Structure and Strategy: The seed industry structure and firms strategies

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Introduction

The debate on explaining firms' performance by market structures and market behaviour in the last three decades showed dubious results. Industrial organization theorists, emerging as a branch of micro-economics, indicated relationships between market structure and market performance. However, the Bain paradigm on Structure, Conduct and Performance was could not stand empirical evidence (Scherer, 1980).

The behaviourists suggested that behaviour variables, such as collusion, pricing strategy, product strategy, efforts on R&D or advertising, could explain performance, measured by industry profitability, growth in output, or technological advance, although controversy remained over the interpretation of the findings. Using game theory these scholars claim that maximal performance depends on the communication between the market actors and their intentions.

The pro-active behaviour of firms is not envisaged in this paradigm, while it is easy to suggest that firms in their competition with others affect industry structure and conduct of competitors as well.

The Chicago school economists still question whether the relationship between concentration and profits, for example, demonstrates confirmation of the market power or efficiency-of-larger-firms hypotheses.

Nonetheless, the importance of the industry structure for the explanation of the behaviour of the firm was accepted widely:

In formula:

$$P = Pi + (P - Pi)$$

meaning the profitability of the firm (P) is equal to the profitability of the industry (Pi) to which it belongs plus the difference in profitability between the firm and the industry. The second part emphasizes the competitive advantage of the firm (Douma, 1993). The profitability of the industry depends on the rivalry in the industry, according to Porter (1985). He states that five forces influence the industry rivalry. Using Porter's framework on the forces driving industry competitiveness, a large number of factors are to be dis-

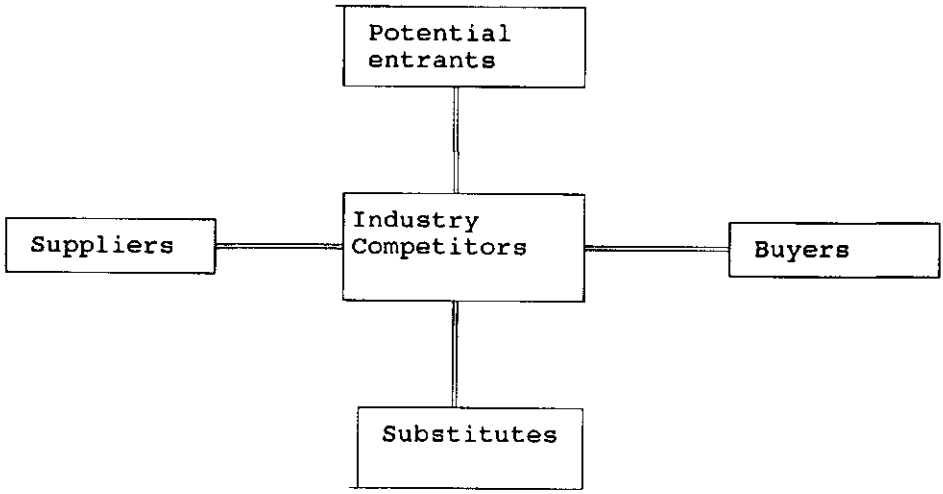

Figure 1. Forces driving industry Competition (Porter, 1980)

cerned that can potentially have an impact on industry competition. The five broad competitive forces provide a context in which all firms in an industry compete (*Figure 1*).

Intensive rivalry is the result of numerous or equally balanced competitors, slow industry growth, high fixed costs, lack of differentiation, capacity augmented in large increments, diverse competitors, high exit barriers and high strategic risks.

A number of companies operating in the same market can form the basis for intense rivalry. The competition among each other to get a share of the market, will press all of them to stay ahead. In this way competition among companies will keep them sharp and constantly looking for a competitive edge. Thus developments can take place on many aspects such as low production costs, better service and innovative products. In this way rivalry makes a company aware of its strengths and weaknesses, and develop/improve them. Thus it follows that intense rivalry in the domestic market can enhance competitiveness in the international field (Porter,1990).

Following the intensity of rivalry some strategic options may enhance the competitive edge of firms further than others. The strategic management perspectives, such as the Porter model, opened new avenues to research to unlock the black box that contains market and firm conduct in neoclassical economic theory and the traditional Industrial Organization paradigm.

Adding the richness of strategic choice certainly complicates the theory of the firm but allows a much more broader scope of performance and behavioral processes of organizations.

The major hypothesis we address in this paper, is whether the strategic choice is reduced, the more concentrated the industry is. This hypothesis is based on the notion that in mature industries where the concentration is high, the rivalry declines and by that increases the profitability of the industry (Scherer, 1980).

The profitability is assumed to be the result of strategic decisions taken by the firms. Some strategies will contribute more to profitability than others (Brealey and Myers, 1988). However, all the firms in the industry are left with a rather thorough knowledge of the implications of strategies for risks and market value. Hence, the strategic room to maneuver will decline, the more concentrated the industry is.

In this paper we shall explore the relationship between structure and strategies of seed firms in Europe. Specifically, we shall deal with the question what impact the concentration in the Dutch and Italian seed industry have for the strategies deployed by the seed firms in those markets.

We shall use data from an international research programme on the vegetable seed industry, conducted by the Department of Management Studies of the Wageningen Agricultural University. These data refer to national studies in Italy, France, Spain, The Netherlands, The United Kingdom, Denmark and Hungary.

The global seed industry

The vegetable chain

The figure below visualizes the role the seed sector plays in vegetable production. No specific national situation is described here, therefore foreign trade is not taken into account.

The figure puts the seed company firmly at the start of the vegetable production chain. This implies that the basis of the production and marketing of vegetables is formed by seed reproduction.

