to provide a composite picture of future developments for use as the background for policy making and/or strategic planning.

Millet (1988) considers two basic aims of scenario analysis for firm/company strategy planning:

- to forecast the economic environment within which the firm/company operates, to establish its long term goals;
- to evaluate different strategic options. Scenarios can be considered as benchmarks for alternative strategies. In this sense, van der Heijden (1996) argues that while forecasts are decision making tools, scenarios aim to develop strategies and policies.

As a general rule, scenarios cannot be evaluated on the basis of their predictive accuracy, as the probability of a single scenario happening completely is close to zero (van der Heijden, 1996).

As a general criterion, credibility can be used to evaluate scenarios, which can be considered to have four major determinants that are strictly interlinked (Helmer, 1981; Schwartz, 1992): comprehensiveness, clarity, consistency and coherence.

Different classifications of scenarios exist according to the various scenario characteristics considered (see, among others: Ducot and Lubben, 1980; Rotmans et al., 2000; Alcamo, 2001; Börjeson et al., 2006). Van Notten et al. (2003), in particular, provided an extensive scenario classification, and discussed how in many cases the categorisation of scenarios was not always either exhaustive nor consistent among studies. Therefore, we provide here a simple scenario classification that is based mainly on the aim, type of data and methods.

A first subdivision of scenarios can be made between explorative or forecasting scenarios and anticipatory or backcasting scenarios (given causes, what are the effects, vs. given effects, what are the causes). Explorative scenarios consider alternative developments into the future, starting from the current situation (the majority of recent scenario studies falls within this category), while anticipatory scenarios start from a desired future situation and explore different strategies to reach this situation.

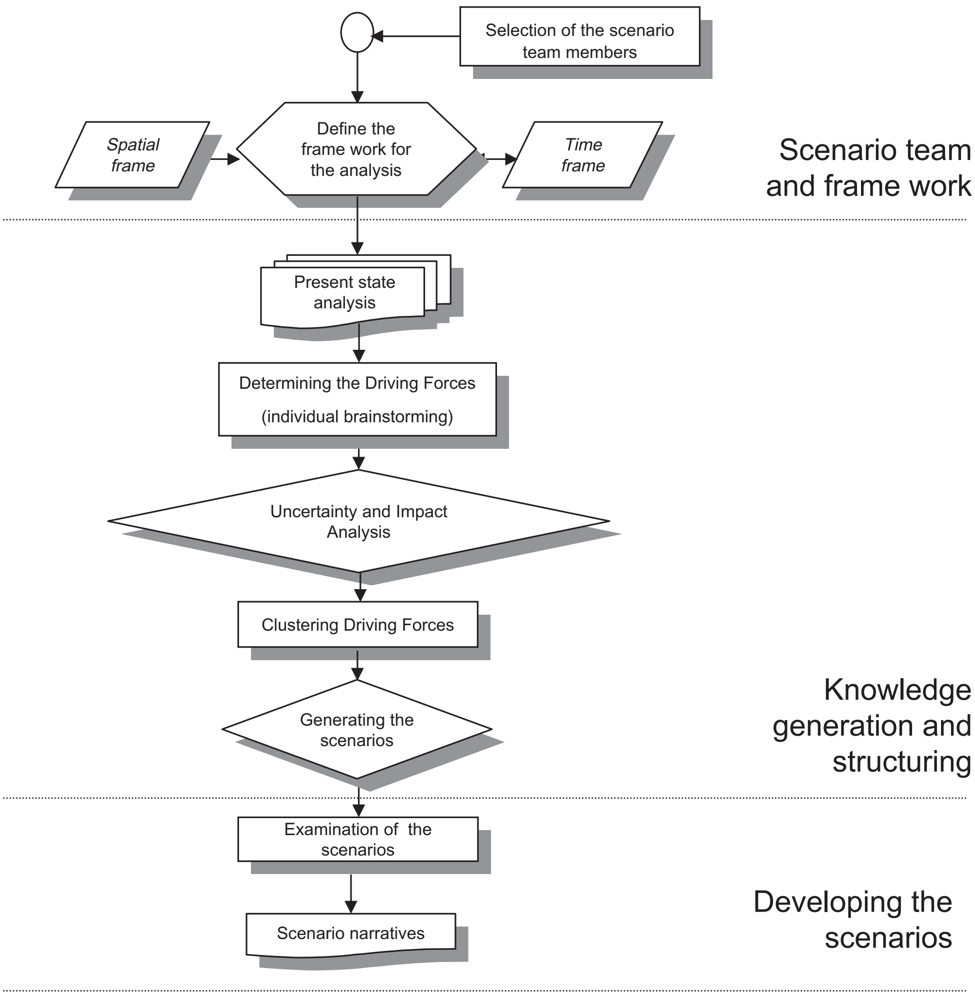

Fig. 1. The process of scenario building.

Secondly, we can distinguish quantitative from qualitative scenarios. While quantitative scenarios are often model based, qualitative scenarios describe possible futures in the form of narrative texts or "story lines".

Finally, scenario methods can be classified according to the nature of the tools used. We can distinguish between participatory/expert-based scenarios, and desk-analysis scenarios. Participatory scenarios refer to approaches where experts and stakeholders (e.g. scientists, decision makers, business people) have active roles in the scenario-generation system (e.g. data elicitation, narrative development). Desk analysis scenarios exploit information based on the existing literature and/or statistical data, which is then elaborated in a scenario form without a collaborative process.

A brief review of scenario analysis in the agricultural sector

Since the publication of the World Resources Report (1992) scenario, scenario development has become an important method and tool for the assessment of land-use change. In Appendix A, we have briefly described the basic characteristics of scenarios relating to the themes of agriculture, and land use in general. The scenarios have been generated according to a range of different approaches, geographical contexts and time frames. The very large majority of scenarios are referring to the European context, with 12 scenarios concerning, in particular, agricultural and land-use aspects on a global European scale, and 10 scenarios focussing on specific European countries. Only two scenarios consider a broad worldwide context, and one refers to the northern Mediterranean area.

For the methods used, most of the scenarios in Appendix A can be classified as quantitative scenarios (Schnaars, 1987), and hence they implement some type of modelling or formalisation in the scenario process, while nine scenarios can be considered as qualitative, and hence based mainly only on a textual descriptions. From this point of view, land use or agricultural focussed scenarios differ from the generally more qualitative-oriented scenario literature. Finally, the majority of scenarios reported follow a participatory approach, hence using information inputs elicited from a set of experts and/or stakeholders in adequately organised scenario sessions.

Of the scenarios concerning agricultural themes shown in Appendix A, only three refer to organic farming issues. Oudshoorn et al. (2009) explored the sustainability of scenarios for organic dairy farming based on visions of and goals for the future. The scenarios were designed using stakeholder and expert opinions, and then they were translated through the choice of the relevant production parameters to a farm unit design. By using a participative process with stakeholders and expert knowledge, three scenarios were defined.

Zanoli et al. (2000a) presented five major possible forms that the European market for organic products might have assumed by 2010. Scenario analysis considers the interactions among a set of variables that are supposed to be able to depict the relevant aspects of the system where the possible evolution has been analysed. In this study, an inductive bottom-up and interactive approach was used, and a selection of the most important key variables that influenced the organic products market in the EU was performed. Instead of a probabilistic evaluation of the event combinations, these authors preferred to adopt an approach that was based on fuzzy logic. Fuzzy rules describe relationships and compatibility among variables, using linguistic variable-state definitions, which make the functioning of the system described and the final scenarios easily understandable.

Gambelli and Zanoli (2004) presented a scenario analysis to anticipate the future environment for organic farming and organic marketing initiatives in the year 2010. A qualitative approach was used, which exploited the expertise within the Organic Marketing Initiatives and Rural Development (OMIaRD) team and that of the external experts who represented the following key stakeholder groups: farmers, consultants and processors. The results of the scenario analysis were presented as textual narratives (four scenarios were developed), which focussed on rural areas, markets, policy environment, certification, and labelling, and which were identified as the four main areas of interest of the experts.

The wide range of different approaches to scenario analysis demonstrates that there is as yet no consensus about the best method(s) to use. Each method has its own strengths and weaknesses, and the various solutions proposed to overcome the limitations of specific models have contributed to an increase in the general confusion about the state of the art of scenario analysis.

