

ANNEX C7

PITA Project: Policy Influences on Technology for Agriculture:  
Chemicals, Biotechnology and Seeds

Royal Cebeco Group Co-operative monograph

Annex C7

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## Introduction to the PITA Project

Technological innovation in the agrochemical, biotechnology and seeds industries and in associated public sector research establishments (PSREs) has the potential to deliver more socially and environmentally sustainable farming systems and to improve the quality of life of citizens in Europe. This is particularly true of farms on the most fertile land. However, although policies developed in different areas may all aim to improve the quality of life, in practice, in their influence on company and PSRE strategies, they frequently counteract one another and so attenuate the desired effect.

Market-related factors also influence decision making in industry and PSREs, the most important for this project being the policies of food processors and distributors and also public attitudes and opinion, which often set more demanding standards than those of national governments and the EU.

The PITA project (see Project Structure) is developing an integrated analysis of policies and market-related factors relevant to the agrochemical, biotechnology and seeds sectors. The core of the project is an investigation of the impact of these factors on the strategies and decision making of companies and PSREs and the downstream implications of these decisions on employment, international competitiveness and environmental benefits. The final outcome will be feedback of our conclusions to policy makers and company managers.

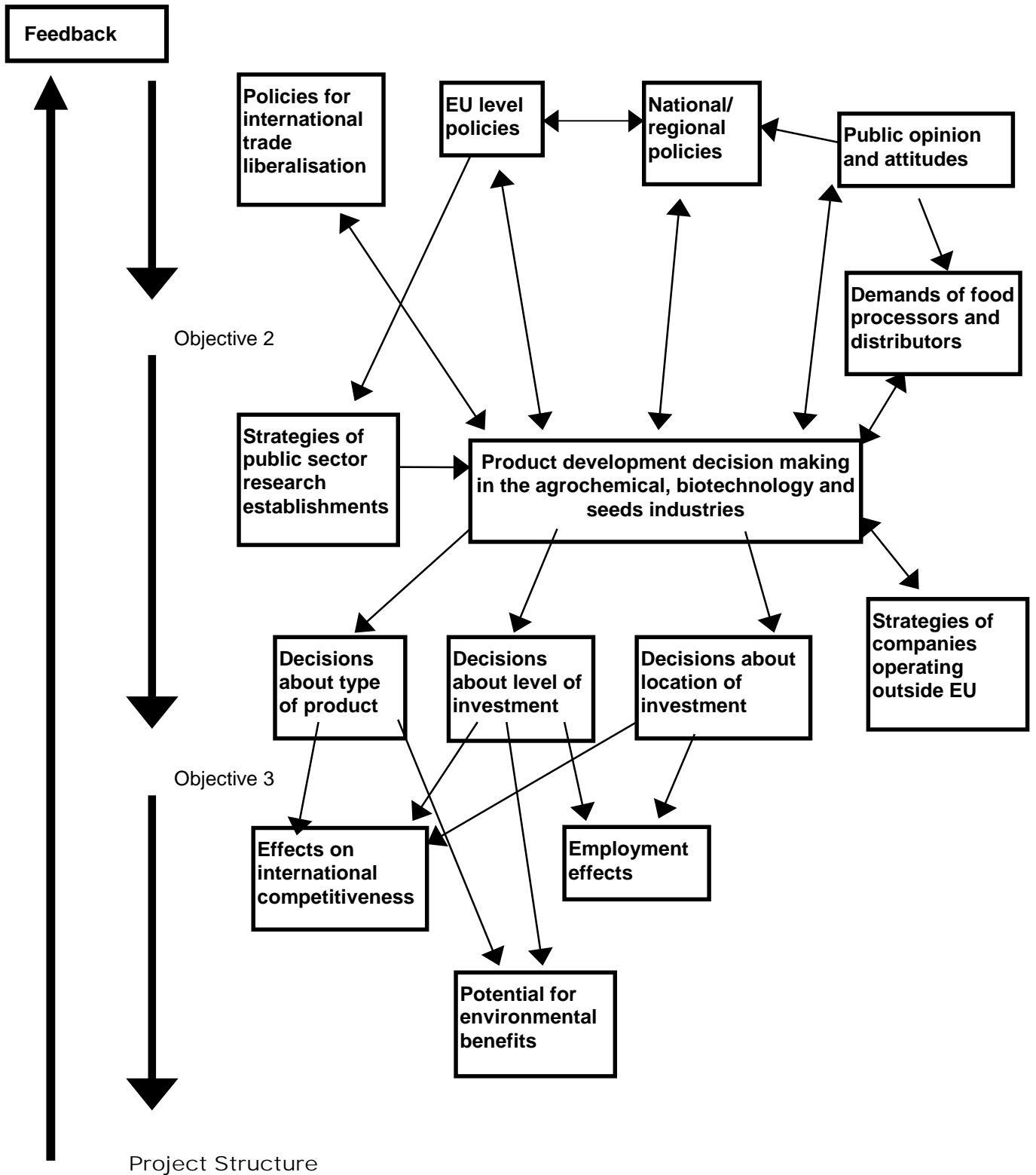
The range of policies and other influences studied includes:

- policies to stimulate innovation in the agrochemical, biotechnology and seeds industries;
- purchasing policies of food processors and distributors;
- policies for international trade liberalisation;
- policies for the regulation of industry and farming (for environmental protection and public health and safety, particularly for pesticides and biotechnology);
- agricultural and farming support policies, particularly for crop production;
- policies to promote environmental sustainability and wildlife biodiversity in arable farming areas;
- public opinion and attitudes.

The overall aim of the project is to contribute to the development of sustainable industrial and farming systems and an improved quality of life by encouraging the development and uptake of 'cleaner' technology for intensive agriculture. Its objectives are:

- to develop an integrated analysis of policies and market-related factors relevant to technological innovation in the agrochemical, biotechnology and seeds sectors, to study their interactions and to develop hypotheses about their impact on strategic decision making in industry and PSREs.
- to study the influence of policies and market-related factors on innovation strategies in the agrochemical, biotechnology and seeds industries and PSREs, and their impact on decisions about product development, levels of investment and location of investment.
- to study the outcomes of the industry decisions investigated under objective 2, in their effects on employment, on international competitiveness and on their potential to deliver environmental benefits.

Objective 1



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**CEBECO GROUP STRUCTURE**

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## 1. Introduction

This monograph reports on Royal Cebeco Group Cooperative as a whole and on two of its subsidiaries: Cebeco Seeds Group and Luxan. Cebeco Seeds Group (in this report named Cebeco Seeds to prevent any confusion with Cebeco Group) is a seed company. It focuses on field crops. Luxan is a producer of crop protection products.

This report has been written on two sources: (1) material published by the companies themselves (annual reports, news releases, web sites, company magazines) and material published by others (in research reports, newspapers, trade journals); (2) interviews with several Cebeco managers. We like to thank these managers for their collaboration in this project.

This report is structured as follows. Section 2 gives general background information on Cebeco Group, Cebeco Seeds and Luxan. Also the main elements of the strategy of these companies are presented. Section 3 describes the innovation strategy of these companies. Special attention is given to biotechnology. In section 4 we discuss the organisation of decision making on innovation within these firms. Section 5 presents the impact of public policies and market developments as they are felt by the Cebeco subsidiaries. The next section studies the internal discourse on environmental and sustainability issues. Finally, in section 7, some conclusions are drawn on innovation strategies and decision making, on impact of public policies on innovation, and on environment issues in relation to innovation.

## 2. Cebeco Group

The identity of Cebeco Group is characterised by the fact that we work in a customer-oriented and knowledge-driven way. With the member co-operatives and subsidiaries, we form a network that is mainly owned by farmers and growers, focusing on activities in base materials, raw materials for compound feed, farm supplies and foodstuffs – in short, Seed, Feed and Food. Each of the participating players strengthens its competitive position through Cupertino within this network.

