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**The Food Sector in Transition – Nordic Research
Proceedings of NJF-seminar No. 313, June 2000**

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Preface

This report presents the greater part of the scholarly contributions at the NJF-seminar No. 313, titled “The Food Sector in Transition – Nordic Research”. The seminar was held at June 14th–15th 2000 in Oslo. The following working group within NJF (Section IX, Agricultural Economics) was responsible for planning and organizing:

- Illka Laurila (Agricultural Economics Research Institute, Finland)
- Jerker Nilsson (Swedish University of Agricultural Sciences)
- Søren Büchmann Petersen (Danske Andelsselskaber)
- Øystein Strøm (Norwegian Agricultural Economics Research Institute).

The overall purpose of the seminar was to debate vital driving forces behind the current changes in the Nordic food sectors such as new regulatory regimes, new competitors, new consumer trends and the rise of dominating retail chains. What challenges do such changes pose for the Nordic food industries? The theoretical point of departure was the ongoing redirection of research focus within agricultural economics from the free competition paradigm towards game theory, principal-agent theory and transaction cost economics.

More specifically, the following issues were debated during the seminar:

- Strategic issues for the Nordic agricultural cooperatives, with a bent towards the significance of agency problems.
- Entrepreneurship and organizational change
- Brands, private labels and willingness to pay
- Vertical coordination
- Margins and consumer prices
- Regulation and deregulation
- Efficiency in agricultural sectors.

We gratefully acknowledge financial support from the Norwegian Research Council, through the research programme “New External Conditions for Norwegian Food Industry”. NILF (Norwegian Agricultural Economics Research Institute) has also contributed by financing the printing costs etc. The report is edited by senior researcher Svein Ole Borgen, NILF. A special thank to Berit Helen Grimsrud (NILF) who not only served as conference secretary, but also provided valuable editorial assistance with the final manuscript. Last, but not least, thanks to all the participants of the seminar who contributed generously to this report. Our hope is that the report adds some valuable insights to the multi-faceted debates on the ongoing transition of the Nordic food sector.

Oslo, January 2001

Leif Forsell
Director

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The Rationale of Traditional Co-operatives – the Case of Danish Crown

Jerker Nilsson¹ and Søren Büchmann Petersen²

The agricultural sector in Denmark has been and is successful. Considering that the marketing of agricultural products to an very high degree is conducted by farmer co-operatives, one may guess that this organisational type accounts for the success.

Agricultural co-operatives have, however, strong market positions also in other countries, though most often with less success than the Danes have. This observation may lead to hypothesis that the Danish success may be explained not only by the co-operative dominance but also by the way the co-operatives are organised – the Danish model. While the so-called *traditional co-operative model* is widespread in most countries, the Danes have developed a special form of this organisational model. This might be the key factor behind the success of Danish agriculture on the world markets.

The aim of this paper is to investigate this hypothesis through a theoretical analysis of the traditional co-operative model as applied in Denmark, thereby using Danish Crown as an illustration. Hence, the paper discusses *the economic logic behind the Danish model for agricultural co-operatives*.

The analyses comprise various neo-institutional theory. As the topic concerns co-operatives, the transaction cost theory is but natural, but also property rights theory and agency theory as well as some neo-classical economic theory are appropriate.

Danish Crown

The Danish pig meat industry

The meat industry in Denmark is highly concentrated. This is the result of numerous mergers during the course of the last few decades (Table 1). Today, there are only three major slaughterhouse firms left, all organised as marketing co-operatives.

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Table 1 The structure of the Danish meat industry 1970–1998

End of the year	1970	1980	1990	1997	1999
Co-operative slaughterhouses	50	18	5	4	3
IOF slaughterhouses	4	2	1	0	0
Number of firms in total	54	20	6	4	3
Number of plants, co-ops	56	34	25	22	22
Number of plants, IOFs	4	2	2	0	0
Number of plants, total	60	36	27	22	22

The present Danish Crown is the result of a merger that took place in 1998. The partners were the former Danish Crown and Vestjyske Slagterier. Thereby the number of Danish meat co-operatives was reduced from four to three. The remaining ones, Steff-Houlberg and Tican (Thisted-Fjerritslev) are considerably smaller (Table 2).

Table 2 Number of pigs slaughtered at the Danish co-operatives, 1997 – 1999

Slaughterhouse co-operative	1999		1998		1997		Change in % 1999:1997
	animals	%	animals	%	animals	%	
Danish Crown	15.817.241	78	10.146.492	50	9.525.773	50	+2.4
Vestjyske			6.216.021	30	5.918.336	31	
Steff-Houlberg	3.228.211	16	2.916.093	14	2.661.168	14	+21.3
TiCan	1.148.466	6	1.143.549	6	1.047.931	6	+9,1
Total	20.193.918	100	20.422.155	100	19.153.208	100	+5.4

The Danish Crown group

Danish Crown is the largest slaughterhouse group not only in Denmark but also in Europe with an annual slaughtering of about 16 million pigs and 360,000 cattle. The slaughtering of pigs is equivalent to almost 80 percent of the Danish pig slaughtering and 7.6 per cent of the pigs slaughtered in the European Union. The Danish Crown Groups' total turnover in 1999 was 36.5 billion DKK. The parent co-operative had a turnover of 18.4 billion DKK. The structure of Danish Crown is shown in Figure 1.

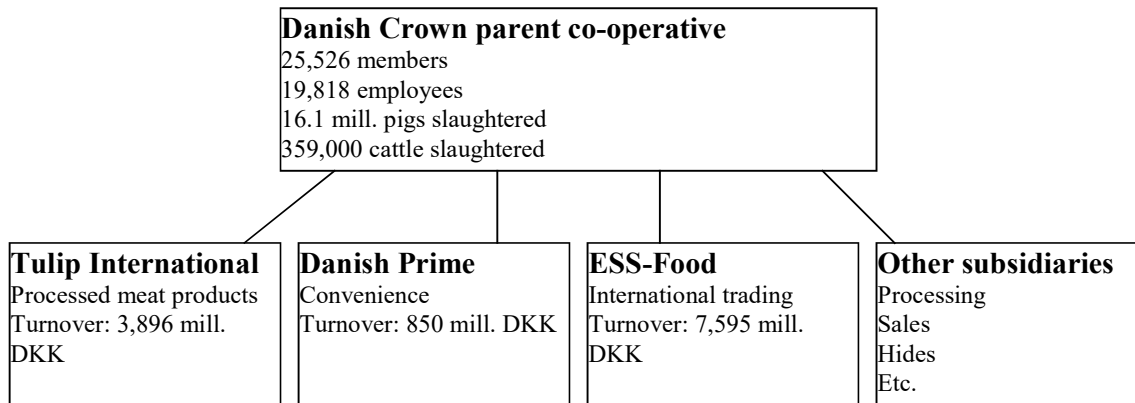


Figure 1 Danish Crown parent co-operative and examples of some of the subsidiaries. 1998/99 figures. Source: Danish Crown annual report

Danish Crown has wide-spread international activities. Sales companies have been established in the most important markets abroad and Danish Crown also has slaughtering and processing activities outside Denmark. The group's sales have a strong international orientation and about 80 per cent of pig production is exported.

In 1999, there were about 25,500 members which include pig, sow and cattle producers. Membership is personal and members are admitted if they are active producers of pigs, sows or cattle and commit to the bylaws of Danish Crown which for instance imply a 100 per cent delivery obligation. This figure will be modified to a 85 per cent obligation in 2002 as a condition for the European Union antitrust authorities' approval of the 1998 merger.

In addition to the slaughtering activities the group includes a number of subsidiaries with activities related to the parent co-operative. *Tulip International* is a processing company which produces bacon and canned meat products. Tulip International has production plants in Denmark and United Kingdom. *Danish Prime* produces convenience products and is oriented towards the domestic market and the Nordic region. *ESS-Food* is an international meat trading company which trades all kinds of meat also from other sources than Danish Crown itself.

Heterogeneous membership

In 1996, Danish Crown acquired the cattle slaughterhouse Dane Beef. By including cattle producers the membership became less homogeneous. The solution was to divide the membership into two strictly separated categories, each with more homogeneous interests.

Danish Crown differentiates its intake of pigs into a number of breeds. Traditionally, all pigs were of the multi-pig type with specific characteristics regarding slaughtering weight and meat contents. From 1997, the pigs are divided into a few different breeds. Each breed is treated separately, both in the production chain and organisationally. The introduction of differentiated raw material from members represents a major change with respect to members, structure of the co-operative firm and production control.

In most traditional co-operatives, raw material intake from members is homogeneous and products are sold under almost perfect competition. When differentiated markets are to be served, some of the products are sold in niche markets where price levels and quantities are closely related. Therefore, close control of the differentiated products is necessary to make sure that the markets are satisfied. Hence, only a fixed quantity of the differentiated product is produced and a limited number of members are allowed to produce this product.

When members' production differs and is sold under different market conditions the membership becomes less homogeneous with respect to member interests. Their interests as concerns price fixing, quantity control and quality requirements vary from one member group to the other.

In traditional co-operatives, geographical representation is the focal point of member governance and the structure of the governance system. When members' production is differentiated, the interests of the producer groups vary across production type and thus, informal interest groups with members from several geographical areas appear.

In the member governance system of traditional co-operatives, decisions are made by bodies (e.g. board of directors and board of representatives) representing all members. If members' interests are different because of differentiated production governance with geographical representation might imply less effective decision making. Some matters might be relevant only to groups of members while in other cases there may be disagreement among members due to difference in member interests.

The traditional marketing co-operatives' mission is to process and market members' production. Consequently, the co-operatives' role in controlling members' production is none or at least indirect. Nevertheless, this role is not sufficient to meet the control and traceability demands required for a co-operative with differentiated production.

The Federation of Danish Co-operatives introduced in 1999 the term *multiple string co-operative* to describe the structure of a co-operative with differentiated production (*Multiple String Co-operatives*, 1999). The multiple string co-operative model is a variant of the traditional co-operative model. Table 3 shows attributes of this model.

Table 3 Comparison of a traditional co-operative and a multiple string co-operative

	The traditional Danish co-operative model	The multiple string co-operative model
Raw material	* Standard	* Differentiated
Market for selling final product	* Perfect competition in the market	* Imperfect competition in the market
Members	* Homogeneous – one group	* Heterogeneous * Several producer groups
Member interests	* Similar	* Different (special interests)
Member governance	* Geographical representation	* Producer group representation
Rights and obligations	* Everyone has the same rights and obligations	* Varies, depends on the producer group
Decision makers among members	* All members (indirectly)	* Selected producer groups (in some matters)
Price system	* Uniform – a common system	* Several systems * Guaranteed prices
Organisation of the enterprise	* One string	* Divided into divisions according to product areas * Functions placed into subsidiaries
Control by the co-operative of members' raw materials	* None, or limited, indirect control	* Close, direct control * Quantity control * Geographical control * Restrictions in form of production * Tradable delivery rights * Conversion schemes

In 1997, Danish Crown presented a strategy for pigs according to which the members' production should be differentiated into several types. The traditional multi-pig was to be supplemented by production of a special UK pig for the British market, Euro-pigs especially for the German market and several special breeds for the domestic market. About half of the traditional multi-pig should turn into special breeds.

The differentiation strategy made members more different with regard to production, their affiliation to Danish Crown and the payment for their produce. In addition, Danish Crown also slaughters cattle, sheep and lamb so in total there are several producer categories in the co-operative. Hence, Danish Crown established a pig and a cattle division, each governed by a committee with pig and cattle producing members, respectively. These committees may be considered as an addition to the traditional governance system that is solely based on geographical representation.

Market conditions

As the markets for most differentiated pig meat are quantity sensitive, a successful market strategy demands strict quantity control on the farmer level. Hence, Danish Crown signs contracts with all farmers of special breeds allowing them to deliver a specified quantity. By these contracts both quantity and the geographical allocation of production is controlled by the co-operative. Pig producers' commitment to follow the requirements is monitored by the co-operative. The geographical control implies that only farmers in certain geographical areas may produce differentiated pigs, the rationale being that thereby it is possible to cut transportation and slaughtering costs.

The pricing of differentiated products is a problem as members have expectations about the conditions for price fixing. Co-operatives in some Danish agricultural industries base their prices on the conditions on the final market for the differentiated products, while the tradition in the pig industry is to set prices of differentiated products on additional costs at the farm level. Danish Crown pays a premium on top of the price for multi-pigs. In order to stimulate the conversion into differentiated pig production an extra bonus is paid which exceeds the extra costs on the farm level. Also, Danish Crown offers a guarantee for the premium price, covering several years.

The Danish co-operative model

The rationale of traditional co-operatives

Almost all Danish co-operatives are organised according to *the traditional co-operative model*. The characteristics of this model can be interpreted as means whereby the co-operative can increase the supplies from the members, whereby it can reap the largest possible economies of scale (Sexton, 1986; Nilsson, 1998) (Table 4).

It is generally recognised that in the collection of and the primary processing of agricultural commodities *economies of scale* are substantial. The larger the production, the lower are the costs per unit and then, provided that the revenues per unit are more or less independent of the sales volume of the individual co-operative, the larger are the profits. Hence, a traditionally organised co-operative is able to pay a higher price to the farmers than any other organisational type would, or otherwise offer better trade conditions. So, it is no wonder that agricultural co-operatives have become dominating at a larger number of raw product markets (van Bekkum and van Dijk, 1997).

Important is that the co-operative should operate on markets where its sales volumes do not influence the price. This is supported by empirical observations. The traditional type of agricultural co-operative has generally been successful on markets so huge that the co-operative's volume is only a small fraction, and on markets where government intervention secures a price level, independent of the co-operative's sales volume. A look at the major markets in most countries reveal that co-operative firms tend to dominate in selling unprocessed or slightly processed agricultural raw products while their market share falls further down-

stream the value chain. Traditional co-operatives are good at selling large quantities of commodities at low costs. Such co-operatives are a superior way of applying a *cost leadership strategy* (Porter, 1980).

Table 4 The traditional co-operative model's effects on economies of scale

Attributes of the traditional co-operative model	Effects on economies of scale
The ownership is in the form of <i>a co-operative society</i> – not a PLC or any other legal form – and <i>this society is open</i> , i.e., new members can easily join the society. Hence, there is <i>free entry</i> .	Societies with open memberships makes it easy to recruit new members as suppliers, thereby increasing the production volume.
<i>The enterprise is collectively owned</i> as it is owned by the society. There are often no individual ownership to the equity, or if there is, this is limited and under collective control.	The unallocated capital as well as the gratis allocated capital means that the co-operative increases the volume by raising the price paid to farmers.
The open membership as well as (frequently) the lack of ownership shares imply that there is <i>no trade of shares</i> , and hence, the members can <i>not realise changes in the value of the assets</i> .	The focus is at the product price paid, not at the farmers' investments, and product price is the most effective instrument to attract volume.
The members' governance of the firm is equal, irrespective of their volume of trade with the co-operative or their volume of shares, if any. <i>One member, one vote</i> applies. Hence, the <i>control is fully in the hands of the members</i> .	Equal voting power, like many other socially attractive elements, belong to a so-called co-operative ideology, which has the effect of convincing the largest possible number of farmers to become and remain as members.
The profits made by the co-operative is not reimbursed to the members as return on investment but as <i>patronage refund</i> , i.e., it is allocated in proportion to the members' deliveries to the co-operative.	The patronage refunds raise the farmers' compensation for the products delivered, and so they will probably deliver a larger quantity
The members enjoy full <i>delivery right</i> , i.e., the co-operative is obliged to buy everything the member may deliver.	The delivery right expresses the co-operative's willingness to receive as large a volume as possible.

One element in the traditional model is that individually owned (allocated) capital is small and that members do not receive remuneration for their investment in the co-operative society. Due to the members' small investments the gratis capital is an acceptable sacrifice. According to transaction cost theory the member investments in the co-operative have the purpose of safeguarding their large investments in their farm enterprises, and so, the amounts should be as small as possible – this is not meant to be risk capital but rather its opposite.

Co-operative firms are often accused of being inefficient due to vaguely defined property rights (Condon, 1990; Nilsson, 2000). This criticism is especially directed at traditional co-operatives. The root of the problems is that members are individualistic actors and will behave in ways that do not fit with the collectivist traits

of traditional co-operatives. The co-operative business sector is abundant with examples of these problems that cause economic hardships in many co-operatives:

- *The joint property or free-rider problem:* Free-riding behaviour is encouraged in collective organisations, i.e., self-interest seeking members reap benefits without contributing accordingly.
- *The horizon problem:* No member wants the co-operative to make investments with a longer pay-back period than his own remaining member period, and hence, co-operatives are normally under-invested.
- *The portfolio problem:* Given heterogeneity within the membership as regards risk preferences, a co-operative's investments will be inoptimal for most members.
- *The control or follow-up problem:* An individual member has very limited incentive to control the management, and also very limited capability.
- *The influence cost or decision-making problem:* When memberships are heterogeneous, the management has difficulties in judging which actions to take and how these affect different member categories.

These agency and property rights problems do, however, not apply to all co-operatives – it should be remembered that co-operatives have existed for more than a hundred years and lots of co-operatives run flourishing businesses. Rather, these problems are indicators of lacking member commitment. i.e., if the members do not consider the co-operative to be instrumental in ameliorating the market failures which they would face without any co-operative, the above-mentioned problems arise (Hakelius, 1996). For members to be committed in their role as users, the co-operative's investments must be limited, otherwise the problems above appear. So, the co-operatives' operations must be closely linked to the members' own operations (Nilsson, 2000).

The logic behind the Danish model – efficient production

It may be true that traditional co-operatives have their competitive advantage in low cost and low price strategy, but this does not say anything about the choice of market. The Danish agriculture has aimed for a *high quality market*, which is understandable from the country's European location. The aim is to be the best supplier of high quality products, earning money through running the operations in a larger scale than any competitor on this very market. By quality is meant not only the taste and texture of the products but also attributes like homogeneity and animal welfare.

The objective can not be reached only by reaping economies of scale in the processing plants. Another prerequisite is that the *farmer-members are able to produce at competitive costs* on their farms. This is attained by exposing the farmers to correct market signals on the international markets. The farmer who can not survive will have to cease operations unless he is not able to undertake adaptive measures. In order to facilitate such adaptations, a well-organised extension system exists in the country.

The way to expose members to the international market forces is to set *prices that are directly linked to the price fluctuations on the sales market*. A price change on the market

for carcasses on the international markets one week will automatically result in a corresponding price change when buying hogs from the farmers.

Another factor with the effect of exposing the members to international markets is the composition of the capital. *The amount of equity and the equity ratio is in general low*, whereby borrowed capital becomes correspondingly larger. The low amount of equity means the co-operative does not have even the possibility to manipulate the price paid to the farmer. A large equity that does not require payment of returns means that the prices get distorted. Furthermore, if the co-operative had a large fortune, the members could feel tempted to force the board to raise the price level above the correct market price. The probability for this to take place is low in Denmark, as Danish farmers have for more than a century been selling to international markets, and the co-operatives have throughout the years taught the farmers that they are businessmen.