With regard to the application of scenario analysis to organic farming in the EU, detailed quantitative information about the organic-products market in Europe are not available. In most cases, the only information available is qualitative assessments that are derived from a panel of experts. Nevertheless, this situation turns out to be in agreement with a qualitative approach to scenario analysis that allows innovative and creative inputs from the experts to be taken into account without focussing excessively on formal issues. Of course, where available, hard data and statistical information are used as benchmarks, to enhance the consistency and robustness of the expert assessments.

The present analysis represents a continuation of our previous studies relating to scenario analysis for the organic market sector: a qualitative scenario through a participatory approach has been used, which means a set of procedures through which the experts and stakeholders work together to develop scenarios.

Methodology

This scenario development process occurred over several months in 2008. The approach used was a deductive one (van der Heijden, 1996), and it is depicted in the scheme shown in Fig. 1, which also illustrates the three main steps of the scenario development:

- In the first step, the time-frame and spatial framework of the scenarios were defined, with up to 12 experts selected to be part of the scenario team that formed the ‘knowledge-generation engine’ of the entire process. Scenarios differ according to the time horizon addressed, whereby they can distinguish between long-term and a short-term perspectives (Rotmans et al., 2000; EEA, 2000). The time-frame was chosen to be medium term (2015), to balance the necessity to cover a sufficiently wide time horizon without introducing too much uncertainty into the scenarios. A seven year time span is however sufficient to consider the potential structural changes that the post-2013 Agricultural Policy Reform might introduce into the organic sector. Europe at large was chosen as the spatial framework, as the study was conducted as part of a large EU-funded research project where the aim was to optimise the benefits to European society of organic and other ‘low input’ farming systems. Experts were selected following a participatory approach and the use of the multi-stakeholder selection process illustrated by Vairo et al. (2009) and the United Nations Industrial Development Organisation (2005). Industry experts were chosen out of the directories of the BIOFACH World Organic Trade Fair and the International Federation of Organic Agriculture Movements (IFOAM), while researchers were selected from among those with the highest number of recent publications on organic farming policy and/or markets. Following van der Heijden et al. (2002), as a means of reducing mind-frame bias and group thinking, a “remarkable” expert was chosen to provide ‘challenging’ opinions to the group.
- In the second step, the experts were involved in knowledge generation, first individually, and then as a group. During this phase, we carried out the accurate recording, processing and structuring of all of the relevant information generated.
- In the third and final step, the scenarios were carefully examined by the experts, influence diagrams were collectively generated, and oral accounts of the storylines, or narratives, were given, which were then transcribed.

The reference starting point of the scenario analysis was the current situation of the organic food market in Europe.

Experts were interviewed individually using electronic semi-structured questionnaires to produce a preliminary set of driving forces. These were classified as *uncertainties* (driving forces *strictu sensu*) and *predetermined trends*, on the basis of group scores regarding the uncertainty and the impact of these with respect to the organic food market. The driving-force generation was structured according to STEEP analysis[1] (UNIDO, 2005) to facilitate the listing procedure. Each driving force was given a name (label) and a detailed description, and was associated with two polar outcomes. The responses were then subjected to content analysis by two independent coders, to avoid any duplication of concepts. The driving forces were judged independently by each expert on Likert-type scales. For uncertainty, the scale ranged from 0 (no uncertainty) to 5 (very high uncertainty). Impact was measured on a range from 1 (very low) to 5 (very high).

To avoid bias due to the type of inferential approach used, we followed the suggestions of Jungermann (1985) and Athey (1987), using a forward-looking approach to generate four scenarios, and then a backward-logic approach to build the causal representation of the alternative futures and to help to sketch out the storylines. In this context, a distinction between external and internal driving forces is not essential (Börjeson et al., 2006). Besides, the use of backward-logic is robust to potential representation problems (Wright and Goodwin, 2009; Taleb, 2010).

A scenario workshop was held in Italy in September 2008. Only nine of the 12 invited experts came to the workshop, and one had to leave after a few hours due to urgent business problems. Six out of the eight remaining experts (5 male and 3 female) were researchers, with two from the organic industry (see Table 1). The ‘challenging’ expert was among the participants.

The mean age was 47.6 years, with a mean of 16.7 years of professional experience in the organic sector. The scenario workshop was managed by a professional facilitator.

[1] STEEP analysis provides a useful framework to assist experts in the consideration of the following factors that impact on market demand for organic products: Social – demographics, education, tastes; Technological – information technology, telecommunications, logistics, transport; Economic – growth, markets, fiscal policies, taxation; Ecological – materials, resources, climate, pollution; Political – structures, activities, leadership, policies.

Table 1
Experts who participated in the scenario workshop.

Field	Country
R&D (Marketing)	GB
R&D (Consumer Behaviour)	GB
R&D (Economics & Policy)	DE
R&D (Economics & Policy)	GB
R&D (Consumer Behaviour)	IT
R&D (Economics and Policy)	CH
Industry (Production & Trade)	IT
Industry (Market Intelligence)	DE

Table 2
Final clusters of the driving-forces.

Cluster	Label
1	Communication of organic distinctiveness
2	Labelling
3	Global socio-economic conditions and resource availability
4	Organic distinctiveness
5	Awareness and consumer recognition of organic products
6	Availability of organic products
7	Commitment and cooperation in the organic chain
8	Relative competitiveness of organic with respect to conventional farming
9	Relative sustainability of organic with respect to conventional farming
10	Policy favourability
11	Relative safety perception of organic with respect to conventional food
12	Relative quality perception of organic with respect to conventional food

During the workshop, the experts were asked to cluster the driving forces into groups that shared a higher-level concept. Consensus was reached by group discussion (see Appendix B). This reduced the overall number of forces to a small and manageable number of concepts. Clusters were defined with the aim of obtaining high internal consistency within each cluster, and high differentiation among clusters (see Table 2). By linking the driving forces using lines and logical signs (+ and −) to show cause and effect relationships, the logic and internal consistency of each cluster was tested. If any driving force could not be linked in this way, it was excluded from the cluster.

The group of experts then ranked the clusters by impact and uncertainty, taking into consideration the original ratings of the clustered driving forces. The aim here was to determine the key areas of critical uncertainty that formed the central themes of the developing scenario. In other words, the two general areas believed to have the highest impact on the organic sector and the highest level of outcome uncertainty were identified. This was achieved by preparing a two-dimensional ranking space depicting high/low impact and high certainty/uncertainty. Two clusters were selected as showing the highest potential for impact and uncertainty of occurrence (Fig. 2, top right quadrant), and hence of being the most interesting for scenario purposes.

On the basis of the driving forces included in the two selected clusters, these clusters were labelled using short titles encapsulating the full content of the driving forces and the higher-level concepts, and assigned two potential polar outcomes. Two main 'dimensions' were thus selected: 'global socio-economic conditions and resource availability' and 'relative competitiveness of organic and conventional farming', which represented the reference grid of what had emerged as the most uncertain and impacting driving forces for the organic system. On the basis of the combination of these two dimensions, four contrasting scenarios were defined, as indicated in Fig. 3.

Fig. 3 summarises the main results of the final examination of the scenarios, and shows for each scenario the performance of the organic market together with the underlying assumptions about the socio-economic conditions and the relative competitiveness of organic and conventional farming.

The scenario development process concluded with the writing-up of the scenario narratives.

Once the scenario process had been completed, the scenario team filled in a questionnaire that was aimed at capturing their thoughts of the scenario process.

Results

Scenario narratives

Once the four reference scenarios had been identified, the experts on the scenario team were asked to develop consistent narratives by applying backward inference and causal reasoning, in the form of graphical influence diagrams. The basis for narrative

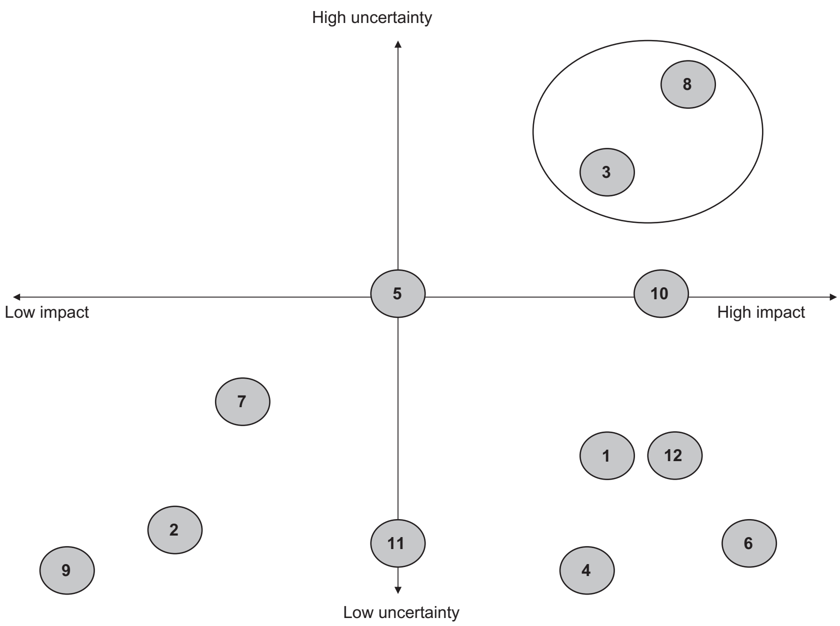

Fig. 2. Impact and uncertainty of clusters (see text).