(1999 Annual Report, p. 5).

### 2.1 General profile of Cebeco Group

In 1999 Cebeco Group<sup>1</sup> celebrated its 100th birthday. The company was established in 1899 to carry out joint purchase activities for several agricultural supply co-operatives. The farmers' organisation *Nederlands Landbouw Comitee* (Netherlands Agricultural Committee) played a decisive role in founding Cebeco. The original name of the company was 'Central Bureau of the Netherlands Agricultural Committee for the purchase of agricultural inputs for all of the Netherlands' (our translation, MJB/JB). During its hundred years' of existence, Cebeco's main goal has not changed: to provide farmer-members with good value, either by lower prices for inputs or higher prices for agricultural products.

Cebeco has always been a federated co-operative, which means that regional co-operatives are the members of Cebeco (see Appendix 1). Indirectly, about 40,000 farmers – the members of the regional co-operatives – are the owners of Cebeco Group. The Cebeco Group nowadays is a network of 25 member-co-operatives and hundreds of operating companies. Its main activities lie in supplying farmers (members of the regional supply co-operatives but also non-members) with starting material (e.g., seeds), feed and other inputs,

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<sup>1</sup> In January 1999, the name of the company was changed from Cebeco-Handelsraad into Cebeco Group.

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and in processing and marketing the products these farmers produce (*Seed, Feed and Food*). In 1999, turnover reached 3 billion Euro, and net profit was 16 million Euro (Table 1). Cebeco employs some 7500 people, 80% of which are located in the Netherlands.

Table 1 Key Figures (million Euro)

	1994	1995	1996	1997	1998	1999
Turnover	1972	2075	2237	2454	2708	3016
Turnover in NL	n.a.	n.a.	n.a.	1310	1293	n.a.
Turnover in EU (excl. NL)	n.a.	n.a.	n.a.	853	1065	n.a.
Net profit	8	12	14	15	5	16
Investments	21	23	75	46	53	77
Number of employees	4698	4516	4557	4892	6765	7482

Source: Based on Annual Reports, original figures in Dutch Guilders: n.a. = not available

The Cebeco Group participates in approximately 200 companies in more than 30 countries. In most of these participations Cebeco is majority share holder, but it also has a substantial number of minority positions. Cebeco Group is a holding company, with the operating firms having a relatively independent management position. Cebeco's operating firms are organised in four divisions: Feed, Seed, Food and Projects. Table 2 presents the turnover figures for the four divisions.

Within the Seed group, companies are working on plant breeding and multiplication and marketing of seeds, bulbs and plantlets for the following crops: cereals, potatoes, maize, amenity and forage grasses, glasshouse and open ground vegetables, flower-bulbs, turnips, cut flower and perennial plants. The Seed group contains three subdivisions: agricultural seeds, horticultural seeds, and flower bulbs.<sup>2</sup>

The companies within the Food group process agricultural products into high quality foods and sell these products world wide. The Food group contains seven subdivisions: meat products, poultry products, egg products, potato products, fruit and vegetables, ready-to-eat meals, and wholesale.

The Feed group provides farmers with compound feed, pesticides, fertilisers, and equipment. The group also supplies hatching eggs and hatching hens, and it has a share in the marketing of ware potatoes and cereals.

The Projects group is small, consisting of agricultural development activities in the former Soviet Union as well as India and China.

<sup>2</sup> Until 2000, there was a fourth subdivision: seed potatoes. At the end of 1999 Cebeco sold its minority share in the seed potato co-operative Agrico.

Table 2 Turnover by main group (million Euro)

	1996	1997	1998	1999
Seed	172	199	243	230
Feed	1419	1542	1492	1650
Food	639	706	960	1125
Projects	7	7	13	11
Total	2237	2454	2708	3016

Source: Annual Reports

## 2.2 Business Strategy

Cebeco Group's main objective – the creation of value for members, farmers and growers – has not changed since the organisation was created in 1899. We pursue this aim by generating extra value for customers through our subsidiaries. At the same time we set out to create a working environment that stimulates and inspires our staff.

Cebeco Group seeks to help improve the world's food supplies. We therefore provide our customers with top quality food that is nutritious, tastes superior, and does not contain artificial additives. Everything is done to ensure that this food is produced from impeccable raw materials, in chains that guarantee the ability to trace the source, with respect for our environment.

(1999 Annual Report, p. 5)

### *Internationalisation*

Cebeco has an explicit internationalisation strategy. As the Netherlands is only a small country and as operating firms have to compete with European and global multinationals, Cebeco follows a strategy of international expansion implemented by direct foreign investments (greenfield investments), expansion of existing subsidiaries and acquisitions of existing companies. For instance, to strengthen its international position in feed ingredients trade, in 1999 Cebeco acquired a 75% share in the Scottish trading company McCorkell. Also the seed firms operating within Cebeco Group acquired foreign companies (see below). The internationalisation strategies of the individual operating companies differ. For instance, Aviko is the fifth largest producer of potato products in the world, and therefore is a global player, with production units in Western Europe, Central Europe and North America, and ambitions to expand in South America. Luxan on the other hand is a small producer of pesticides, shifting its attention from the domestic to the European market (although it now has a sales office in Argentina).

## 2.3 Cebeco Seeds

Cebeco Seeds is a fully owned subsidiary of the Cebeco Group, and is part of the SEED division. Main activities are the breeding, testing, production and marketing of seeds of following field crops: cereals, pulses, flax, maize, and amenity and forage grasses. Cebeco Seeds has subsidiaries in the Netherlands, Belgium, Germany, United Kingdom, Denmark, France, Czech Republic and the United States (see Table 3). The headquarters of Cebeco Seeds is located in Vlijmen. Research stations are located in the Netherlands, Germany, UK, France, Czech Republic, USA and Chile. The research facilities in the Netherlands (Lelystad) are still the most important, but research outside of the home country is expanding.

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Maize is becoming a more important crop and Cebeco Seeds has expanded its investments in maize breeding, both in the Netherlands and abroad (Cebeco Seeds News, no date).

Cebeco Seeds develops field crop varieties mostly for the north-western European market (Netherlands, Belgium, Germany, Denmark, France and the UK) and Europe accounts for about 75 percent of turnover. Currently, the company is seeking expansion in several directions. Cebeco Seeds' international strategy varies by crop:

For the large field crops – cereals and maize – we follow a European strategy. For pulses we also follow a European strategy, but with good spin-off opportunities in the United States and Canada. For grasses we have a world-wide strategy, including America, Europe, Central and Eastern Europe, Pacific, China and Japan.

A major region where Cebeco Seeds growth strategy is focussed, is Central and Eastern Europe and in 1999, Cebeco Seeds acquired a Czech cereal breeding company, *Plant Select*. In 2000, the company opened a sales office in Warsaw, Poland. In a 23 March 2000 Press Release the company stated:

This development in Poland underlines Cebeco Seeds Group's intention to further expand its activities in Central Europe!

Table 3 Cebeco Seeds subsidiaries

Company	Country	Activities
Cebeco Zaden BV	NL	Breeding, production and marketing of seeds for maize, cereals, pulses, flax and grasses
Cebeco Saaten GmbH (incl. Cebeco Mais)	G	Testing and marketing of seeds for cereals, pulses, grasses and maize
Cebeco Van Engelen NV	B	Marketing of grasses, maize, green manure crops, sods and various forage crops
Cebeco International Seeds Inc. (50% share in Twin City Seeds)	USA	Breeding, testing, producing and marketing of amenity and forage grass seeds
Cebeco Semences S.A.	F	Breeding, testing, production and marketing of the total range of field seeds
Cebeco Maison de Gazons S.A.	F	Marketing of amenity grass seeds and related products (fertilisers, pesticides)
Wiboltt Frø A/S	DK	Production and marketing of grass seeds.
Cebeco Seed Innovations Ltd. (incl. Oliver Bros)	UK	Breeding, testing, producing and marketing of the total range of agricultural seeds
Cebeco Seeds S.R.O. (incl. Plant Select)	CR	Production and marketing of the total range of agricultural seeds, and breeding of winter wheat and spring barley.