The economic thinking is seen i.a. in the *distinction between the co-operative society and the co-operative enterprise*; the enterprise is there in order to make money for the members while the society's role is to own and control the firm. This principle is seen also in the relationship between the board and the CEO, viz., Danish boards do not interfere very much in the day-to-day running of the business. This is the CEO's job.

This type of market distortions may also follow if the co-operative is involved in processing of the members' raw products. If profits made in the processing activities are paid to the farmers in the form of a higher price for hogs, this price will not be the correct market price for the raw product. Danish slaughterhouse co-operatives have *little further processing*, relative to co-operatives in many other countries.

The fact that the farmers are fully exposed to the international markets lead to a *continuous process of structural rationalisation*. As the farmers for years face correct price signals from the international markets they have strong incentives to become as efficient as possible at their farms, otherwise they will not survive. Linked to this is that the Danish farming population is characterised by *a high degree of homogeneity* in respects that are of importance to their production. This homogeneity is a consequence of the many years of international market exposure.

Over the decades there has been intense *competition for raw produce* between the co-operatives, each processing firm wanting to be the largest one. This has led to many mergers. This process has now lead to almost-monopsony in the meat industry, so the degree of domestic competition for raw products is now limited. This competitive pressure is, though, still high, due to the competition on the international markets.

The domestic rivalry for supplies meant that the farmers were fairly prone to change co-operative if the prices of a competing co-operative was better than their existing one. The price was undoubtedly the ultimate criterion for the farmers' choice of co-operative, also because the meat co-operatives have had a national pricing system that facilitated price comparisons. The farmers' propensity to switch from one co-operative to another forced the co-operatives to be *extremely efficient*.

The business orientation of Danish co-operatives may seem surprising in light of the fact that the principle of equal voting is supported by Danish farmers, even the large ones. According to experience from other countries this governance principle may lead to inoptimal outcomes, e.g., that the majority of members forces the board to favour of smaller farmers. Equal voting power may foster political and social action within the co-operative. The Danish way of handling this issue is that democratic voting applies when appointing representatives to the regional bodies, while there is a weighting when the regional bodies vote for directors. Regions with a large volume of production have more votes than regions with smaller production. The consequence is that the Danish directors tend to be large, business oriented and well educated farmers.

One reason for the strong position of equal voting power is the fact that there is *no legislation on co-operatives* in Denmark. The co-operatives are eager to preserve this as it gives them freedom to adapt quickly to changes in the business environment. One way whereby the co-operatives can argue for no legislation is by belonging to the International Co-operative Alliance, adhering to the principles that the ICA has decided upon, i.a., the one of equal voting. Most Danish politicians consider the ICA principles to be as good a set of rules as a national legislation on co-operatives.

The logic behind the Danish model – effective governance

While the preceding section indicates the existence of good conditions for efficient production in the Danish agricultural co-operatives, another issue is whether members are able to control the co-operatives effectively. This question may be relevant because of the strong elements of collectivism in the financing and governance structures, which may be expected to give rise to property rights and agency problems.

Property rights problems are large in heterogeneous memberships. The preceding section stated that Danish memberships tend to be fairly homogeneous in respects of relevance to the co-operative business, being an effect of the long period of exposure to international market forces. Another factor is that the business is focused. Danish agricultural co-operatives are truly single-purpose co-operatives. For example, hogs and cattle operations are strictly separated, and there are hogs of a few breeds only.

The membership homogeneity is further enhanced by the pricing system, implying price differentiation based on demand. This has the effect of stream-lining the farmers' production, i.e., products that do not correspond well to the standards are badly paid and hence the farmers do not produce them.

Co-operatives with operations far ahead in the value chain often face *portfolio problems*, as not all members have an interest in all investments. The more heterogeneous the membership is in terms of risk preferences, the greater becomes the portfolio problem. In the Danish case, this problem is due to be small. The memberships' relative homogeneity as well as the limited degree of vertical integration mean that all investments are more or less in the interests of all members.

The small net fortunes of the co-operatives or the low equity ratios may seem to be drawbacks, but these factors are advantageous in relation to property rights

problems. As investments are limited and basically have the character of reinvestments, there is no *horizon problem*, i.e., all members pay for the benefits they enjoy. Likewise, no member is able to reap benefits on the expense of other members, i.e., the *free-rider problem* gets a solution. Concerning the *free-rider problem*, also the strict business relations between the members and the co-operative should be mentioned. The costs that a farmer induces are covered by himself due to price differentiation system.

The low degree of vertical integration has a beneficial effect on the *control problem* as well as the *decision-maker problem*. The operations are so simple and straightforward that the individual farmers can have a good understanding of them. The difficulties he faces are the international operations, such as export channels to overseas markets.

The *control problem* is solved by the fact that the farmers are extremely dependent upon the co-operative, and so in several respects. First, the co-operative is his only channel to the market, especially as the degree of industry concentration is extremely high. The farmer senses that without the co-operative, he would be in a poor position. Second, this dependence is the greater as the Danish farmers tend to be heavily indebted, having invested large amounts on their farms in order to be internationally competitive. Third, the liability that the farmers have for the co-operatives' debts adds to the farmers' dependence of the co-operative. Fourth, the strict delivery obligations makes it difficult for the farmer to find another buyer of his raw products.

The multiple string co-operative model

The multiple string co-operative model is a continuation of the Danish Model, the difference being that the co-operatives have become large and the market conditions are increasingly diversified. These factors have created heterogeneity in both the membership composition and the production and marketing operations, and so, there is a need to create higher degrees of homogeneity.

The characteristics of the multiple string co-operative model do not violate the characteristics of the traditional Danish model. The latter attributes are equally valid for the multiple string concept. Within each "string" (differentiated product category), the traditional Danish model is applied.

The production volume of multi-pigs is reduced when Danish Crown embarks on new breeds of pigs, and hence, some economies of scale may be lost. These losses are, however, possible to bear – first, the production of multi-pigs is still so large that the average costs are reasonably low, and this is especially so after the last merger, and second, the new breeds mean such improvements in adaptation to some specific market demands that the profitability is improved.

Conclusions

The success that Danish agriculture has on the world markets is related to the fact that the Danish agricultural co-operatives are organised according to a specific variant of the traditional co-operative model. There is theoretical support for this assertion and empirical observations are supportive. The Danish model implies large scale production in all stages of the value chain, combined with truly market-oriented operations through the entire chain. The farmers get exposed to the market forces that the co-operatives face when selling the produce to their buyers. The transaction costs in the dealings between the farmers and the co-operative are low.

As the markets become more diverse and turbulent, it is difficult to maintain the high degree of homogeneity as concerns products and production. The response is the development of a variant of the traditional co-operative model, labelled the multiple string model. The operations of the co-operative are divided into “strings”, each dealing with a specific type of product, be it different animals slaughtered or different breeds of pigs. Thereby better market adaptation is attained, while the co-operative and the farmers still operate at largest possible scale, thereby reducing the cost level.

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Influence Activities in Agricultural Cooperatives: The Impact of Heterogeneity

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Introduction

Organizational economics seeks to analyze the most efficient way to organize different types of economic activities. In the agricultural sector, a substantial part of both purchases of inputs and marketing of finished products are carried out by cooperatives, that is, organizations owned by the farmers who are buying/selling products. The cooperative represents a particular type of vertical integration, with a large number of principals and their elected, as well as hired, agents. The cooperative organizational form is important in many countries and has played a crucial role in promoting the interests of the farmers. The role of agricultural cooperatives in the EU is documented in van Bekkum and van Dijk (1997).

In a number of countries, the cooperatives are now adapting to a changing environment by implementing various organizational measures. Mergers may take place to exploit economies of scale further, but the traditional cooperative model is also being challenged by new types of cooperatives. In some cases the cooperative may end up as an ordinary investor owned firm, but different types of entrepreneurial cooperative models are also available (Nilsson, 1999). Transaction cost analysis has been used to explain the transformation of traditional cooperatives (Harte, 1997). Conventional transaction cost analysis is focusing on the factors that may cause market failure, and argue that in such cases a hierarchical type of governance structure may be more efficient. A vertical integration of transactions between adjacent stages in the value chain exemplifies this, and one way of achieving this is by establishing a cooperative.

The benefits of vertical integration and large companies in general have sometimes been overstated. Opportunistic behavior is not necessarily curtailed by bringing transactions under the roof of a single company. Also, when people have different interests and their welfare is affected by the decisions made by a central authority they will seek to influence the decisions made. These influence activities are not costless and deserve to be explored in more detail. This paper is an attempt to apply the general framework of influence activities and - costs originally associated with the work of Milgrom, and recently applied to cooperatives by Iliopoulos and Cook (1999). We are particularly concerned with the types of heterogeneity that

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may cause influence activities. In this context we rely upon data collected in a comprehensive survey among members of the Norwegian Meat Cooperative in 1997. The unit of analysis is the individual members, while previous work in this area has been at the organizational level.

Agricultural Cooperatives and Governance Problems

A broad definition of an agricultural cooperative has recently been proposed based upon three principles: “First, the user-owner principle. Persons who own and finance the co-operative are those using it. Second, the user-control principle. Those who use the cooperative have control of the cooperative. Third, the user-benefits principle. Benefits of the cooperative are distributed to its users on the basis of their use” (Barton, 1989 p.21). The traditional cooperative model has been around for more than a century and has a number of well-known characteristics: a) The major part of the equity is unallocated and the pay-off is distributed to the members/owners via the price level, often partly paid as a bonus based upon the volume of trade at the end of the year, b) Membership is open to everyone engaged in the type of business the cooperative operates in. The membership fee is nominal and this is the only pay-off the member/owner receives if he/she decides to withdraw from the cooperative, c) Each member/owner has one vote when decisions are being made at the basic level in the governance structure of the cooperative and when representatives are being elected for higher levels.

The traditional cooperative model was designed to take advantage of considerable economies of scale in collecting, processing and marketing basic agricultural commodities. As the farmers were small and numerous their individual power was negligible compared to the power of a limited number of buyers/processors, and the idea of joining forces in establishing marketing cooperatives (as well as other types of cooperatives) caught on in many countries. It has been argued by a number of scholars that the traditional cooperative model is appropriate if economies of scale are present and the price level to consumers are more or less fixed. In particular, attracting new members is in the interest of existing members if average costs are decreasing more than the price level. When the competitive environment is changing, the traditional cooperative model may not be adequate for developing the degree of market orientation needed in a more competitive situation where risk-taking and heavy investments in new product development are part of the game (Kyriakopoulos, 2000). As a consequence, a number of entrepreneurial cooperative models have evolved. They are better suited to cope with the challenges facing many cooperatives these days (Nilsson, 1999). Typically, the amount of unallocated equity is being reduced and the incentives to invest is being strengthened in these models.

The marketing cooperative is a type of vertical integration of operations at the farm- and processing levels, with multiple principal-agent relationships involved. It has been argued that conflicts over residual claims and decision control are inherent in the cooperative model. Cook (1995) maintains that five general problems deserve closer attention in this context: 1. The free rider problem, 2. The

horizon problem, 3. The portfolio problem, 4. The control problem and 5. The influence cost problem.

The free rider problem is well-known in a number of situations and refers to the possibility of obtaining a benefit without paying the associated costs. Open membership cooperatives have institutionalized a type of free-riding since “new members obtain the same patronage and residual rights as existing members and are entitled to the same payment per unit of patronage” (Cook, 1995 p.1156). The horizon problem arise since in traditional cooperatives the member-owners do not receive their share of the value generated by their investments if they withdraw from the cooperative. It means that the member-owners will tend to prefer current cash flow to investments. The portfolio problem arise since the investment decision is tied to the patronage decision in the traditional cooperative, and risk averse member-owners will exert influence on the management to carry a reduced risk portfolio even if it means lower expected returns. The control problem is the well known agency problem of preventing management and elected representatives from diverging from the interest of the rank-and-file members/owners. This problem is found in all types of organizations, but different organizational designs may be able to cope more or less efficiently with the problem.

The last type of problem identified by Cook (1995) is referred to as the “influence cost problem”. In all organizations different groups will want to influence the decisions made by the central authorities provided organizational decisions affect the distribution of benefits among the members. In the pursuit of selfish interests the different members or constituent groups will try to influence the decisions made, and these influence activities are not without costs. The members spend time and resources on attempts to influence the decisions of the organization and the organization itself may spend resources in responding to such influence attempts. If particular groups are successful in influencing the decisions made, the decisions may be inefficient and the organization should therefore take measures to restrict excessive influence attempts.

Milgrom and Roberts (1988, 1990) argue that bargaining- and influence costs are important when it comes to designing efficient organizations. Transaction costs analysis - as discussed at length by Williamson (1986, 1996) - primarily focuses on situations when the costs of using the market are likely to be high (caused by factors such as asset specificity, uncertainty and frequency of transactions), and suggests that transactions in such cases should be carried out inside the same company (e.g. vertical integration) or by using a hybrid solution (e.g. franchising). In standard transaction cost analysis less attention is given to the costs associated with carrying out transactions within a hierarchical structure such as a company. Unfortunately, integrating activities into the same legal entity is not a costless way to control opportunism and the pursuit of selfish interests. Influence costs may be considerable when transactions are carried out within the same company. The existence of such costs helps to explain why not all productive activity is carried out within a single organization, while conventional transaction cost analysis has focused mainly on market failure. A traditional agricultural marketing cooperative represents a type of vertical integration with a considerable number of individual

members/owners, each having individual interests. Also in such organizations *“efficient organization design seeks to...channel the self-interested behavior of individuals away from purely redistributive activities and into well-coordinated, socially productive ones.”* (Milgrom, 1988 p.58).

Influence Activities, Influence Costs and Heterogeneity

Influence costs are likely to arise when a) a set of decisions must be made that has a direct impact on the distribution of benefits and costs in the firm, and b) the affected parties have open channels of communication with the decision-makers. Influence activities will aim at influencing the decisions taken. Research on influence activities and influence costs in investor owned firms (IOFs) has focused on how groups of employees spend time and resources in order to position themselves. In such firms, the owners are likely to agree that the objective of the company is to maximize profits and the distribution of the profit is according to the number of shares. In a cooperative, the objective of the company is generally more complex.

Iliopoulos and Cook (1999) argue that agricultural cooperatives are likely to incur higher influence activities and costs than IOFs for several reasons. The unallocated capital means that the members/owners cannot demand interest on their “share” of the capital. Furthermore, cooperative decisionmakers are not exposed to market control as the residual claims are not tradable in any secondary market. Also, the members/owners of the cooperative usually have direct access to the firms’s decision-makers, which allow them to influence the decision-making process. As the objective of the cooperative is complex and often vaguely defined, every resource allocation decision becomes a potential source of influence costs. Typical examples are decisions regarding the location of processing plants and the allocation of transportation- and handling costs.

Influence costs in agricultural cooperatives have been categorized into five types by Iliopoulos and Cook (1999):

- 1) opportunity costs of cooperative stakeholders’ time,
- 2) costs of monitoring and enforcing decisions that create quasi-rents,
- 3) coordination and measurement costs associated with delayed decisions,
- 4) costs of wrong or no decisions, and
- 5) costs associated with policies designed and implemented to avoid influence costs

Influence costs – as well as some of the other problem areas identified by Cook (1995) – is closely related to the heterogeneity of the members/owners. If the constituent groups of an organization all have the same goal, the same resources, and perceive the environment in the same way, there is limited need to attempt to influence the decisions made by the central authority. Everybody would then strive to achieve the same goal and the distribution of the surplus among the owner-members would be straightforward. Most agricultural cooperatives have restricted their areas of business to a particular type of product. The main reason for this is to

secure a high degree of homogeneity among the members. Still, the members differ in attributes such as farm size (volume of trade), age and education (perception and attitudes). Hakelius (1999) has demonstrated that the age of farmers is an important determinant of values and opinions in a cooperative context in Sweden. Gray and Kraenzle (1998) have shown that – in addition to a number of other factors – a) gross farm sales and b) the percentage of gross farm sales from the sale of milk, both were positively related to the attendance at meetings for members of a dairy cooperative in the United States.

Iliopoulos and Cook (1999) suggest that the degree of membership heterogeneity should be measured by the following seven variables: 1) geographic dispersion of membership, 2) the number of different commodities/inputs produced/purchased by the members, 3) variance in member's age, 4) variance in members' educational levels, 5) differences between members in terms of farm size, 6) increased percentage of non-farm income for some members, and 7) differences between members in terms of business objectives. The empirical results of their study indicated that variance in the size of members' farms was the most crucial dimension of heterogeneity. The data base was questionnaires sent to key informants in US agricultural cooperatives, and the cooperative organization was the unit of analysis.

Given that members have conflicting interests, the member meetings will be an arena for promoting views, forging alliances and engaging in politics in general. At these meetings decisions are being made and representatives are elected for higher levels. A significant part of the activities the members are engaged in between and during member meetings, may be regarded as influence activities with associated influence costs. We will focus on the individual member as the unit of analysis and explore how difficult or easy they consider it to be to get support for their own viewpoints at member meetings. In particular, we are interested in exploring the relationship between different background variables and the perceived success in influencing at the member meetings. The seven variables listed by Iliopoulos and Cook (1999) as relevant in assessing membership heterogeneity, are all potential background variables creating conflicts of interest. The point is that if heterogeneity in a particular variable has an impact on influence activities and associated costs at the organizational level, this variable should be related to influence activities at the individual level.

The Empirical Setting and the Data Base

In Norway, the agricultural cooperatives play an important role both in shaping and carrying out the agricultural policy. Three large marketing cooperatives, in the dairy, meat, and eggs and poultry sectors respectively, have taken on the task of regulating the market prices for their product groups over the year to achieve the average annual “target price” for the various products. These “target prices” are agreed upon in annual negotiations between the farmer organizations and the government, often referred to as the “basic agreement on agriculture”. The farmers have benefited from a high degree of protection from imports and considerable financial

support from the government. During the last years, the farmers have experienced an increased financial pressure as consumers and different interest groups demand a reduction in the price level of most agricultural products and the government has recognized the need for reforms.

The marketing cooperatives dominating the most important sectors are all organized according to the traditional cooperative model, and until recently the federate model linked organizations at different levels. At the primary level, regional cooperatives have been the rule even if the number of regional units over the years have been reduced as a result of mergers between smaller geographical units. At the secondary level, the regional units have had a national headquarter to coordinate activities and policies. As a result of the struggle to reduce costs in collection, processing and marketing, the cooperatives have explored some organizational changes. In particular, the efficiency of the federate model is being questioned. According to van Bekkum and van Dijk (1997), there is a trend in the EU away from the federate organizational model among cooperatives. The authors maintain that *“the weaknesses of the federate co-operative organisational form are connected with the longer distance between the members and their business activities. Member control often becomes problematic as signals have to pass through several tiers, i.e., between local, regional and national units. As these signals are often only indirect, they can easily become distorted.”* (p.167).