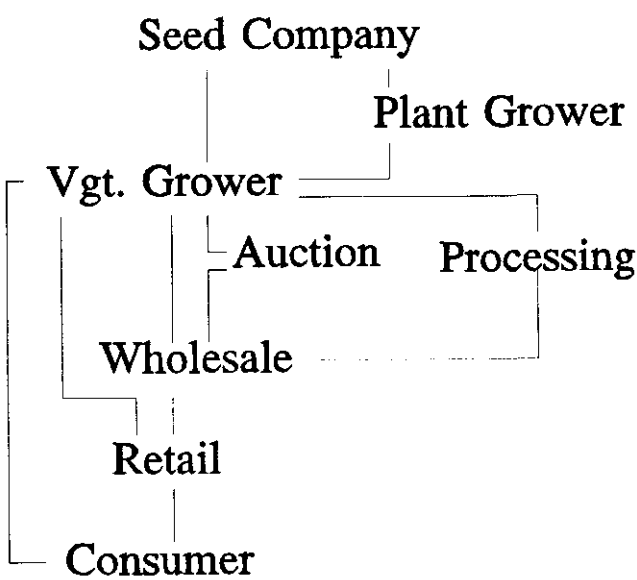

Figure 2. The vegetable production chain

The chain should also work the other way around. Which means that the basis of the breeding programmes of the individual seed companies should lie in consumer preferences. This type of information trickles up and down the production chain. However seed breeding faces a long term production cycle. While consumer preferences are subject to swift changes. So the seed sector has to put up with an imperfect response to the informationflow.

World vegetable demand and supply

The following two tables will give a broad idea of what happened in world agriculture and horticulture over the past decade. The regions have been divided according to the FAO structure.

In arable farming the world has seen no rise in the total cultivated area. Losses in the Developed world have been compensated by reclamations in Africa and Asia. Both in area and production volume the power of the Far East is significant. In both areas it takes roughly 40% and equals North America, Europe and the USSR combined!

The production figures of the past decade show astounding growth figures in the Asian region. Especially the Far East saw a steep rise in productivity. Africa follows closely with rising output figures. In the Developed world, only Europe was able to break the doom and gloom.It shows an overall production increase and a rise in productivity on world average. The table also shows that rising production is generally followed by rising exports.

In vegetable production the world saw a handsome 6.6% increase in cultivated area. However this was followed by a 26.6% increase in production, mainly instigated by the Far East. North America strongly follows the rise in production and even more in productivity. Oceania has put out even better figures, but fails to make an impact.

The whole of the developing world show strong growth in vegetable production. Growth in area can be found mainly in Africa and the Far East. Where Africa has a lot of catching up to do. Both in area and production volume the power of the Far East is significant. On 36% of the area, almost half the worlds vegetable production is grown. Thus a 40% growth rate makes quite an impact on world production figures.

Table 1 Changes in global arable farming 1981-1991 (%)

	Area	%	Production	%	Import %	Export%
World	876,666	.0	2,621,499	15.8	1.1	0.4
North America	109,739	9.8	416,244	0.8	73.4	15.7
Europe	74,500	5.6	393,026	9.1	22.6	34.5
Oceania	14,421	12.4	21,068	9.6	168.0	16.5
USSR	116,745	12.8	238,583	6.7	12.9	82.7
Rest Developed	8,744	20.0	32,282	8.8	12.9	78.8
Africa	106,701	26.5	214,087	42.8	20.3	137.3
Latin America	76,137	2.8	185,167	15.0	6.6	11.2
Near East	44,190	10.2	89,129	67.3	38.9	204.7
Far East	335,990	1.7	1,057,129	28.7	23.6	90.5
Rest Developing	250	11.6	1,749	14.5	62.5	69.6

source: FAO
area in 1,000 ha; production in 1,000 tonnes

Table 2 Changes in global vegetable growing 1981-1991 (%)

	Area	%	Production	%	Import %	Export%
World	13,303	6.6	452,336	26.6	30.0	29.8
North America	581	-1.0	34,288	26.0	61.8	18.8
Europe	2,010	-10.4	68,530	8.2	31.7	16.4
Oceania	52	15.6	2,089	45.7	-97.6	61.2
USSR	1,661	-3.7	31,412	1.7	23.6	—
Rest Developed	348	-0.3	18,076	2.4	-61.0	38.6
Africa	784	38.3	19,315	48.3	11.5	63.7
Latin America	1,103	9.3	21,668	25.4	16.3	94.2
Near East	1,936	-0.2	43,715	25.7	36.7	45.2
Far East	4,830	20.1	212,805	40.6	96.7	9.1
Rest Developing	2	0.0	438	31.1	7.9	-81.8

Source: FAO
import/export of vegetables comprise of tomatoes and onions.
area in 1,000 ha; production in 1,000 tonnes

World vegetable trade balance

Unfortunately the data presented in *table 2* only allow general statements as the import-export figures comprise of tomatoes and onions. Onions are durable and can thus be stored during long periods of time or transported over large distances.

Most other vegetables do not allow for this without conservation in one way or the other. Therefore vegetable growing generally takes place around the main consumption centres. This restricts foreign trade to a mere regional level, among neighbouring countries. A higher off-season price would pay for high inputs of technology or transportation required by global vegetable trade. In this way Kenia has built a strong position in exporting vegetables to Europe in wintertime.

Improvements in technology or production of more durable varieties in effect cut down the total transportation time to consumption centres. This increase the potential production area of this consumption centre, making the world a smaller place as it were.

European Demand and Supply

In order to get an idea of the nature of the seed demand it would be wise to take a closer look at the state of agriculture in Europe. *Table 3* below give a picture of the developments in the agricultural structure over the past years. One should note that after 1990 the former East-Germany is integrated in German statistics. That is why 1990 has been chosen as the year of reference.

Large arable areas can be found in the larger countries. Spain and France supply the largest areas, followed by Germany, Italy and the UK. A small country like Denmark has a remarkably strong position in arable farming. Over the period 85-90 little changed on a European scale when the arable areas are considered. The only sizable decline in arable area took place in the UK and Denmark.