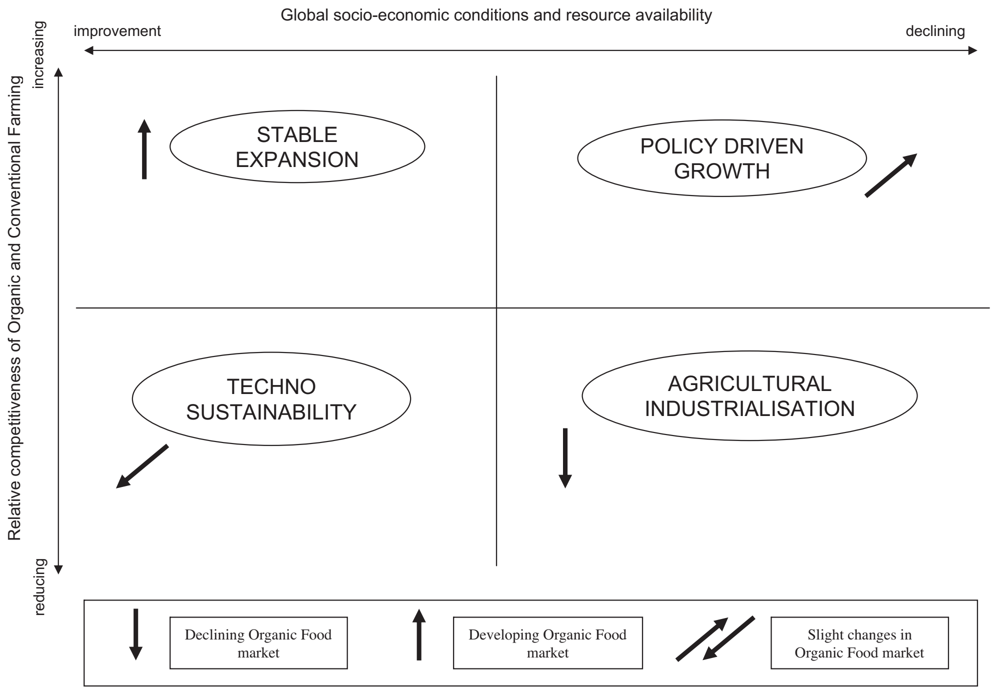

Fig. 3. Main scenarios for the organic food market.

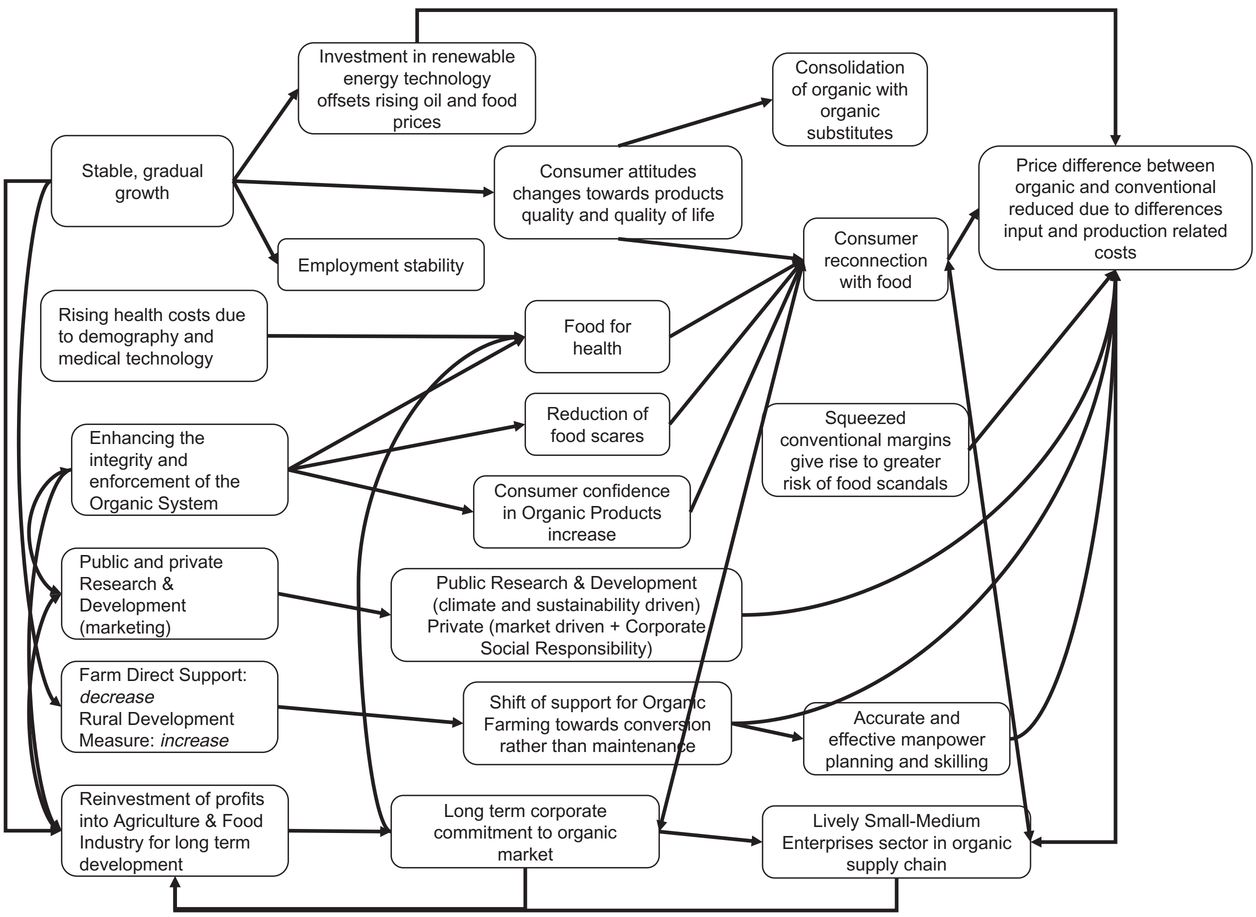

Fig. 4. Scheme of the stable expansion scenario.

development was the analysis of the driving forces that were originally clustered to form the final scenario classification. Driving forces can behave and combine differently, according to the general picture described by each scenario.

Table 3
The top five driving forces in by centrality measures – the stable expansion scenario.

Driving forces	Normalised OUT degree centrality	Driving forces	Normalised IN degree centrality	Driving forces	Normalised betweenness centrality
Enhancing the integrity and enforcement of the organic system	26.3	Reduced price difference between organic products and conventional products	36.8	Reinvestment of profits into agriculture and food industry for long-term development	20.3
Stable, gradual growth	26.3	Consumer reconnection with food	26.3	Lively small-to-medium enterprise sector in organic supply chain	18.8
Consumer reconnection with food	15.8	Reinvestment of profits into agriculture and food industry for long-term development	21.0	Consumer reconnection with food	14.3
Lively small-to-medium enterprise sector in organic supply chain	15.8	Lively small-to-medium enterprise sector in organic supply chain	15.8	Public and private research and development (marketing)	14.1
Long-term corporate commitment to organic market	15.8	Food for health	15.8	Reduced price difference between organic products and conventional products	13.7

The participants were divided into two groups, and each group developed two scenarios, starting with the list of driving forces and their polar outcomes. At this stage, the experts were asked to express their creativity freely, with the possibility to change the driving forces labels or even to introduce new ones where appropriate. The experts were encouraged to integrate narratives with the driving forces that were originally clustered elsewhere, as well as the predetermined trends that had so far been left out of the process. This process was aimed at exploiting all of the wealth of potentially useful information that had emerged during the scenario process.