The cooperative responsible for the processing and marketing of all types of meat except poultry – Norsk Kjøttvirke (The Norwegian Meat Cooperative) – has recently been reorganized. Starting 1st of January 2000 each of the nearly 40 000 members is a direct owner of a single countrywide organization, and the regional units have been turned into wholly owned daughter companies of the national cooperative. The ambition is to reduce costs by a considerable amount, but the cooperative is still based upon a traditional cooperative model. In the two other main marketing cooperatives (Tine – the dairy cooperative and Prior- eggs and poultry), organizational changes are still being debated. So far, there is no indication that an entrepreneurial cooperative model will be chosen, and the most likely development is that they will follow Norsk Kjøtt in merging regional units while the basic characteristics of the traditional cooperative will be preserved.

When independent regional cooperatives are being merged into a single national cooperative, the new national unit will not only be larger but probably also less homogenous. The key question in this respect is what the relevant variables are when we assess the degree of homogeneity. Obviously, the new unit will be less homogenous when it comes to geographical dispersion. As far as farm size, type of production and age of farmer etc. is concerned, heterogeneity is also likely to increase when the regional units are merged. This is an empirical question, depending on the structure of members in the various regional units.

The data base utilized in this study is a large-scale survey among the member-owners of The Norwegian Meat Cooperative in 1997. At that time there were 9 regional cooperatives, and the federate structure meant that the regional units had a coordinating unit at the national level. 5900 members were randomly selected for the survey. In addition, all board members were included. A questionnaire was mailed to the sample, and within one week they were contacted by students

recruited in order to collect the answers by telephone calls. The survey was undertaken by the Agricultural University of Norway and resulted in 3719 respondents, that is, the response rate reached 63 percent (27% refused to participate, 3% were not able to participate or did not respond after 6 call-backs. The remaining 7% consisted of wrong telephone numbers or other registration mistakes). The response rate was exceptionally high, and it was no doubt due to the fact that the survey was endorsed and financed by the Norwegian Meat Cooperative itself. The cooperative has kindly given us permission to utilize the data base.

The questionnaire used in the survey contains a large number of items designed to map different issues. Background variables used in this study were measured by the following questions:

1. Age: How old are you? (number of years)
2. Regional cooperative: Which regional cooperative do you deliver your animals to? (9 alternatives possible)
3. How important is the meat production for the family's total financial situation? (very important, some importance, minor importance)
4. Approximately, how much money did you receive for the animals delivered in 1996? (under 30 000 NOK, 30-100 000 NOK, 100 000 – 300 000 NOK, more than 300 000 NOK)
5. Which production of meat is the most important for the financial situation of the farm? (sheep, cattle combined with milk, cattle, hog, others; It was possible to mark 2 or more alternatives if they were equally important).

Limitations in the empirical study used means that it is only possible to test for some of the background variables suggested by Iliopolos and Cook (1999); namely age, farm-size, non-farm income and type of production. Relationships have been tested for all of the 9 regional units.

Empirical results

The basic hypothesis is that differences in some background variables imply conflicts-of interest between the members. This will stimulate influence activities, which again will lead to “losers” and “winners”. The dependent variable is measured by the response to the following statement:

“My experience is that it is difficult to make myself heard at member meetings”.

The respondents were asked to what extent they disagreed or agreed to this statement on a 7 point scale ranging from strongly disagree (1) to strongly agree (7). A low score on this variable means that the respondent does not think it is difficult to exert some influence. Using a single-item variable has weaknesses from a reliability and validity point of view, but when secondary data are used compromises usually have to be made. We will now present bivariate results for each of the background variables and the “dependent” variable:

Age

The relationship between the age of the respondents and the dependent variable was tested by simple regression. It turned out that there was no significant relationship neither in any of the 9 regional units nor in the total data base. In other words, differences in age do not translate into influence activities or conflicts that create perceived “winners” and “losers”.

Economic factors

There are two variables mapping economic aspects, both measured at the ordinal level. The first variable concerns the importance of meat production for the income of the family running the farm, while the second variable measures the sales from the farm to the cooperative. We have calculated Spearman rank correlations for each of the two economic factors and the “dependent” variable. In Table 1 the results are reported for each of the 9 regional units and for the organization as a whole.

Table 1 Spearman rank correlations between economic factors and perceived success in making oneself heard at member meetings (two-tailed significance levels in parantheses)

Region	Sample	Importance of meat production for the income of the family	Value of sales to the cooperative
1	423	-.115 (0.018)	-.164 (0.001)
2	318	-.301 (0.000)	-.364 (0.000)
3	471	-.061 (0.187)	-.142 (0.002)
4	421	-.193 (0.000)	-.201 (0.000)
5	542	-.159 (0.000)	-.285 (0.000)
6	288	-.289 (0.000)	-.283 (0.000)
7	449	-.094 (0.047)	-.267 (0.000)
8	266	-.177 (0.004)	-.261 (0.000)
9	519	-.147 (0.001)	-.255 (0.000)
Total	3697	-.165 (0.000)	-.252 (0.000)

As can be seen from Table 1, in general both of the economic variables are related to the perceived success in making oneself heard at the member meetings. The only exception is found in regional cooperative 3, where the correlation between the importance of meat production for the family’s economy and the success in making oneself heard at member meetings is not significant. In most cases, the correlation coefficient for the value of sales to the cooperative is the highest one, but it turns out that the two economic variables are actually quite interrelated.

Main type of production

As previously pointed out, most cooperatives tend to restrict the range of products handled to reduce heterogeneity – or rather to reduce the potential sources of conflicts. The Norwegian Meat Cooperative handles different types of meat, and farmers specializing in a particular production may resort to influence activities with different degrees of success. To explore if the perceived degree of success in making oneself heard is related to the type of production, multiple regression analysis with dummy variables were applied. Members with “cattle combined with milk” as the main type of production were used as the baseline. Table 2 reports the results of dummy regressions for each of the 9 regional units and the total data base. To simplify, only significant coefficients are reported, and the t-values are given in parentheses. The sample size for each region is the same as reported in Table 1.

Table 2 Significant regression coefficients with the different types of production introduced as dummies

Region	Constant	Sheep	Cattle	Hog	Other		Adj.R ²
1	4.517 (23.17)	.769 (3.11)		n.s.	n.s.	n.s.	.027
2	5.068 (18.29)		n.s.	n.s.	-1.34 (-2.48)	n.s.	.021
3	4.789 (33.66)	.816 (3.00)		n.s.	n.s.	n.s.	.015
4	4.348 (21.27)	1.381 (3.97)		n.s.	n.s.	n.s.	.034
5	4.733 (31.482)	.683 (3.10)		n.s.	-.723 (-2.12)	2.320 (2.33)	.032
6	4.875 (26.14)	1.083 (3.24)		n.s.	n.s.	n.s.	.031
7	4.736 (25.38)	.903 (3.58)		n.s.	n.s.	n.s.	.022
8	4.187 (16.93)	1.904 (5.72)		n.s.	n.s.	n.s.	.122
9	5.060 (28.44)	.842 (3.76)		n.s.	n.s.	n.s.	.029
Total	4.734 (76.36)	.873 (9.96)		n.s.	-.453 (-3.63)	n.s.	.035

The results indicate quite convincingly that the farmers specializing in sheep production tend to conclude that it is difficult to make themselves heard at member meetings. A reasonable way to interpret this is that their influence activities are not successful. On the other hand, the hog farmers seem to perceive that they are successful in promoting their views even if the picture is more blurred in this case.

Summary and discussion

The impact of heterogeneity in agricultural cooperatives has been discussed by a number of authors. One approach is focusing on the costs that will arise when different factions of the members will attempt to influence the decisions made to further their own interests (Illiopoulos and Cook, 1999). A related stream of literature is analyzing the impact of voting rules for the efficiency of the investment decisions taken (Albæk and Schultz, 1997). The present study has explored to what extent differences in various background variables have an impact on the perceived ability to influence the other members at member meetings. Differences in background variables create heterogeneity at the organizational level, and Illiopoulos and Cook (1999) suggest that seven variables are relevant in this context. The data base available only allowed us to test the effect of four variables at the individual level. The data base consisted of survey data from 9 regional cooperatives, all constituting a part of the Norwegian Meat Cooperative when the data were collected in 1997.

The results indicate that it is basically economic factors that are related to the perceived influence of the members. Age differences are not correlated with the success in influence attempts as measured in this study. Differences in the age of the farmers may be important when it comes to values and attitudes towards the cooperative movement, but the ability to influence is only correlated with economic factors: The larger the share of the family's income generated by meat production and the larger the sales to the cooperative, the more influential the individual member perceives herself/himself. Also, the type of production the member is involved in may be important. In this study, sheep farmers as a general rule considered themselves to lack influence while hog producers tended to be influential in their own eyes.

The empirical data used in the study are not ideal for measuring the constructs involved. In particular, the dependent variable is a weak operationalization of influence activities. The variable used rather measures the *outcome* of influence activities and not the *activities* themselves. The outcome may be the result of different efforts to influence by individual members and/or different willingness to listen to particular groups of members. Members which are major suppliers to the cooperative may be considered to be more important to accommodate by other members as well as by the administration. The lack of influence felt by sheep producers may be a reflection of their general economic situation (e.g. low prices achieved in the market at that time), and not the amount of influence activities performed by these members. The strong point of the data base is that it allows us to test relationships in 9 regional cooperatives. When the same results are found, the reliability of the findings is supported even if multi-item measures certainly would have been better.

The merger recently undertaken in the Norwegian Meat Cooperative will result in increased heterogeneity in the single organization now replacing the 9 organizations analyzed in this paper. The increase in heterogeneity will vary from one background variable to another. To what extent influence activities and the related influence costs also will increase, probably depend upon the organizational struc-

ture and to what extent different views are allowed to be represented at the various levels. An important attribute of the cooperative is that those who use the cooperative have control of the cooperative (Barton, 1989). Still, when the users are not homogenous the way the control is exercised, and by whom, deserve closer attention.

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Agency Theory as a Framework for Explaining Member Strategies: The Case of Norwegian Agricultural Cooperatives

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Abstract

The article evaluates the usefulness and shortcomings of agency theory as a framework for discussing the future of Norwegian agricultural cooperatives. The first major argument in the paper is that agency theory ignores the significance of the traditional collective thinking in Norwegian agricultural cooperatives. In this respect, agency theory is incomplete and its explanatory power is low. The second point is that, nevertheless, the value of applying agency theory as a conceptual tool may increase in the close future, due to the emerging of novel industrial strategies and new cooperative forms. Some of the crucial agency-problems may come to the forefront, and increasingly imprint the agenda of Norwegian agricultural cooperatives.

Introduction

The purpose of this paper is to evaluate the usefulness and shortcomings of agency theory as a framework for analysing the future of Norwegian agricultural cooperatives. Focus is set on the conditions under which the agency problems are likely to be accentuated in cooperative organizations. The first major argument is that agency theory ignores the significance of the traditional collective thinking in Norwegian agricultural cooperatives. In this respect, agency theory seems to be incomplete and its explanatory power is low. Nevertheless, the second point to be advanced in this paper is that the value of applying agency theory as a conceptual tool is likely to rise in the close future, due to the emerging of novel industrial strategies and new cooperative forms. Thereby, some of the agency-problems may come to the forefront, and successively imprint the agenda of Norwegian agricultural cooperatives.

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Agency theory – and its critique of the cooperative form

Doubtless, agency theory contributes to a more advanced discussion of the relation between the members (the many small principals) and their cooperative (the agent). However, agency theory tends to be critical with respect to the efficiency of the cooperative form, and this critique is multifaceted. From the agency perspective, the fact that the equity capital is collectively owned (unallocated), inhibits both the efficiency of the cooperative and the fairness in the treatment of members. The individual member has no direct or personal control over his respective part of the unallocated capital. The capital is in everybody's hands, but not in anyone's hands. Therefore, agency theory assumes that the rational member will question why (s)he should engage in issues (s)he can not impact. It would normally be more rational for the individual member to engage in matters and organizations that they can more easily influence. Not surprisingly, cooperative members are expected to become apathetic (Nilsson, 2000). According to the agency perspective, the horizon problem emerges in cooperative organizations for two causes: First, members are expected to be predominantly occupied with shortsighted perspectives on their cooperative membership. They tend to think and behave myopically. Here-and-now actions dominate a strategic, long-term perspective. Second, residual rights are not tradeable. The individual members' rights to a fair proportion of the cooperative residual is not tradeable. Agency theory argues that a system with tradable owner shares will overcome the horizon problem. The portfolio problem is related to the horizon-problem, but set focus on the members' variety of risk/reward-profiles rather than the diversity of time horizons. As long as cooperative members have different time horizons, there will exist different viewpoints with respect to the risk/reward-profile of the cooperative. Following agency theory, all investors should have an investment portfolio that reflects the members' preferred trade-off between risk and reward. Agency theory is critical to the cooperative form since efficient allocations of this type is unattainable in cooperative organizations. The cooperative organization lacks a trading system that allows the members to end up with an investment portfolio which corresponds to their preferred risk/reward-profile. The follow-up problem and the decision-making problem stem from the fact that in a situation where members are increasingly diverse and specialized, they may gradually lose their interests in overall, strategic issues in the cooperative. Diversity and fragmentation may inhibit active participation. If certain groups of members experience that the cooperative works insufficiently hard to promote their specific interests compared to the interests of other member groups, their engagement and commitment to the cooperative is likely to decrease.

When is this critique relevant? As argued by Nilsson (2000), the agency-problems can appear as more or less problematic, depending on several conditions. First, one factor that can impact the extent and strength of the agency problems, is the degree of homogeneity within the body of members. If members are literally equal and have precisely the same business interests, the agency problems listed above (unallocated equity, horizon, portfolio etc.) are not very likely to unfold.

Further, the smaller the joined assets, the more negligible are the agency problems (Nilsson, op.cit). Relatively small amounts of money should imply less controversy than larger amounts. In other words, whether or not unallocated equity represents a strategic and political issue in the cooperative, may relate to the absolute size of the financial contributions of the members. The less the financial contribution from members, the more negligible are the agency problems in cooperative organizations. For the established members it can be economically rational to allow new members to join without paying a fee. Given that operations reduce members' transaction costs and that members have low internal transaction costs, the agency problems are less likely to severely challenge the coherence of the cooperative. If the membership is homogenous and if the co-operative firm focuses on operations which significantly reduce members' transaction costs, the investments of the cooperative are made to profit all members. Their joint benefit is that transaction costs are reduced through the membership. Ideally, all members benefit from all operations in the firm, and therefore also from all investments. Given these conditions, the critique from agency theory (the collective capital is inflexible and that owner-shares are not transferable) is less relevant. Hence, the third condition is that if the co-operative firm operates solely with those activities that lead to reduced transaction costs for members, agency problems are more likely to be negligible. The closer the cooperative activities are to the operations of the members, the more negligible are the agency problems.

Further, agency theory holds that the collective characteristics of the capital may hinder the capability of individual members to receive clear signals regarding the returns of the cooperative firm. According to agency theory, capital should be as mobile as possible in order to maximize efficiency. The collective capital in a cooperative, however, is per definition linked to the specific missions and objectives of the cooperative. Investments are highly asset specific and immobile, and intimately linked to the cooperative's role as purchaser of the products of the members. In this respect, unallocated capital also has advantages from the perspective of the members. A certain degree of collective property induces a lag that protects the transaction-specific investments of the members. Thereby, the risk that the cooperative firm will suddenly vanish is diminished. Even from the agency perspective, it is too simple to claim that unallocated capital necessarily represents a problem (Nilsson,op.cit). Finally, the more the members are committed to the values and strategies of their cooperative, the less likely it is that the agency problems will unfold. As already indicated, this type of commitment will probably increase the more homogenous the members are. The fourth condition is that the more involved, engaged and committed the members are, the more negligible are the agency problems.

To sum up, agency problems are likely to be negligible under the following conditions:

- The members are relatively homogenous.
- The financial contributions from members to their cooperative are relatively small.

- The activities of the cooperative are close to the operations of the members, so that the activities contribute substantially to solve the transaction cost problem of the members.
- The members are involved, engaged and committed to the collective thinking and strategies of their cooperative.

Now, the task at hand is to explore the relevance of the agency problems in Norwegian agricultural cooperatives, based on the conditions listed above. Norwegian agricultural cooperatives are discussed through a brief review of the development at three intimately linked levels of analysis: the environment, the organization-structure and the body of members.

The usefulness and weaknesses of applying agency theory to the Norwegian agricultural cooperatives

What is the usefulness and weaknesses of applying agency theory to the Norwegian agricultural cooperatives? How does agency theory contribute to develop propositions about the future of these cooperatives? If the agency theory is right in its critique, the Norwegian agricultural cooperatives are plagued by severe problems that may not be solved unless the cooperatives are transformed into public companies. However, we have argued that the agency problems will only unfold under certain conditions, which have been briefly specified above. The relevance of the agency perspective for Norwegian agricultural cooperatives shall now be discussed. The approach is to explore to what extent the abovementioned conditions are fulfilled in the case of Norway. Other potential reasons why the agency problems are (not) significant is also addressed. The discussion is at three independent levels of analysis; institutional environment (particularly emphasising the cultural heritage and political-institutional arrangements), the organization structure, and members' values and strategies. I shall make a distinction between two historical epochs; the period from approx. 1950 through 1990, and the period after 1990.

Environmental changes

A natural point of departure here is the cultural heritage and the corporatist nature of Norwegian agricultural cooperatives. These cooperatives have for a long time been permeated and characterised by collective and anti-authoritative thinking. Hallenstvedt (1996) presents the rich diversity of cooperative and popular organizations which grew up in Norway from the early 18th century. The voluntary organizations were in different sectors (farming, labour relations, Christian life, teetotalism), but shared an anti-authoritative and collective thinking. The glue of the early cooperative movement was the obvious advantages of joint action for small scale-members in order to cope with poor treatment from the political authorities, purchasers and middlemen. Within the group of founding members, neither the portfolio-problem, the horizon-problem, the decision-problem or other agency problems challenged the coherence of the cooperative. The members were

homogenous, their financial contributions were modest, the activities of the cooperative were close to the operations of the members, and the members were involved, engaged and committed to the collective thinking and strategies of the cooperative. This cultural heritage contrasts to the premises for the critique which is addressed towards the cooperative form from the agency theory. These remarks refer to specific conditions in the very start of the cooperative movement in Norway. Some decades later – around the 1930's – the political-institutional framework of Norwegian agriculture contributed significantly to maintain the egalitarian character of the Norwegian agricultural cooperatives. The corporatist governance model was well developed in Norway, and was at its peak around the mid-1980's. For decades, the Norwegian agricultural cooperatives operated within the boundaries of a strictly regulated market and an advanced regulatory regime. The political and economic protection was the result of an intimate interplay between the political authorities and the cooperative organizations (Røkholt and Borgen, 1998). To sum up, the agricultural cooperative movement in Norway has benefited from a collectively oriented cultural heritage. From the very beginning, the cooperative form has been in harmony with mainstream thinking among small-scale farmers, and also fitted well into the overall socio-economic structure of Norwegian agriculture.