The total number of arable farms is the largest is Italy, with an average size of some 7 hectares. Greece and Portugal have a similar situation. Large scale arable farming traditionally takes place in the UK, Denmark and France.

The number of arable farms in Europe show an average annual decline of 2%, whereby numbers of Irish farms plunge quite dramatically. Only Greece and the Netherlands have

Table 3 Changes in agricultural structure 1985-90 (%)

	Arable				Vegetable			
	Area	Change	Holdings	Change	Area	Change	Holdings	Change
EC-12	67,371	-0.4	4,432		1,693	0.6	1,030	
Belgium	711	-4.2	52.5	-13.1	31	2.7	12.7	-26.6
Denmark	2,507	-4.1	76.6	-11.6	15	-2.5	3.1	-31.1
Germany	7,382	2.1	518.2	-12.4	49	3.5	25.5	-20.3
Greece	2,925	0.0	430.9	-5.3	135	-2.0	116.9	1.9
Spain	15,560	-0.6	668.7		469	0.6	319.3	
France	17,753	1.4	668.3	-10.0	276	1.5	85.2	-29.2
Ireland	1,029	-6.4	59.9	-47.9	5	0.0	1.1	-82.0
Italy	8,917	-1.7	1,294.6	-8.9	411	-0.6	357.7	-34.1
Luxembourg	55	0.0	3.1	-11.7	0	-15.1	0.1	-42.9
Netherlands	897	4.9	62.5	-5.5	65	0.5	18.8	-26.6
Portugal	2,906	0.0	406.0	82	-2.3	71.6		
UK	6,589	-5.9	130.6	-9.4	142	0.8	18.0	-19.6

source: Eurostat
Area in 1,000 Ha, number of Holdings in 1,000.

1% per year drop numbers. When the arable area remains constant, a drop in number of holdings means a larger scale of farming. A very small decline or growth, could then mean either intensified cultivation or stagnation.

In vegetables, large areas can be found in Spain and Italy, smaller territories are in France, Greece and the UK. Drastic changes in area over the past years have not been taking place.

The total number of vegetable producing farms is highest in Spain and Italy, leaving Greece the runner up with half the number. The average size of farms differs widely, again the large scale farms can be found in the UK, Denmark, France and the Netherlands. The southern European countries have a below average scale.

In the number of holdings a noticeable decline of 4-6% per year on average took place. Greece was the only country here to show growth. This would imply a rapidly growing scale of production in vegetable production across Europe.

The total change in production volume in the EC amounts to zero over the five-year period. However between productgroups this is hardly the case, as there is no country without double digit growth figures. Pulses and oilseeds have benefitted the most, the EC-agricultural policies of the time would explain a large part of the growth. Within cropping plans vast changes can take place rapidly. Therefore the recent agricultural reforms will undoubtedly have left their impact on the division of production among productgroups.

France is easily recognized as the main arable producer within the EC, with Germany coming second. Considerable growth takes place in Denmark and the Netherlands. Productivity in arable farming is highest is the northern EC-members, foremost the Netherlands, and lowest in the south, especially Spain.

One should note that the Danish Bureau of Statistics stopped collecting horticultural data in the years 1990/91. This would explain the "collapse" of the Danish horticultural production.

Table 4 Changes in arable production volume 1985-90 (%)

	Volume	Change	Cereals	Pulses	Rootcrops	Oilseed
EC-12	338,862	0.0	-0.9	66.9	2.6	52.7
Belgium	11,446	2.3	-3.8	220.0	3.4	78.6
Denmark	31,078	46.8	20.8	5.4	-2.5	1,556.4
Germany	63,431	-4.4	-0.1	41.6	-9.3	87.4
Greece	8,850	4.6	2.0	1.7	5.5	26.3
Spain	33,674	-5.0	-10.5	-21.6	0.3	42.9
France	102,703	-0.8	-1.5	225.7	-9.7	53.9
Ireland	4,715	6.0	0.7	600.0	10.4	7.1
Italy	33,800	9.0	-2.6	-25.3	15.7	295.9
Luxembourg	179	3.5	12.1	-	-37.5	400.0
Netherlands	17,428	16.7	20.4	-8.8	16.7	-7.9
Portugal	2,648	-3.0	0.9	0.0	-9.1	62.1
UK	39,125	-0.2	0.5	90.8	-6.2	40.6

Adapted from Eurostat
volume in 1,000 tonnes

Table 5 Changes in horticulture production volume 1985-90 (%)

	Volume	Change	Cabbage	Leaf	Fruitvgt	Root	Pulses
EC-12	44,553	1.9	-5.4	19.8	-1.9	-1.9	-7.3
Belgium	1,136	11.3	-13.8	13.0	57.7	-15.2	-9.1
Denmark	18	-93.7	-87.6	-92.6	-32.7	-100.0	-100.0
Germany	1,479	-3.1	-9.8	12.5	26.9	34.3	-22.7
Greece	3,841	-10.8	11.5	8.8	-14.7	2.7	-13.5
Spain	11,496	21.0	-1.1	50.0	29.2	-5.2	-3.9
France	5,472	-1.2	-17.3	5.2	-0.4	-7.6	-6.4
Ireland	227	3.1	-15.8	10.0	-14.0	-0.1	-4.3
Italy	12,246	-6.2	4.5	16.8	-15.3	21.0	-16.3
Luxembourg	3	-13.3	-80.0	-30.0	—	-70.0	—
Netherlands	3,479	26.9	12.3	12.7	31.1	34.8	-0.3
Portugal	2,120	6.9	1.2	6.7	8.1	-2.1	-16.7
UK	3,579	1.2	-5.1	25.8	26.2	-5.9	-0.1

adapted from Eurostat
volume in 1,000 tonnes

Overall vegetable production is stagnant in the EC, nevertheless growth figures differ widely among countries. Total growth is highest in the Netherlands and Spain, while Greece shows a decline of over 10%. Major producers are Spain and Italy, France coming second with half the volume, Greece, UK and the Netherlands complete the picture. When volume and area are compared, the Netherlands have a clear productivity lead of double the EC-average.