Source: www. cebeco-seeds.com; Cebeco Group, Annual Report 1999.

Cebeco Seeds falls in the category of small and medium-sized firms. In 1999, turnover was almost 100 million Euro (see Table 4). About 425 people are employed by Cebeco Seeds, of which approximately 125 work in R&D. Expenditures on R&D are about 10 percent of turnover, 10 million Euro. It is the ambition of the company to substantially increase turnover in the coming years, by autonomous growth as well as by acquisitions and collaborations (Cebeco Seeds News). The company want to expand and intensify its maize and cereal breeding activities across Europe and to increase its knowledge base, both by internal R&D and research alliances. To sustain a large R&D effort, a large commercial base is needed.

Table 4 Turnover (in million Euro) and employment of Cebeco Seeds

	1995	1996	1997	1998	1999
Turnover	95	104	103	95	100
Employees	379	386	395	400	425

Source: Cebeco Agricultural Seeds Group, Facts & Figures

## 2.4 Luxan

The second Cebeco subsidiary presented in this report is Luxan, a producer of crop protection products. Luxan is part of the division FEED, which contains several companies supplying inputs to Dutch and foreign farmers. Also within the FEED division is the pesticide wholesaler *Cebeco Agrochemie BV*. While the latter is only selling the pesticides that other companies manufacture, Luxan specialises in the production of crop protection products on the basis of active ingredients supplied by others, as well as – more recently – the development and production of new crop protection products.

Luxan was established in the 1950s by several agricultural co-operatives with the purpose to provide Dutch farmers with a broad range of plant protection products. For that purpose a manufacturing plant was built in Elst, the Netherlands. Until the 1990s, Luxan had two main activities: to produce and to distribute plant protection products for agriculture and household purposes. In the late 1980s Luxan changed its strategy from a mere formulator and distributor towards a developer of new crop protection products. This focus on product development also led to a more international strategy, as the Dutch market is too small to recoup investments in new pesticide development.

Luxan has a 8-10 percent market share of the Dutch pesticide market (Agrow No. 348). Its main activities used to be the formulation and wholesale of pesticides with active ingredients supplied by foreign producers like BASF, Rhone-Poulenc and Ciba-Geigy. Due to the concentration among the major pesticides producers and the stagnant market for pesticides, fewer and fewer business opportunities remained for Luxan. Also, for generic products like glyphosate Luxan has become too expensive as a producer.

As a result of these changing market conditions, Luxan shifted its strategy from formulating and wholesaling to developing and producing its own products. Also, it is shifting from primarily servicing the Dutch market with a broad range of products, to focussing on the European market with a small number of (proprietary) products. The company's profile has changed considerably in the last decade, as it is now less concerned with generic products and more with innovative products. Luxan is investing more in new products, and has an R&D budget of 5% of turnover. The company believes it can better complement the multinationals by concentrating on smaller, niche products.

Another reason to focus on a small number of products for a large European market is the Dutch and EU registration policies. As environmental policies become more and more tight, fewer products will receive or maintain approval, while registration itself is becoming increasingly expensive. According to Agrow (No. 345) pesticide registration fees in the Netherlands are among the highest in Europe. The cost of supporting older registrations and registering new products has led Luxan to withdraw several products and abandon the development of others. In 1998, Luxan still had 121 registrations in the Netherlands.

Like the other Cebeco subsidiaries, Luxan has a relatively independent position in the Cebeco Group, with its own subsidiaries in the UK, Spain and Argentina. Luxan has an annual production of more than 10,000 tonnes of plant protection products. Its turnover is about 45 million Euro (see Table 5), half of which is realised in the Netherlands. Foreign markets include EU countries and Central European countries (Poland, Czech Republic and Hungary).

In 1999 a total of 140 people were employed at Luxan, of which 90 work in Production, half of these being staff. The Sales department involves 20 people, and the Laboratory department consists of 10 employees.

Table 5 Luxan Key Figures

	1996	1997	1998	1999
Turnover (million Euro)	50	43	43	44
Profit (million Euro)	0.5	0.5	0.7	1.0
Production (tonnes)	n.a.	9,600	10,500	10,000
Number of Employees	n.a.	139	140	140

Source: Luxan, Annual Reports 1997 and 1998; 1999: Luxan. n.a. = no available data

The business activities of Luxan are organised by function. Luxan has separate departments for production, sales, registration and development, and laboratory. Luxan has 5 production departments covering 20 different production lines. Its Sales department is subdivided into client groups: farmers in the Netherlands, farmers abroad, and private households. The department Registration and Development is dealing with regulatory affairs. The Laboratory department conducts research on new and existing products and carries out quality control.

### 3. Innovation Strategy

#### 3.1 Innovation Strategy of Cebeco Group

Cebeco Group is a decentralised organisation. At the Group level – in Rotterdam – there is the executive board, together with a small staff. Most management decisions are taken at the level of the operating companies. These firms have to fulfil financial performance requirements. As long as they fulfil these criteria, the operating companies can make strategic decisions independently, including innovation decisions. Although most innovation decisions are made by and within the operating firms, there is a staff director for R&D at the Group level whose main function is to co-ordinate, stimulate and if necessary control innovation activities in the various subsidiaries. The Group R&D director brings together R&D managers of the various operating firms, initiates ad-hoc working groups on special issues, and encourages collaboration on R&D projects that can be important for more than one subsidiary.

If promising innovation projects at the operating firm level require financial resources that go beyond the resources of the individual firm, the Cebeco Group may supply the required funds. In such a situation, the Cebeco Group executive board meets with the management of the operating firm to discuss the pros and cons of the research project. If it finds that the project has sufficient potential benefits for the Group as a whole, the board can decide to support the operating firm financially, for instance by adjusting the annual financial requirements. Usually, the Supervisory Board of the Cebeco Group is consulted also. One example of this role of the Cebeco Group board in supporting large investments at the operating company level was the recent decision of Cebeco Seeds to substantially enlarge its maize breeding activities. This resulted in a significant increase in the Cebeco Seeds R&D budget, which it would not have been able to support if it had to fulfil the original profit requirement of the Cebeco Group (as the profit was used for the maize breeding investment instead of being transferred to the Cebeco Group).

Still, the R&D director emphasises that innovation decisions must be taken at the level of the subsidiary, because this is primarily in the interests of the continuity and profitability of the operating firm. The management of this firm has to carry the risks, has to do the work, and

has to be fully devoted to the innovation project. The Group management does not have the capacity to control the operating firms in detail. Innovation in the Cebeco Group primarily follows a bottom up approach. Compared to large, integrated agrochemical-seeds companies like Novartis, AgrEvo and Monsanto, Cebeco is much more a network of companies, where the operating firms have great discretion in deciding on what research projects to start, and who to choose as collaborator.

An exception to the rule of decentralised innovation decision making is the *agrification* project, orchestrated by the R&D director at Cebeco Group. *Agrification* means the development and cultivation of arable crops that can be used as renewable energy sources. As it is expected that the supply of fossil fuels such as oil, coal and gas will be exhausted within fifty years, many companies are seeking alternatives. The development of renewable energy resources is one such alternative. Biomass is produced by crops specially bred for energy purposes, for instance cannabis and oilseed crops. The growing of biomass crops for energy production also leads to less environmental degradation. As such, agrification fits in a strategy of sustainable development.

