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"Identifying possible futures in food chains"

Tracks: Food Chains Approach / Agribusiness strategies

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Identifying possible futures in food chains

Introduction

Corporate managers and policy-makers usually look ahead to figure out the outcome of their decisions and actions. Then companies, governments and research centers carry out forecasts. However, if forecasts are only based on present and past, results can be strongly biased! Indeed, historical events never happen twice exactly in the same way. By extension, a single decision has to cope with moving conditions over time. As a consequence, when thinking of food chains in the long term, we have to indicate possible changes and ruptures as well as trends. « Foresight » techniques, also called « future studies », invite managers to build multiple scenarios. Several methodological recipes are available to achieve this objective.

Moreover, every actor in the food chain may have her/his own vision about the future of the agriculture and food system. Our research objectives were (a) to compare two techniques commonly used to form representations about the future (2) to analyze representations about the future. The first technique, the scenario technique, requires technical skills, time and energy. The second technique, the vision method, is simple and rapid. We have assessed the value of the outputs using standard and ad hoc criteria. To achieve this task, we have asked international agri-food management researchers to provide their vision about the sector future. We have compare these to scenarios produced using a standard scenarios technique.

1. Investigating the future: choosing among many possible methods

1.1. Needs for insights about future issues

Managers need to be prepared for the challenges ahead. This implies building a representation about the future.

Depending on the manager position in the companies, the needs will differ. A procurement manager wishes to get precise information about his business needs for the next days or weeks. His information needs to extend occasionally to a year or more. His planning time horizon can be called "short term". Strategists' time horizon is much longer, from 5 to 10 years.

Manager's ideal temporal horizon is usually proportional to the lifespan of firm critical investments. For example, for nuclear production of electricity, the ideal planning horizon can be estimated at more than 40 years. The first 10 years are needed to build the plant. The exploitation will last 40 years. And, an unknown number of years will be necessary to dismantle and treat the obsolete plant.

In food manufacturing, operational planners often use a temporal horizon of 3 to 5 years. Strategists' horizon is twice longer.

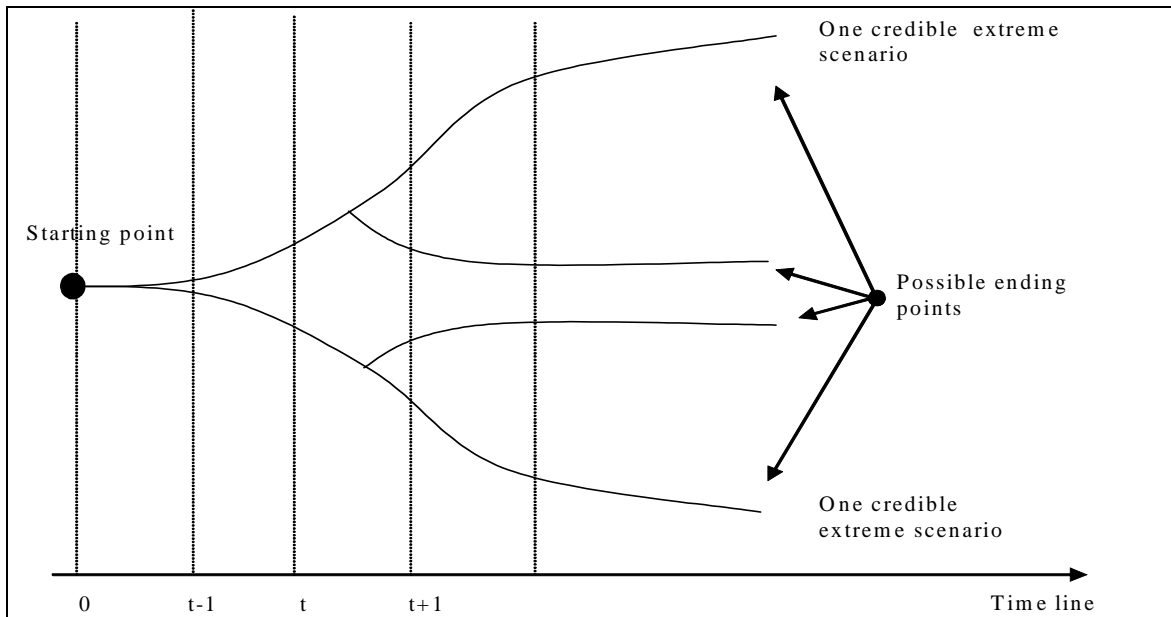
The amount of uncertainty increases with the remoteness of the horizon. This paper focuses on long range strategic horizons, which generally incorporate a great deal of uncertainty. Working with such a high level of uncertainty is intellectually challenging.

