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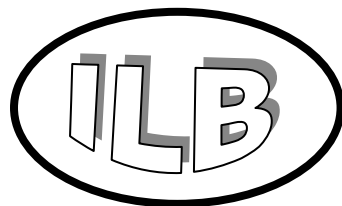
System Dynamics and Innovation in Food Networks 2009

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Business Dynamics with Scenario's on Dutch Agriculture and its Institutional Arrangements

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Abstract

This paper investigates the developments in the Dutch Agri-Food innovation system. Main components of the system are agriculture and agribusiness, the promotion of interests in the lobby system and the knowledge system. Each has its own dynamics but they are until now tied together by institutional arrangements. Based on a historical description we formulate a simple business dynamics model. The robustness of the system is investigated by a scenario analysis. Results have been checked by interviews with experts.

Keywords: *agri-food innovation system, business dynamics, scenarion analysis*

1. Introduction

The successful Dutch Agri-Food innovation system is based on institutional arrangements in the sector organisation (farm lobby groups, commodity boards, own Ministry of Agriculture) and its own knowledge system (Wageningen UR, agri-education system). This paper raises the question how sustainable this system is in a world with a more concentrated and industrialized agriculture and further internationalisation.

Dutch agriculture, horticulture and the agricultural sector as a whole (referred to hereafter collectively as “agriculture” for the sake of simplicity) are often seen as a knowledge intensive, well-organised part of the Dutch economy. This paper looks at the way in which the current organisation of the promotion of interests and the knowledge system adds value to the primary process within industry, the limitations this system comes up against and how the system of the promotion of interests and knowledge provision (particularly research) could contribute to the optimised performance of agriculture in the future (i.e. the agricultural sector in the broadest sense).

The approach of this study was to describe the developments of the past century (section 2) from the perspective of the knowledge and experience of the project staff members and based on a literature study. This was then converted into a system-dynamic model, including a value-creation circle, as an abstraction to reach a consistent image and to make an inventory of uncertainties for the future (section 3). On the basis of this, a scenario analysis was carried out (section 4). The research was validated by interviews with eleven experts (section 5). The paper ends with conclusion on the robustness of the Dutch agri-food innovation system and on the methodology.

This paper is based on a study in Dutch (Poppe et al, 2009).

2. Historic overview of the Dutch Agri-food innovation system

The seeds of the agricultural knowledge system and of the promotion of agricultural interests were sown in the same period: the agricultural crisis around 1880, after which the agricultural cooperatives were also set up. The promotion of interests and the knowledge system subsequently worked together on the same objective for a long period of time, almost a century, on the basis of cooperation and consensus. That goal was the improvement of the productivity of agriculture and of the contribution of agriculture to the economy.

The organisation of the promotion of interests was tailored to this objective after the Second World War: together with the *Landbouwschap* (Agricultural Board) and the Product Boards, the agricultural organisations of both entrepreneurs and employees were represented in the negotiations with the government, amongst other bodies. For a long time, the government – particularly the Ministry of Agriculture, Nature and Food Quality – attached great importance to such structured discussions. Reaching an agreement with the organised agricultural sector was important for the minister to strengthen his position in the cabinet and in parliament. The Dutch model of regular discussions and consultation with the agricultural organisations regarding policy was also adopted in the EU by the first Commissioner for Agriculture Sicco Mansholt.

In the Netherlands, the government was able to disperse the responsibility for agricultural policy through the work of the *Landbouwschap* and the Product Boards (the PBOs); through regulations, co-governance and joint financing of the PBOs, a number of tasks were fully or partially taken over from the government by the agricultural sector. This also played a role in the field of agricultural research, information provision and education. The agricultural organisations therefore had a considerable level of influence on the knowledge system.