Each scenario narrative was first developed by a sub-group of experts, and then discussed and integrated in plenary sessions, so that the entire scenario team participated in all of the four scenario narratives. The four scenarios will now be presented in more detail. A graphical influence diagram is included for each scenario, which shows the relevant driving forces and their connections. Adjacency matrixes measuring the interactions among the driving forces were derived for each scenario. We then computed different centrality measures to analyse the role of each driving force involved in more detail. More specifically, normalised Freeman degree IN and OUT centrality was used to measure the role of each driving force in terms of its relevance for 'information' propagation within each scenario, according to information originating from (OUT) and received by (IN) each driving force. Normalisation of the degree centrality scores allows comparisons among different scenarios. The higher the OUT degree centrality, the higher the active role of the driving force within the scenario; the higher the IN degree centrality, the higher the characterisation of the scenario due to the driving force. As well as degree centrality, normalised betweenness centrality was computed to evaluate the roles of the driving forces in the information flow of each scenario: the higher the normalised betweenness centrality, the higher the 'strategic power' of the driving force in terms of the connectivity among the different nodes in each scenario. For details concerning the network centrality measures see Wassermann and Faust (1994).

Scenario 1: Stable expansion

The 'stable expansion' scenario yields a basically positive environment for organic farming, and a lasting stable positive (although only slightly) mid-term trend for the economic situation, despite signs of the upcoming global crisis at that time.

The basic assumption is that policymakers are wise enough to manage the current economic crisis well, using correct fiscal and monetary policies to recover quickly from recession. The overall effect of this scenario on the organic sector is particularly evident from the price side. The general prices level is assumed to increase substantially, particularly in the food sector and including organic prices. Nevertheless, the price differential between organic and conventional food should be reduced. Organic prices grow at a slower rate due to public and private investment in the organic sector, a positive policy environment, and changes in input prices, which favour organic farming (Fig. 4).

The results given in Table 3 show the relevance of 'consumer reconnection with food' and 'lively small-to-medium enterprise sector', which are comparable in all of the three centrality rankings. Economic stability and organic-sector integrity are among the main triggers in this scenario, while the 'reduced price difference between organic produce and conventional produce' reaches particularly high scores. Finally, 'reinvestment of profits into agriculture and food sector' behaves as a crucial link, sharing high scores with all of the top-five driving forces in the betweenness ranking.

The main outcomes from this scenario can be summarised as follows:

- The global economy goes into recession, but recovers relatively quickly. Oil prices increase after the economic shock. However, input costs rise less rapidly for organic farming, as these costs are less dependent on scarcity of resources, while economies of scale arise from the strengthening of the sector. Profits are reinvested in the organic system, particularly from small-to-medium enterprises.
- Consumer requirements for food safety and confidence in organic products are fulfilled by the solid situation of the organic sector. As a consequence, the risk of organic food scandals is minimised.
- Consumers are keen to spend more for food and catering, as they are more involved and concerned with aspects related to health and quality of life. A reconnection with food as a source of health and a 'slow', happy life also takes place.
- The main market substitutes for organic food (e.g. ethical, fair-trade, local, 'slow' food) become closer to the organic concept, as they all feature organic certification. At the same time, conventional 'low-input' foods (e.g. from integrated farming) lose their appeal due to a reduction in price differentials.
- Public authorities increase their support for the organic sector, both by demand-and-supply side measures and by boosting specific organic research and development.
- A synergy takes place in research and development between the private and public sectors.

- Policy support for agriculture goes mainly through indirect, rural-development measures, while direct farming support is reduced. Economic support to organic farming is mainly given for conversion rather than maintenance, and as a consequence, the economic risks of conversion are minimised.

Scenario 2: Policy-driven growth

The 'policy-driven growth' scenario depicts the reactions of the organic sector under a general global economic crisis and a worsening of the socio-economic situation. Even under this gloomy scenario, the organic food market appears to have the chance for development.

The strong increase in input prices and the general economic difficulties facilitate the occurrence of food scandals and the rise in food products prices above critical limits for an increasing number of consumers. In this situation, government intervention in the economic arena is strengthened, and the agricultural sector is no exception. As a consequence, agricultural policy still has a relevant impact, resulting in more public research and development, more financial support and higher payments for organic farming (see Table 4).

Fig. 5 shows the main driving forces that were taken into consideration by the scenario team here, and their connections.

The structure of this scenario is quite simple, as shown by the highest scores for 'policy response' in all three centrality rankings. Also, a crucial role is played by resources scarcity (water, oil), which propagates effects in terms of 'increasing food prices', 'organic farming relatively more profitable' and 'low level of consumer income'.

The main aspects in this scenario are as follows:

- Rising oil and commodity prices and resource constraints lead to high input and food prices.
- Lower incomes and higher food prices lead to a general reduction in consumer disposable income, as well as in an increase in income distribution disparities.
- A general socio-economic crisis arises, requiring strong governments intervention.
- Organic farming exploits low-input technologies better than its conventional counterpart. This contributes to reduced production costs with respect to conventional farming.
- The government attitude is to support low-input, energy-saving technologies in all productive sectors, and organic farming receives relatively more support than energy-intensive conventional farming.
- The joint effects of favourable support policies and technological changes towards low-input standards substantially improve the relative profitability of organic farming.
- This competitive advantage of organic farming on the supply side are coupled with the increasing demand by the high-income segments of consumers, leading to a slow, but relatively stable, growth rate of the organic sector. The low-input substitutes are ruled out. Scandals make the wealthy consumers choose the more expensive but safer organic niche, while the vast majority of poorer consumers have no choice and choose cheap food that is mass produced.

Scenario 3 – Agricultural industrialisation

The 'agricultural industrialisation' scenario involves a general worsening of the global socio-economic conditions, combined with a reduction in the competitiveness of organic farming with respect to conventional farming. Organic products end up being produced and processed in exclusive and secluded organic districts, to preserve the 'purity' of the sector and to avoid contamination by genetically modified organisms (Fig. 6). The performance of the organic food market in this scenario turns out to be critically negative (see Table 5).

In this scenario, critical economic conditions and income reductions result in strong reductions in premium priced products in general. From the food market perspective, a generalised acceptance of genetically modified foods takes place, as they are considered as a sort of 'necessary' condition to have cheap food.

The policy approach here is radically different from that in scenario 2. Economic policy is based on a *laissez-faire* conservative attitude. De-regulation takes place, while agro-environmental policies are reduced and no support for organic farming is maintained.

Table 4
Top five driving forces by centrality measures – policy driven growth scenario.

Driving forces	Normalised OUT degree centrality	Driving forces	Normalised IN degree centrality	Driving forces	Normalised betweenness centrality
Policy response	23.1	Policy response	30.8	Policy response	20.5
High oil price	23.1	Increasing food prices	30.8	Increasing food prices	8.0
Low water availability	23.1	Organic farming relatively more profitable	30.8	Low level of consumer income	5.4
Farmer price premium decrease	15.4	Low level of consumer income	23.1	Farmer price premium decrease	2.2
High input and commodities prices	15.4	Farmer price premium decrease	15.4	High input and commodities prices	1.6

Table 5
Top five driving forces by centrality measures – agricultural industrialisation scenario.