Changes in the cooperative organization structure

For decades, the corporatist governance structure of Norwegian agriculture has substantially influenced the activities and structure of the cooperatives. A complex interplay has emerged between the significant actors in the domestic environment (political authorities, the farmers unions) and the cooperatives. The agricultural cooperatives were given the mandate to implement the national agricultural policy.

The organization structure of Norwegian cooperatives is now in a process of rapid transition. The agency problems were largely negligible until the 1990's, but may become more influential under the current conditions. The different organizational characteristics is close to the images of cooperative organizations suggested by van Bekkum et.al. (1997), namely countervailing power cooperative and entrepreneurial cooperative. Following van Bekkum (op.cit). there are two major conditions under which the countervailing power cooperative is viable. The first condition is that there exist economies of scale, so that the average cost curve is continuously declining as the volume increases. The second condition is that the sales price of the cooperative is independent of the production volume, for instance because the government guarantees the prices. This means that it is in the interest of all members that the volume is always as large as possible. Hence, countervailing power cooperatives have a volume maximisation goal, they are production oriented. The co-operative works very close to the members' own businesses, and can therefore be easily controlled by the members.

However, the countervailing power cooperative is likely to be supplemented by what van Bekkum (op.cit) denotes "the entrepreneurial cooperative". This type of cooperative is characterised by forward integration, the assumption of market risks and increased value-added component in the products. By processing the products

several steps further, they can differentiate their production from their competitors, gain consumer loyalty, etc. all with the aim of raising the price and profitability levels. A further argument from van Bekkum et.al. (op.cit) is that cooperatives which are engaged in value-added activities but are still organised according to the countervailing power co-operative model, are likely to be faced with the agency problems.

To what extent does Norwegian cooperatives develop from “countervailing power”-models towards entrepreneur-oriented models? The picture is complex, but some general trends may be identified (Røkholt and Borgen, 1998). Within fruit and vegetables, a sector in which the cooperative organizations traditionally have had a limited market share (approx. 25%), the former Gartnerhallen was liquidated in 1997, due to low productivity, low member engagement and unsatisfactory economic results. Gartnerhallen was exposed to the weaknesses of the traditional co-operative form, without being able to utilise its potential benefits (Røkholt, 1999).

There are now indications that a “new generation cooperative” is in the making in this sector, very much in line with the general characteristics presented above. The new organization (“Nye Gartnerhallen”) is directly integrated with a retailer chain through a long-term, exclusive contract. Membership in the new cooperative is closed, and only the most productive members are regarded as eligible members. The membership contract in the new cooperative is demanding with respect to delivery precision, quality level etc. The two most influential producer cooperatives in Norway – the meat producers cooperatives and the dairy cooperatives – are also in a period of rapid transition. Either cooperatives are organised as two-layer, federate structures, with regional organizations as the basic production and distribution units. So far, the meat producers cooperative seem to run the most effective restructuring programme. A new governance structure has now (Fall 1999) been agreed to. The most significant change is that the authority to make investment decisions is placed at the apex of the cooperative. The rationale for this change is that the cooperative must enhance its capability to move financial resources according to new industrial strategies, fast and more powerful than before. More advanced strategies for market development and specialisation of production are prepared. Substantial financial amounts are used to further develop the brand image of the cooperative, in a severe competition with the private label strategy which is pursued by the retailer chains. The cooperative is preparing for a situation in which specialisation and the capability to pursue an aggressive investment strategy is a crucial competitive weapon. To accomplish this, less efforts are undertaken to level out inequalities among members, so that equal treatment is redefined from an egalitarian version to a version more emphasising equal chances. This opens up for more differentiated treatment of members, depending on their relative importance for the strength and survival of the cooperative. It should be mentioned, however, that active members, and broad participation from members in the restructuring process is considered a resource in the transition process.

There are also some embryos of genuine novel cooperative organizations in Norway, organized around regions, niches or production technology (e.g. ecological production types). It is too early to declare them as “entrepreneurial cooperatives”,

but they are more likely to develop in that direction than to become similar to the countervailing power type of cooperative.

Changing member values

The abovementioned pattern can also be traced as changes in membership strategies, values and mentality. The more alike the members, the less likely it is that the agency problems unfold. What today characterises the body of members of most cooperatives, however, is increasing diversity and intergenerational value differences (Hakelius, 1996). The new generation of farmers differ from their parental generation in many respects. They are likely to be more influenced by modern trends within technology, consumer patterns etc.. In future, members will probably identify more with their specific type of production and selected colleagues in the same niche, than with the cooperative as such. Moreover, the investor-role may gradually be more focused, as a supplement to the role as user. This too may contribute to make the membership body more heterogeneous and fragmented. The expansive farmers may insist on a more aggressive investment strategy than the rest. Once again, the essential point to be drawn is that the agency problems have been negligible, but is likely to increase in the close future.

Conclusion

We have critically explored the relevance of the agency-problems in the Norwegian agricultural producer cooperatives: To what extent does agency theory illuminate critical and strategic issues of Norwegian agricultural cooperatives? Our major conclusion is that traditionally, the agency problems have been negligible in Norwegian agricultural cooperatives, but the problems may become more challenging and pressing in the close future. Indirectly, we have paid attention to several weaknesses of agency theory as a framework for understanding cooperative organizations. An institutional theory should offer an appreciation of the way in which specific historical structures shape economic behaviour (Robins, 1987). Agency theory seems not to be equipped to stand up to this expectation, for multiple causes. First, agency theory underestimates the significance of collective thinking and collective strategies in producer cooperatives. The historical roots and cultural heritage of Norwegian producer cooperatives make their collective thinking very strong. Second, the human model inherent in agency theory is an image of hyper-calculative individuals, who are abstracted and isolated from their contexts. Agency theory assumes that principals and agents live in abstract environment, but neglect the processes by which specific environmental patterns also live in the minds of the actors. The relational aspects between members are treated in a cursory manner. No interest is devoted to solidaric behaviour, not to speak of altruistic thinking and strategies. Our attempt here to apply the agency theory to explore Norwegian cooperatives, is built on the premise that under certain conditions, the agency problems may become highly problematic in cooperative organizations, and deeply affect their operations and structure. As said earlier, our overall conclusion is that agency theory has low explanatory power as applied to the

evolution of the Norwegian agricultural cooperatives up to approx. 1990, but may turn out to be a much more relevant and inspiring framework for the future analysis of these cooperatives. However, agency theory is unlikely to stand up as a complete and coherent analytical framework. We have already mentioned the incomplete treatment of institutional and cultural settings. Another issue is that the scope of agency theory is limited, so that the theory is unable to give a full treatment of the crucial question why cooperatives exist. To answer this question, it is far more relevant to draw on macro-oriented institutional theory as well as transaction cost economics, than on agency theory. Probably, cooperatives are so viable because the agricultural cooperatives in Norway have successfully solved the transaction cost problem of their members. The cooperative membership has safeguarded the highly asset specific investments of the members. For decades, this protection has been offered by agricultural cooperatives in an intimate interplay with the political authorities, due to the cooperatives' role as implementer of national, agricultural policy (Røkholt and Borgen, 1998). Therefore, even though the agency problems may become substantial, they may still be negligible to the extent that they are outweighed by the cooperatives' ability to reduce the transaction costs of the members. Under these conditions, members actively control the firm since it is meaningful for them. Therefore, an understanding of the agency problems is by far a complete frame of reference for a scholarly discussion of agricultural producer cooperatives.

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The Competitive Tools and Capabilities of Micro Firms in the Nordic Food Sector – a Comparative Study

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Abstract

This paper focuses on capabilities and strategic competitive tools implemented by niche-oriented micro firms in the food sector. During last decade, establishment of new food processing ventures has increased in Nordic countries. New potential for food-market entrepreneurship exists especially in the traditional farm sector. Also in the Nordic countries, farmers seek new income sources through starting value-added processing of their own-produced raw material. The rivalry in the food market is, however, intense. Thus, positioning in the food market is a very challenging task for micro firms. The paper describes capabilities as well as distinct competitive positioning in the context of small-scale food processors in Norway, Sweden, and Finland. In this study, relations between firms' basic resources, competitive positioning tools, and performance are analyzed. Comparison is made between farm-based enterprises and firms started without a "farm platform". The empirical analysis is based on survey data from 557 food processing ventures. Comparative analyses reveal similarities and differences between the countries. Implications for micro firm owner-managers and policy makers are discussed and suggestions for future research are provided.

Key words: Food markets, farm-based entrepreneurship, capabilities, competitive tools, micro firms.

Introduction

Within agribusiness, the structural rationalization of the large-scale food manufacturing industry has reduced the number of plants and farms. Governments have developed policies for the restructuring of the food systems to maintain an underbrush of small processing firms in the food markets (Goodman & Watts, 1997). Among others, rural support has been channeled to farms willing to take a step

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further through the value chain creating value-added food products. Thus, there has been a wave of new firm start-ups in Europe focusing on food products processing, among others based on food traditions and local culture (Borch, 1998).

As an emergent sector opposing the mainstream trend towards scale advantages and broad cost leadership strategies, an important research question is how to accumulate competitive strength for this category of new start-ups in a market characterized by harsh competition both on price and quality. To increase the survival rate and also to level the government schemes, we need more knowledge about the strategic tools needed in this type of enterprises. In a competitive environment, the positioning in the market is a very challenging task. The risk of being “stuck in the middle” with low maneuvering capability due to the lack of financial and human resources is imminent (Porter, 1985; Borch, 1999). Several studies in this field highlight the role of product-market orientation towards niche markets with a special quality-orientation related both to the environmental issues and the local culture (Fanfani, 1994; Mason & McNally, 1997). Also, there has been an emphasis on the benefits of exploiting the present farm capability in the development of new food products (Carter, 1996; 1998). Finally, the presence of competence and capacity expanding networks are regarded as potential sources of competitive advantage for this category of firms. Not the least, one may find a culture among small firms in rural areas that may facilitate cooperation and communicative action towards new understanding and creative solutions (Lowe et al., 1995). On the other hand, one may also risk that the present experiences and context related to primary production may result in a “liability of staleness” serving as a barrier for new venturing (Starr & Bygrave, 1991).

In this paper, we take as a starting-point the competitive strategies and resource base of micro firms (firms employing less than 10 persons) in the food industry. We elaborate on the resources needed in the pursuit of success in the modern food markets. Third, we discuss how micro firms in this sector may benefit from the resources present at the farm. In the Analysis section we present results from empirical studies in three Nordic countries. Finally, we look at the implications for the small scale actors within this industry and present suggestions for further research.

The food market and the farm-based entrepreneur

Stimulus of entrepreneurial orientation and innovation have played a central role in regional development programs during the nineties (Landabaso, 1997; OECD, 1998). The importance of small firms in the creation of dynamic regional economies are well documented (Davidson et al. 1994; Spilling, 1998; Storey, 1994). In their search for entrepreneurial growth potential, the government schemes have been oriented especially towards novice entrepreneurs. However, an increased emphasis has been laid on the group of habitual entrepreneurs (Kolvereid & Bullvåg, 1992), and multiple owners or portfolio entrepreneurs where the new-firm owner is linked to the existing business community (Rosa & Scott, 1999). One may find that there are significant synergy effects between firms run by the same person

that increases the survival rate and results of the firms. This paper focuses on a special category of entrepreneurs, i.e. farmers expanding downstream into the value chain by establishing a value-added food processing enterprise based on the farm. We define entrepreneurs as “individuals or groups of individuals, acting independently or as part of a corporate system, who create new organizations, or instigate renewal or innovation within an existing organization” (Sharma & Chrisman, 1999)

Farmers have been known for their commitment to independence and entrepreneurial orientation (Gasson et al., 1988; Carter, 1996). In Norway, for example, 53% of the farmers had additional income outside the farm (Statistics Norway, 1996). One may find an entrepreneurial resource right in the middle of the rural societies where new firm foundation is needed the most. Through stimulating to entrepreneurial initiatives among this group, one may create more robust farms and increase the survival rate of the enterprise, develop new sources of income for the farm household, and increase the diversity of the local communities. However, there is a need for knowledge about the basic conditions for innovation and the competitive advantages in specific rural and industrial settings (Landabaso, 1997; Carter, 1998). We need to enter the organizations at a firm-level and develop an increased knowledge base around the managerial challenges of the farm-based entrepreneur.

Strategy and resource base concepts

To survive in a competitive market like the food market there is a need for distinct capabilities and distinct competitive positioning (Traill & Pitts, 1998). In a situation with global production surplus and decline in the consumption of basic agricultural products, the successful firms have to be innovative. Otherwise, the risk of being “stuck in the middle” with no action opportunities is manifest (Porter, 1985; Borch, 1999; Viaene & Gellynck, 1998).

The strategic adaptability of smaller firms will depend on the resources developed within their present industrial setting. This implies an even greater focus on more fine-grained typologies (Miller, 1992), contingency emphasis on different market environments (Dess et al., 1990) and relevance of prior experience to a new setting (Starr & Bygrave, 1991).

Studies of strategic behavior in fragmented environments has been a missing link within this research field (Borch, 1999). In a situation of industry transformation, we need a knowledge platform for exploiting new opportunities based on “old” resources. There is also a need for strategy research addressing the conversion of organizational skills and resources into positional advantages in the market (Spender, 1993). Including the resource base dimensions of competence, routines, and working culture may accentuate the intra-organizational premises for achievement and maintenance of competitive advantage (Barney, 1991; Black & Boal, 1994).

During the nineties there have been several efforts in the literature to create a strategic tools classification. Also there have been a growing amount of studies with emphasis on the development of a resource-based theory of the firm. However,

there have been few efforts towards linking the two theoretical fields. This opens for the imminent risk of circular arguments in the emerging resource based theory development. The resource base discussion has to be linked to a chain of causality focusing on the setting and conditions (in the market) that make them successful. If not, resources will have their position only because they are rare and not possible to imitate (Porter, 1991). Thus, if we should search for tools that are special for the new ventures in a specific context like the agribusiness sector and a farm platform we may be a step closer to resources difficult to imitate by newcomers and by the large scale industry as well.

Farm-based entrepreneurs have been ignored within entrepreneurship and small business research (Carter, 1996). The empirical challenge is therefore manifest when trying to create categories and build theories in this field. In the remainder of this section, we will look closer at the competitive positioning strategy literature related to the food markets, and highlight the resource capabilities that are claimed central to competitive advantage in the food industry. In the third section, we will try to link the competitive positioning tools to the resource capabilities and discuss how important the farm is as a platform for providing these resources.

The competitive positioning perspective

A competitive positioning strategy is defined as the implementation of tools that relate the firm to customers in the market, and restrict competition from other rivals through the creation of entry barriers (Porter, 1980; 1985). In the traditional literature, there has been a focus on different strategic typologies and classifications that may lead to superior results. However, empirical studies have shown that we need to look at several dimensions of adaptation to get hold of the variety of strategic patterns among growth firms (Borch et al. 1999). We have chosen four main sub-strategies contributing to the competitive positioning of the firm: customer segmentation strategy, product differentiation strategy, price level strategy, and distribution channel strategy.

The resource-based perspective

A challenge for the new farm-based firms is to create the necessary resources for the effective and efficient exploitation of the competitive tools. In particular, it is a question about the innovative capabilities within each positioning dimension to create something different from the large scale industry. During the nineties, a renewed interest in the role of the firm's resources as the foundation for firm strategy and development has occurred. We define resource base as "the immaterial quality of the organization in terms of competence, routines, personal commitments and working culture of the firm" (Bartlett & Ghosal, 1991). The resource-based view of the firm (hereafter RBV) deepens our understanding of how resources are applied and combined, and what makes competitive advantage sustainable. A major contribution of the RBV is the explanation of long-lived differences in firm profitability that cannot be attributed to industry conditions. However, a weakness of this literature is the lack of links to the competitive positioning of the firm (Porter, 1991).

If new ventures in the food markets should have any chances for survival, they have to contribute with some very distinct competencies. A basic premise of RBV is that the firm represents an aggregation or bundles of resources and capabilities. By making better use of these bundles of heterogeneity or distinct competence, a firm may achieve an additional rent or return. A firm's current resources will influence managerial perceptions and thus the direction for growth (Wernerfelt, 1984). Thinking about creative combinations of resources, one may open for building competitive advantage in smaller firms that may not have the same opportunities for new resource investments as their larger counterparts. For the farm-based venture, one may expect that its roots in rural traditions and culture, its basic insight into the food sector and its experience in running an enterprise should represent strategic value to the new value-added product venture.

However, with a limited financial base, smaller firms have to be very careful about deploying their bundles of resources in ways that create a foundation for innovation, organizational development and growth. Even small failures in configuration may have large consequences due to a limited amount of financial resources and may as well have negative effects for the farm.

Non-immutable manager know-how is ranked as a major intangible resource important for business success (Hall, 1993). Storey (1994) claims that there are positive relations between managerial experience or tenure and new business growth. In particular one may expect the leaders having a varied education and experience to be more creative in linking resources in new patterns. Also, they may have an increased ability to link to external resources and achieve new impulses of importance for further development, for example as to new products, new markets and more advanced technology.

The practical background of the manager is of importance. One of the benefits of the smaller firms is the short distance between the planning and the implementation of new ideas. The manager is often participating in the day-to-day management of the production. In micro firms, and not the least at farms, the manager is also taking part in the activities within the primary value chain. As the failure rate has to be low, it may be of special advantage for smaller firms to have a manager with experience, either from the same business or from other fields. The farm-based entrepreneur may benefit from the resources developed through his career as an owner-manager at the farm and his broad experience from other income sectors. Building upon previous research within the food sector, we expect that within food markets there are some resources that are more distinct than others. We emphasize in particular three basic capabilities, i.e. marketing capability, handicraft-oriented production capabilities, and downstream networking capabilities.

The model

Based on the presented literature and the arguments in the previous section, we develop some possible relations about the roads to competitive advantage for farm-based ventures in the market for value added food products.

Customer differentiation tools and the combination of farm-based capabilities

The customer differentiation strategy is related to the degree of adaptation of products to specific customers. For a small enterprise, customer differentiation increases the precision of the competitive tools and therefore the possibility for loyalty among customers. It may contribute to an increased sale, and may also reduce the risk of mismatch and increase efficiency in the market approach. Market orientation includes a basic understanding of the differences among customer groups as to food and eating. This is regarded a major parameter in developing competitive advantage. We may therefore expect that the customer differentiation strategy will have a positive effect on firm performance.

Creativity and innovation in the dialogue with consumers are here of importance. The differentiation strategy is not possible without advanced marketing competence. This includes competence within marketing intelligence where new trends among the up market customers have to be tracked. Quality perception among different customers and new quality parameters are important elements in the marketing capability side.