Cebeco Group has conducted several research projects on oilseed crops such as crambe and marygold. Cebeco Seeds carried out the plant breeding activities, while other subsidiaries of the Cebeco Group dealt with the processing and marketing elements of the agrification project. In the 1990s the Dutch government spent several million Euro on agrification (e.g., on the Cebeco crambe project), as part of its policy to encourage sustainable agriculture. It is often suggested that agrification crops could be the so-called fourth crop for arable farmers (besides cereals, sugar beet and potatoes). However, currently agrification is only carried out on a small scale, primarily for purposes of maintaining and expanding the knowledge base. Producing biomass as an alternative for fossil energy sources is too expensive – at least in the Netherlands – to become a viable option for Dutch farmers.

In October 1998, the Foundation for Non-food use of Agricultural Products established a chair in Agrification at the Wageningen University, in order to strengthen knowledge on industrial non-food applications of agricultural products. Prof. A. Capelle, since 1990 Cebeco Group staff director for R&D, holds this chair for five years. In the foundation Cebeco co-operates with six other European agricultural co-operatives: Aveve (Belgium), Fenaco (Switzerland), R.H.G. Nord (Germany), R.W.A. Raiffeisen Ware Austria (Austria), Sigma (France) and Uncaa (France).

### 3.2 Innovation Strategy of Cebeco Seeds

#### *Crop Portfolio*

Due to the merger of the Cebeco Breeding and Sales divisions, the market influence on breeding processes has changed significantly in the 1990s. Before this restructuring, the Breeding Department of Cebeco – established in 1938 - operated independently from the Sales Department. In the Breeding Department, the variety requirements of Dutch farmers were a very important reason to operate a breeding programme. Whether such a programme was cost-efficient was less of an issue. This resulted in the development of breeding programmes for a large number of crops: wheat, barley, peas, flax, beans, rye, potatoes, grasses, oats and maize.

Once a breeding programme resulted in good varieties, the Sales Department also started to test and sell these varieties outside of the Netherlands. In particular those crops with a high level of adaptability to specific agroclimatological conditions could be sold in many other European countries. In the 1970s, the breeding of peas was strongly encouraged by the European Community policy to promote vegetable protein production (in response to the world wide vegetable protein shortage). The peas developed in the Netherlands proved to be suitable for growing conditions in many other European countries. Within two years, Cebeco had about 80% of the European seed pea market. Once an international sales network was established, the next step was the development of local testing programmes for other crops.

Eventually, different breeding programmes have been developed for various regions in Europe.

Nowadays, Cebeco Seeds follows a much more focused strategy, specialising in the following core crops: maize, cereals (mainly winter wheat, spring barley and winter barley), peas, and grasses. Besides the core crops, Cebeco has breeding programmes for flax, linseed and spring beans. Cebeco's roots lie in wheat, barley and peas. In wheat, it still is the second largest breeder in Europe. The maize breeding programme has recently been reinforced, as the result of a strategic reorientation on the future market opportunities for field crops in Europe. Cebeco Seeds expects a further growth in the European market for maize, partly as result of changes in public policies (see 5.4).

Up to now, the scale of our maize breeding programme has been relatively limited and we have mainly concentrated on selling varieties developed by others. To get a good variety, you need to invest in extensive breeding and selection work, at many locations. We are therefore going to seek more locations for our maize breeding. In doing so, we have decided to strengthen our own breeding programme.

(Cebeco Seeds News)

Depending on the adaptability of the crop to various climate conditions, Cebeco Seeds has a different structure for the breeding programmes for each crop. For instance, for peas Cebeco Seeds has centralised the programme in the Netherlands. Peas bred in the Netherlands can be cultivated all over Europe, and even in Canada. Also for flax varieties, a centralised breeding programme is sufficient to cover Europe. However, for winter wheat the company has four decentralised breeding programmes: one in the Netherlands, which develops varieties for the Dutch, Belgium and German market; one in France; one in the UK; and one in the Czech Republic. Also maize requires several breeding programmes, particularly to cover the North-South differences in agro-climatological conditions in Europe. Another factor that influences the set-up of a breeding programme is regional competition.

### *Biotechnology*

In 1989, Cebeco Seeds was one of founding companies of the Dutch biotechnology firm Keygene, and it is still one of the five shareholders. As such, Cebeco Seeds has always closely followed developments in plant biotechnology. Research at Keygene is currently focussed on techniques for marker-assisted selection (particularly the AFLP fingerprinting technique). These techniques are now applied by commercial plant breeding companies, including Cebeco Seeds, to speed up the breeding and selection process and thus shorten the time needed to develop a new plant variety. Still, horticultural crop breeders have profited more from Keygene's knowledge and expertise than field crop breeders like Cebeco Seeds. In horticultural crop breeding, traits are based on less complex inheritance and are more expensive to test. Cebeco Seeds is using the technology in several crops and is very hopeful about future possibilities.

Cebeco Seeds itself has chosen not to develop transgenic varieties for several reasons particularly the uncertainty surrounding the acceptance of genetically modified food products. Cebeco has followed a "wait-and-see" strategy. It does not want to invest in large scale genetic modification research itself, but chooses to form alliances with suppliers of techniques and traits. Cebeco Seeds is an interesting partner for technology supplying companies:

We have a good European-wide testing network, good breeding programmes, a good distribution network, good knowledge of the market and good knowledge of production and marketing.

Cebeco Seeds is discussing with several life science companies the development of transgenic varieties currently mostly herbicide resistance traits, using Cebeco top quality varieties. So far these discussions have not yielded any product. It has become clear that

genetically modified crop varieties will not be introduced large scale in Europe in the coming five to ten years, so the cautious strategy of Cebeco Seeds has proven to be right. As Cebeco has not invested large sums in genetic engineering research, it does not need to 'push' transgenic varieties.

The delay in public acceptance GMOs leads to a situation of relative tranquillity for the breeding companies. There is more time for orientation on attractive partners for collaboration in the field of genetic engineering. The strategy of focusing on strong, traditionally bred varieties and close ties with the farmer has proved – at least for the time being – to be the right one.

(Cebeco Group, Annual Report 1999)

In sum, Cebeco Seeds considers the current low acceptance of GM-crops in Europe as beneficial to its competitive position.

### *Agrification*

For agrification crops, Cebeco Seeds follows a low profile strategy. The company has collaborated in several EU research projects, in order to enhance its knowledge base and to be able to anticipate on future market developments, but due to the high cost of biomass production, large scale agrification is not expected in the Netherlands. Another constraining issue is the need to develop a new production, processing, distribution and marketing chain before any agrification crop can be grown commercially. Without this, farmers are not willing to grow these crops, and Cebeco Seeds will not invest in developing them. The availability of plant protection products may also be limiting the cultivation of agrification crops. As registration of pesticides becomes more expensive, fewer products will be available for minor crops, and agrification crops should still be considered as minor crops.

### *Organic agriculture*

Cebeco Seeds does not have a special range of varieties for organic farming. The company offers varieties that can be used in organic cultivation, but these varieties have not been bred in a purely organic way. Market developments are being followed closely, and studies undertaken within the company to see what is needed to be ready when organic farming becomes a substantial market share. The company has also contacted representatives of the organic farming community, both farmers and researchers, to find out their opinion on organic breeding programmes. Cebeco Seeds sees opportunities for its varieties to be used in organic farming. However, developing special breeding programmes for organic varieties is questionable, but may be possible in the Netherlands. The company has good contacts with several organic farmers in the Netherlands, who already grow organic maize. For producing organic grass seeds, Cebeco Seeds sees a number of major problems. When grasses are grown for seed production, grass weeds are a big problem. Without herbicides to control these weeds, it can be difficult and/or costly to produce seeds with a sufficient level of quality.