Driving forces	Normalised OUT degree centrality	Driving forces	Normalised IN degree centrality	Driving forces	Normalised betweeness centrality
Elimination of extensification measures	26.3	Decrease in organic farming relative profitability	26.3	Increasing food prices	3.1
Increasing food prices	15.8	Policy response	21.0	Commodity prices increase	1.2
High oil price	15.8	Low level of consumer income	15.8	Organic price premium decrease	1.2
Reduced availability of land	10.5	Increasing food prices	10.5	Low level of consumer income	0.7
Low level of consumer income	5.3	Commodity prices increase	10.5	Farmer price premiums decrease	0.3

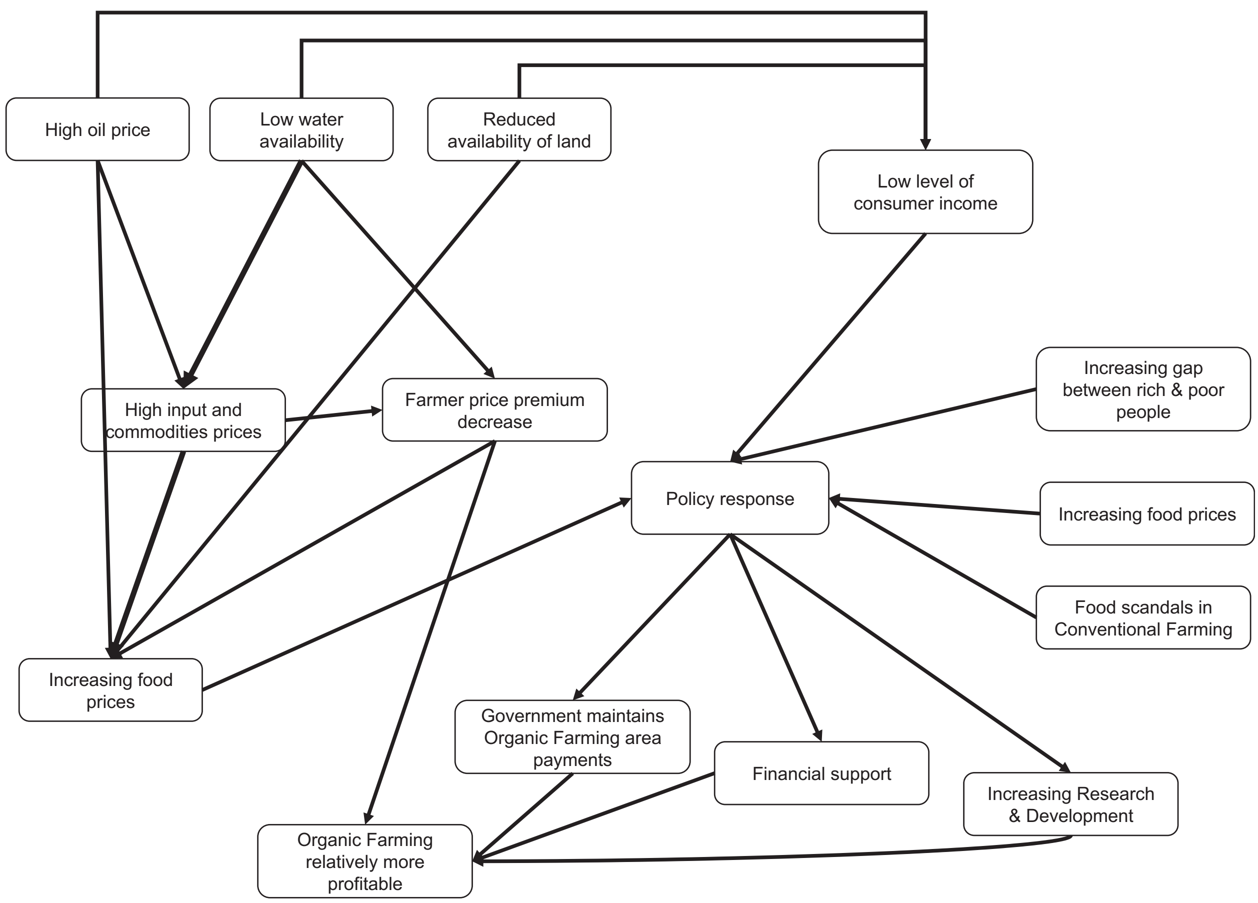

Fig. 5. Scheme of the policy-driven growth scenario.

Public and private financial resources are redirected to high-yielding farming systems, which at least in the short term appear to cope with the increasing demand for agricultural products, as an effect of Engel's law.

In this scenario, organic food sales decrease, and the organic food market share reduces to marginal levels. Given the general acceptance of genetically modified food products, production costs in organic farms rise due to the high risks of contamination. Only a few rich people can afford the 'luxury' of organic foods.

The 'elimination of extensification measures' driving force is at the basis of this scenario, showing highest out degree scores. On the other hand, 'decrease in organic farming relative profitability' is the most frequently targeted node in the scenario. Other relevant driving forces are 'increasing food prices' and 'low level of consumers income', which are in all three of the centrality rankings. It is interesting to note that the betweenness centrality scores are particularly low, which shows that no driving force here assumes a crucial linking role in the scenario process.

The main aspects in this scenario are as follows:

- Lower incomes and higher food prices lead to a general reduction in consumer disposable income.
- Policy and government actions progressively reduce their influence on the economy, while a *laissez-faire* attitude represents the main credo in terms of government intervention.
- Increasing oil prices lead to an increase in the demand for biofuels as alternative sources of energy. This restores the traditional influence of agro-chemical lobbies over the whole agricultural sector and its remaining policies.
- As a consequence, the conventional agro-food industry increases its influence over the food market.
- Agricultural policy withdraws traditional support schemes to organic farming (no area payment, no research and development, no financial support).
- Due to a reduction in demand, the marketing channels of organic products become highly specialised, as no mainstream retailers are expected to have a crucial role.
- All of the above lead to a general strong reduction in the organic sector and organic sales.

Scenario 4 – Techno-sustainability

The 'techno-sustainability' scenario involves a general improvement in global socio-economic conditions, combined with a reduction in the relative competitiveness of organic farming (Fig. 7). Despite the positive economic environment, organic farming loses competitiveness in favour of new, 'high-tech' farming systems (Table 6).

Technology is considered here as the key driver, and the European consumer perception relating to genetically modified organisms shifts towards higher acceptance. Technological innovations are seen as an opportunity to match productivity with environmental protection. Conventional products become a substitute for organic products, as due to the new technological improvements in agriculture, environmental protection is no longer a specific competitive advantage for organic farming. There is a change in the perception of consumers, who are keen to buy organic

Table 6
Top five driving forces by centrality measures – technological sustainability scenario.

Driving forces	Normalised OUT degree centrality	Driving forces	Normalised IN degree centrality	Driving forces	Normalised betweenness centrality
Declining support for farmers	20.8	Decrease in organic farming relative profitability	37.5	Declining support for farmers	2.0
Strong private research and development in conventional farming (genetically modified organisms, nanotechnology, functional food)	16.7	Higher organic costs raise organic prices	12.5	Public research and development in organic farming is reduced	1.5
Increase in consumer confidence in technologically sustainable solutions	12.5	Public research and development in organic farming is reduced	12.5	Higher organic costs raise organic prices	1.4
Oil price rises gradually	12.5	Sustaining middle-class lifestyles	12.5	Increase in consumer confidence in technologically sustainable solutions	1.1
Stronger standards for conventional food chain	12.5	Declining support for farmers	8.3	Sustaining middle-class lifestyles	1.1