In recent decades, however, changes in the market and circumstances within society have gradually led to the scaling down of the harmony model within which policy formulation took place with regard to agriculture. The interests of the agricultural organisations – which are primarily socio-economic by nature – were put under pressure by broader social interests (the environment, nature, etc.), which the Ministry also wanted to serve. Within the promotion of interests, the influence of relatively new organisations in the field of nature and the environment also gradually increased. The “Green Front” (also referred to as the iron triangle of the Minister, the Agriculture Committee of the Lower House of the Dutch Parliament, and the *Landbouwschap*) was broken through. At the same time, the changed circumstances made it more difficult to reach consensus within the organised agricultural sector. The promotion of interests gained a more sectoral and regional organisational form; collectiveness more or less disappeared in an administrative form within Dutch agriculture. Today, partly under the influence of the liberalisation of policy, the promotion of agricultural interests focuses less on the government and more on the market and has become more accustomed to other interest groups in the field of nature, the environment, animal welfare, consumers etc.

The agricultural knowledge system in the Netherlands, which for a long time was instrumental in increasing productivity, reducing production costs and improving competitiveness, was also confronted by a change of course due to changes in circumstances. The framework in which agriculture had to work become more complex and the collective joint financing from the sector crumbled away. A dividing line was drawn between public and private financing of the research and the agricultural extension service was privatised, whereby the financing by the Ministry of Agriculture, Nature and Food Quality was scaled down. The OVO triad (Education, Research and Extension), in which the three elements were organised in close connection with each other and managed primarily by the Ministry of Agriculture, Nature and Food Quality, was confined to the past. There were also major changes for agricultural organisations, which mainly related to elements of the research (practical research), education (except university education) and agricultural information provision. The farmers’ organisations also lost their administrative

hold on almost all agricultural schools. New ways needed to be found to steer the development and flow of knowledge in the desired direction.

The networks used by the farms for the acquisition of information and knowledge are now therefore clearly different from those used in the past; the era in which the state agricultural information provider visited the farm to provide advice – whether requested or not – ended long ago. In addition to the familiar agricultural magazines, websites have become an essential tool. One thing that has not changed, is the fact that the Dutch agricultural sector is primarily focused on foreign markets and has thus managed to retain the required level of competitiveness.

3. Business-dynamics modelling

System-dynamic modelling (Sterman, 2000) makes it possible to think about the relationship between agriculture, the promotion of interests and the system of research, education and information provision. Figure 1 contains a model that has been developed in which production cost-based thinking occupies centre stage for agriculture (including agri-business). Technology and increasing scale lead to lower cost prices of the biggest farms that puts the margin under stress, and leads to farm exits. This makes it possible for other farms to grow.

The side effect of the higher production were environmental externalities, leading to counter-vailing actions of NGOs and to environmental policy.

Lower cost prices improved the competitive position of the sector, and contributed to an increase in welfare over the last 50 years. This increased the demand for differentiated, higher value products, and for services, including eco-services.

However such, more recent modifications within the framework of chain reversal ('from fork to farm'), organic farming and multifunctional farming have not nullified the central mechanism of cost price orientation to improve the competitive position. Therefore in they have been modelled as expansions or 'by-passes'.