One problem is that the farm-based manager may have a limited amount of knowledge in this field. For example, Borch & Iveland (1998) as well as Forsman (1998; 1999) found that the small scale producers in Norway and Finland were not very conscious about customer segmentation and did not differentiate according to customer characteristics. The farmers are normally selling their products in bulk to larger processing companies, not the least the farmers' cooperatives. They have, traditionally, not been involved in the marketing side. One may therefore expect that new ventures based on a farm platform lack the necessary marketing capability for customer segmentation. This will hamper the creativity when it comes to adjusting the message to the composite and bored modern consumer. We may therefore experience a negative relation between farm-based ventures and the implementation of customer differentiation tools. We may also find that firms with a distinct posture on customer differentiation are experiencing superior performance compared with the non-positioned firms.

Product differentiation tools and the combination of farm-based capabilities

In a competitive food new suppliers have to be innovative in finding ways of differentiating their products from other products in the same category as well as substitutes. We may therefore expect that the firms that manage to develop special qualities will have advantages in the market and experience superior performance. In the theoretical discussion about resource base we focused on the importance of bundling different resource factors into strategic resources for the creation of sustainable competitive advantage. This may create new resource platforms that are both valuable, rare, and difficult to imitate (Barney, 1991; Black & Boal, 1994). In the food sector the firm that manages to combine marketing capabilities with specific handicraft competence may experience these advantages. Much of this type of competence is tacit knowledge only developed through long-time experience and working together with artisans. Through mixing the old handicraft with marketing

capabilities related to the new trends in the market, the entrepreneur may find ideas for the adjustment of products built upon old food traditions to new eating habits and tastes. This combination of resources may result in unique, valuable products.

The farm platform may give a special knowledge related to food traditions and the old handicraft. At the farms, the old customs are preserved, and in the local communities there are increased interests in traditions and food culture. The local community roots and farm-based production may also prove important in securing the perception of product authenticity in the market (Tregaer, 1998). We may therefore find that there is a positive relation between farm-based ventures and product differentiation substrategies. We may also find that firms with a distinct posture on product differentiation substrategies are experiencing superior performance compared with the non-positioned small scale producers.

Price level and the combination of farm-based capabilities

The global integration of the food markets increases the competition on price. In particular, the strength of the wholesalers and the low-price retailer chains forces the prices down. Forsman (1996; 1998) showed that the small scale processors had problems with raising the price above average retailer price for similar products. We may expect that there is a low “snob effect” when it comes to food consumption. However, firms producing products of a high degree of differentiation and adopting “high price strategy” seem to have better opportunities to profitable pricing (Forsman 1999). We expect there will be a negative relation between high price substrategies and performance. The farm-based producer faces special problems in this respect. Both the lack of scale and lack of experience as well as the time-consuming handicraft-based production may contribute to high costs that has to be compensated through higher prices. We, however, also expect that firms with high marketing capabilities may have better opportunities to charge a higher price. We may therefore find that there is a positive relation between farm-based ventures and high price level substrategies. We may also find that there is a negative relation between high price level substrategies and firm performance among small scale food producers.

Distribution channel tools and the combination of farm-based capabilities

The dominance of the wholesaler-retailer chains and the large food processors in the distribution channels still make distribution a challenging task for the small scale firm. As the production takes place in rural areas and the majority of the population lives in the towns, there are often high transportation and communication costs. Adding to this complexity is the perishable characteristics of the food products. Improved transportation infrastructure, however, has reduced the problems of distance. We therefore expect that the firms managing to exploit a variety of distribution channels to reach the customers may have advantages. The negative side of this strategy is higher costs in distribution. The firms that have the most rural location may face special problems. They have fewest transportation alterna-

tives, longer distances that may reduce product quality and increased transportation costs; and fewer opportunities for face to face contact with consumers.

One way of dealing with this challenge is to develop networking capabilities downstream into the value chain (Grunert et al., 1996). With more direct links to customers, joint ventures to exploit scale advantages in distribution, and trust-based governance mechanisms to reduce transaction costs, the small scale producer may gain access to the market through a broader set of channels. We expect that the enterprises that put their efforts into building innovative downstream business relations may improve their position in the market.

Farm-based enterprises might face difficulties in this field. One may expect that the traditional focus on strong, local ties to families, friends and horizontal links to other farmers may hamper the development of downstream relations. The institutional aspects related to strong farmers' industry cooperatives and negative sanctions against newcomers may amplify these barriers (Aarset & Foss, 1996). We therefore expect farm-based new ventures to have a low score when it comes to downstream strategic posture into the distribution channels. We may therefore find that there is a negative relation between farm-based venture and distribution channel sub-strategies. We may also find that there is a positive relation between distinct distribution channel sub-strategies and firm performance among small scale food producers.

Methodology

Research design

This study focuses on basic capabilities and strategic competitive tools implemented by small-scale micro firms in the food sector. To explore linkages between firms' capabilities, competitive positioning tools, and performance in this non-explored setting we chose an exploratory approach. The study of capabilities and strategic positioning was based on a sample of small-scale businesses in the food sector in three Nordic countries: Norway, Sweden, and Finland.

Sample and data collection

As a target group of the study was defined micro firms (less than 10 employees) located in rural areas and operated in the food sector. The data (n=557) were obtained via structured questionnaires in each country in 1997. The questionnaire was aimed at the entrepreneur or owner-manager of the firm and distributed by post. The questionnaires used in Norway and Sweden were the same. The Finnish sample is based on a population of larger firms and a somewhat different questionnaire, but include similar questions on most themes related to competitive positioning tools. The data included both farm-based companies and companies without farm connection. This provided an interesting chance to make comparisons between farm-based enterprises and firms started without a farm platform. The number of firms within the sample in Norway, Sweden, and Finland were 174, 132, and 251, respectively. The number of farm-based enterprises was 75% in Norway, 71% in Sweden, and 66% in Finland.

Analysis³

The analysis of data was conducted in several steps. First we run principal component analyses (PCA) to develop aggregated and stronger factors. The next step in the analysis of the data was clustering the firms into homogenous groups. Building upon the developed capability and strategy factors excluding the performance factors, the firms were classified according to the similarity along capability and strategic positioning dimensions. The four-cluster solution was ultimately chosen and selected for each country to improve comparative opportunities.

Analysis of variance (ANOVA) was conducted showing high variance in the mean values of the factor scores among the four clusters within each country. This variance indicated that the factors presented in the cluster analysis were important in revealing differences in capability and strategic positioning among the firms. In addition, the clusters were compared with two performance factors and firm size measured in working months per year. Percentage of the farm-based companies within each cluster was also examined.

Validity

Items and variables selected for the questionnaires were based to a large extent on earlier case studies with qualitative interviews of entrepreneurs. This ensured that the questions of the questionnaires were designed using such a language that was understood well by the entrepreneurs. Second, the questionnaire was reviewed by scholars in the field. They suggested some improvements in the content and clarity of the questionnaire. Third, the questionnaire was tested through a few firm visits during which the entrepreneur filled the questionnaire.

When interpreting the results, one need to note that the questionnaire used in Finland was not completely the same than the questionnaires used in Norway and Sweden. Due to this, the contents of the extracted factors are to some extent different. This, in turn, means the results are not completely comparable. However, in spite of this, there are similarities when it comes to the larger part of the study that should make comparison possible.

Analysis

Capability and strategy factors

From the Norwegian-Swedish data 21 capability and competitive tool factors were developed. From the Finnish data 12 strategy factors were developed.

Capability factors. Four capability factors were extracted from Norwegian-Swedish data. “Co-operation capability” factor groups co-operation capabilities in various business activities. “Expansion strategy capability” factor emphasizes a firm’s willingness to increase its production volumes and broaden its market area. “Product development strategy” factor has a strong emphasis on product development and especially considering customers’ needs and hopes when developing new

³ Tables showing the results of the analyses are available from the authors.

products. Onto “Business management capability” factor are loaded variables that represent business management capabilities.

Marketing communication factors. Three marketing communication factors were extracted from the Norwegian-Swedish data. “Relational communication” factor emphasizes own or common marketing material, personal contacts with customers and own internet-pages. Factor 2 is based on advertising in national media and in professional magazines (Communication through national advertising). Factor 3 emphasizes communication through local media (Communication through local advertising).

Customer differentiation factors. Four customer differentiation factors were extracted from the Norwegian-Swedish data. “Sociographic differentiation” factor represents differentiation according to customers’ incomes, education level, and living place. “Ideological differentiation” factor emphasizes customers’ willingness to maintain environmentally friendly and small-scale agriculture. “Tourist segmentation” factor emphasizes tourists as common customer group. “Consumption arena differentiation” focuses on local catering and special occasion market.

Product differentiation factors. Four differentiation factors were extracted from the Swedish-Norwegian data. “Superior quality” factor has a strong emphasis on quality of both raw material and final products. “Traditionality” factor bases on traditionality, home-made nature of the products, and special taste. “Ecological” factor has a strong emphasis on products with no additives. Factor 4 is based specially on producing “Healthy products”.

In Finnish data, different items compared with the Norwegian-Swedish data were used when asking differentiation from competitors. Five differentiation factors were extracted. “Ethical production” factor groups ethical production methods, environmentally friendly policy, and knowledge of the product origin. Factor 2 represents “Service differentiation”. Factor 3 is based on “Special production skills”. Factor 4 emphasizes a “Short chain” from producer to customer and small-scale nature of the production. Factor 5 groups “Appearance of the product and its selling package”.

Pricing factor. One pricing factor was extracted in Norwegian-Swedish data. The factor was named as a “High-price strategy”. From Finnish data, one pricing factor was also extracted. It was also named as a “High-price strategy”.

Distribution channel factors. Three distribution channel factors were extracted from Norwegian-Swedish data. “Chain distribution” factor emphasizes the selling of the products to retailers and using outside distribution service. Factor 2 is based on “Direct distribution”. Factor 3 has a strong emphasis on “Specialized distribution”, mainly local and co-operative association as distribution channels.

From the Finnish data, four distribution channel factors were extracted. “Regional oriented distribution” represents distribution on the province level. “National distribution” factor emphasizes wholesales as a distribution channel and national markets as a main market area. “Retail-shop oriented distribution” has a strong emphasis on retail shops as a distribution channel. “Restaurant-oriented distribution” factor stresses restaurants or catering firms as a main distribution channel.

Performance factors. Two performance factors were extracted from the Norwegian and Swedish data. Factor 1 represents “Financial performance” and Factor 2 “Sales performance”. From the Finnish data, two performance factors were also extracted. They were also named as financial performance factor and sales performance factor although their contents are a little bit different from the factors extracted from the Norwegian-Swedish data.

Capability and competitive positioning tools

We analyzed the differences in capabilities and the implementation of competitive tools between farm-based and non-farm enterprises in the three countries.

Capability. As for the internal capability of the firms there were a significant differences in the Swedish sample between farm-based and non-farm companies with respect to product development capability. The non-farm companies were more emphasized on the analysis of the customers need for new products. As for performance in Sweden, the business management capability strongly influenced the sales performance of the firms. In Norway, the product development capability had a positive influence on sales performance. However, it influenced negatively on financial performance. This may imply that the firms have to be careful about the time and effort spent on building up new product competence. Management time in particular may represent a scarce resource within micro firms.

Product differentiation. As for the product differentiation factors there were no differences in product differentiation emphasis between the farm-based firms and the firms without farm-connection in Sweden and Norway. As for differences between countries, “ecological” factor as a differentiation tool was more common in Norway than in Sweden ($p=0.010$). Healthy products, on the other hand, were emphasized more in Sweden ($p=0.022$). The female entrepreneurs seemed to emphasize more “traditionality” than the male entrepreneurs ($p=0.007$). This may be explained by the fact that women more often have represented the continuity when it comes to food tradition in the village. They therefore possess the tacit knowledge of receipts and broader service concepts that are needed in this segment. The firm size when measured by the number of months work had a slight positive correlation with superior quality factor ($p=0.047$) and a slight negative correlation with the “Ecological” factor ($p=0.038$). This relation is of interest because quality control is a critical factor especially in a wider geographical market context. There has been discussion around the ability of small firms to follow the rigorous demands of documented quality concepts and routines in modern quality systems.

In the Finnish data, ethical production tools were emphasized more in the farm-based firms ($p=0.003$) relative to the other firms. Special production skills, in turn, were stressed more in the firms with no farm-connection ($p=0.020$). Rural location also seems to have an association with ethical production factor and service differentiation factor. There seems to be a connection between the entrepreneur’s gender and ethical production factor and special production skills. Both ethical production factor ($p=0.025$) and special production skills ($p=0.013$) are emphasized more in the firms that are run by females.

When it comes to influence on performance, a focus on healthy products seems to have a negative influence on financial performance both in Norway and Sweden. In Norway it also influences negatively on sales performance. This seems to indicate that the health product niches are not too lucrative in these two countries. Traditionality arguments focusing on food traditions seem to have a positive influence on financial performance in the Norwegian market. In Finland, a service orientation emphasizing fast deliveries influenced positively on sales performance.

Customer differentiation. As for customer differentiation factors the “Tourist segmentation” factor and the “Consumption arena differentiation” factor showed differences depending on whether the firm is farm-based or has no farm-connection. In Norway, the customers of the farm-based firm are more often tourists compared with the firms with no farm-connection. Here we may find that the farm-based ventures have comparative advantage. They can offer the experiences of farm life and a higher authenticity for the products, i.e. a more differentiated product than an ordinary manufacturer. In Sweden, the non-farm companies focused more on the special party catering segment. However, when it comes to influence on performance, a focus on this catering segment seems to have a negative effect on sales performance both in Sweden and Norway. On the other hand, tourist segmentation in Sweden and ideological differentiation in Norway seems to influence positively on sales performance.

Marketing communication. As for the marketing communication tools, the Swedish firms seem to put more effort in both own marketing material and personal contacts than the Norwegian firms ($p=0.000$) and local advertising ($p=0.000$). Moreover, the firm size when measured by number of work months has positive relation to advertising both at the national and local level ($p=0.009$). The larger firms are more inclined to make use of non-personal promotion tools. In Sweden, the non-farm enterprises were more active on the national advertising arena, while the farm-based firms concentrated on local media. In Norway, communication through national advertising media seemed to influence the sales negatively. This seems to indicate that the effectiveness of this type of communication is not high and may take focus and efforts away from other channels.

Pricing tools. As for the pricing tools there were no significant differences between farm and non-farm companies in the samples. However, there were significant differences between Norway and Sweden. In Norway, the firms more frequently followed a high price strategy. This may indicate that the price competition is higher in Sweden than in Norway.

Distribution channels. As for the distribution channel tools there were significant differences between farm-based and non-farm enterprises both in Norway and Sweden. The non-farm companies were more distinct on exploiting both retailer chain distribution and direct “prosumer”-strategies. In Finland, too, the non-farm companies were more oriented towards the retailer chains. However, they were not that focused towards local direct consumer distribution. As for the between country differences, the Swedish firms were also more oriented towards chain distribution than the Norwegian firms.

The business strategy clusters

To find out the overall strategic posture of the firms, we analyzed the business strategy approaches using a four-cluster solution in each country. In the Norwegian and Swedish data, the clustering was based on 19 factors and in the Finnish data on 10 factors. The results showed differences in strategic approaches between the three countries. In Sweden, there was less variation in business strategy approach. The firms were concentrated around two clusters, i.e. “The non-profiled local party caterer” and “The high-quality national-arena provider”. The firms in last cluster had better sales performance than “the Non-profiled” group. This cluster also had a higher relative number of non-farm firms. The average size of these firms was 1 ½ man year. “The high-quality national-arena provider” was characterized by expansion ambitions, offering products with superior quality, and communication through national media. This type of firms also combined chain and direct distribution solutions. These firms were slightly larger than the ones in cluster one.

In Norway, the firms were more evenly distributed around the four cluster alternatives. The largest cluster, where the firms oriented towards ecological products, was dominated by farm-based ventures, and also used ideology as a customer differentiation tool. “The tourist focused expansionist” cluster was the second largest cluster in the sample and contained the smallest firms. The average size of the firms in this cluster was 8.7 work months. The firms in this cluster had high expansion ambitions, they were focusing on the tourist market, had a high price level and emphasized direct distribution to the consumers. They also had the highest sales performance and the second largest financial performance.

In the “Low-profiled firms” cluster the most distinct feature was communication through national media. This category of firms had a positive financial performance, but the lowest sales performance among all clusters. The average size of these firms was 1 ½ man year. “Product-oriented traditionalists” cluster included a larger group of non-farm enterprises. This cluster also had the highest average size of the firms (3 man years). These firms emphasized traditional food, health arguments, and customer differentiation along sociographic criteria such as high income and education.

Performance

When comparing financial and sales performance by country, there was a significant difference in sales performance. The sales performance was significantly better in Norway compared with Sweden ($p=0.000$). As to financial performance, there were no significant differences. There were no associations between firm age, firm size, rural location, or entrepreneur’s gender and performance factors. Moreover, there existed no differences between the farm-based firms and the firms with no farm-connection. We controlled for the role of local support on performance. This factor seems to be important. The financial performance is weaker in those firms in which combining business and family responsibility is perceived difficult ($p=0.003$). Secondly, firms meeting resistance toward firm and food processing from local environment, the financial performance had weaker financial performance

($p=0.026$). Thirdly, those firms that perceived their local environment in their home municipality as positive had better sales performance ($p=0.026$).

In the Finnish data, financial performance differed between the farm-based firms and the firms with no farm-connection. We found that the farm-based firms had a better financial performance compared with the firms with no farm-connection ($p=0.045$). This may result from the fact that in farm-based firms, the food processing is often a complimentary income source and the firms are not dependent only on this income source which in turn may be the case in those firms that are concentrated only on food processing.

Conclusions and implications for further research

There are a large group of potential entrepreneurs within the farm sector that serve as an innovative reservoir in local communities. Farmers are known for their pluri-activity, i.e. the combination of farming with other income activities, and this group is therefore a promising group for the encouragement of portfolio entrepreneurship activity. This paper has concentrated on entrepreneurship within the food sector. We have shown that in spite of extreme challenges when entering a market characterized by stagnation in consumption, over capacity in production and increased cross-border competition there are large groups of firm with high expansion ambitions. We have shown a broad range of capabilities and competitive tools implemented among the firms. There are differences in business strategy postures between the countries with the Swedish sample as the most distinct one with concentration along only two main strategies, i.e. a non-profiled strategic posture and a superior quality focus. The ecological strategic posture is strong in Finland and Norway but low in Sweden.

There were differences between farm and non-farm ventures. In Norway, the farm-based firms were more oriented towards the tourist segment. In Sweden, the non-farm enterprises were more oriented towards product development. They also made use of national advertising media. In all countries, the non-farm firms were more inclined to make use of the retailer chains. One explanation may be found in a more relaxed attitude to the retailer chains compared with the farmers, that have for the last years seen the retailer chains as “enemies” in the value system. It may also reflect that the non-farm ventures have a larger (national) market arena based on superior quality. In Finland, ethical production were emphasized more in farm-based firms, while special production skills with regard to food production was more developed among non-farm firms.