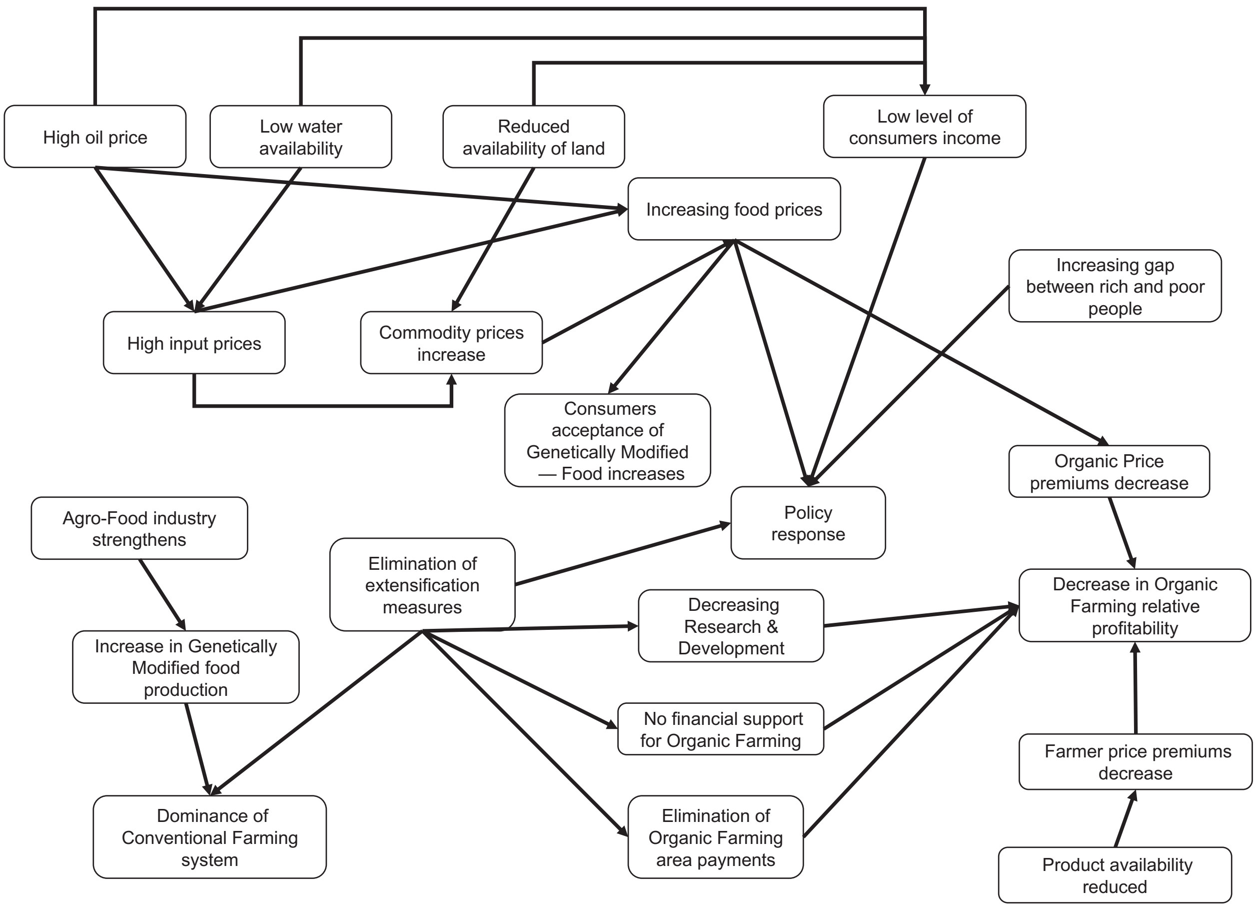

Fig. 6. Scheme of the agricultural industrialisation scenario.

substitutes, like environmentally friendly food, even if these are based on genetic modifications.

As a general consequence, the relative profitability of organic farming is reduced substantially due to higher production costs and higher prices, which make organic products attractive only in niche markets.

Under this scenario, the reduction in relative organic profitability assumes the highest IN degree scores among all of these four scenarios. 'Declining support to farmers', and 'strong private research and development in conventional farming' are the key triggering driving forces, while the betweenness centrality scores are not particularly high.

The main aspects in this scenario are as follows:

- The economy recovers from recession, and relatively stable economic growth is again underway by 2015.
- Food prices fall slowly, while commodity and oil prices rise gradually and employment remains stable. This general economic situation sustains the middle-class lifestyle, where food is not a crucial issue.
- Research and development focus on productivity enhancement and resource efficiency. Conventional technology advances (e.g. genetically modified foods, nanotechnology) and becomes the

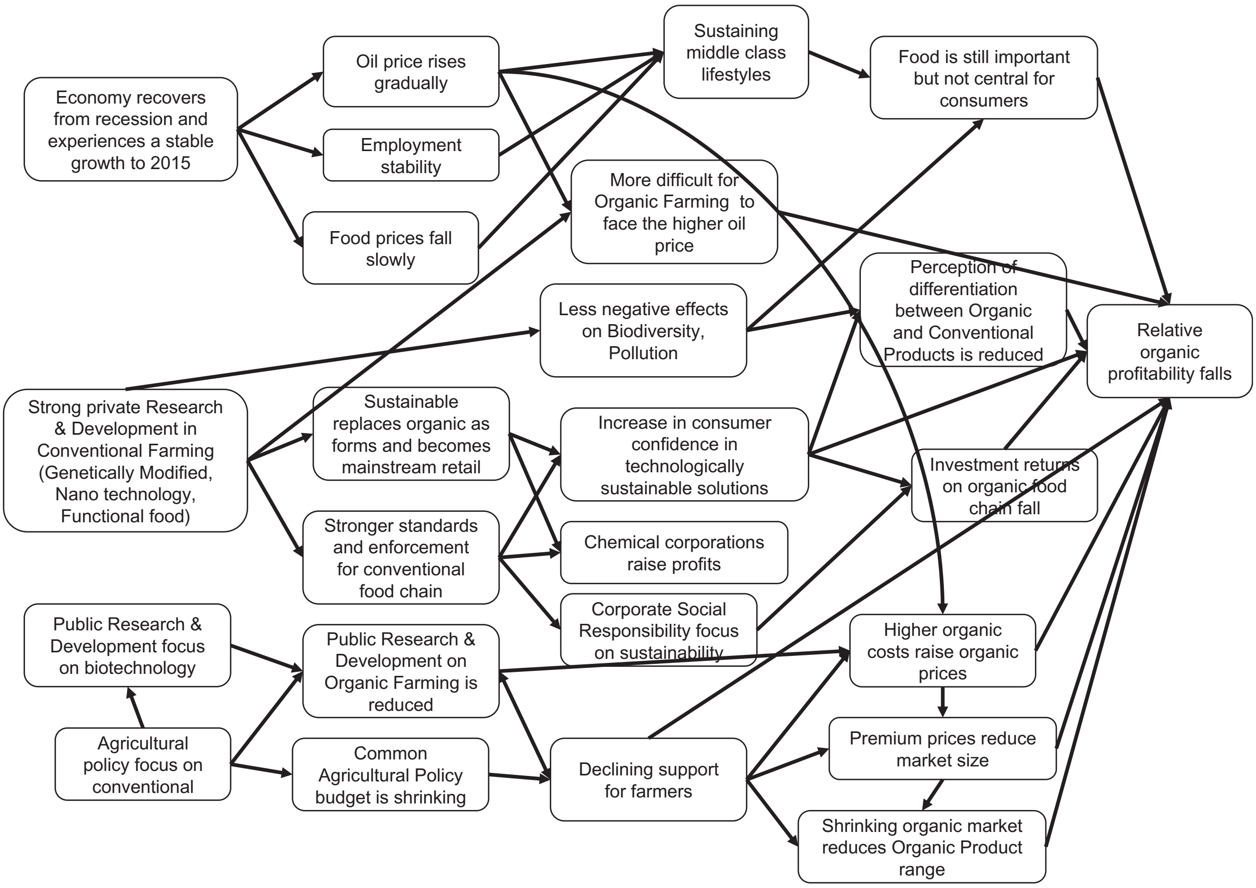

Fig. 7. Scheme of the techno-sustainability scenario.

key driver in this scenario, which produces different general effects. New technologies can cope with issues of sustainability and the environment, and with productivity as well, giving strong competitive advantages to conventional farming: conventional farming now offsets organic farming.

- Biotechnology is finally accepted as an environmentally friendly and generally safe technology. Organic farming advocates lose their battle against genetically modified organisms, while consumers no longer see the added value of consuming organic food as a means to better health and safety.
- Agricultural policy is shrinking both on CAP pillar 1 and 2, as the support for farming is mainly a technological one, coming from the agro-chemical sector. At the same time, research and development specifically dedicated to organic farming is declining, which results in lower efficiency and higher organic costs.
- Consumer acceptance of new genetically modified products increases as food is cheap, good and apparently safe.
- Economic importance of organic farming is reduced, mainly due to the reduction in relative profitability with respect to conventional farming, but it does not disappear. Organic food products remain a niche segment, sold equally in specialised shops as well as in supermarkets and other mainstream food retailers. The overall market share remains insignificant, and below 5%.

Discussion of results

These scenarios were based on the shared vision that economic conditions and competitive positioning of the organic sector (aided by public policy support) are the most influential and uncertain clusters of driving forces. Growth or decline of the organic market appears to be highly dependent on these crucial triggers.

However, there was a high degree of consensus among the experts about the relevance of other driving forces in explaining the complexity of the markets and economic environments in which organic stakeholders interact, leading to the above-mentioned key uncertainties. Disposable income, consumer attitudes towards environmentally friendly products and organic 'low-input' substitutes, policy targets, and technological aspects emerge as combinations and interactions that should mostly affect the future shape of the organic system in Europe. Although an active policy reaction has been shown to have a crucial role in the case of worsening global economic conditions (as, probably, for all of the sectors of the economy), it might not be an adequate tool when other driving forces take place. Similar conclusions have been found also in previous studies on scenario analysis relating to the future development of organic markets: Zanoli et al. (2000a,b) presented data from scenario analysis developed in the Organic Farming and the Common Agricultural Policy (OFCAP) research project, while Gambelli and Zanoli (2004) refers to scenario results from the OMIaRD research project. These scenario analyses were developed with different methodological approaches, different panels of experts, and different specific focus and time frames: the OFCAP scenario is a cross-impact modelling that is based on fuzzy logic, which focuses on the organic sector and markets; therefore, it shares basically a similar aim with the present scenario analysis, but differs substantially from a methodological point of view. The OMIARD scenario on the other hand, has a semi-structured intuitive logic approach, and hence it is more similar to the methods used in the present scenario analysis, but focuses more on the implications of organic farming on the rural development and marketing implications. Despite these differences, it can be of some interest to identify possible common pathways within these three approaches to organic farming scenarios that might be crucial in the development of organic farming; these can be summarised as follows:

- Policy for organic farming and common agricultural policy, and economic policy in general.
- Economic cycle.
- Consumers attitude towards organic farming and organic products.
- Food prices.