Among productgroups only among leaf- and stalkvegetables (lettuce, celery, etc) a strong growth is shown. Spain and the UK benefitted most from this, while France lagged behind in growth. An overall decline is registered in the production of pulses, this is a small sector in terms of volume. Other sectors show a diverse picture with strong growth and decline. However the best overall performance is given by the Netherlands. In

general the southern EC-members have an emphasis on fruitvegetables and leaf-/stalkvegetables, while the northern states concentrate on cabbage and rootcrops.

The European seed industry structure
The structure of an industry can be typified by several indicators:
- degree of collusion or concentration
- product differentiation
- growth of demand
- cost structure
- intensity and size of investments and
- over capacity of production means.

The first indicator we present here is de demand side of the seed industry.

Seed demand and supply
Patterns in demand for seed in general follow production patterns. This is easy to conclude, as there will be no production without seed. The demand for vegetable seed on a global scale could therefore be derived from the figures of table 3. The problem arising here is that crops, varieties, spacing of sowing, productivity and the number of harvests per year may differ from one country to another. This means that an estimate of seed demand can hardly be computed from these data. A rule of thumb would be that large production areas imply high demand of seed.

The above will also be true for the EC-countries. Thus Italy and Spain should have the highest demand, followed by France, Greece, the Netherlands and the UK. In the figure below the production volumes are compared to the value of the vegetable seed markets. These values are estimates compiled by LEI-Rabobank in a previous study.

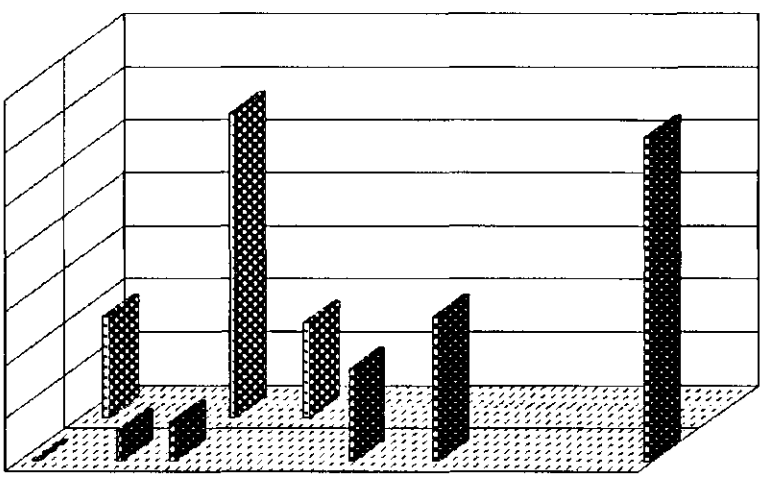

Figure 3. Vegetable productionvolume and seed value in Europe, 1990

The figure shows a striking disparity between volume and value where Greece, Spain and to a lesser extent the UK, are concerned. For all three countries the value of the seed market has a lower estimate than expected according to production figures. To avoid the conclusion that the estimates of the value of the seed market cannot be trusted, it is best to assume all figures to be correct. This implicates that the larger part of vegetable production in Greece and Spain is generated by farmer-saved seed instead of commercial seed. This is supported by the results of the Spanish national studies performed in 1993.
An indication of the supply of vegetable seeds is given by the following figure, showing international trade flows. It becomes clear that there are tree major trade centres in world: USA, France and the Netherlands.

These figures are a bit murky as there are sizable re-exports and re-imports.

Concentration in the seed industry

A characteristic of the industry structure, we use here, is the degree of concentration. Concentration is influenced by two factors: the number of companies in the industry and the relative size of the companies. In general it is said, that the less companies and the less larger companies, the higher the concentration within the industry.

Concentration can be measured by various means, like the C4, being the total turnover or market share of the four largest companies in the industry, the H(erfindhal)-index or the Entropie of Theil-index (E-index). The H- and E-index take into consideration the market shares of all the actors in the market. The intercorrelations between the three are high (Scherer, 1980).

In our study we base our findings of the modified C4-indicator.

Thus one should take a look at the companies in the industry and the estimated turnover per company in vegetables.

If 10 million Guilders turnover in vegetables (4.3 mln ECU) or more is taken a large enough size, it is possible to compare rivalry within several countries.

The table shows strong rivairy can be expected on the French and the Dutch market. Taking a closer look at the annex, it follows that 4 companies appear more than 3 times, totalling 13 out of 32 appearances. This means that they are large enough to keep up the competition at home and abroad. The companies involved: Groupe Limagrain, S&G/Sandoz Seeds, Royal Sluis and Asgrow Seeds.

The table also indicates that competitive rivalry will show some stability with some dominant firms within the domestic markets. This stability occurs in growing markets.

However, because the slower growth in the domestic markets, as shown before, rivalry increases: the firms have committed themselves in keeping up the market shares. In this

Table 6 Number of large vegetable seed firms and national market value

	Nr of Companies	Marketvalue
Spain	3	32.5
France	10	86.5
Italy	7	129.8
Netherlands	11	69.2
UK	1	47.6

market value in million ECU

situation conditions prevail for co-operative behaviour, expressed by merger, acquisition and alliances.

In the seed industry in Europe, this concentration process has been going on already for about two decades. Some examples:

Italy

The intensity of the competition in the seed industry in still increasing in Italy. The most important competitors for most of the companies in Italy are:

- Royal Sluis S.R.L.
- Peto Italiana S.R.L.
- Asgrow Italia S.P.A.
- Sluis&Groot/Sandoz Italia S.P.A. and
- Clause Italia S.P.A..