The performance measures have to be regarded with care. However, there seems to be a lack of profitability in the health product market both in Norway and Sweden. A focus on the local party food catering market influences negatively on sales performance. Among the Norwegian firms there are indications that an expansion strategy seems to influence negatively on the financial performance. The farm-based ventures are facing significant competition from the non-farm ventures. These firms seem as good as the farm-based companies to develop superior quality

and emphasize food traditions. They also seem to increase their market range into a national market at a faster pace.

The study represents one of the first empirical studies focusing on business strategy among micro firms in the food sector. The study has its limitations in a cross-sectional design, weak performance measures and differences in the questionnaire between the countries. The methodology of such studies should be improved in future. This study may, however, stimulate research in several directions. Most of the small-scale food production firms are still very small and in their infancy. The owners have invested their own money and even more non-paid time to get their firms up and running. Some of these firms have managed to settle in a profitable niche and seem to prosper. Firms with success have ambitions of increasing their volumes as well as their geographical range. Their successes, together with government support schemes, will also draw attention to newcomers who will try the same concepts. One may therefore expect that more firms will be established in this sector in the years to come with more competition also in these segments.

The increased volume produced may increase the risk of devastating price competition among the small-scale producers. We are very much in need of more knowledge about how to differentiate the products towards special customer and geographical segment preferences, i.e. the uniqueness of the new market concepts, and the effect of newcomers on competition. The authenticity aspects of the products linked to regional heritage, food traditions, special taste and personal touch of the products have to be transferred through the distribution channels to new consumer groups. This means that the whole marketing mix has to be in focus, and in particular the customer communication and promotion tools that tie the product to its local identity. As long as entrepreneurs manage to create such links, one may look at this as efforts to create totally new and different markets that are less vulnerable to competition from their larger counterparts.

A second important research challenge is the efficiency problem. Even though one is talking about small-scale production and a high degree of differentiation, the cost elements cannot be ignored. In most industries the relative prices decrease or stagnate over time. There is also a risk of market penetration as the large-scale industry pays a great deal of attention to developing flexible specialization concepts based on advanced computer-based processing machinery. On the technological side, there should therefore, be more research efforts towards developing adequate small-scale technology for this category of firms.

On the management capability side, we need more knowledge about how to organize emerging firms within this sector. Researchers should emphasize the cooperative ties to other firms, and the more functional-business roles and obligations of such relations. So far, most of the focus on the informal networks has been on social ties and their role in the foundation phase and not in the process of expansion.

The role of the government and the local community in developing an entrepreneurial spirit in the food sector has not been given much attention in research so far. This is a paradox as government initiatives should be given much

of the credit for this emerging sector, both within the EU and in the Nordic countries. We need more knowledge about the interplay between the entrepreneurs and the local and regional government, both when it comes to the role as financial source, but even more with regard to the active role of government bodies serving as local development agents.

For government programs, the exploitation of smaller firms potential for the creation of new jobs may be of special importance. Also, they have mutual interest in creating sustainable competitive advantage to achieve job security in the long run. The government development agencies will therefore be searching for ways to improve the configuration of critical resources within these firms.

Government support programs have traditionally contributed with financial support into tangible resources such as machines and buildings. We emphasize the supply of more composite immaterial resources that are at the same time scarce and critical for changes in strategic direction and further growth. We argue for the focus on intangibles such as advanced marketing competence, links to external resources through cooperative networks, and managerial capability within the strategic apex of the firm to increase the number of links and impulses. The fulfillment of these needs may demand and active in-firm involvement of the development agencies and the local government.

Due to the focus on differentiated product and firm concepts, not the least including contextual aspects such as environmental issues, culture and ideology, we need to broaden the theoretical platforms for research within this sector. Links between disciplines like business management, marketing, anthropology and sociology are at hand, in addition to improved links between the social science disciplines and technology research. Comparative research across regions and nations should be emphasized to spot the differences due to culture, government involvement and other contextual aspects. Finally, even though it may increase research costs, one should strive towards more longitudinal research to reveal the dynamic features of this emerging and alternative food system.

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Resource-Based Strategy Analysis: A Case of Local Food Processing Firms in Finland

Sari Forsman¹

Abstract

This paper is concerned with local small-scale food processing firms in terms of their resources to promote the possibility to survive and succeed in the agri-food chain in Finland. More information is needed about firm resources and their management in order for a small-scale firm to establish a favourable position on the local food market as well as to respond to the challenges and market opportunities in the changing and dynamic competitive environment. The main objective of the paper is to develop a framework for resource-based strategy analysis within a local, small-scale food processing context. Elaborating the framework forms a basis for empirical survey and analysis to be conducted later. The framework is founded on the resource-based view of the strategic management, with emphasis on the significance of firm resources in achieving a favourable position on the market. For the framework, a distinction is made between two types of fundamental resources: 1) strategic core resources and 2) critical supporting resources. Some hypotheses based on the framework for empirical analysis are also developed, and implications and challenges for future research are discussed.

Key words: Resources, competitive advantage, success, small-scale firms, food industry.

Introduction

This paper looks at local small-scale food processing firms in terms of their resources to promote the preconditions to survive and succeed in the agri-food chain in Finland. The significance of small-scale food entrepreneurship has increased in Finland especially since the end of the 1980s. In recent years farmers, in particular, have taken the initiative for small-scale food production as they seek a better price for their primary products by value-added processing of their own raw material on the farm level. The interest toward small-scale food entrepreneurship, however, is not a farm-based phenomenon alone. The increased demand for a more diverse selection of foodstuffs as well as extensive research and development

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relating to food entrepreneurship during the last decade have strengthened the position of small firms on the Finnish food market side by side with bulk products and brands provided by large-scale firms. The foodstuffs produced by small-scale firms are mainly associated with concepts such as differentiated products, niche products, value-added products, local food, or alternative food. Figure 1 illustrates the position of the small-scale firms in the Finnish food industry.

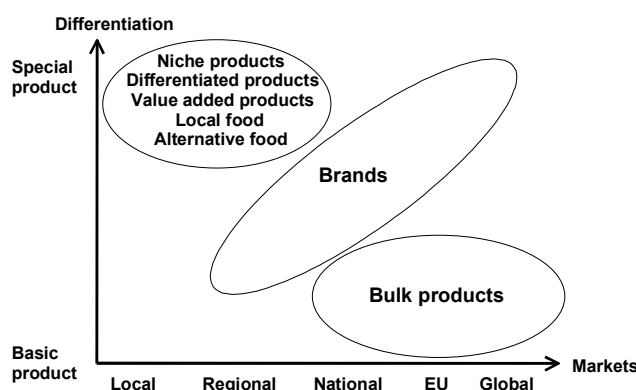


Figure 1 Trends in the Finnish food industry (adopted from Kyläheiko 2000)

About half of the small-scale food processing firms in Finland are located in rural areas². According to the Rural Business Register of Finland (Rantamäki-Lahtinen 1999), there were about 900 food processing firms³ in rural areas in 1996. These rural food processors can be further divided into two groups: (1) firms that are located on a farm and are run by a farmer (or by family members) and (2) firms that are located in rural areas but have no connection to farms. Typical lines of food processing in rural firms are meat processing, bakery and mill production, milk processing, and the processing of potatoes and vegetables as well as berries and fruit. The firms are usually very small. In most cases the annual turnover is less than EUR 0.08 million (FIM 0.5 million), and the business activity usually employs 1-2 persons (Forsman 1997).

Despite the increased demand for differentiated food products, the fact is, however, that it is very difficult for small actors to operate and survive in the Finnish food market environment. One of the main problems is that these small-scale firms are often too supply-oriented and have no consistent strategic orientation when managing the business. They often lack information about potential target groups and markets for their products. This implies that, although the firms try to apply a differentiation strategy, they do not necessarily manifest differentiation in a customer-oriented way. Moreover, firms often perceive the access to traditional marketing channels quite difficult. In many cases this may arise from the firms' lack of an ability to co-operate and build network relationships. Shortage of

² Based on the Rural Business Register, 'rural area' is defined by the population density, i.e. if the population density within a certain zip code area is less than 50 persons per km² the area is defined as a rural area.

³ A small-scale firm is a firm whose annual sales are over FIM 49,000 and the number of staff is less than 20.

resources such as poor availability of capital or unfavourable geographical location relative to customers may weaken the firms' preconditions to survive on the market.

The paper assumes, however, that small-scale firms could have a better chance to achieve and maintain a favourable position on their markets. This requires development of the firms' knowledge and competence to respond challenges and market opportunities provided by the changing and dynamic competitive environment. A potential approach to carry out this development challenge is by looking at firms in terms of their resources and resource management.

The main objective of this paper is *to develop a framework for resource-based strategy analysis within local small-scale food processing firms*. Elaborating the theoretical framework lays the foundations for empirical survey to be conducted later. The paper is mainly theoretical, based on a survey of the existing literature. The information relating to this field provided by the author's previous studies (Forsman 1996, 1997, 1999) is used as secondary data. The paper is positioned in the resource-based view of strategic management (e.g. Wernefelt 1984, Barney 1991, Grant 1991, Mahoney 1995), which emphasises the significance of firm resources in establishing a favourable position on the market.

There are two reasons for adapting the resource-based view in the small-scale food processing context. First, small-scale firms often have some kind of special resources on which they base the differentiation from larger firms. Second, small-scale firms often lack certain resources (e.g. capital, marketing capability) that are to some extent necessary resources in order for a firm to establish a sustainable competitive advantage on the market. Earlier ideas on the topic are presented in Forsman (2000).

Adapting the resource-based view in the local food processing context

This chapter presents a theoretical framework for resource-based strategy analysis in the local small-scale food processing context. Some basic hypotheses to be tested through empirical analysis are developed based on the framework and underlying theory. An earlier version of the framework is presented in Forsman (2000), and a modified version of this is elaborated in this paper. Before presenting the framework, adapting the resource-based view in the local small-scale food processing context and identifying two types of fundamental resources – strategic core resources and critical supporting resources - are discussed.

The resource-based view of strategic management emphasises the significance of a firm's unique or distinctive resources as sources of competitive advantage. The focus on strategic management research as well as strategic thinking has evolved and changed over time (see e.g. Robinson and Pearce 1988, Day 1992, Hoskisson et al. 1999). One of the main changes is the shift of the focus of strategy from the outcomes of the strategy to the sources of competitive advantage (Grant 1991, Day 1992). According to this view, a firm should develop specific resources and capabilities so that it could create and sustain competitive advantage. This implies

that sources of competitive advantage should be distinguished from the position of the advantage (Bamberger 1989).

When looking at small-scale firms, resources are often considered from a negative perspective; it is often scarce and limited resources of the small-scale firms that first come to our minds. Limited financial resources, for example, are usually seen as factors that reduce firms' possibilities to carry out marketing activities. The significance of the resources in small-scale firms is, however, much broader as the specific resources, in particular, enable a small-scale firm to differ from larger firms. This means that small-scale firms usually have some kind of special resources and competence or combinations of resources that form a basis for differentiation and, further, achieving a favourable position on the market. Consequently, the significance of the resources within small-scale food processing firms is ambiguous, and based on this a distinction between two types of resources is made in the following section.

Identifying the fundamental resources underlying competitive advantage

Resources can be defined as strengths or weaknesses for a firm (Wernefelt 1984). Consequently, the core idea within the resource thinking is that a firm should differ from competitors by exploiting its unique strength resources and resource combinations. In this paper, the term "resources" is used as a higher concept, which covers the following sub-concepts: specific resources, capabilities, core competence, and knowledge. The concepts are strongly interdependent and to some extent overlapping. In the broad sense they all can be seen as sources of competitive advantage.

The most obvious difference lies between specific resources and capabilities. *Resources* are inputs in a production process. Examples of specific resources in the small-scale food processing context are selected raw materials, employees' skills, availability of capital, and favourable geographical location relative to customers. *Capability* is the capacity of the resource combination to perform a certain task or action (Grant 1991, 1998). Examples of capabilities are marketing and distribution capability. *Core competence* is also connected to the resource-based view. Core competence means a combination of skills and technologies that enables a firm to offer a particular benefit to customers. For example, managing a distribution channel may become a core competence factor for a firm. Distribution channel in itself, however, does not represent core competence (Hamel and Prahalad 1996). When looking at a local food processor, mastering a production process based on a unique method might develop into core competence. *Knowledge*, according to the knowledge-based view, is also seen as a special type of resources (Hoskisson et al. 1999). Knowledge includes several sub-concepts, such as information, skills or know-how, explanation, and understanding (Wikström and Normann 1994). Information about markets and target customers is an example of knowledge that is perceived as a weakness in many small-scale firms.

However, the distinction between specific resources, capabilities, core competence, and knowledge does not provide a meaningful basis for studying the sources of competitive advantage. Instead, it can be argued that it is more relevant to

consider a firm's resources as a twofold phenomenon. Therefore, I propose that in the local small-scale food processing context an a priori distinction should be made between *strategic core resources* and *critical supporting resources* (Figure 2).

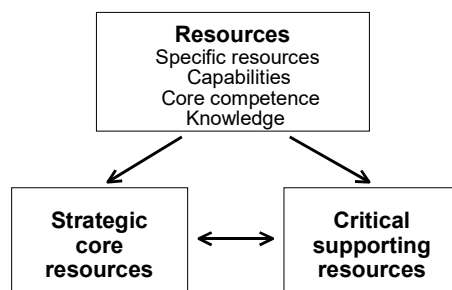


Figure 2 Two types of fundamental resources underlying competitive advantage

Strategic core resources available for a firm are resources that constitute the primary source of competitive advantage. Accordingly, the strategic core resources represent the core idea around which the business is built. It can be argued that without these resources a real competitive advantage cannot be created. In the small-scale food processing context, a typical example of strategic resources is different use of raw materials, which may result in a different raw-material basis compared with a bulk product. Strategic core resources should be approached by identifying which resources among a firm's range of resource are factors differentiating a firm and its product from principal competitors. According to the earlier studies (Forsman 1996, 1997, 1999), potential strategic core resources in the small-scale food processing context may be a unique product recipe, mastering of a particular production method, farm-connection (own raw material), location near customers, and flexibility of a firm's activities due to the small firm size.

Critical supporting resources, in turn, are resources that as such do not constitute a sufficient basis for competitive advantage but are needed to support the strategic resources so that a firm could achieve a favourable position in the market. Critical resources are not necessarily rare but, rather, they are resources that Barney (1991) defines as "common" resources that may help to ensure a firm's survival when pursuing the competitive advantage. For example, marketing capability may have an important role as a critical supporting resource for a firm to find an optimal target group for its differentiated product. The critical supporting resources, therefore, should be approached by identifying common resources the lack of which makes it difficult to achieve or maintain a favourable position on the market. Examples of typical critical supporting resources that small-scale firms are often assumed to lack are financial capital, competence in various business areas (e.g. product development, selling, marketing), co-operation skills, ability to build network relationships, a sufficient customer base, etc. These resources are not strategic in the sense that they are often tradeable (see Dierickx and Cool 1989), at

least to some extent, and can be acquired by education, co-operation with other firms and actors, and outsourcing.

To summarise, the critical supporting resources are specific resources, capabilities, core competence, and knowledge that support the management of the strategic resources into a favourable position on the market relative to a firm's principal competitors. In this sense, the availability of critical supporting resources can be seen as a precondition for a sustainable and successful business. However, the strategic core resources and the critical supporting resources are strongly interdependent, which makes it difficult to identify the causality between them.

Elaborating a framework for empirical analysis

This chapter presents a framework for resource-based strategy analysis. The framework links three main components: firm resources, competitive advantage, and firm success. From the resource-based view, competitive strategy can be defined as managing resources into the position of competitive advantage (Varadarajan 1992). Hence, a starting point in the framework is a firm's range of resources, which includes specific resources, capabilities, core competence, and knowledge. It is evident that each firm possesses a wide selection of resources. Therefore, the first task is to identify the strategic core resources on which the competitive position within a firm is primarily based. The second task is to identify the critical supporting resources that are in some respect necessary for a firm in order to exploit its strategic core resources. A combination of these two types of resources forms the basis for a favourable position in the market.

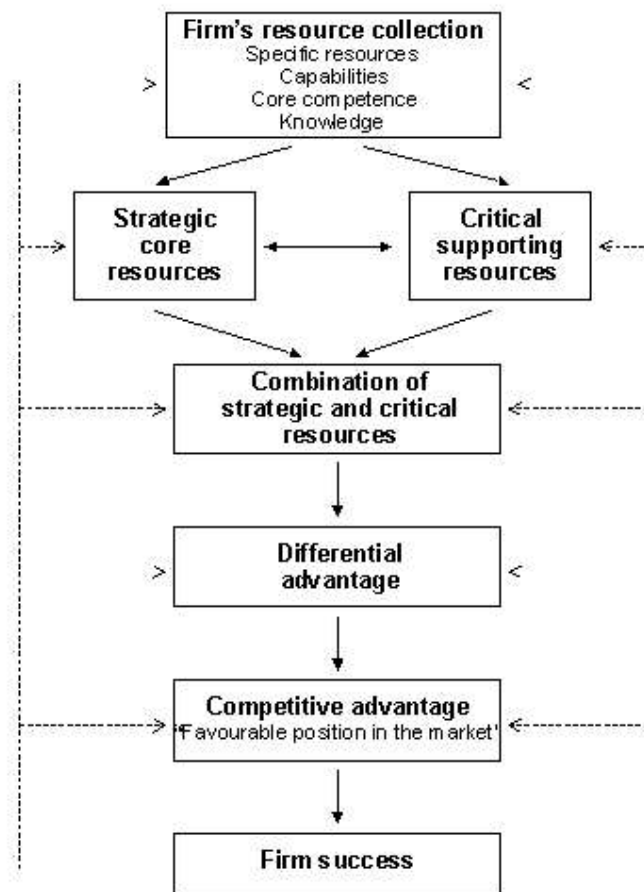


Figure 3 Framework for resource-based strategy analysis for local small-scale food processing firms

By exploiting and combining its strategic core resources and critical supporting resources a firm should – at least in theory – be able to differ positively from its competitors and, thus, achieve a favourable position on the market. This favourable position refers to competitive advantage, although the term may sound too bombastic when considering very small firms with diminutive market shares. We might also question whether small-scale firms are in general able to create superior competitive advantage that cannot be duplicated and outcompeted by larger firms. Consequently, in this study competitive advantage is defined more broadly based on the resource-based view and adopting partly the definition used by Hyvönen and Kola (1995). In this context competitive advantage refers to a combination of resources and competitive activities the management of which leads into a favourable position on the market relative to competing firms.