### *Collaboration*

For a medium-sized company like Cebeco Seeds, with a focussed innovation strategy, collaboration with other companies is very important. Such collaboration can be on R&D or on marketing, and can be within the Cebeco group of companies or with outside companies. In R&D it has a collaboration with Keygene (see above), as well as with large biotechnology companies providing GMO traits. Within the Cebeco Group it collaborates with other firms on agrification. Cebeco Seeds has also collaborated with Luxan to set up a project for caraway varieties (for Luxan's natural anti-sprouting product), and has a research collaboration with a French company for the development of hybrid wheat varieties. This makes it possible to share specific knowledge and costs on high risk projects like hybrid wheat. However, there is no institutional preference to collaborate within the Cebeco Group.

### 3.3 Innovation Strategy of Luxan

Innovation at Luxan follows two lines. First, the traditional line of formulation involving the production of plant protection products for the Dutch market on the basis of active ingredients supplied by large agrochemical companies like Bayer, BASF and Aventis. The active ingredients are formulated for farmers and gardeners. Luxan also does applied R&D with these formulated products, and takes care of the registration process. Luxan has expertise in formulation, and will continue to do this work as long as there is a market for these products and the agrochemical multinationals allow independent companies to do the formulation, but opportunities for formulating are declining.

The second, and newer, innovation strategy followed by Luxan is the development of proprietary products. As developing new plant protection products is very expensive, Luxan focuses on a small number of products which will be targeted at the European or world market.

One of Luxan's main target markets is sprouting inhibitors for potato storage. It has two such products in its portfolio, one chemical, the other a natural product. Luxan began to develop chemical sprout inhibitors, when one of the main producers, Bayer, decided to discontinue production and registration because of the small market size. Thus, Luxan services a niche market left open by a large multinational. The natural sprouting inhibitor, Talent (active ingredient carvone) is extracted from caraway seed oil, and is an alternative for use in countries where chemical products are legally prohibited or not allowed by the potato processing industry. It can also be used for storing organic potatoes. Luxan has marketed this product in the Netherlands and Switzerland since 1995. In 1999 the EU approved the active ingredient dossier, which opened the gate for further product development and commercialisation in other EU countries.

The natural sprout inhibitor was developed in collaboration with the Agrotechnological Research Institute (ATO) in Wageningen which, at the time, was part of the Ministry of Agriculture. This project also profited from subsidies for sustainable technological innovation, from the Ministry of Economic Affairs and the Ministry of Agriculture.

The development of the natural sprout inhibitor has profited from Luxan's network of agribusiness companies, including direct financial linkages to the Cebeco Group, and the close collaboration among producers, traders and processors of potatoes. Both potato traders and potato processors favour this new product. Experimental research was carried out in collaboration with Agrico and ZPC, two potato co-operatives, and Van Rijn and Hettema, two non-co-operative potato breeders and traders.

## 4. Decision Making on Innovation

### 4.1 Decision Making at the Cebeco Group Level

Cebeco Group, as a co-operative, has a board of directors representing its members that takes most strategic decisions. The Board of Directors consists of 9 members. Operational decisions are mainly taken by the Executive Board, which consists of three members and there is also a Board of Supervisors, consisting of 9 members. The Board of Directors and Board of Supervisors are elected by the representatives of the 25 (in 1999) members co-operatives. Monitoring and controlling the activities and the financial performance of the operating firms is the responsibility of the Executive Board which also designs a strategy for the Cebeco Group as a whole, develops a knowledge management policy for the Group, and promotes and facilitates co-ordination among subsidiaries.

In the 1980s, Cebeco Group (at that time called Cebeco-Handelsraad) went through a process of restructuring, where functionally separated operating departments were turned into individual operating firms, subsidiaries of Cebeco Group, with financial responsibility for

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their own activities. Each subsidiary has its own board of directors and board of supervisor (often including one or two members of the Cebeco Group Executive Board).

In this restructuring process, the two separate activities of breeding and marketing selling seeds became activities of the same company, so that decision making on breeding was more influenced by the sales department. Technical opportunities and farmer needs were no longer the only determining factors.

Thus, within the operating firms of the Cebeco Group, R&D and marketing were brought together into one decision making structure (see 4.2). At the group level, however, a new structure had to be designed to guarantee that knowledge was shared by and collaboration encouraged among people from the different operating firms. It was the task of the staff R&D director at Cebeco Group to develop a co-ordination scheme that would encourage the separate operating firms to exchange knowledge and to collaborate. The result is the technology exchange networks (TENs) (see Figure 1).

There are three TENs within Cebeco Group, one for FOOD, one for FEED and one for SEED. The TENs consist of the R&D directors of the individual operating firms. For example, the SEED TEN consists of S. van der Heijden of Cebeco Seeds and K. Reinink of Rijk Zwaan, together with A. Capelle of Cebeco Group. Each TEN meets regularly: The FOOD TEN every other month, the FEED TEN every three months, and the SEED TEN once a year. Every other year, all three TENs come together, in a two-day meeting, usually to discuss a special theme. Often external experts are invited to share their knowledge. Reports of the individual and the combined TEN meetings go to the Executive Board, which uses the information in its consultation with individual operating firms, both with the management and the Board of Supervisors of these firms.

One of these meetings decided to establish an ad-hoc discussion group on biotechnology, consisting of people from the seed and food companies. The group discussed possible products and policies, and formulated a strategy for the next years. The meetings also resulted in an increase of reciprocal company visits, which can be very helpful in performing external projects.

Pooling our knowledge is essential if we want to obtain and hold a strong market position. (Cebeco manager)
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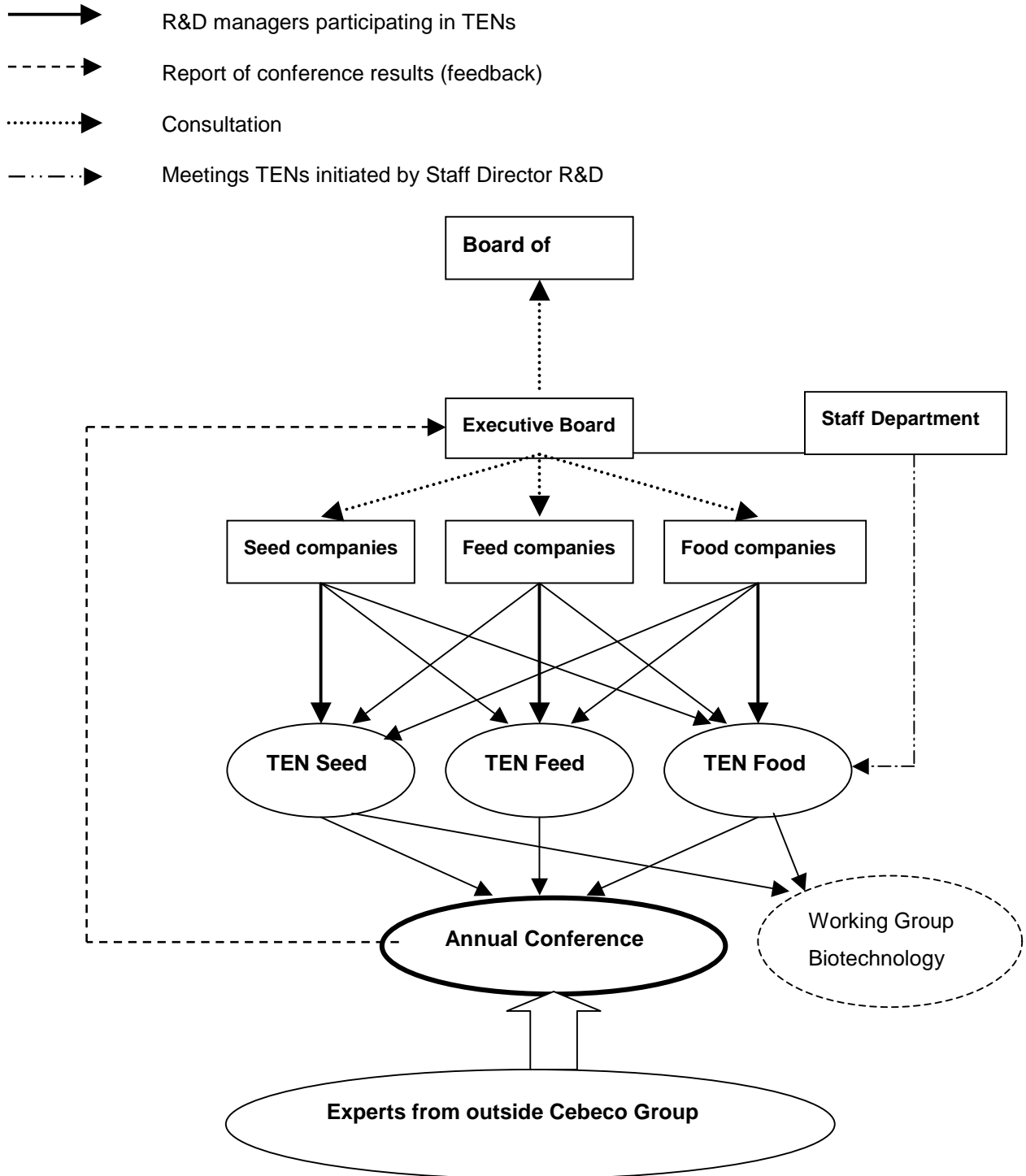