1.2. Methods overview

To form representations about the future, managers have a tool box. Some tools fit particularly well for short term issues, but they are inefficient to deal with long term horizons. For example, the accuracy of forecasting techniques decreases with the remoteness of the horizon. When the time horizon is distant, uncertainty is so important that the future cannot be captured by a just one representation. Building several representations about the future seems more relevant. The "high probability" short term rational has to be replaced by the "possible scenario" logic when tackling long term issues. Therefore, strategists' strive on answering "What ... if..." questions. "What is our best strategy, if we face a technological breakthrough?" "What is our best strategy, if new competitors enter the market?" However, answering those questions will be considered useless, if strategist could not identify the ongoing scenario. For this reason, a good scenario connects the present to a possible future via a credible path. By assessing from observation which one of the different scenarios is occurring, strategists get a view about the most likely futures. (see figure 1)

Scenarios are stories, which logically connect the present to a possible future. Scenarios must be built to form a set catching the scope of the uncertainties. By construction, scenarios must contrast strongly each other to cover all possible futures.

Figure 1 – Scope of long-term future divided in contrasted scenarios



Beyond scenario techniques other methods are also available to conjecture about the future.

We can set a typology of the approaches commonly used to form representations about the future. Only a few relevant dimensions are helpful to cluster around methods. For example, we can separate methods into two groups ; there are those which require a consensus of representations among contributors and those which do not.

For instance, the Delphi method falls into this category. Experts in the given subject are first asked to produce a representation and then to motivate their view. The different views and their explanations are collected and grouped by similarities. If there are substantially different views, opinions or explanations, then a second round is organized. The results of the previous round are presented to the experts. They are given a chance to change their initial position to join a view offered by another contributor. After a few rounds, this process usually converges towards a consensual representation.

Another category of methods promotes the emergence of many contrasted views. These methods are based on the idea that a unique path into the future would be an ineffective managerial illusion. They consist not only in collecting personal views that may substantially differ from one another, but they also aim at producing creative but credible representations of the future. If one looks for creative representations, cognitive sciences suggest that "experts" may not be the ideal natural contributors. Everyone can produce fairly creative representations when trained to use appropriate techniques.

Another critical dimension lie on the ability of the methods to allow for emerging patterns. As for the consensus dimension, it is grounded into one's own belief about the nature of the future. Either the past is reproduced into the future or the future can emerge from the past as a totally new configuration. In the latter, the new configuration has two major properties: it could possibly exist and it is also unpredictable, that is, we cannot assign a probability to it. Many discoveries fit with that idea about the future. While Peter Fleming discovery of an antibacterial effect could have been foreseen based on previous observations about population development, a probability of its occurrence could not be assigned.

1.3. Properties for long-term representations of possible futures

Each method implies some properties of possible futures and their presentations. Those properties are generally similar following one method of scenario building or one another (Reibnitz 1988, Randall and Fahey 1998, Godet 2001). Therefore, they seem to determine “best quality” criteria. We hope those properties extend to other types of long-term representations (see 2.)

Criteria can be applied either to one scenario or a portfolio of scenarios.

1.3.1 Quality criteria for a representation of the future

a) credibility and plausibility

Scenario should sound credible to be heard, memorized, and last but not least actionable in the reality of management and for leadership purposes (see also Denning, 2005). The credibility property comes along with the possibility property. As said above, possible is more than probable; something is believed possible due to previous knowledge or to striking credible rationales. To help, another property of scenarios is transparency.

b) Transparency and clarity

Transparency comes either by the method used (steps well done) or how the future is told. A recommendation is for example, to set up a representation from the present to an image of the long-term future through a detailed path. It has to be fairly understood.

c) Relevance

Scenario should be relevant to a major topic that matches decision makers' interests. Even if the given subject deals with world destiny (for example, example water resources of the Earth), it must address decision-makers issues (how to build some food manufacturing process saving water).

d) Robustness

Path to the future may not differ substantially in case of minor exogenous shocks.

e) Abundance of drivers:

Drivers, levers and brakes that move the system should be abundant enough to avoid limited views. Individualization of players. Actors and organizations act as groups or as individual entities. On a daily basis, competition or cohesion exist among them. Individualization of players enables the expression of dynamic forces in the system.

f) Rationality

Actors need to have a rationale for their behavior. However, those rational to not have to be in accordance with standards of the neo-classical approach. Fear of being poisoned is a strong rational for consumer behavior (not buying a product). Although the hazard and the risk involved might be estimated by science as extremely low. Scientist might consider this behavior as irrational.

g) Multiscale views

Local views and global views may substantially differ, then a scenario must wrap up them if it makes sense. Emergence often appears when changing a scale level.

h) Consistency:

All the items mentioned in the representation must fit together like the pieces of a puzzle.