France

The major players in the vegetable seed industry in France are Limagrain, Clause (owned by Rhone-Paulenc and Orsan), Caillard (owned by Sandoz), Plan, Royal Sluis, GSN Semences, Asgrow France, André Blondeau and TOP Semences.

Limagrain, the largest group in France, was created by successive purchases of well known companies, such as Vilmorin (1975) and Tezier in France, Ferry Morse and Advance Seeds (USA), Flora Frey (Germany) and Nickerson-Zwaan in 1990, that before that event participated in the Shell group, that acquired A.R. Zwaan en Zoon in 1973.

Some other recent developments are the formation of the joint-venture with the Danish DLF-Trifolium for fodder-crop seeds (1990), the joint-venture with the co-operative Union du Cher on biotechnology,

Clause has a long-standing position already in the vegetable seed market.

The take-over by Rhone-Paulenc and Orsan, the growth in the professional market has increased rapidly. Acquisitions played a part in this development.

Asgrow France, owned by Upjohn (USA) bought Bruinsma (The Netherlands) in 1992.

Petoseed Europe bought van Waveren, a subsidiary from KWS on seeds for vegetables for the canning industry.

Sweden

In 1993 the two major Swedish companies Svalöf and Weibull merged to enlarge their efforts in, among other businesses, the horticultural industry.

Spain

Now, there are 35 companies active in the vegetable seed market. Twelve firms are subsidiaries of foreign firms and three are joint-ventures with foreign firms.

The main Spanish firms are:

- Semillas Fito S.A.
- Semillas Battle S.A.
- Intersemillas S.A. and
- Ramori Arnedo S.A.

Since the 70's and early 80's many foreign seed companies entered the seed market directly, because of the growth in the vegetable industry.

Concentration processes have been induced since then by those foreign based firms. Petoseed and Clause are the major players in this market.

The Netherlands

Structural concentration also took place in The Netherlands.

A.R. Zwaan en Zoon was established in 1942.

Cebeco-Handelsraad acquired a majority participation in Rijk Zwaan in 1989.

As mentioned before, A.R. Zwaan en Zoon, was acquired by Nickerson Seed Specialists in Rothwell (U.K.), being a subsidiary of Shell in 1973. Nickerson- Zwaan, the name adopted in 1980, took over D.van der Ploeg Seeds in 1981 and Supergran (Belgium) in 1979. Limagrain took over Nickerson- Zwaan in 1990.

De Ruiter Zonen, one of the major tomato seed firms , took over Gebr. van den Ploeg in the eighties.

Bejo Zaden is a merger of two companies in 1978: Jacob Jong and C.Beemsterboer, both pioneers in open air vegetable seeds.

Nunhems Zaden was taken over by Hoechst in 1986 to lead the seed division of this German chemical conglomerate.

Rijk Zwaan was taken over in 1986 by the petro-chemical company B.P. Nutrition. However, B.P. stepped out the seed business in 1989 and sold Rijk Zwaan to Cebeco-Handelsraad.

Bruinsma, one of the first pioneers in hybrids, was taken over by Asgrow in 1988.

Sluis&Groot/ Sandoz already has a long history (established since 1887).

The firm has a rather consistent pattern of autonomous growth for a long time.

In 1963 the Co-operatieve Zaaizaadvereniging West-Friesland.

In the eighties some major changes occurred.

In 1980 the firm was acquired by the Swiss based chemical giant Sandoz.

After that, the firm developed internationally by take-overs and new ventures.

Royal Sluis is the second eldest firm, originating from 1868.

Autonomous growth also in this case is the device for decades. Take-overs are recently new and contain some specialist groups, like on tissue-culture.

Koninklijke VanderHave Group, now involved in onions, rape and grass,

was established in 1979.

In 1977 the co-operative Suiker Unie took over the company. VanderHave acquired in 1990 Leen de Mos, a medium-sized tomato, lettuce and cauliflower expert.

Considering the number of employees, six firms employ about 80% of all employees of the eleven largest firms.

United Kingdom

The concentration process had dramatic consequences for the U.K. seed industry. Very few firms still remain (Andrews, 1993, in Seed World april).

The major players:

Nickerson, being a part of Limagrain.

According to Market Assessment 1990 Sutton Seeds has a total market share in the U.K. market of 39%. Sutton is owned by Svalöv & Weibull.

Samuel Yates Ltd. is owned now by Yates Australia.

Nutting and Sons is now french owned.

Sharpes International Ltd. has been acquired by VanderHave Group.

Considering the major firms in France, Spain, Italy, The Netherlands and United Kingdom, active in vegetable seed, the major five companies Limagrain, S&G/Sandoz, Royal Sluis, Nunhem and Clause make out 60.7% of the total turnover in these countries.

The findings show an overriding concentration process in the European seed theatre.

Petro-chemical companies were rather active in the take-overs in the seventies and eighties. However, some of them pulled out of this business, selling their seed interests to larger international seed companies.

This horizontal integration is slowing down in the nineties.

This proves the next point, firms with strong domestic competition are likely to perform well in the international arena. To keep up the struggle, companies are looking for a wider scale of operation to cash in on the efforts that have been put in. This means that internationalizing is a logic option, a company already knows (and developed) her edge, and can stick to it.

As far as the comparison concerns between the Dutch and Italian seed industry, we may conclude that in both cases the industry is highly concentrated.

Firm's strategies

Concept of strategy

Strategy is a coherent, unifying and integrative pattern of decisions as a response to external and internal developments to achieve a long-term sustainable advantage over competitors.

Typology of strategies.

Competitive advantage is to be measured by the total revenues collected by the buyers' payment for the firms' output. Added value is created whenever the buyers' contribution exceeds the total cost resulting from the completion of all the activities in the firms' value chain. The margin is the difference between the total value generated and the aggregated cost of the value activities. The margin directly contributes to the competitive advantage.