Figure 1. Technology Exchange Networks (TENs)

#### 4.2 Decision-making at Cebeco Seeds

Cebeco Seeds uses a business plan outlining the broad lines of product development, and setting general goals on products and market. From the overall business plan, a plan for each product-market combination will be developed. For decision making on innovation, both the technological and the commercial aspects come together. For each crop (i.e. wheat,

barley, maize, pulses and grasses) a special structure has been designed: the COOP structure (Coördinatie van Onderzoek en Ontwikkeling per Product = *Coordination of Research and Development by Product*). For each product all the stages of its development process (research, design, testing, production, and marketing) are discussed in the COOP-teams and a matrix is used to decide on product development, one side presenting the specification of the crop, commercial and legal requirements and the other presenting the potential markets. Innovation decisions are a combination of the technical requirements of the various markets and the commercial opportunities. One of the main advantages of the matrix is the transparency of the decision making process for everyone in the company, researchers and marketing people. Each matrix is updated every year, and investment decisions are adjusted if needed.

Besides the short term decision making by the COOP team on innovation and investments, a long term assessment is made of technological progress (e.g., in biotechnology), of major developments in government policies (e.g., Agenda 2000) and of new or shifting market opportunities (e.g., in organic farming).

Major investment decisions are taken by the board of directors in consultation of the board of supervisors. The latter always contains one or two members of the board of directors of Cebeco Group who are thus present when important decisions are made.

### 4.3 Decision-making at Luxan

In developing new products, Luxan considers itself more technology driven than market pulled, although a Luxan manager made the following remark which implies a particular type of “market pull”:

When we decided to develop the new anti-sprouting product based on caraway seed oil, we did not hear signals coming from the market which indicated the need for a product specifically based on caraway seed oil. Besides, in our view, there was a more general development for environmental-friendly products.

The influence of the Cebeco Group is through the financial requirements – the Cebeco Return on Investment – that Luxan has to fulfil, and through the presence of two members of the Cebeco Group Board of Directors in the Luxan Board of Advisors. Being part of the Cebeco Group network, Luxan keeps in touch with other companies belonging to the Group, particularly Cebeco Seeds and Aviko. However, these contacts are informal, and not on a regular base. Because Luxan is the only producer of crop protection products in the Cebeco Group, it does not find much synergy of belonging to the group. Even contacts with the seed business people in the Cebeco Group is of limited value:

In practise, the seed activities and the chemical crop protection activities of Cebeco are quite separated. Although the companies are facing the same kind of strategic problems, they do not easily turn to each other, because of the fact that there is no synergy.

## 5. Influence of public policies and market

The influence of public policy in our sector is enormous. All legislation and regulation has direct influence on our activities.

(Cebeco manager)

## 5.1 Introduction

An agribusiness company like Cebeco is faced with restrictions and opportunities caused by governmental policies at national and international level. R&D activities (e.g., biotechnology) are encouraged by technology policies (providing subsidies and other incentives), but are also restricted by regulations protecting the safety of humans, animals and the environment. On the market side, Cebeco is indirectly affected by the restrictions and opportunities that its clients face, for example, changes in agricultural policies influencing farmer decisions

There are also several market-related factors influencing Cebeco's innovation strategy, including market developments further down the production and distribution chain for agricultural products, which influence farmers' choices and thus influence Cebeco's market prospects e.g. consumer concern for pesticide use on food products which will encourage farmers to look for plant varieties that minimise pesticide use. Cebeco Seeds will therefore try to develop varieties with better pest and diseases resistance.

In this chapter we present the impact that (changes in) governmental policies and market-related factors will have on Cebeco strategy, particularly its innovation strategy. Three areas of government policy are distinguished: (1) science, technology and innovation; (2) environmental protection, public health and biodiversity; and (3) agricultural and international trade. The information presented here comes from Cebeco publications and from interviews with Cebeco managers.

## 5.2 Science, Technology and Innovation Policies

Changes in public policies on agricultural research, and particularly the reorganisation of public sector research enterprises (PSREs) are met with scepticism by Cebeco managers. One concern is the reduction of the number of study years at universities, from five to four, which has had detrimental effects on the natural science knowledge of students. Another concern is the shift in activities and responsibilities between university and agricultural research institutes. While the Agricultural University has been confronted with major budget cuts and is now doing more contract research, the agricultural research institutes like the CPRO (the plant breeding research institute), have shifted towards more fundamental research. According to a Cebeco manager, nowadays private industry hires more researchers from research institutes than from universities.

Several decades ago, Dutch agribusiness was in a very fortunate position, with 6000 researchers (half of them academics) at its service. Companies did not have to spend large sums on applied research, because everything was done for them in Wageningen. This situation no longer exists. Research in Wageningen has become more fundamental, forcing companies to set up their own research facilities. Also, research in Wageningen is no longer free, which induces companies to also look abroad for cost-efficient contract research. In general, companies like Cebeco nowadays source their knowledge world-wide.

Cebeco Seeds is ambivalent about the usefulness of Dutch government policy to invest money in start-up biotechnology firms. On the one hand, tax money is used for investments in a technology that eventually will be used by only four or five large firms which own the intellectual property rights (IPR). These companies are powerful firms that dominate biotechnology development. Subsidising small biotechnology companies is primarily beneficial to these large biotechnology multinationals and not to Dutch small and medium sized enterprises. On the other hand, the company also sees opportunities ahead:

However, on the longer term the seed companies can also profit from this development, by bringing the innovations through their varieties to the market.

According to Cebeco Seeds, the present situation in the plant biotechnology industry is comparable to the electronics industry: only a few large companies own the patents. These large companies profit from the discoveries made in public sector research establishments

like universities by assimilating these findings in their own R&D units and developing products ready for the market, which leads to employment in these large companies.

Another element of IPR policies is the impact of national variety listing on innovation. No agricultural crop variety can be commercialised in Europe if it is not listed on a national or European list of approved varieties. To enter a list, variety tests have to prove that a new variety is better than any existing variety. However, there are options to bring new varieties to the market that do not fully comply with the requirements of the Dutch variety list. Each nationally accepted variety has access to the European list and each variety from the European list can be marketed in every EU Member State. As all countries do not have the same strict requirements for their national listing as the Netherlands, Dutch seed companies can enter the European market without national listing in the Netherlands.