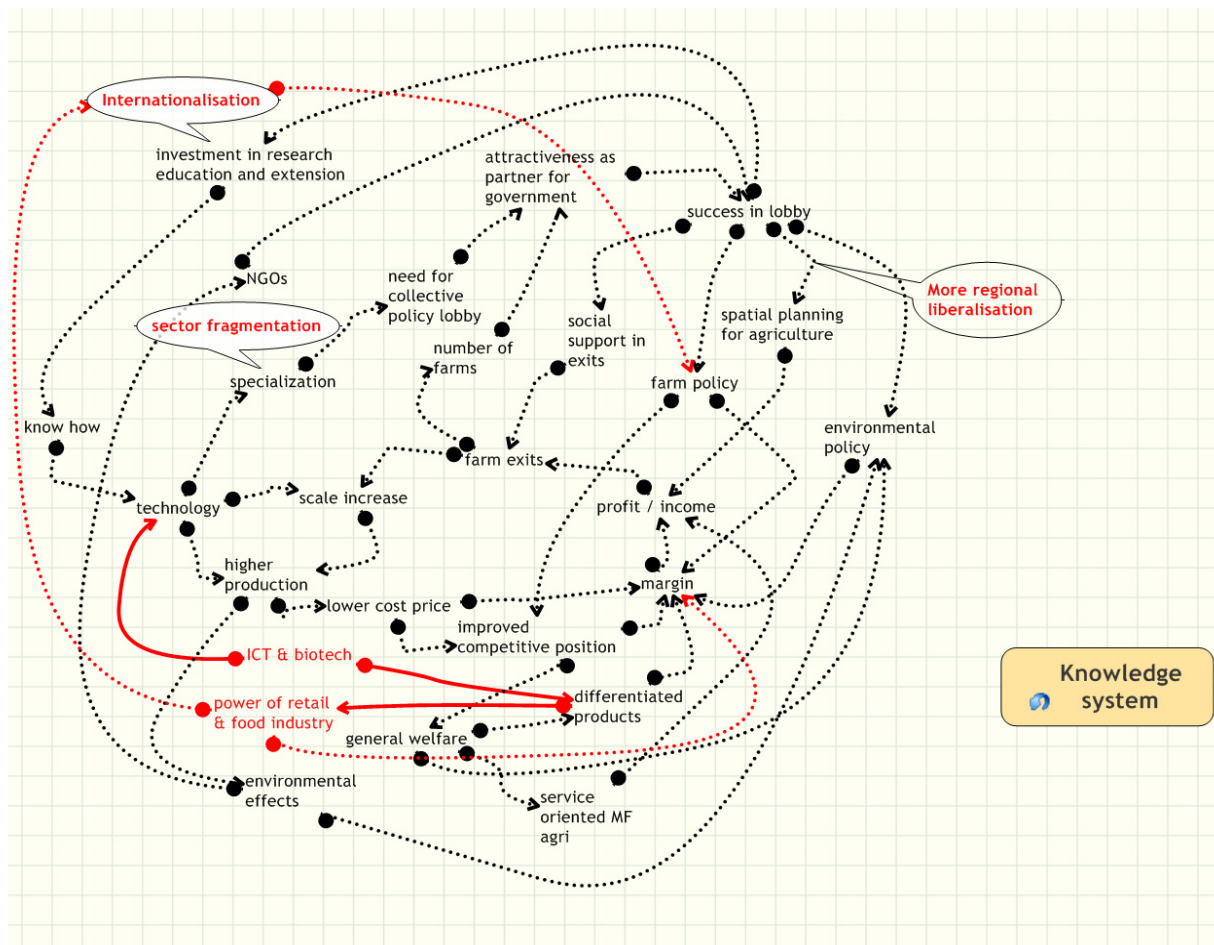


Figure 1. Business-dynamics model of the Dutch agri-food innovation system

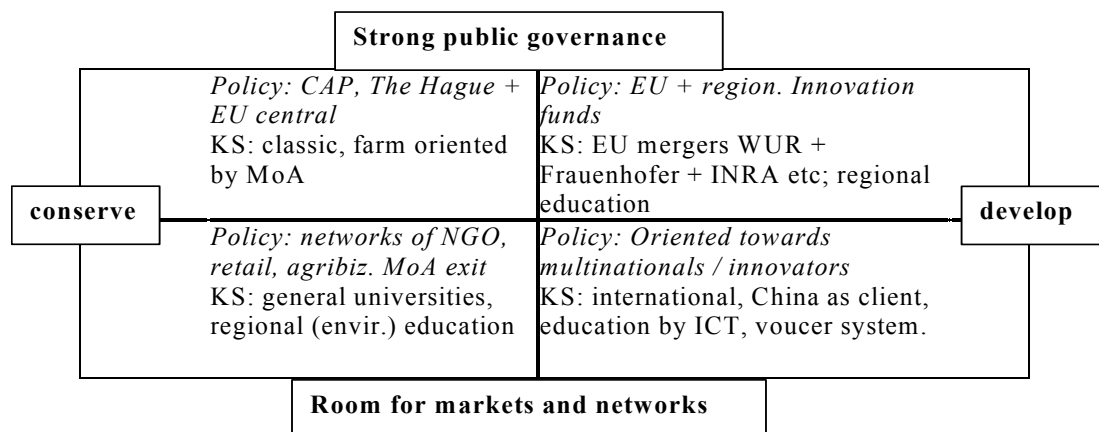
In this model, the promotion of interests by the agricultural lobby has the task of converting problems within the sector with clients (such as in the “*Wasserbombe*” affair in the export of tomatoes) and with society (the environment, swine fever, animal welfare) into social innovation challenges.