The main types of competitive advantage are cost advantage and differential advantage (Grant 1998, p. 189). Considering the limited ability of small-scale firms to pursue a low-cost strategy, differentiating products for selected niches is probably the best way to create value in small-scale firms (Pelham and Wilson 1996). Therefore, in this context, the discussion of competitive advantage is more differential than low-cost oriented. However, differentiation is not simply a

question of whether to differentiate or not (Grant 1998, p. 190). A firm might also choose a strategy in which both the position of cost advantage and differential advantage is emphasised to some degree. It may also be possible to supply undifferentiated products in a small geographic area, based on contacts and knowledge on a local market (see Traill 2000).

Differential advantage requires that a firm offers a product that is differentiated in such a positive way that the customers are willing to pay higher price – price premium – that exceeds the additional cost of the differentiation (Day and Wensley 1988, Grant 1998, p. 189). To adjust which are the main factors or dimensions of the differential advantage, potential differentiation factors should be compared within a firm. According to the previous studies (Forsman 1996, 1997, 1999), the most emphasised factors within the small-scale food processing firms are, among others, product quality, raw-material basis (e.g. selected raw materials, higher content of main raw material compared to a bulk product, or products contain no additives), manufacturing method (traditional, hand-made), short distribution chain from producer to customer, knowing the product origin, producing ecological products, way of selling, and service factors, such as fast deliveries and considering customers' special demands.

Identifying potential differentiation factors, however, does not provide sufficient evidence about how sustainable these differentiation factors virtually are. Therefore, to get a deeper idea of the differential advantage and its sustainability in the long run, the following aspects need to be examined (Coyne 1986, Doyle and Wong 1998, Forsman 1999):

- Relative degree of differentiation in terms of concrete product attributes, services, and overall way of doing the business compared with competitors.
- Relative degree of price level compared with competitors.
- Competitors' possibility to imitate the product.
- Willingness to imitate among competitors.
- Substitutes of the product.

It is evident that if a firm succeeds in creating a favourable position on the market by exploiting its resources, it should be able to do this in a profitable way. Hence, the concept of success is included in the framework. Analysing the linkages between resources, competitive advantage, and success makes it possible to identify the most significant strategic core resources and critical supporting resources needed by a firm to be able to achieve a favourable position on the market relative to competitors. The resource-based view is especially interested in performance differentiation between different firms (see Barney 1991). It can be assumed that some firms are more successful than others and that there are differences in resource management between more successful and less successful firms. This assumption is based on the common argumentation within the resource-based view, according to which a firm's success in the long run is mainly a function of its internal and unique competitive resources (Hoskisson et al. 1999). Consequently, by comparing different firms with different combinations of resources we may find

linkages between resources, competitive advantage, and success. Analysing these linkages in more detail provides an opportunity to explain a firm's success through its resources and their management.

When studying the linkages between the concepts of the framework, two issues should be considered. First, a deep understanding of competitive environment, which is one of the common elements of successful strategies (Grant 1998), is needed. Second, a firm's objectives should also be taken into account. Especially firms that operate in a connection with a farm may often have non-financial objectives that outweigh the financial objectives, such as profit maximisation. These two aspects are discussed in more detailed in Forsman (2000).

Development of hypotheses

Finally, some hypotheses based on the framework, underlying theory and literature are developed for empirical analysis. First, based on the distinction between the two types of resources – strategic core resources and critical supporting resources – it can be expected that differences in firm resources influence the nature and sustainability of the differential advantage. Consequently, the following hypotheses are developed:

H₁: There is a linkage between differences in firms' strategic core resources and the nature and sustainability of firms' differential advantages.

H₂: There is a linkage between differences in firms' critical supporting resources and the nature and sustainability of firms' differential advantages.

H₃: There is a linkage between firms' combinations of strategic core resources and critical supporting resources and the nature and sustainability of firms' differential advantages.

Based on the discussion in the previous section, it can be assumed that the position of competitive advantage in terms of differential advantage can be identified by looking at a firm's success. Therefore, the following hypothesis (Doyle and Wong 1998) is developed:

H₄: Successful firms have sustainable differential advantage in terms of product characteristics, service factors, or overall way of running the business.

It can also be assumed that in successful firms, the lack of critical resources is not so significant and that successful firms place greater importance on possessing such critical supporting resources that are necessary for a firm to establish a favourable position on the market. Hence, the following hypothesis is proposed:

H₅: Successful firms have no major problems relating to the availability and possession of critical supporting resources.

Finally, it is assumed that a firm's success, when considered from the multi-dimensional perspective, can be explained partly by the differences in a firm's

resources and their management. It is evident, however, that a firm's success depends on several factors, which means that success cannot be explained exclusively through the resources. Consequently, it can be expected that, when looking at firms with a different degree of success, there will be a link between the total resource deployment and resource management and success. Therefore, the following hypothesis is presented:

H₆: Firm's success can be explained partly by the differences in firms' resources.

Conclusions

The paper proposes a theoretical framework to study resources as sources of differential advantage, a position of competitive advantage, as well as linkages between resources, competitive advantage, and success within local small-scale food processing firms. The framework can mainly be used in the planning and building of quantitative surveys to examine how to manage the resources into the competitive advantage, and further, into success in the long run. Analysing empirical data based on this framework will help to understand differences in resource management and reasons for success and failure between different small-scale food processors. It will also reveal how the expected hypotheses are supported by the data. Research findings based on this framework should indicate which resources (specific resources, capabilities, core competence, and knowledge) are the most clearly associated with a firm's favourable position on the market and, further, success. This information should in turn be useful to owner-managers in firms in order to change their strategies and cultures toward more successful business-making. Based on the research findings, it is possible to suggest some policy and managerial implications to strengthen the competitive position of locally-oriented food processing firms, which will help to improve the possibilities of the firms to succeed in the agri-food chain.

The paper also makes a distinction between the two fundamental resources - strategic core resources and critical supporting resources - to be adapted in the small-scale food processing context. An empirical research challenge is to study what kind of combinations of these resource types will be the minimum requirements for a favourable position on the market and what kind of combinations will result in the most successful market positions.

One important research challenge is to model the linkages between resources, competitive advantage, and success on the empirical basis. This can be done, for example, by structural equation modelling. In this paper, as well as in the study underlying the paper, small-scale firms are looked at as a group of their own. The aim is to study the differences between these firms and explain why some firms are more successful than other firms through the resource-based approach. However, it might also be fruitful to use the framework in conducting a similar type of survey among large-scale firms. By comparing data from small-scale firms with large-scale firms, a more holistic view of the resources and resource management of the small actors compared with the whole food industry setting could be created. In addition,

comparative data from other European countries would provide synergy in dealing with problems as well as challenges of the local small-scale firms.

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Why are organisational changes so difficult? A discussion of organisational knowledge creation¹

Egil Petter Stråte²

Abstract

External factors force firms in agro-food industry to act in new ways to maintain their economic viability. Development strategies and innovations require firms to change their patterns of action. The purpose of this paper is to discuss how organisational structures, especially within a firm, influence innovation processes. A model of organisational knowledge creation is presented. In addition, it is discussed how organisational structure may influence organisational conditions for knowledge creating processes.

Introduction

As a result of increased international trade, more industrial competition and increased concentration and influence on wholesaler/retailer groups in the agro-food chain, the agro-food processing industry is being forced with new challenges. These challenges in the processing industry are also due to changing consumer trends and pressure towards decline in agricultural support (Borch and Stråte 1999). These external factors force firms in the processing industry to act in new ways to maintain their economic activity.

The processing industry is meeting these challenges mainly through two strategies. Firstly, working for cost reductions and increased efficiency to increase their competitiveness – *cost strategies*. Secondly, working for increased income through innovation, product and market development – *development strategies*. Such strategies constitute the context of this paper. Examples of development strategies might be restructuring from conventional processing industry to new business instead of traditional structural rationalisation, development of niche products and “regional products”, development of small scale production and farm processing. These strategies require firms to change their patterns of action. This means that new products must be developed, new relations established, new markets

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approached, and new technology introduced; employees are given new tasks and working operations, resources must be reallocated, new resources are needed and so on. These are all innovative actions.

Innovation can be studied as social process that starts when a firm recognises that changes are needed, then develops strategies, and takes new actions; results in the firm's performance can be observed. The sequence "takes new actions" is my focus. The purpose of this paper is to discuss how organisational structures, especially within the firm, influence the creation of knowledge related to innovation processes. According to Schumpeter (1934) is development – or innovation – "only such changes in economic life as are not forced upon it from without but arise by its own initiative, from within" (quoted in Nelson and Winter 1982: p 277). A key process is to carry out new combinations. Innovation in this paper is understood as a change of a production system, expressed as new actions within a firm.

My theoretical perspective is that innovation is a question of knowledge creation, and creation processes are embedded in an organisational structure. My discussion is based on Nonaka and Takeuchi's (1995) theory of knowledge creation. I will first discuss the connections between organisations, knowledge, and knowledge creation, including a presentation of a model of knowledge creation processes in organisations. Then I discuss connections between organisational structures and knowledge creation. In a more complete version of this paper a case from a dairy company is applied to illustrate the model (Stræte 2000).

Theories on organisations and knowledge

My analytic unit is business organisations defined as companies or within companies. This perspective need some elaboration. There are many interpretations and perspectives on organisations (Morgan 1997, Scott 1998); in this study, I consider an organisation as a number of individuals who have something in common. They are able to act in co-operation – to carry out a co-ordinated action. Over time they develop their own identity. Nelson and Winter (1982) define individual skills as "a capability for a smooth sequence of coordinated behaviour that is ordinarily effective relative to its objectives, given the context in which it normally occurs". A characteristic trait is the problem or impossibility of explaining in words what happens when a skill is executed. We just do it. Skill-based human activity is automatic in the way that most of the details are executed without conscious purpose. At the organisational level, Nelson and Winter call the kinds of acting that are analogous to skills *routines*. Tasks and working operations in an organisation are expressed in routines and I regard these routines as characteristic of an organisation.

By *organisational structure* I mean how tasks and working processes are organised, how tasks and responsibilities are distributed. More specific organisational structures can be understood as channels of communication, information systems, the spatial environment of the organisation, guiding procedures and routines, systems of incentives (Argyris and Schön 1996).

Technology can be defined as having three components, according to Mitcham (1994): technology as type of objects – artifacts; technology as knowledge and skill in use; technology as knowledge of development. The knowledge components of technology are my focus here. Technology is important elements in a business organisation's activities; to stimulate innovations and new actions, development of this knowledge is a key factor in making use of technology to achieve the organisation's objectives. To treat technology just as artifacts limits our understanding of, for instance, the processes related to development of technology. The knowledge component of technology and the social context must be taken into analysis (Petroski 1997).

When an organisation has realised there is a need for new actions they can create strategies for these actions. What can organisations do? Organisations are not static but are influenced by changes in technology and market. As ideal-types, organisations can meet these changes in two ways: First, they may ignore changes in technology and market. There is a resistance against change. Routines represent stability and make the organisation conservative. The organisation adjust activities to be in line with their organisational routines. Second, they may change their patterns of action. Then there is a need for social reconstruction so the organisation are able to change routines and meet the challenges. If there is consciousness and self-knowledge about this, an organisation must determine what to do.³ Their findings and the operations which have to be done, I understand as strategies.

So far I have argued that knowledge is crucial to new actions. But what is knowledge? My starting-point is a distinction between reality and knowledge. Reality can be defined “as a quality appertaining to phenomena that we recognise as having a being independent of our own volition” (Berger and Luckmann 1966). In other words, reality can be considered as something outside myself. Knowledge then is “the certainty that phenomena are real and that they posses specific characteristics” (op. cit.). In other words, knowledge is knowing, thinking, acting or behaving in relation to reality. This definition gives everyday knowledge crucial significance.

Knowledge is complex and can be studied from different perspectives. A distinction between espoused and not espoused knowledge is useful. Nonaka and Takeuchi (1995) distinguish explicit and tacit knowledge, where explicit knowledge can be articulated in formal language and tacit knowledge can not. Nonaka and Takeuchi focus on the interactions between these two kinds of knowledge. They argue that these are a key to the dynamics of knowledge creation in the business organisation. And in my view, knowledge creation is crucial to changes of actions in organisations. Tacit knowledge is embedded in routines and a distinction between cognitive and technical tacit knowledge can be made. Cognitive is “mental models” shared by individuals. These models are, for example, like schemata, paradigms, perspectives, beliefs, viewpoints etc. Technical tacit knowledge includes more concrete know-how and skills (op. cit.).

³ When I consider the organisation as a subject, that may not be precise, in reference to my understanding of organisation. But for short I use organisation as subject.

Theory of knowledge creation

Changes in market demand can force organisations that are dependent on a market for their products, to do something to maintain their position. They must take new actions. Crucial questions are: about what to change and how make those changes? When knowledge is fundamental to action, knowledge creation is fundamental to new action. As Nonaka and Takeuchi (1995) write: “Understanding how organizations create new products, new methods, and new organizational forms is important. A more fundamental need is to understand how organizations create new knowledge that makes such creations possible” (p 50).

A main point here is that creation of new things in an organisation requires a change in the organisation itself. An argument for this view can be found in Levin (1997). He argues that transfer of technology must be regarded as organisational development because introduction of new technology implies a change in work routines. To change routines it is necessary to change the way of working, and that is organisational development.

Nonaka and Takeuchi launch a model for processes of knowledge creation. They take tacit and explicit knowledge as a starting point. Between these two kinds of knowledge there are conversions: four different modes (according to a traditional four-cell table). First, from tacit to tacit: *socialisation* where individuals, through interaction, adapt and share cognitive and technical tacit knowledge. Second, from tacit to explicit: *externalisation* where tacit knowledge is articulated into explicit concepts. Such expressed concepts may be metaphors, analogies, hypotheses, models, etc. This process is triggered by dialogue and collective reflection, according to Nonaka and Takeuchi. Third, from explicit to explicit: *combination* where concepts are systematised into a knowledge system. In my view this is the mode where hypotheses are “tested” in the organisation and are related to other explicit knowledge. Fourth, from explicit to tacit: *internalisation* where experiences from the other three modes are internalised into individuals’ cognitive and technical knowledge. The “circle” is then complete because individual tacit knowledge will be socialised with other individuals in the organisation. Actually, the model it is not a circle, since the new socialisation does not take place at the original starting point. New knowledge is created and this again starts a new process. A spiral is a better metaphor for this model.

An important element in this model is the inclusion of tacit knowledge in knowledge creation for new actions. Tacit or “everyday” knowledge is crucial to everyday life. By including tacit knowledge we also include the social context. As individuals, we have different contexts; this implies that knowledge is relative and dependent on context (Berger and Luckmann 1966). This is a broad and deep understanding of knowledge, because it is not something “outside” the organisation. Of course, some kinds of knowledge can be carried in from the outside such as explicit knowledge formulated in books etc, - but to be expressed in new actions, knowledge must be internalised in an organisation. Then social context is essential to the social construction of knowledge. That means we must understand the context in order to understand the knowledge situation in the organisation.

In addition to the epistemological dimension – knowledge, an ontological dimension is also included in this model. This is defined to be different levels related to organisations, from individual, group, organisation and to inter-organisation. The knowledge processes develop in a spiral between the levels. When these two dimensions are combined, a model to explain organisational knowledge creation is made. As Nonaka and Takeuchi put it: “... The mobilized tacit knowledge is “organizationally” amplified through four modes of knowledge conversion and crystallized at higher ontological levels. We call this the “knowledge spiral”, in which the interaction between tacit knowledge and explicit knowledge will become larger in scale as it moves up the ontological levels. “(op. cit. p 72).

I would emphasise that this model focuses especially on the idea that knowledge is *created within* the organisation. Knowledge is not something an organisation can collect or buy externally. It does not allow organisations to exist in a closed room without inter-organisational relations. I argue that this model is relevant because it allows scope for organisations themselves to be active actors in developing their own organisations, and that is relevant to the topic in this paper.

If we accept Nonaka and Takeuchi’s model as a way to understand how knowledge is created, the next step is to discuss factors that promote or hinder creating processes. In Nonaka and Takeuchi’s model there are five conditions at the organisation level that are required to promote the knowledge spiral (op. cit. pp 73-83). The first condition, *intention*, is defined as the organisation’s aspiration to its goals - in a business organisation usually as strategies. If an organisation has no visions or commitments regarding the direction they want to take, then it will be difficult to pass through the different modes of knowledge in creating processes at the organisational level. The second condition, *autonomy*, is understood as the ability of the individuals in the organisation to act autonomously as far as possible. The argument for this policy is that creativity will be stimulated and hereby increase the chance for unexpected opportunities at organisational level. Individual knowledge processes will be stimulated. The third condition, *fluctuation and creative chaos*, is when routines, habits and thinking in an organisations are challenged and exposed to interruptions. In the knowledge spiral the interaction between the organisation and the external environment are stimulated. The fourth, *redundancy*, is defined as the existence of information that goes beyond the immediate operational requirements of organisational members. That means different kinds of overlapping, such as information, functions, working tasks etc. In this way members in the organisations better share tacit knowledge; they will better understand each other, so that the knowledge creating processes will be speeded up. The fifth and final condition, *requisite variety*, requires the organisation’s internal diversity to match the variety and complexity of the environment. This will give knowledge creating processes in the organisation that are adequate to changes in environment. It is not enough to have diversity, it is also necessary to make use of it. That means that there must be a flow in the systems of information. In addition, the organisation must stimulate the articulation of different interpretations of new information. Then the organisation will have greater possibilities to choose among adequate interpretations.

Other organisational conditions that are relevant to knowledge creation could also be mentioned. A further discussion could be done of Nonaka and Takeuchi's selection of conditions, but that is not done in this paper. Organisations have different structures and different structures give different organisational conditions for knowledge creating processes. I make this as a basis for my further discussion.

Models of organisational structures

As discussed above, several factors are significant in the stimulation of knowledge creation processes. Organisational structures are important because they affect the viability of the governance modes differentially (Håkansson and Johanson 1998). When discussing organisational structure, models and images are often used (Morgan 1997, Nonaka and Takeuchi 1995). I understand these models as ideal types in a Weberian way (Weber 1971). In other words I regard them as constructions of ideas and not as descriptions of reality.

The context in this paper is agro-food processing industry. In general it is assumed that niche production, product development and market contact need a different type of adaptability than standard production does. There is a need to cultivate that which is unique and a need to be flexible. It is more the production system than the product itself that separate standard industry from niche industry.

A lot of organisational models have been launched, but according to Nonaka and Takeuchi (1995) two basic models have been discussed most: bureaucracy and task force. I argue that bureaucracy is a model for mass-production, while task force is a model for niche-production. Task force is flexible, adaptable, dynamic, and participative. I regard the model of task force synonymous with project model. I will use the models of bureaucracy and project in the further discussion and adapt them to the agro-food context.