To Porter (1985) two basic ways of achieving competitive advantage are cost leadership and differentiation. Cost leadership requires the construction of efficient-scale facilities and sustainable cost reducing activities. Differentiation calls for creating something that is perceived by customers or clients as being unique by technology, customer service, image or other dimensions. Market scope consist of concentrating on a segment or geographic market. It may be broad or narrow.

Putting these generic strategies together, Porter emphasizes the importance of the following strategies showed in *figure 4*.

Going a little bit further we may assume that seed firms will likely be interested in value added strategies at a similar or somewhat higher price. if the aim is to get higher market share uniqueness in products and services should be perceived by customers/growers in the relevant market segments. depending on the financial return of the purchase of higher priced/higher value added seed the customer/grower may be convinced. On the other hand, if the market prices of vegetables stabilizes the grower will not expect a

		Competitive advantage	
		Lower cost	**Differentiation**
Market scope	**Broad**	Cost leadership	Differentiation
	Narrow	Cost focus	Differentiation focus

Figure 4. Generic strategies (Porter, 1985)

higher return and will look for another more advantageous price/value added clue in his purchasing process.

For the international firm, value added/higher priced strategies are a hard ball game to play, because of the specific customer needs in the fragmented or differentiated international markets. A Dutch cabbage doing well in Belgium, may not flourish in southern Spain because of different clima-ecological conditions.

Cost leadership is feasible for most firms to achieve. Experience curve effects can be achieved in all firms. Learning to do it better to a lower cost level is feasible for all seed firms in principle. However, the competitive advantage becomes marginal if and when all firms deploy cost reduction strategies and drive down costs in areas as research and development, overhead positions and sales forces.

The highest possible cost reduction target is close to shut down the firm!

So are there alternative routes to achieve competitive advantage?

Yes there are. From a product-market point of view the seed firm may select for the specific product groups the most suitable strategies (*figure 5*).

The seed firm always is able to withdraw from a market, for instance if the value of the product-market combination exceeds costs on a permanent basis or if the market changes considerably over time, implying hugh risks. For determining whether withdrawal is a adequate recipe, the firm deserves cost and market monitoring systems in the first place.

Some seed firms may partially withdraw from a market by licensing the rights to other organizations and/or to specialize on the market of basic seed. This partial withdrawal is highly advantageous for instance if market opportunities are crumbled by lack of proprietary rights protection.

		Product	
		Present	**New**
Market	**Present**	Withdrawal Consolidation Market Penetration	Product improvement New product development
	New	Market development	Diversification forward development or backward

Figure 5. Product-market strategies

Consolidation in growing markets is attractive a strategy because of the expected high return low cost consequences. In mature markets consolidation provides strategic challenges. In face of the competitors positions, the consolidating firm puts emphasis on quality, increasing marketing activity or cost reduction through productivity gains or higher capital intensity, which often is hard to achieve in the seed business. In declining markets consolidation may require more severe cost reductions and/or increasing market share of competitors leaving the market.

Market penetration in growing markets builds upon the desire to increase market share. "Belong to the dominant market players" sets out a device for aggressive market penetration in growing markets. To the contrary market penetration in static markets is much more difficult to deploy. Market leaders already have established their position, preventing others with lower market shares to grow. For low market share players fine tuned tactics may do well, for instance by using reputation as niche leader, by allying with others to fight dominant complacent market leaders or by using price tactics.

For seed firms product improvement is connected directly with their basic competence. The long enduring process of new product development lacks behind the advantage of product improvement. Although also that process is susceptible to time consuming processes of testing, registration, multiplication and product introduction. More successful product improvement seed firms will tailor their products to market needs, build on the firms' core competencies and have organized the processes of product improvement internally on product management basis.

Market development builds upon the existing range of products while venturing into new markets. Specifically, because of the high capital investments in seed development the firms' assets might be specifically devoted to exploit the product by new market development. In particular, when existing markets are saturated theses seed firms incline to expand businesses in new markets. To the process of internationalization we shall come later.

Diversification brings the firm away from its present products and markets at the same time. Still, the diversification may lie within the confines of the firms' competence. The direction of diversification may be backward or forwards. Backward diversification is well known in the seed industry. Seed merchants having taken over seed breeders. Vice versa, forward diversification meaning seed firms acquired merchants. In that sense the seed industry showed many examples of vertical integration, being the combination of backward and forward diversification. Most seed firms are nowadays engaged in breeding, multiplication and distribution. Still, processes of vertical integration slow down, if the transaction costs and experience curve effects lose their positive contribution to the firm and negative implications flourish, like growing bureaucracy, less flexibility, higher overhead costs and massive inertia. In that stage of industry development new entrants may step in and externalization of the vertical integrated firm activities starts up.

Examples of horizontal integration are also well known in the seed industry. In particular in the seventies petro-chemical and pharmaceutical companies acquired seed firms, because of the expected complementarity between seed technology and seed products on the one hand and biotechnology, pesticide and insecticide products and distribution channels on the other hand. Synergy may be the result of related diversification rooted in technology, products or marketing and distribution competencies.

As we have seen before, acquisitions, mergers and alliances are specific ways of supporting strategies. Mergers and acquisitions tend to go in waves. In the seed industry the last thirty years these phenomena are widely shown. Mergers are the result of organisations coming together voluntarily on an equal basis, while acquisitions always show asymmetry in power, capital or other resources.

Evident reasons for acquisitions are: cost efficiency by building up economy of scale and/or geographical scope, expanding market share by taking over low share value firms, entering new markets by piggybacking on the acquired firm or the expanding competence because of lack of knowledge or resources internally.

In the seed industry many of these factors have played a major role in the acquisitions in the past and present times.