This is an institution that is typical of smaller, export-focused countries. The Dutch government has various instruments for this purpose; besides the agricultural policy, there is also the spatial planning policy and the tax policy, and particularly the knowledge policy. This results in knowledge that reduces costs. These costs can be private costs of the agri-business (by offering results from R&D in Wageningen or extension) or the social costs of the environmental problems.

It appears possible to use the model to deepen and expand. The value-creation model of Dutch agriculture that is associated with this emphasises the competences that arise from the position of the Netherlands and its trading role. Together with a high level of knowledge, this leads to a good export position that in turn is translated into high land prices and high labour costs. Agriculture thus becomes knowledge-intensive and therefore also local. Knowledge-intensive processes have less of a tendency to disappear to Eastern Europe, South America or China. This leads to an important economic position within the national economy. In this way, investments can also be made in the promotion of interests, in the knowledge system, within agri-business and in new business systems, with which negative results in the intensive system are combated.

4. Scenario analysis

On the basis of an analysis of uncertainties, a scenario analysis (Heijden, 2004) was carried out whereby clustering of the uncertainties results in two strong axes (figure 2). One axis is responsible for steering: strong, public-law control versus scope for the market and networks. Strict rules are needed for strong public-law control regarding spatial planning and the environment, and taxes are used as a steering mechanism. The alternative is a much more liberal policy with a diffuse, not very active government. The other axis is that of the dynamics of people and networks: are they looking for conservation or development. In the case of conservation, the focus is on managing and controlling through chain power and the local preservation of things that matter (“social values”), and existing institutions deploy technology to ensure that the situation does not change (while in the meantime resolving environmental problems, for example). On the other hand, there is a great deal of development, driven by new technology (ICT, biotechnology and nanotechnology) to which international networks are adapting.



KS = knowledge system

Figure 2. Scenario analysis

The combination of both axes gives us four squares. The combination of strong public control and an emphasis on conservation (scenario 1) can be labelled as “French-style”: a dominant and strong EU, prescribing clear rules on such matters as the environmental policy without large-scale derogation. The government also exercises control through taxes and levies, for example. The central government – in this case the European government – is very powerful. This scenario stems from the situation that the European countries do not see the point in collaborating with other continents and are in fact actually afraid of other countries. Since the EU is primarily internally oriented, there is no strong technological modernisation. Thanks to that internal focus, a great deal of value is attached to the EU’s own food and energy supplies; new life is being breathed into the classic CAP and agriculture is being given scope to produce (few spatial planning claims).

The second scenario has a strong public governance, but more aimed at development and innovation in stead of conservation. The EU is important but the CAP gives way to rural policy and regional development. Initiatives on climate change, new energy sources and biotechnology provide the funds for the knowledge system. Lobbying is linked to such initiatives on EU and on regional level.

A third scenario describes a California style innovation environment: not much state intervention, and lot of room for entrepreneurs and new initiatives. Policy is less important and oriented to multinationals and to new start ups. Growth is high and there is international cooperation with

e.g. China. ICT is important and universities work in a business-like manor (third generation universities) on a world wide scale.

The fourth scenario combines the room for markets and networks with a conservative attitude: a Bavarian model. In such a situation the multinationals in retail and food set the scene and are not so much checked by governments but by NGO's. There is not necessarily a Ministry of Agriculture anymore, that perhaps has been merged into Economic Affairs. Agriculture and food are not that different from other sectors, and general universities provide the education and research for the the food sector.

The scenario analysis suggests that the current system is reasonably robust. Elements can be found in both the promotion of interests and in the knowledge system in the current system that could play a characteristic role in the more extreme scenarios (Poppe, 2008). It is of course also possible that the scenarios that we have designed are not extreme enough, but the impression within the project group following this analysis is that the Dutch agricultural model is more robust that is sometimes thought.