1.3.2 Quality criteria for a set of representations:

a) Relevance

Relevance is also required for the set of scenarios to arrange the nodes and crossroads of the different scenario paths. Every future scenario must be rooted on the same references (same definitions of sub-systems, items, actors, forces).

b) Completeness

The scope of the set of scenarios must be large enough to include all possible and credible futures (see figure 1.).

c) Contrast and parsimony

In contrast to completeness which enlarges the number of possible futures, scenarios need to be restricted to a few contrasted paths. Paths with a maximum of consistency have to be clustered and dissimilarities should be emphasized between two contrasted paths. Techniques like morphological analysis may help (Godet, 2001). It can be checked if opposite situations appear in the set of scenarios: e.g., peace vs. war, recession vs. growth, technology acceptance vs. technology rejection.

To conclude, some best practices deal with content and other with formats to allow the scope of scenarios to be understandable and useful to managers and decision-makers. Let us see if collecting spontaneous future visions of agri-food management researchers match those quality criteria.

1.4. Testing an alternative method to collect possible futures

We built a survey targeted at international agri-food management researchers to collect their visions about the future in their field of expertise. “Vision” may be a specific type of representation for the possible futures, to be distinguished from scenarios.

Scenarios tell events that come from an initial point to an ending point, maybe out of any (strategic) purpose². In contrast, a vision may tell points and events in the future but always embedded in a personal or collective goal (as defined by Van der Helm, 2009: outlook, project, wiseness, changing). That’s why in “visions”, manifestations of « intentions », « expectations » and « desires » of human beings are revealed and emphasized. They are extremely personal and may not be guided by explicit analysis steps. As a consequence, a vision doesn’t come from any method, whereas scenario building follows steps and guidelines.

Consistency of a vision is generally welcome, but not as a necessary condition. In our survey, we asked for narrative consistency and explicit paths from nowadays to a long-term horizon, like if visions were first draft scenarios. The objective of the research is to assess if visions formed given those guidelines fit the “best quality” criteria identified for scenarios (see part 1.3).

We got inputs from 25 researchers, members of the International Food and Agri-business Management Association (IAMA) or from the European Food System Dynamics Forum 2009. they provided ten individual visions and two collective visions (built in small groups), from worldwide contributors.

2. Results : visions of agri-food management researchers

2.1. How agri-food management researchers see their future?

Content collected during the survey is summarized in figure 2. It was divided depending on sub-systems (demand, supply, regulation), interactions, and on application scales (local, regional or global).

² Strategic scenarios may also be found as a sort of backward planning. In that case, they are told from an end state to the initial point. The paper focuses on explanatory scenarios.

This global content is multi-scaled and implies different types of actors and many driver forces. “Adaptation” is the system dynamic key word in most of the visions. Technology helps in many cases.

Table 1. Agri-food management reserchers” vision about the future of the agri-food system

	Local to national	Global
Consumer demand	<ul style="list-style-type: none"> - Food intake adjusted to individual needs for everybody - Increasing protein consumption due to standard of living - Demand for local and traditional food products 	<ul style="list-style-type: none"> - Increasing demography - Increasing demand for environmental, animal welfare and fairness concerns
Firm supply	<ul style="list-style-type: none"> - Functional food, source of health and well-being - Technological push, increasing productivity, automation Biotechnology, genetics, nanotechnologies - Human capital development - Production flexibility: late differentiation and destination of agriculture products towards food, feed, fiber, energy according to market prices - Precision agriculture will become dominant - Food synthesis without farming,-without animal husbandry - The end of family farm 	<ul style="list-style-type: none"> - Need for feedstock - 2nd generation biofuel
Regulation tasks	<ul style="list-style-type: none"> - Educational institutions and spread of knowledge - Standardization on food labeling 	<ul style="list-style-type: none"> - World trade - Decrease in non tariff trade barriers - Increasing power of non economic actors (NGOs and citizen groups)
Interactions among actors	<ul style="list-style-type: none"> - Consumer orientation of supply, greengrocer store/retailer as interface for supply-chain coordination - Information and communication technologies for transparency, food safety, home delivery of products and innovation for coordination mechanisms 	<ul style="list-style-type: none"> - Transfers of technology and know-how - Increasing interdependances of actors in the world village - Convergence of technologies in life sciences - Health system and food system are connected - Too much information, no more privacy

2.2. Results about the alternative method

We have first compared visions to standard scenario on the key quality criteria dimensions (see page 5). Below, in table 2, the major dissimilarities are reported. These dissimilarities are the authors' relative judgment based on the analysis of 12 visions. For example, when assessing the visions' credibility, we did not ask ourselves if a given vision was credible or not, but rather we strived to identify possible structures that serve as a credibility enhancer. Logical ties between two components of a vision, such as an action and its consequences, or between a motivation and an action, were considered to improve credibility. We considered sentences such as "After the major food poisoning episode the consumer had to face in 2010 and its trade impacts, the government decided to implement a drastic sanitation system" to be more credible than "government will go on increasing the food control systems." While the latter is substantially similar to the first one regarding the action, it is less (not) motivated.