Alliances support the firms' strategy in a more open way. Allied firms cooperate to share some assets of each of the firms through a mechanism of mutual advantage and trust. Examples are alliances in distribution, when firms are distribution capabilities to lower costs and share a broader product assortment exposure. Another example is research and development. Seed firms engage in alliances by sharing biotechnology capabilities that each of the individual firm can not permit himself directly. Allying is sharing risks and synergy at the same time, without losing the firm identity and autonomy. Licensing, as we have seen before, is a particular expression of an alliance. Giving the right to produce seed granted for a fee gives both partners a sustainable advantage. Some forms of subcontracting also share the characteristics of the alliance. In the seed industry coating of seed for instance is subcontracted to the coating firm on a permanent basis. This may lead to far going arrangements in which the seed firm and the coating firm may build up competitive advantage over other alliances.

Summarizing, in this paragraph we have looked at strategic options open to seed firms to deploy. There are no arguments yet why this general framework could not fit in the strategic arena of the seed industry.

In this paper we shall now discuss the strategies the Dutch and Italian seed firms have adopted and the relative changes of the strategies over time.

Strategies of Dutch and Italian seed firms

We asked 11 Dutch firms to the strategies deployed in 1985, 1990 and preferred for 1995 and 2000. The range of options given to the respondents, were aggregated and ranked (1= mentioned often to 5 = mentioned not often).

Table 7 gives an ample evidence for the emerging drive for customer service.

The earlier described saturation of the seed market pushes seed firms to improve customer relationships on a sustainable basis by a differentiation strategy, containing methods like better service, higher quality and control and better product image.

The product innovation drive comes second in the row. Remarkable is the finding that increases in the R&D budget are not preferred that much as a strategic method. This means that product innovation largely will be built on existing resources, possibly not giving that much of an outlook on increased in-depth investments in biotechnology research.

From a product-market strategic perspective, firms do not perceive stronger drives for entering new markets. This, coupled with the former mentioned product strategies, means

Table 7 Strategies deployed in 1985 and 1990, and preferred in 1995 and 2000 by Dutch seed firms.

Strategies of firms	Deployed		Preferred	
	1985	1990	1995	2000
Durable relations with clients	2	2	2	1
Enlarge customer service	2	2	2	1
Best service support	4	3	2	1
Quality guarantee and control	3	2	2	2
Distinguish product from competitor	2	2	1	2
Improve product/market image	3	2	1	1
Develop new products	2	3	2	2
Improve/ renew existing products	4	3	3	2
Strive for unique product	4	3	1	3
Bigger product assortment	2	3	3	3
Product in higher price segments	4	3	2	3
Products in lower price segments	4	5	5	5
Lowest cost per product unit	5	5	3	3
Lower prices than competitors	5	5	5	5
Higher R&D expenditures	4	3	3	4
Innovate production process	4	3	3	3
Enter new markets	4	3	3	4
Control production flow	5	5	3	4
Enlarge reliability of supply	5	4	3	3
Shorten delivering time	5	5	5	5
Strong influence on distribution channel	4	4	5	4
Innovation of distribution process	4	4	3	3
Innovation of marketing instruments	4	4	4	4
Adapting of organization structure	4	4	4	5
More attention for higher educated personnel	5	5	4	4

that most firms expect to choose for market penetration and product improvement. Theoretically, not unexpected, taken the development of the seed market.

Also remarkable is the finding that more emphasis on improvements on internal operations and logistics is not expected to increase. Cost reduction strategies are not perceived as that promising. Cost leadership apparently is not sought for by most firms.

How does these findings compare with firms in other countries ?

In our study we focused also on Italy and asked eleven firms, engaged in vegetable seed, to rank their strategies deployed in the past and preferred for the future.

In *table 8* we give a ranking of the strategies being deployed in 1985 and 1990 and preferred for the year 1995 and 2000.

The dominant feature of the strategies over time is the increase of customer and market orientation of the firms. Customer relation and service, a focus on quality, by using better distribution and marketing instruments should give room for higher prices in better market segments. This rather ambitious perspective goes hand in hand with smaller product assortment and a stabilizing expenditure for R&D. The differentiation strategy is not focused on the product as such giving the unique dimension to the firm competitive position, but on customer relationship, strengthened by value added, service and delivery in time.

Table 8 Strategies deployed in 1985 and 1990, and preferred in 1995 and 2000 by Italian seed firms.

Strategies of firms	Deployed		Preferred	
	1985	1990	1995	2000
Durable relations with clients	1	1	1	1
Products in lower price segments	2	4	1	1
Quality guarantee and control	2	1	1	1
Improve/ renew existing products	3	2	1	2
Develop new products	3	2	1	1
Shorten delivering time	3	1	1	1
Bigger product assortment	3	3	4	4
Distinguish product from competitor	3	1	1	1
Control product flow	3	3	2	2
Enlarge reliability of supply	3	2	2	2
Strive for unique product	4	4	4	4
Product in higher price segments	4	3	1	1
Improve product/market image	4	2	1	2
Enlarge customer service	4	2	1	1
Higher R&D expenditures	4	4	4	3
Innovate production process	4	3	3	3
More attention for higher educated personnel	4	2	1	1
Strong influence on distribution channel	5	3	2	2
Innovation of distribution process	4	3	2	2
Innovation of marketing instruments	4	3	2	2
Adapting of organization structure	4	3	2	2
Enter new markets	4	4	2	2
Lowest cost per product unit	4	4	3	2

Cost leadership does not really get that much of attention now; however the importance increases over time according to the preferences of the firms.

Comparing the findings of the Italian study with the Dutch study reveals a lot of correspondences. Differences concern a stronger Italian emphasis on:

- products in lower price segments
- logistic improvements (delivery time, reliability and product control)
- smaller product assortment
- more attention for higher educated personnel
- new market development.