With regard to the policy influence on organic farming performance, OFCAP scenarios indicate that the political environment can be considered a crucial element for the development of the organic farming sector, and organic markets in particular. This might overcome the effects of the basic macroeconomic conditions, such as consumer confidence and the general economic trend. Indeed, the OFCAP scenarios that show the best results in terms of organic farming development share similar hypotheses relating to the active role of the common agricultural policy, particularly from the point of view of direct support to organic farming, and to international trade policy, where European Union institutions maintain an active role concerning agricultural policy. Similar results arise from the OMIARD scenarios, where the scenarios that depict a positive environment for organic farming are those that share the same hypothesis of an increase in rural and agricultural regulation.

As shown above in the results section, an active policy intervention is considered to have positive effects also in scenarios 1 and 2, although with a general difference: in scenario 2, the EU and governments are supposed to maintain direct economic support for organic farming, hence in accordance with the findings of the OFCAP scenarios; in scenario 1, the role of policy support is mainly represented by indirect, rural policy measures. From the point of view of implications on the policy side, the data are particularly consistent with those from the OMIARD scenarios, where, again, we find two generally positive scenarios for organic farming, one more radical with a strong direct support policy, like the hypothesis underlying scenario 2, and another with a 'softer' policy support, which mainly goes through the rural development approach, and hence is more similar to the policy assumptions in scenario 1.

While a supportive policy for organic farming can be substantially considered as a common element in all of the scenarios that leads to the development of organic farming in general, more controversial data emerge when the general economic situation and economic policy are considered. In the present scenario analysis, there is no evidence for a positive correlation between the economic cycle and the organic farming performance. Indeed, a positive environment for organic farming can be found both with a developing or stagnating economy, and the same is true for negative organic farming scenarios. The same conclusions are found in both the OFCAP and OMIARD scenarios: their data show that organic farming can develop or decline under both positive and negative economic conditions.

Although each scenario is of course developed according to a specific structure and logic, and hence reflecting different varieties of driving-force combinations, a general consideration that is emerging is that agricultural and rural policy interventions can be adapted to the prevailing economic cycle to produce effective results on the organic sector.

Consumer attitude is seen to have a crucial role in scenario 1, particularly due to a change in their general approach to food, which shifted towards natural and healthy aspects of food consumption. The change in consumer perception of food is a common factor for the success of organic farming also in the OFCAP and OMAIRD scenarios that yield the best results from the organic farming prospective. The main difference with respect to scenario 1 is that while here the shift in consumer food approach happens in a context of what could be considered – apart from the consumers side – a scenario with no major structural changes, in the OMIARD and OFCAP scenarios, the pattern of food consumption change was imagined within a context of more radical changes towards a more 'green' approach to society and to the economy.

Food prices are, of course, a key issue in any scenario concerning the evolution of the organic market, but in the present scenario analysis and in the OFCAP and OMIARD scenarios, food prices, and particularly organic food prices, basically reflect the general conditions encountered in the various scenarios, rather than being considered a triggering variable itself. In particular, in none of the four scenarios developed here were the prices of organic food considered as crucial for the development of organic farming. In scenario 1, organic food prices are supposed to rise moderately, and less than prices of the intermediate standard products, which thus lose their competitiveness. Prices for food in general, included organic food, are supposed to rise in scenarios 2 and 3 as well, but with different implications for organic farming: in scenario 2, higher prices are however accepted by richer consumers, and supply side policies are adopted, hence creating conditions for the maintenance of the organic farming sector; in scenario 3, the higher prices for organic products simply take them out of the market, whereby organic products are only sold as luxury goods. On the other hand, scenario 4 considers a general food-price reduction, led by a general technological shift that leads to lower costs for mass food production. Organic farming developments are therefore compatible with a general situation of moderate price rise, which was also a conclusion developed under the OFCAP scenarios, where both the scenarios yielding positive results in terms of organic farming development considered a slight increase in farm-gate prices for organic products. OMIARD scenarios do not explicitly take into consideration food prices, but they confirm indirectly such a conclusion, as in one scenario where a general global crisis is assumed: organic farming suffers dramatically for unbearable price competition with other food products.

Besides common themes, some differences among the present scenario analysis and the OFCAP and OMIARD scenarios can also be identified, due of course to the different specific scopes of the analyses. Technology shifts in particular appear to have potentially critical effects on organic-sector performance across all of the four scenarios developed here, while they are not particularly taken into consideration in the OFCAP and OMIARD scenarios. However, the issue of technological development assumes different roles across the four scenarios. On the one hand, in a gloomy economic situation, a strong change towards more productive and intensive farming might be considered as the main response to the economic crisis, with new technologies leading to cheaper foods ruling out the organic food system. On the other hand, a general technological change towards new genetically modified organisms and nanotechnologies in the agricultural sector might be perceived as an acceptable way of maintaining environment safety, low food prices and economic performance. More specifically, in terms of the scenarios leading to positive performances for organic farming, the role of technological development in scenario 1 influences organic farming directly in terms of research and development specifically fitted for the organic sector. Scenario 2 considers a more general technological shift towards "green" technologies which benefits organic farming twice: first, because organic farming is structurally more prepared than conventional farming to implement low-input technologies; and secondly, because specific public support for low-input farming takes place. Also, the scenarios leading to negative performances of organic farming show different hypotheses for technological change. While in scenario 3, there was the predictable idea of negative effects on organic farming due to agro-chemical lobbies in favour of conventional farming, in scenario 4, a strong shift in technological change towards genetically modified organisms actually 'crowds out' organic farming, as biotechnological food products are accepted as safe and environmental friendly.

Conclusions

Ultimately, the relevance of any particular research technique in policy analysis is determined by its effectiveness in improving decision-making processes. As a tool for collective policy learning, scenario analysis can supplement information derived from more conventional modelling sources, and it is designed to supplement, rather than replace, traditional decision-making techniques. Of course, in the same way that the validity of research findings (and the decisions based upon them) are very often defined by the original choice of quantitative methodology, the results in the case of scenario analysis will ultimately depend on the nature of the scenarios drawn up and on the judgement of the experts. However, a rational approach to decision making would combine the forces of both elements, for the development of foresight and for a better understanding of the potential impacts of policy reforms and changes in global market conditions. Knowledge acquired by more formalised, statistical approaches to future envisioning usually leave the decision makers with cognitive, hermeneutical and behavioural flaws (van der Heijden et al., 2002; Makridakis and Taleb, 2009a,b). Often, even team-work by people with a homogeneous background can result in group think, i.e. the suppression by the group of ideas that are critical of the common understanding of the direction that the group is moving in (van der Heijden et al., 2002).

Scenarios can be very effective when organisations wish to formulate plans to cope with conditions of low predictability (Wright and Goodwin, 2009).

Our scenarios have provided conditions for a challenging mental framework and to emphasise stakeholder analysis and option planning, and they are consistent with the validation criteria of both Wright and Goodwin (2009) and Gambelli et al. (2010), and they support the crucial role of agricultural policy and general economic trends for the future of organic farming.