For a few criteria we were not able to form a judgement. For example, we could not estimate the relevance of a vision or a scenario because we did not have a matter at hand.

Table 2. Judgement of visions versus scenarii according to quality criteria

Quality criteria	Visions (vs. scenarii)
For a single representation of the future:	
Credibility and plausibility:	Fewer and weaker credibility enhancer
Transparency and clarity:	Same level
Relevance:	Not testable
Robustness:	Seem equally robust
Abundance of drivers	Much less
Individualization of players	Players are not usually individualized
Rationality	Rationals are not often made explicit
Multiscale views	We did not observe any multiscale views
Consistency:	Strong consistency however built on a limited number of pieces.
For a set of representations:	
Relevance	Not testable
Completeness	No
Contrast and parsimony	No

While estimating the dissimilarities between visions and scenario, we identified a few other dimensions that might be important. For example, sets of scenario often contain a pessimistic scenario, a conservative one and an optimistic one. The visions we received have mostly exhibited an optimistic position about the future. Current tensions perceived by the contributors were gently attenuated in the long term, such as “technology” will help solve current issues. Vision seems to be idealized (Our findings are consistent with those of Van der Helm, 2009).

We found that

- a) visions were rather short term: they did not extend into a long range future. Therefore, the negative feedback loop was not present.
- b) When the number of drivers was significant, they were mostly put side by side rather than combined (juxtaposition vs combination). Therefore, interactions, whether positive or negative, were missing.
- c) There were no disruptive visions. Though, the end states differed from the initial states, they seem to be connected through a continuous process. They were no unexpected events.
- d) While all visions provide a direction towards an end state, the development of the path is not defined. Only a few events are pictured.
- e) We think that most of the visions were finalized (i.e. goal oriented), rather than neutral. As a consequence, convictions were often mentioned rather than pure logical developments.
- f) We may also question regional influence of visions provided by researchers since most of them had a local scope.

We did not identify any irreversible path in the visions.

3. Conclusion

From the previous section, we can draw the following conclusions:

1. The “vision” method and the “standard scenario” method exhibit different quality levels: the two methods are not substitutes, they seem complementary. Visions appear as an efficient tool to get many short and inspiring dimensions about the future. However, they do not offer the structural rigor of scenario. Results from visions could serve as an input into a scenario making process.
2. The 12 visions seem less contrasted, thus more consensual than the 5 scenarios. This lead to the risk of establishing an early consensus about the future. Usually consensus is considered as

good and desirable, but the idea can be challenged in task of investigating the future. An early consensus, ie a consensus that will emerge without being stressed, is a risky posture. Consensus build after debating and an intense challenging step, such as devil advocate, are usually much better.

3. As a collective academic body we must be concerned about the similarities of the 12 visions members provided. As we mention before this exhibits some risk. This also suggests that there could be a strong intellectual inbreeding among contributors, and possibly among members of the association. Systematic development of alternate views might appear as a sound practice given the increasing uncertainty ahead.
4. Going back to the discussion about the methods, we think the quality of the visions could be easily improved by providing stricter guidelines to the contributors. For example, to clearly identify out of the initial scale implications.

The conclusion of this study is limited by the number of contributions we have received. We will be happy to enlarge the contributor base to all IAMA members and share visions via an Internet web site.

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Annex : Scenario methods

Building future scenarios (and see above) is generally guided in several steps and techniques that can be summarized as below.

- first of all, define and understand the given subject on systemic basis (for example: agri-food businesses as a system; supply, demand and regulation tasks as sub-systems; each sub-systems related to other ones by many links, and to an “outside” world).
- then discriminate as possible present and past situations from their contexts. It helps to project sub-systems on possible future contexts (trends, re, emergent ones).
- rebuild the entire system in a long-term view (keep possible combinations between sub-system projected events) and choose the best represents of it to form a set of contrasted scenarios. They have to scope all possible futures as in figure 1
- set up narratives to communicate scenarios from present situations to the future ones and indicators to monitor month by month where the real path to the future will be located among these hypotheses

(from Reibnitz, 1988; Randall and Fahey, 1998; Godet, 2001; De Jouvenel H. & Durand N., 2004)

The objective of this recipe is to obtain at the end a “good” set of scenarios, i.e. useful tool for managers in the short run and for researchers in the long run.