Cebeco Seeds supports proposals to make variety testing and listing a responsibility of private industry as less strict requirements for national listing would be beneficial to new variety development. Nowadays, all farmers look at the national list and only choose the top listed varieties, even if differences among the listed varieties are so small that they may not be statistically significant. The result is 'winner takes all': the top variety has a large market share while the other varieties are only sold in minimal quantities. This leads to a high risk in product development. If the list was less influential, sales would depend more on other factors like service which would lead to more stable market positions in the agricultural seed business, and therefore to a more stable industry structure (and to less consolidation and restructuring).

Luxan has profited from several government subsidies in developing its natural potato sprout inhibitor but, although subsidies have been important for some innovation projects, current or future market opportunities are always the primary incentive.

### 5.3 Environmental Protection, Public Health and Biodiversity Policies

Cebeco managers have varying opinions on the impact of these policies on company activities and innovations. In the crop protection business, the company's activities are 100% influenced by government policies. For instance, the Dutch government decision to discontinue (by January 2000) the registration of 36 pesticides, directly impacts on Luxan, which will lose about 30 products out of its total portfolio of 110. It also makes cultivation of minor crops more expensive in the Netherlands. If pesticides are allowed in other EU countries because they have not yet gone through the process of re-registration, this may result in unfair competition for Dutch farmers. This will also indirectly influence the cost structure of crop farming by Cebeco members.

In breeding, the impact of policies on innovation decisions is lower and much more diffuse. One Cebeco manager indicated that improving yield and resistance are and always have been the main breeding targets and no policy has changed this. Another Cebeco manager indicated that if fewer pesticides become available, as is currently the case for minor crops, plant breeding will put more emphasis on enhancing resistance. The availability of effective pesticides thus influences priority setting in plant breeding:

If a cheap, broad-spectrum pesticide is available, we are more inclined to say: let us not put too much emphasis on that, and focus more on traits that are important in the market.

However, even this manager stated that no major shift has yet occurred in plant breeding from yield to resistance. Reduction of pesticide use in farming is more a result of farmer knowledge and of economising on pesticide costs than of varieties with enhanced resistance becoming available.

Cebeco complained about the unpredictability of environmental policies in the Netherlands. Some 15 years ago, the Dutch government set up a research programme with private industry to reduce the use of fungicides in potato cultivation and Cebeco Seeds reacted by developing a potato variety with higher resistance, but with lower yield. When the research

programme and related government signals did not translate into restrictive regulation of fungicide use, Cebeco's varieties were not successful, although they had much better resistance than competing varieties.

Several times Luxan has made investment decisions based on lists of pesticides proposed to be de-registered but many of these products have not (yet) been removed from the market. This makes it difficult for Luxan to develop a consistent innovation policy. In the words of a Luxan manager:

Every time you are shooting at a moving target.

Also on the issue of biopesticides government policies are not very helpful. Luxan has been working on these products for a decade, but as no clear regulation for the registration of biopesticides has been introduced Luxan's efforts were in vain.

For Luxan, EU Directive 91/414/EEC is of utmost importance. Because old and new active ingredients now have to be approved by the European Commission and product formulations still have to be approved by national authorities, registration of plant protection products has become much more expensive. More strict pesticide regulation leads to consolidation in the pesticide industry because companies have to increase their scale of operation (through mergers, acquisitions or autonomous growth) to be able to pay for the costs of testing and registration.

#### 5.4 Farm Support and International Trade Policies

The EU Common Agricultural Policy (CAP), particularly the Agenda 2000 measures, have affected the size and direction of R&D programmes at Cebeco Seeds. Agenda 2000 determines the prices that farmers receive for their crops and thus indirectly determines the market for seeds. For instance, oilseed crops will receive less support in the EU, making them less attractive for farmers and the demand of oilseed seeds will decline. For this reason, Cebeco Seeds has discontinued its oilseed rape breeding programme. At the same time, fodder crops like maize have become more important, as compound feeds have become relatively more expensive and intensive dairy farming has become more difficult (at least in the Netherlands) because of environmental regulation. Cebeco Seeds expects that Agenda 2000 will have a positive impact on the market for wheat but grass seed production will become less profitable. In grass breeding this would mean a shift away from quality (including environmental quality) characteristics, back to seed yield, and may also lead to a shift in the location of seed production.

#### 5.5 Market Conditions and Consumer Attitudes

As stated above, the low acceptance of genetically modified food has so far been beneficial to Cebeco Seeds, as it has not developed transgenic varieties. Cebeco continues to compete with other seed companies on the basis of its proprietary conventional germplasm. Because the company is part of the Cebeco family and has preferential access to the regional supply co-operatives (i.e. the member co-operatives of Cebeco Group) Cebeco Seeds has a good marketing position in the Netherlands. In other European countries it does not have this institutional benefit and has to compete fully on the quality and price of its products.

Cebeco believes that it can play a role in the development of special agrifood chains developing Identity Preserved Production (IPP). Because the Group participates in all stages of the agrifood production and distribution chain, it can bring together the companies necessary to set up IPP, and align the incentives necessary for these systems. However, Cebeco Seeds sees only limited opportunities for IPP, for instance in developing special protein crops. The company already has an IPP system for peas in the UK where it develops and sells seed peas, contracts farmers to grow the peas and sells the special peas to the pet food industry.

Cebeco Seeds has to take into account the differences that continue to exist between various national or even regional markets. A manager indicated the following difference of the UK and German seed market. In the UK, farmers on average use intensive cultivation practices, have a broad range of pesticides available, and use relatively large amounts of pesticides. Crop varieties for the UK market have to give priority to yield and quality. Disease and pest resistance is of smaller importance than yield. An opposite case is Germany, where more extensive production methods are favoured, where farms are smaller, where farmers are focusing on input costs, where disease and pest resistance is just as important as yield. Also government policies may be more discouraging of pesticide use. Within Germany there are large regional differences between North, South, and East and a seed company like Cebeco Seeds has to take these national and regional differences into account when developing new crop varieties.

For Luxan, the world-wide potato processing industry is an important market factor. As Luxan's main product is used in storing potatoes, it follows the potato industry and indirectly the fast food industry (e.g. McDonald's). This focus on the international potato industry also means that Luxan is expanding in other parts of the world, for instance in South America:

Luxan is present in Argentina because Farm Frites is investing in Argentina, because McCain is investing there, because Pepsico/Frito-Lay is investing there. Argentina has various climate zones, and one is a perfect climate for potato production. Argentina will be the bridgehead for expansion into Chili and Brazil.

## 6. Environmental Issues and Sustainable Agriculture

Sustainability is the central theme of the 1999 Annual Report of Cebeco Group, adopting a broad concept of sustainability, incorporating concern for the environment, for employees and consumers, and for the profitability Cebeco and its members. One manager stresses that sustainability is much more than just care for the environment.

Sustainability means treating people, resources and the environment with respect and achieving good profitability in this way. It can be summed up as concern for 'People, planet, profit'. (...) Cebeco Group has embraced sustainability as part of its strategic aims. We are actively involved in the sustainability dialogue with the environment, with people showing concern, attention and focus on quality.

(Cebeco Group, 1999 Annual Report, p. 4)

Cebeco Group has designated sustainability as a strategic cornerstone of its policy, together with value creation, chain development and internationalisation. Sustainability was added to the strategic goals for the first time in 1999 when Cebeco joined Duvo, a discussion group on sustainable food production, consisting of food companies and food retailers. Discussions within Duvo have helped Cebeco to conceptualise sustainability, to define indicators and to assess the sustainability of its own activities. While Cebeco Group has initiated internal discussions on improving sustainability and has developed concepts and criteria to work with, the implementation of the sustainability policy has to be done by the subsidiaries.

In the 1999 Annual Report every Cebeco subsidiary emphasises its care for the environment in its own way. Rijk Zwaan, for instance, stresses that it has a comprehensive environment plan, which ensures that sustainability is taken into account in all its business activities. In 1999, Rijk Zwaan won a Dutch award for environmental care management. At Aviko, the potato processor, care is taken of the environmental impact of its activities by improving the purification system of its waste water, as well as by purchasing potatoes that can be grown in an environmentally friendly way.