Acknowledgments

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Appendix A. Scenarios for the agricultural sector and land use

Author	Scope	Timeframe	Scenario type	Number of scenarios generated
World Resources Report (1992)	Four explorative scenarios of land use changes at both the EU12 and regional level are developed and analysed in particular in view of the achievement of policy goals for rural areas (focusing on agriculture and forestry)	2015	Desk, quantitative	4
Rotmans et al. (2000)	Integrated VISIONS for a Sustainable Europe. The project goal is to increase awareness of sustainable development by enhancing the understanding of the many links between socio-economic and environmental processes and by assessing the consequences for Europe from an integrated viewpoint	2000–2050 (20–50 years)	Participatory, quantitative	4
Zanoli et al. (2000a,b)	Scenarios concerning possible future developments of European markets for organic products, and an evaluation of different possible policy options	2010	Participatory, quantitative	5
Marsh (2001)	Explorative scenarios for competitive agriculture in the framework of the United Kingdom Foresight. Explore possibilities and develop strategies that help the enterprises concerned to consider their own future and to adapt in the most positive and profitable way	Open (two decades)	Desk, qualitative	3
Raskin et al.(2002)	Vision of a sustainable world: the scenarios describe the historic roots, current dynamics, future perils and alternative pathways for world development (scenarios developed by Global Scenario Group)	1995–2100 (twenty-first century)	Participatory, quantitative	6
IPCC (2002)	Exploratory scenarios aimed at exploring future developments in the global environment, with special reference to the production of greenhouse gases and aerosol precursor emissions, land use and other driving forces	1990–2100 (twenty-first century)	Participatory, quantitative	40
EURUralis (2004)	Exploratory scenarios on the future of rural areas in the EU. They depicts land-use changes under a set of different future developments for the three domains of sustainable development: ecology, economy, socio-cultural aspects	2000–2030 (30 years)	Participatory, quantitative	4
Meyer (2004)	Exploratory scenarios for future development of the food sector within a Technological Assessment Project managed by the Office of Technology Assessment at the German Parliament	Open	Desk, qualitative	3
Broch (2004)	Exploratory scenario by the Danish Forest and Nature Agency develops the Green Technological Foresight on environmentally friendly agriculture, with the aim of examining the agricultural environmental challenges and suggesting technological and structural solutions	2004–2024 (20 years)	Desk, qualitative	2
Gambelli and Zanoli (2004)	Scenario concerning the future environment for organic farming and organic marketing initiatives in the year 2010	2010	Participatory, qualitative	4
Stern et al. (2005)	Sustainable pig production in the future within the Swedish FOOD 21 sustainability	2010 (around 5	Participatory,	3

(continued on next page)

Appendix A (*continued*)

Author	Scope	Timeframe	Scenario type	Number of scenarios generated
	research programme: normative scenarios, concerning alternative future systems for agricultural production are developed and evaluated with respect to ecology, economy and animal welfare	years)	quantitative	
Verburg et al. (2006)	The aim was to provide a procedure to visualise and explore different, plausible developments in land use in the European Union	2000–2030 (30 years)	Desk, quantitative	4
Eickhout et al. (2007)	Scenarios for Europe, dealing with interactions between agricultural trade, production, land-use change and environmental consequences	–	Desk, quantitative	4
Overmars et al. (2007)	Scenarios using both inductive and deductive approaches to derive the relationships between land use and its explanatory factors	Medium term perspective	Desk, quantitative	2
Van Rompaey et al. (2007)	Land management scenarios to evaluate the impact on soil erosion. The authors explore the impact of four possible future land-use change scenarios for rural areas in the north of the Czech Republic	Ambiguous	Desk, quantitative	4
Castella et al. (2007)	Based on the Conversion of Land Use and its Effects approach (CLUE) developed at Wageningen Univeristy (The Netherlands) for the Bac Kan province in Vietnam. The aim is to visualise the spatial patterns of changes in land use under a set of scenario conditions	5–15 years	Participatory, quantitative	3
Patel et al. (2007)	Exploratory and anticipatory scenario with participatory construction process for the Northern Mediterranean Area, with interactive stakeholder involvement. This case study has been used to illustrate the opportunities that such interactive approaches can provide for communities having to deal with complex issues affecting their region	30 years	Participatory, qualitative	3
Millennium Ecosystem Assessment (2006)	The Millennium Ecosystem Assessment considers the possible evolution of ecosystem services during the 21st century by developing four exploratory scenarios relating to plausible future changes in ecosystem services and human well-being, incorporating both ecosystem dynamics and feedbacks	21st century	Participatory, quantitative	4
ScMI (2006)	Scenario Management International uses the Szenario-Management™ explorative approach to design possible development perspectives for food intake in Germany. Scenarios are offered to stakeholders as a basis for their individual strategy planning.	2015 (around 10 years)	Desk, qualitative	6
EC (2007a)	SCAR – EU RTD's Standing Committee on Agricultural Research: the aim was to analyse through exploratory scenarios alternative futures for European agriculture 20 years into the future, to support public decision making.	20 years	Participatory, qualitative	5
Ec (2007b)	The SCENAR 2020 study aims to identify future trends and driving forces that will be the framework for the European agricultural and rural economy by 2020.	2005–2020 (15 years)	Participatory, quantitative	3
INRA (2008)	Agriculture 2013: the aim of this Foresight Study is to examine the possible scenarios for the evolution of French and European agriculture in an international context characterised by uncertainties	2013	Participatory, quantitative	3
Soliva et al. (2008)	Scenario on the effects of agricultural restructuring on biodiversity conservation in mountain areas of Europe, with the aim to enhance EU agri-environmental and rural development policy (Bioscene study).	2030	Participatory, quantitative	4
Gómez-Limón et al. (2009)	Scenario on the future of the agriculture sector in Castilla y León. The aim is to explain the cause–effect relationships of changes affecting agriculture in this region of Spain, and to stimulate an in-depth reflection of how the design and implementation of current agricultural policies will affect the fragile agricultural sector of Castilla y León	2020	Desk, quantitative	4
Oudshoorn et al. (2009)	Scenarios concerning organic dairy farms exploring the implications for animal welfare and environmental issues at a farm level using stakeholders and expert assessments	2020	Participatory, qualitative	3
UNEP (2009)	UNEP – Global Environment Outlook (GEO 3): develops and analyses four exploratory scenarios to investigate implications of different approaches to policy making. The scenarios span different overlapping and interlinked areas, including populations, economics, technology and governance (European food systems)	2002–2032 (30 years)	Participatory, quantitative	4
EEA (2006, 2007)	PRELUDE – EEA land use exploratory scenarios exploring what the European landscape might look like 30 years from now. The focus of the scenario discussion is on the interaction between societal future and land-use changes, with particular interest on agriculture and food production	30 years	Participatory, quantitative	5

Appendix B. List of the driving forces as clustered by the experts

Clusters	Driving forces
Cluster 1 – Communication of organic distinctiveness	Information technology communication at point of sales Cooperation within the organic chain Organic product traceability Communication of the producers and processors of the organic products at point of sale
Cluster 2 – Labelling	Mandatory greenhouse gas labelling Mandatory food miles labelling Additional life cycle assessment labelling Green corporate policy
Cluster 3 – Global socio-economic conditions and resource availability	Food price Financial support to organic market Differences between poor and rich people in Europe General level of consumer income Age profile Food prices Oil prices Farming input prices Water availability Extensively managed agricultural land Organic price premium
Cluster 4 – Organic distinctiveness	Political support for healthy food campaign Food prices Organic products substitutes Local and typical food and non-organic 'ethical' food Mandatory food miles labelling Organic products availability Development of slow food movement Demand for fair and ethical products
Cluster 5 – Awareness and consumer recognition of organic products	Political support for healthy food campaign Food education at school
Cluster 6 – Availability of organic products	Mainstream food actors in organic farming Organic products in canteens and vending machines Organic products availability Organic products wide range/assortment
Cluster 7 – Commitment and cooperation in the organic chain	Number of committed organic producers Cooperation within the organic chain Extensively managed agricultural land
Cluster 8 – Relative competitiveness of organic with respect to conventional farming	Food prices Organic farming subsidies Organic farming/conventional farming relative profitabilities Financial support to organic market Research and development for organic farming Organic price premium
Cluster 9 – Relative sustainability of organic with respect to conventional farming	Conventional farming vs. organic farming environmental sustainability Organic farming adaptation to climate changes Farm production biodiversity (conventional farming vs. organic farming)
Cluster 10 – Policy favourability	Political support for healthy food campaigns Organic farming subsidies Financial support to organic market Policy for renewable energy resources Research and development for organic farming 'Old style' agricultural policy (food security) Farm production biodiversity (conventional farming/organic farming) Fiscal policy Organic sector investment
Cluster 11 – Relative safety perception of organic with respect to conventional food	Certification scandals in organic farming Food scares Genetically modified organism scandals Food scandals in organic products Organic products traceability Research and development for organic farming National differences between standards
Cluster 12 – Relative quality perception of organic with respect to conventional food	Communication of the producers and processors of the organic products at point of sale Research and development for organic farming Taste Residues Shelf life Varieties Nutritional contents Safety Farm production biodiversity (conventional farming/organic farming)

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