In all four scenarios, a consistent development of industry, the promotion of interests and a knowledge system is possible. Nonetheless, things can still go wrong, if industry or the promotion of interests move in one direction and the knowledge system moves in the other. It therefore appears important to exchange thoughts at a high level on these strategic developments and the options in this regard.

5. Experts

Eleven top-level experts, including two former ministers, were interviewed on the topic of the future of the Dutch agri-food innovation system. The interviewed experts endorse the most important findings in a variety of ways where the history and current situation of agriculture, the promotion of interests and the knowledge system are concerned. With regard to the future developments of agriculture, the experts indicate that this relates to the form of steering from three domains (government, market and civil society) and to the scale level of agriculture: regionalisation or internationalisation and globalisation. Chain independence, the emergence of strong new countries, urbanisation and new values can be derived from the scenario axes of conservation or development.

Spatial planning is missed, both regarding large scale and further chain integration (regional development) and for the further expansion of agriculture (new-style land development). Extended and/or regional agriculture is still being given support by the EU, the state, the provincial governments and municipal councils, but will this still be the case after 2013? Are we heading towards a common rural policy, analogous to the common agricultural policy?

The professionalisation that is taking place among farmers is also set to spread to agricultural organisations. Two developments are taking place within the knowledge system: on the one hand, the knowledge system is heading more in the direction of the individual level of the farmer, and on the other hand it is heading more towards the scale level of international cooperation.

6. Discussion and conclusions

In conclusion, it can be stated that the patterns for the development of Dutch agriculture (the agricultural sector) in the future are less clear than they were in the past. In the past century, the sector has enjoyed relative success through improving the efficiency of the production (including supply, processing etc.). Although this development model has come up against limits in recent years, it has also discovered new possibilities through technological modifications. In-

vesting and continuing the process of scale increases have in that sense remained important trends for Dutch agriculture regarding the retention of an important position within today's world, opened up by globalisation.

The analysis shows that the promotion of interests and the research result in individualisation and professionalisation; there is less scope for a collective approach, there is a certain amount of fragmentation, and there is a need for tailored work. The harmonisation between the worlds of knowledge (R&D) and agricultural/green producers and their representatives (interest groups, lobbyists) has also become less structured due to the developments referred to. All these changes have consequences for the way in which knowledge development and knowledge dissemination can be arranged. The central question relating to the desired knowledge has at any rate become much broader and more complex, but the possibilities relating to the gathering and use of knowledge have also greatly improved, partly due to the use of ICT. The changes in agriculture and in the promotion of interests will also lead to innovations in the way in which the knowledge is organised. It is impossible to predict the direction these will take. However, various scenarios can be presented. The analysis shows us that in terms of strategy and organisational forms, experimentation is taking place within the realms of both the promotion of interests and the knowledge system, and that the sub-systems are therefore responsive. This contributes to the robustness. Nevertheless, the sub-systems of agriculture, the promotion of interests and knowledge systems develop differently, whereby the first and the last are becoming more international more strongly than the promotion of interests, for example. This could be the weakest link in the agri-food innovation system.

There is a strong connection between the performance of the agricultural sector (including agribusiness), its financing at a primary level within the family business, the promotion of interests and the knowledge system. Changes that occur in one of the parts have implications for the total system. Making such changes without first looking at the consequences results in confusion and potentially incorrect decisions. The observations of the current situation show that there is currently a great deal of experimentation. Organisations are modifying their strategies. The system therefore seems to be responsive, and this contributes to robustness. The description of the recent developments indicates that incremental modifications are continually taking place at various levels, ultimately resulting in the transition of the system. This also makes the future less predictable, but makes plans for the future easier to fulfil.

The methodology and working method – via a historical analysis, explicit system-dynamic modelling, interviews with experts and a scenario analysis – has increased understanding of the operations of the Dutch agricultural sector. The methodology also helps with the sharing and validation of that knowledge. The research could be expanded by comparing the results for the Netherlands with agri-food innovation systems in other countries.

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