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According to an internal note on sustainability policy, Cebeco's seeds and pesticides subsidiaries will be faced with the following dilemma's when working on improving sustainability:

- high tech agriculture with genetic engineering versus lower value creation in agriculture;
- low gentech acceptance versus technological benefits;
- large crops cultivated in monoculture versus small crops with higher biodiversity;
- diminished chemical crop protection versus profits for the agrochemical division;
- focus on local markets with decreasing growth versus world market with large growth.

According to Cebeco Seeds, transgenic herbicide-tolerant varieties can be beneficial to the environment. If farmers shift from pre-emergence spraying to post-emergence applications, a reduction in the use of herbicides can be achieved because farmers can wait to spray until after a certain damage threshold is passed. Then they can apply herbicides adjusted to the weed situation in particular spots and particular fields. However, this is a theoretical benefit. It has to be proven that this benefit will actually be achieved in practice, particularly as most spraying on maize is done by contractors. Cebeco Seeds does not expect that herbicide-tolerance will have a large impact on maize cultivation, so does not see much advantage in commercialising a herbicide-tolerant maize variety.

Still, the company is closely following the development of herbicide-tolerant crop varieties, for instance by planting test fields with such crops. According to a Cebeco seeds manager, this is the best way to follow the technological development and to be ready if and when public acceptance becomes favourable. It is also important to have expertise in how to handle GMO and non-GMO crops within the same company, and how to approach the market with these different varieties (if they are accepted).

Cebeco Seeds emphasises that the choice of putting more emphasis in breeding on pest and disease resistance is strongly dependent on the availability of crop protection products. As long as specific pesticides are available, and can be applied cost effectively, breeders will focus more on yield and quality traits than on resistance traits. This is not to say that resistance is not important. On the contrary, breeders will only put more emphasis on resistance breeding if pesticides are no longer available, or are three times as expensive,.

Neither conventional breeding nor biotechnology can solve all the crop protection problems

At Luxan, care for the environment is a central factor in all its activities. The company wants to operate in a way that is acceptable to society at large, by the norms and values of the society it is part of. To operate, the company needs several licenses that are issued by authorities that look at the environmental impact of its activities. The company has cleaned the soil under and next to the production plant.

Luxan, together with other members of Nefyto, the interest organisation for pesticide producers, has signed a Product Stewardship Declaration. One of the items in this Declaration is the promise not to use the environmental impact of their products in advertisements. Other items concern transport and packaging of pesticides, for which the private norms go beyond the legal requirements.

In line with the major societal trends, Luxan is driven by the desire to develop more natural, green products. The company has an internal working group to find out what sustainability means for its current and future activities and products. Luxan considers Talent as a natural product which fits with sustainable development.

In the long run we would like to develop more products like Talent. Sustainability in the agrifood chain. At Cebeco they are working on sustainability. What is also sustainability, is staying within the European regulations for crop protection products. Compounds that

are not toxic and break down rapidly. That is sustainability. Talent is also sustainability. It is a natural product.

## 7. Conclusions

### 7.1 Innovation Strategy

Royal Cebeco Group Co-operative presents itself as a network of co-operatives and subsidiaries, with 25 regional co-operatives as members. The Cebeco Board of Directors consist of representatives of these regional co-operatives. The primary clients of Cebeco Group are the regional co-operatives and the farmers that are their members. The group operates as a holding company for its approximately 200 operating companies, which have to fulfil financial requirements set by the Group Executive Board.

The management of the Group promotes collaboration among the operating firms by facilitating exchanges of R&D expertise, creating a common culture, and operationalising issues like sustainable development. Decisions about collaboration with other firms within the Cebeco family or with third parties are taken at the level of the subsidiaries, as is decision making on most other strategic issues.

Innovation is primarily the responsibility of the management of the subsidiaries. Thus, innovation in field seeds and in pesticides is the decision of the board of directors of Cebeco Seeds and Luxan respectively. When an investment exceeds the budgetary possibilities of the subsidiary and when it is in the interest of the Group as a whole, financial support can be obtained from the Cebeco Group.

In general, Cebeco companies follow a rather cautious strategy which can be explained by its co-operative nature. The main goal of a co-operative is to supply services to its members, in this case, the supply of inputs (seed, agrochemicals, feed) and the processing and marketing of agricultural products. The bottom line for Cebeco activities is whether they are in the interest of members of the regional co-operatives. This limits the type of innovative activity that Cebeco can undertake. Co-operatives are financed by retained earnings (income not paid out to members). As co-operatives do not have a stock market listing, unlike their competitors, they cannot expand by issuing additional shares, and they have more difficulty in raising equity capital for investments in R&D, marketing and international expansion.

Cebeco seed subsidiaries apply several biotechnology methods in their breeding work. Great emphasis is put on the molecular marker technology developed by Keygene (in which Cebeco has 40% ownership). No transgenic varieties have been developed yet, although applied research is done to build up knowledge of transgenic varieties. Cebeco has followed a 'wait-and-see' strategy on the introduction of genetically modified varieties. Current low public acceptance in Europe proves that so far this has been the right strategy.

Both the seeds and pesticides subsidiaries are now following a more international and focused strategy than ten years ago. As the R&D, registration and marketing costs for a new product have risen substantially, the companies need a larger market to recoup investments. Thus, the focus is on fewer products that can be sold in a larger European or world market.

### 7.2 Public Policy Influences on Innovation

Cebeco Group is one of the main companies in Dutch agriculture and horticulture, and is actively involved in all stages of the production and distribution chain. As such, it is directly influenced by many government policies.

Science, Technology and Innovation Policies are important for Cebeco because the companies obtain a large part of their external knowledge and expertise from Wageningen University and the DLO Research Institutes. Many Cebeco managers received their education in Wageningen and/or have worked at one of the agricultural research institutes.

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Cebeco is closely following the restructuring of agricultural education and research, and has some concerns about the direction of these changes. Subsidising small biotechnology firms is not considered very useful, as the knowledge will eventually be patented and bought up by large multinationals controlling a large part of agribusiness.

Policies for the protection of the environment are very influential, particularly for the agrochemical subsidiaries. Luxan's innovation strategy is 100% influenced by national and EU pesticide policies. Registration and testing have become more expensive forcing Luxan to focus more on a small number of products. The loss of registration of several crop protection products in the Netherlands as of January 2000 is affecting Cebeco in several ways: Luxan loses some of its markets, Cebeco Seeds sees certain crops become less attractive, and Cebeco member farmers are faced with higher production costs in the cultivation of certain crops. Several Cebeco managers have complained about the unpredictability of Dutch environmental policies. Political signals towards more environmentally friendly production methods are not followed by the prohibition of heavily polluting pesticides. Policies to delay the introduction of genetically modified crops in Europe have favoured Cebeco Seeds which has put less emphasis on transgenic varieties.

Agricultural and trade policies are important for Cebeco member farmers and indirectly for Cebeco subsidiaries supplying these farmers. Lower prices as a result of market liberalisation will make certain crops less profitable, and will lower the demand for seeds for these crops. On the other hand, the future accession of Central and Eastern European countries is seen as an opportunity for Cebeco Seeds. Due to shifts in protection of European cereal markets, on-farm feed production is becoming more and more important for farmers.

### 7.3 Environmental Issues

Environmental issues related to crop production have not received much attention by Cebeco Group. A producer of pesticides like Luxan is dealing with environmental issues every day, but in the Group as a whole, environment is not a major discussion issue. This is a matter for subsidiaries.

Recently, sustainable development has become an important issue at the Group level. The title of the 1999 Annual Report was *Towards Sustainability*. The concept of sustainability has been operationalised through indicators and each subsidiary is responsible for translating the general ideas of sustainability into its own goals.

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Appendix

Cebeco Group Structure