Although a comparison should be handled with some necessary care, we incline to the idea that the Italian firms also agree on the product differentiation strategy as such, by customer service improvements and product development, but also stress the importance of strengthening internal factors, like logistics and personnel. Apparently these firms still have some room for improvements internally, whether because they rank below the Dutch competitors, or because they believe these internal factors are crucial for surviving in the business.

Summarizing, the seed firms, engaged in vegetable seed, in The Netherlands and Italy all have a rather thorough perception view on the actual and future seed market. The keywords are differentiation by a high committment towards customer and market orienta-

tion. According to many firms this strategy deserves investments in customer service, improvement of product quality and control and improvement in distribution and marketing. Many firms opt for a smaller product assortment and will invest less in R&D accordingly.

The attention for cost leadership is less apparent.

The European integration stimulated many firms to make an European strategy. Dutch and Italian firms strive for differentiation and market leadership. Only Dutch firms opt for foreign direct investments, apart from increases in exports. Italian firms focus on export increases in the first place.

Structure and strategy in the Dutch and Italian seed industry

Our findings leave us to conclude that the in the highly concentrated seed industry, a convergence is taken place in the strategies of the seed firms over time. In the past ten years, the differences in strategies employed, are evident. However, for the years to come strategies of Dutch and Italian seed firms tend to converge, emphasizing the customer relations in the first place.

According to our findings we face some interesting questions.

First, if concentration in one geographical market, being The Netherlands and Italy, is high, one might theoretically expect a weaker rivalry. The weaker the rivalry the higher the profitability, one might assume. This relationship is validated in most American studies, although the profitability gains are not reported that high. In other countries these findings sometimes are reconfirmed (De Wolf, 1982) or not found, like in Belgium (Jacquemin e.o., 1980).

From strategic management point of view, taking into consideration the American studies just mentioned, one might hypothesize that the higher the concentration in a geographical market, the more strategies are focused on increasing market value. This would suggest that increases of market value certainly would best be enhanced by the differentiation strategies, supported by relative low investments in R&D.

One might also expect that high concentration, invites firms external to the industry to enter the industry. There is ample evidence that the petro-chemical companies entered the seed industry to exploit the high profitability of the industry in the seventies and eighties. This, in turn, changed the industry relationships, the contestability and jeopardized the co-operative behaviour of the larger companies to maintain the status-quo. On the other hand, one might expect, based on the fact that the Dutch and Italian seed market does not show off growth, a tougher competition between the few, lasting seed companies.

This might explain why Italian firms prosper the strategy of lowering cost.

There is ample of evidence that the increase in concentration in The Netherlands and Italy, is due to the expansion strategies employed in the eighties, when the firms enjoyed the relative high growth in the vegetable seed market. Due to differentiation advantages the Dutch firms contested the Italian firms and achieved in gaining a relative high market share.

In The Netherlands the industry concentration emerged because of other forces, such as the higher investment needs of the seed firms. This allowed new entrants to acquire Dutch firms. By doing that these new entrants supported the seed firms in their capital needs.

So, industry concentration in The Netherlands apparently is the result of the technological breakthroughs and capital requirements for investments in R&D, while in Italy the

concentration is caused merely by the new entrants raping off the profits to be made in the italian seed market.

Evidence for this exploratory hypothesis, can be found in the findings on the strategies of the firms.

Up till now, the seed industry in Italy have achieved a new status quo, with a high concentration. The firms adopted strategies that shifted from expansion to further penetration, using price strategies.

In The Netherlands the seed industry faces a rather new status quo, with a high concentration. The firms adopted strategies that shifted from high investments in R&D to expansion into new markets.

The difference between the two situations can be interpreted by the following reasoning.

The take-over of the Italian market by the Dutch firms, is a part of a broader expansion strategy of the larger Dutch firms to enter international markets and build up market share. The low contestability of the seed market in Italy offered low risks and high gains for the Dutch entrants.

Conclusion and discussion

The conclusion of this study is that high concentration induces firm to converge their strategies. This hypothesis has been validated by comparing the Dutch and Italian seed industry.

Strategic choice behaviour apparently, is not merely a function of internal competencies (Hamel and Prahalad, 1990) or unique differentiation abilities or skills (Porter, 1985), but strongly influenced by developments in the industry.

There are, however, several complexities in the explanation.

First, the industry structure is a far more complex concept as normally accepted.

Firms in the same industry may not supply substitutable products. In fact, they may sell their products to quite different sets of market segments. Since industry data are often used to test implications about market behaviour, there are obvious difficulties in doing empirical research.

In our study we also faced a second complexity in defining the industry.

In the concentrated seed industry the process of strategy formation and implementation is done differently by the firms. Some firms conduct highly centralized processes of strategyformation, while others prefer highly decentralized patterns of strategic decision-making.

Third, the cross border complexity in the industry concept, deserves a clear distinction between levels of analysis. In the European market the seed industry should be analyzed from a different perspective, compared with the national seed markets. This leaves open the question how the dynamics between national and regional markets can be catched, using a comprehensive paradigm or theory.

Fourth, the relationship between structure and strategy still lacks a thorough theoretical understanding. The assumed causality between structure of the industry and strategic choice behaviour is still based on the Bain theory. From an theoretical point of view it still is a challenge for research how to analyze the dynamic character of the relationship between the two entities.

The implications of the findings for practice, are abundant.

For firms in maturing industries, concentration favours the profitability on the long run, after the processes of merger and acquisition. If the entry and exit barriers are high, the firms left in the industry, may prosper and use the capital for expansion in new geographical markets, so broadening their scope.

However, if the expected profitability will not increase, after the turbulent stage of merging and acquisition, the contestability of the industry at large is at stake.

New firms may enter the industry, exploiting new assets, such as cost advantages, higher service levels or quality that better fits the customers.

In the European seed industry, the profitability of the firms increasingly depend on the success by which firms already have entered non-European markets.

The maturing European market will not offer higher levels of profitability to firms focusing on that market only.

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