An organisational model of hierarchy and bureaucracy has been discussed in many situations, with different perspectives, and with different names. Weber's introduction to bureaucracy is one example. Weber (1971) presented an ideal

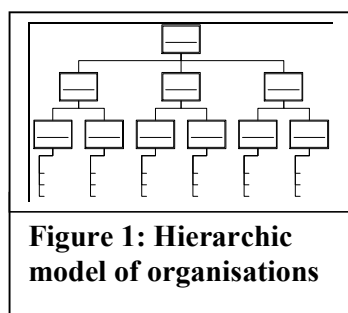


Figure 1: Hierarchic model of organisations

description of bureaucracy as model. Later it has been interpreted as a description of the best administrative form for the rational or efficient pursuit of organisational goals (Abercrombie et al. 1994). Characteristics of Weber's model of bureaucracy include a high degree of specialisation, defined division of tasks, a hierarchic structure of authority and predictable rules. Morgan (1997) used the image "organisations as machines". Common characteristics of this model are: highly

formalised, specialised, centralised, and standardisation of work processes (Nonaka and Takeuchi 1995). The model is hierarchic and organisational charts are often made like the one shown in figure no. 1. Boxes indicate departments or individuals as members of the organisation. Lines indicate formal relations. In this model, organisations are considered to be rational. Through management it is possible to find organisational solutions that solve (all) problems effectively (Morgan 1997).

Productivism can be described as mass-production where high efficiency is given priority in order to achieve low prices for the consumer. This model is inspired by Scientific Management (Taylor 1911), where use of “scientific” methods of designing work conditions, selecting workers with good skills, structuring working operations, etc., would increase productivity a lot and give more welfare. This concept was developed and led to mass-production. Fragmentation of tasks in production lines achieved dramatic increases in productivity. This mechanism is often characterised as Fordism. As Zuboff (1988 p 47) summarises it, “This formula has dominated the design of mass-production techniques throughout the twentieth century. Effort is simplified (though its pace is frequently intensified) while skill demands are reduced by new methods of task organization and new forms of machinery”. There seems to be no doubt that this hierarchic and bureaucratic model has been dominant in management in the 20th century. Morgan (1997) argues that classical management theory for design of bureaucratic organisations is widespread.

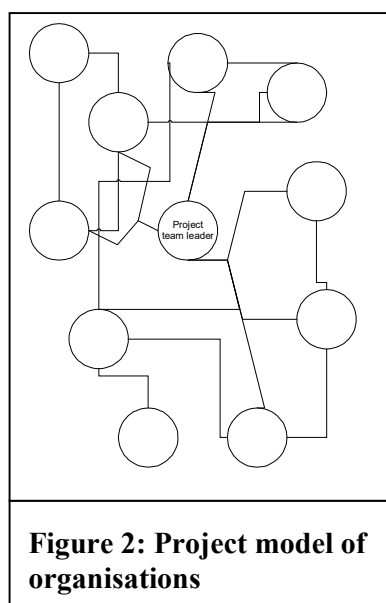


Figure 2: Project model of organisations

As a reaction to the classical hierarchic organisational model and a development of new focuses in science, several new “schools” have been launched. Examples are the socio-technologic perspective where working groups are in focus (Trist and Bamforth 1951, Trist 1981). It is not my intention to construct a common alternative organisational model from these schools, but just make it clear that there is a distinction between, on one hand, considering organisations as rational, instrumental and effective, and on other hand consider organisations as complicated, irrational and in dynamic interaction with their environment (Brunsson and Olsen 1998). March and Simon (1958) consider organisations to be less rational because of limited human capacity and introduced the concept of bounded rationality. To

find “the optimal choice” is not realistic.

One example of another perspective on organisations than “the rational” one, is the project model. In this model, teams are composed to solve specific problems or tasks. These teams are mostly ad hoc or limited in time. They are focused on the end product rather than on functions or departments of authority. The project model encourages flexible, innovative, and adaptive behaviour (Morgan 1997). Examples of tasks are development of a specific product and establishing or relocating a plant. An illustration of the project model is given in figure no. 2, where circles indicate individual members of the organisation or team and lines indicate most frequent interactions.

In this paper I regard the project model as an ideal type of model and independent of other organisational structures.

Towards a model of knowledge creation in organisations

A model of knowledge creation development in organisations might be as shown in figure 3. Changes in the environment force a need for new actions in organisations if those organisations are to maintain and develop their position, for instance, in the market. New actions often require innovations.

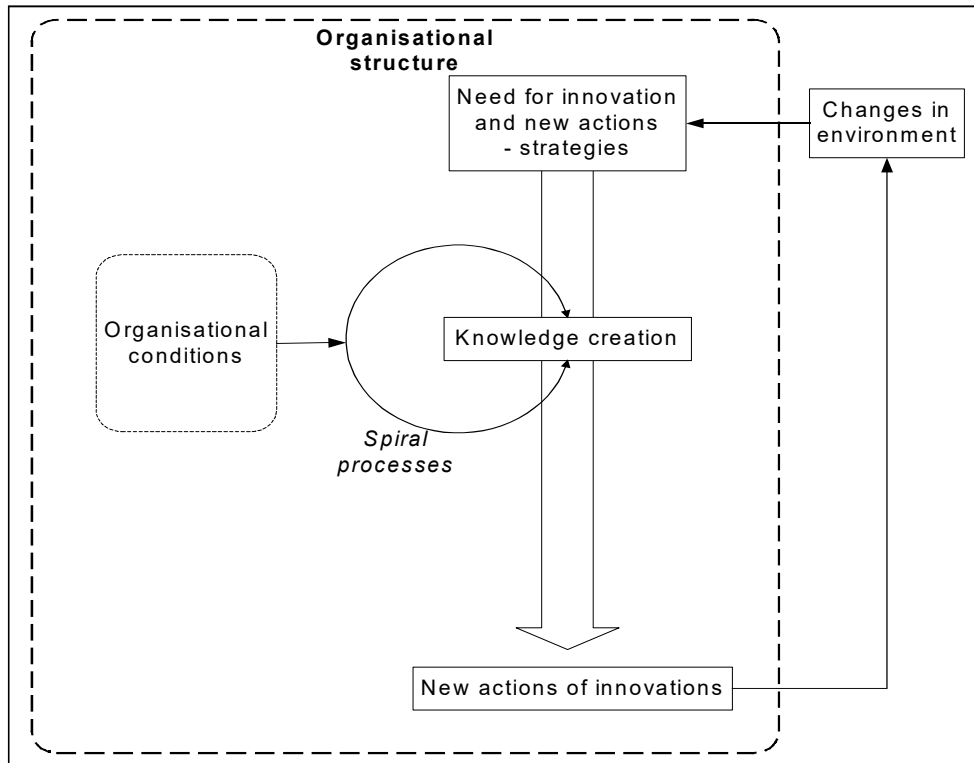


Figure 3 Model of knowledge creation processes in organisations

Strategies are often designed to give direction to the kind of actions that are needed. To be able to design such strategies, organisational knowledge creation is needed. As discussed above, knowledge can be created in a spiral process where knowledge is transitional moving between tacit and explicit knowledge in an epistemological dimension, and between individuals and the organisation in an ontological dimension. Different organisational structures stimulate organisational conditions for spiral processes to varying degrees. Organisational structure is indicated with a broken line, according to the definition of organisations as open systems.

It must be emphasised that this is a model. Nonaka and Takeuchi themselves say they present an ideal model for knowledge creating. In my model, I have added organisational structure. Of course other factors influence organisational conditions and spiral processes. Such factors could, for instance, be different kinds of resources (human, capital, technology etc), networks of relations, kinds of production etc. These are relevant subjects for further research, both theoretical and empirical.

Discussion of connections between knowledge creation and organisational structure

In this section I discuss how the hierarchic and the project model stimulate organisational knowledge creation. Organisational conditions mentioned by Nonaka and Takeuchi are the frames of the discussion.

How is knowledge treated in the hierarchic model? In Scientific Management we can distinguish between explicit knowledge and tacit knowledge. What Taylor (1911) calls scientific methods to select and train workmen and to make the best structure in working operations, must be understood as development of knowledge for managers in business organisations. On the other hand Taylor focuses on skills of workers. Tacit knowledge is rooted in skills. In my view, Taylor makes a sharp boundary between what we today call explicit and tacit knowledge. By stimulating separate development of these two kinds of knowledge, two organisational effects are gained: effectiveness and constancy. There seems to be no doubt about the effectiveness in this Tayloristic model (Zuboff 1988). Whatever we call the model, Tayloristic, productivistic, Fordistic, or hierarchic, the model has been successful in making the most of scale advantages and especially in industrial development. Several factors have contributed to that development, including knowledge.

The constancy effect needs a further explanation. By constancy I mean stability in the organisation, predictability in actions and in production. When an organisational task such as a working operation in a production line is defined and skilled workers are set to work, knowledge transforms are mainly limited to tacit-to-tacit. In an ontological perspective the knowledge spiral interacts hierarchic (worker – manager) in the organisation and not between the different levels (individual – group etc.).

Intention in a hierarchic model may be a problem. The problem is not the content of the intention, but how to implement the intention in the organisation. When tasks are specified for each member, the members will endeavour to solve those particular *tasks* (Weber 1971, Taylor 1911). Problems may turn up if the tasks are not congruent to the intention or strategy for the whole organisation. Lack of congruence may occur because of invisible intention and changing conditions for executing tasks. A problem may also arise related to *autonomy*. When certain tasks are defined to each member, the focus is on how each member is fit to solve that task. Members are recruited and trained to do a certain task, which is often described in detail (Taylor 1911). This stimulates standardising, also of members, and hinders autonomy. In a project model, intention does not have the same structural problems. Focus on the end product and not the functions, gives possibilities for all members to be included in the same vision. Success for all members depends, in principle, on whether the intention is achieved and not on how well each member fulfils his function. The question about autonomy and project model is not of a structural kind. On the one hand, less focus on functions and standards should give individual autonomy. But on the other hand, groups can

create a strong culture such as the worker collective (Lysgaard 1985), that does not stimulate individual autonomy.

Standardising in an organisation, also of members, does not stimulate *requisite variety*, but rather conformity. An argument against that point of view, is that variety can be found in a company as a whole. The problem is that interaction between functions or departments is not a tool in a bureaucratic organisation so that possibilities are not utilised. In the project model, variety is sought already in the building. This model then has structural advantages to fulfil the condition of requisite variety.

A problem arises when changes are to be made. Practice is institutionalised and it is difficult to get out of it or change it (Karlsen 1999). That sort of constancy tries to avoid and protect against changes (Lysgaard 1985). *Fluctuation and creative chaos* is not a challenge but a threat in the hierarchic model. In the project model, it is difficult to see the structural effects on the condition of fluctuation and creative chaos. On the one hand it seems more dependent on the cultural development within the team – how things are done etc. On the other hand, building an organisation with variety among members and with their different networks and relations should give a greater degree of “turbulent” situations that can be used creatively.

I argue that a hierarchic and bureaucratic organisation does not stimulate the transform of knowledge, either between tacit and explicit or in an ontological perspective. The reason is that organisational conditions are not adjusted to creation processes. An example could be the flow of information and communication in a hierarchic system of authority. When this flow follows the hierarchy it does not stimulate the interaction between groups or departments. *Redundancy* is not stimulated. From that it follows that tacit knowledge will be more or less isolated to small groups. Another example of lack of conditions to stimulate creation processes, is Taylor’s distinction between knowledge of scientific management and knowledge related to skills. These two forms of knowledge are considered as separate; they are also connected to different groups of members in the organisation (managers and workers). Transforms are not focused upon. In the project model, structural conditions are open to redundancy. That is because the team as a whole is focused on a task, and interaction between members is a part of the model. Then members will overlap in information and skills. From that it follows that teams or working groups give flexibility to changing individual motivation and capacity, and to changing external influence (Trist 1981).

The potential for the use of technology may not be utilised if the usability is not good enough. In a mechanic perspective, humans are considered as components in a system. Social and cultural aspects are not taken into account. This situation will bring low efficiency and productivity. Adler and Winograd (1992) argue that the process of design must be more user-oriented in order to increase usability. Especially designers have to get practical understanding of the use of new technology or, in other words, get socialised to tacit knowledge. To achieve that, user-participation in development processes is important. That means processes have to be organised

to stimulate participation from relevant groups and actors. A project model is better suited for that than the hierarchic model.

Conclusions

Innovations require firms in agro-food industry to act in ways to maintain their economic position. In this paper it is argued that new actions need new knowledge and a model to understand knowledge creation in organisations has been discussed. Different organisational structures give different conditions for knowledge creation processes. From that follows that knowledge creation is dependent on structure. In general, we can say that compared to a hierarchic model, the project model can be regarded as having greater structural advantages that stimulate knowledge creation. By stimulating conditions for knowledge creation, processes can be speeded up and organisations will be more able to be proactive rather than reactive to changes in environment. To be able to take new actions, new organisational structures may be needed. That is why product development is also organisational development.

To this conclusion I have two modifying comments. Firstly, there are factors other than organisational structure that influence organisational conditions for knowledge creation. Although they are not discussed in this paper, factors like organisational culture, management etc. seem to be of importance. But it can be argued that it is possible to stimulate through developing organisational conditions for creation processes within certain organisational structures, including hierarchic. Secondly, my perspective on organisational conditions is based on Nonaka and Takeuchi's work. There is a need for a deeper discussion about their choices of conditions, and empirical studies. This is beyond the range of this paper. I must emphasise I have not discussed the strengths and weaknesses in general related to the hierarchic and the project model, but have only pointed out how their structures influence knowledge creation.

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The Certification Mark as a Brand Support? An Evaluation by Consumers

Hans Martin Norberg¹

Abstract

This paper is based on a qualitative pre-study gaining insight into consumer experiences and attitudes towards non-company specific symbols on foodstuffs. The focus is the certification mark (a non-company specific symbol) as a strategy for differentiation in the food sector. Most of the reviewed literature concludes that non-company specific symbols have a positive influence on consumers' buying behaviour. According to a focus-group study among Norwegians, such symbols presently seem insignificant. Findings suggest prospects and limitations for the certification mark as a supplement to the brand.

Introduction

Brands often exist simultaneously (cf. co-branding) in a single product (Levin, Davis and Levin, 1996; Rao and Ruekert, 1994) and in many sectors, particularly in the food sector, brands often *coexist* with non-company specific symbols (Kapferer, 1997). The establishment of such symbols is a well-known strategy for differentiation in the food sector (cf. Kapferer, 1997). However, relatively little is known about how an "alliance" between a brand and a non-company specific symbol may influence consumer purchasing evaluations of food products (cf. Simonin and Ruth, 1998). Compared to the research effort devoted to the effectiveness of branding, the literature on brand equity and consumer behaviour makes scarce reference to research into this type of brand-symbol "alliance" phenomenon. As with the point made by Rao and Ruekert (1994) regarding implications of co-branding for consumers, it is reasonable to request empirical validation of the implications for consumer behaviour of synergistic alliances between a non-company specific symbol and a brand physically integrated on a product.

Consumer behaviour models generally assume that product preferences find their basis in product attributes as perceived by the consumer (Peter and Olson, 1996). This stems from the idea that products may be conceived as an array of informational cues (Cox, 1967) and each cue, intrinsic or extrinsic, provides a basis for developing impressions of the product (Steenkamp, 1990). The consumer's task

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in evaluating a product is to identify cues with *informational value* about product attributes that may have different consequences and values for them (Peter and Olson, 1996). Besides manipulation of the physical product features, attribute perceptions may be generated through *communication* such as positioning and image building. This is very much the purpose of an extrinsic cue such as a non-company specific symbol, namely to provide marketplace signals (Rao and Ruekert, 1994) and to communicate product attributes *common* to one or several product classes in order to establish a preference for these specific items of produce in the consumer's mind. Nedungadi, Mitchell and Berger (1993) conceptualize the consumer's choice process as consisting of three stages: 1) generation of alternatives, 2) consideration of alternatives and 3) selection of *an* alternative. Accordingly, an important issue is whether or not a certification mark is a salient information cue that may help products having such a cue to become included in the choice process and advance from one stage in the process to the next. In consequence, the purpose of an ongoing research, of which this pre-study constitutes a part, is to explore whether – and if so, when and how does a non-company specific symbol influence consumers' decision making with respect to choosing foodstuffs that are physically marked with both a brand and a non-company specific symbol?

The remaining part of the paper is organised as follows. Firstly, a review of selected literature is presented to justify the paper's focus as a contribution to theory. Secondly, certification marks are assigned to non-company specific symbols, and a definition unifying several categories of such marks is given. At the same time, arguments are presented for the potential benefit that a certification mark may represent a potential benefit to a brand. Subsequently, the potential benefits are related to challenges. In the two following chapters, procedures used for the focus groups are described and the most important findings are given. The final chapter concludes and suggests a next step for a quantitative research to further investigate the presented research issue.

Literature review

Only a few published studies are devoted to non-company specific symbols and their significance to consumers. These comprise studies of existing and potential seals and certifications of approval (Beltramini and Stafford, 1993; Parkinson, 1975), third party certification marks (Kamins and Marks, 1991; Laric and Sarel, 1981; Taylor, 1958), and quality labelling (van Trijp, Steenkamp and Candel, 1997; Verbeke and Viaene, 1999). All these studies are empirical. Three of them involve symbols for food only, one includes food among other products, while the two remaining do not specify products for the analyzed symbols. Below, parts of the studies are summarized according to the usefulness of the symbols to consumers in relation to the purpose of their rise.

Objective of non-company specific symbols. The point of departure of the studies represents a common view that regards a non-company specific symbol as a source of information having the *potential* to assist consumers in their decision

making. Broadly speaking, this function is either stated as a general aid (Taylor, 1958) or, more specifically, as a protection of consumer rights with regard to product selection (Laric and Sarel, 1981). Alternatively, and for quality labels in particular, the purpose of such symbols is perceived as a guide for selection of products with quality attributes above some general level (Kamins and Marks, 1991; Parkinson, 1975). Some of the studies combine these different viewpoints and consider a non-company specific symbol as a quality indicator that also serves to protect the consumer against confidence-reducing product quality (Verbeke and Viaene, 1999). The papers all try to highlight somewhat different aspects of what may be perceived as the fundamental question, namely: does the symbol achieve its purpose? Although this question is not raised by Taylor (1958), Taylor's paper provides a basis on which to answer such a question because it takes the discussion a step back and asks what objectives are sought by registrants of the marks.

Consequence of non-company specific symbols. Two conclusions can be drawn on the basis that the studies either support or contradict each other. First, a common conclusion for four of the seven studies (i.e. Beltramini and Stafford, 1993; Laric and Sarel, 1981; Parkinson, 1975; Verbeke and Viaene, 1999) is that consumers do *not* seem to know the actual meaning of certification marks. In some cases consumers attribute more meaning to the presence of such marks than is justified by the issuers of the marks (Parkinson, 1975). It is speculated that the influence of certification marks on consumer choice behaviour and the credibility associated with such marks is to some extent related to the misunderstanding of their meaning (Parkinson, 1975). The second conclusion points out possible conflicting views. According to Beltramini and Stafford (1993) the presence of a certification mark in an advertisement is not readily employed in assessing the believability of the claim in the advertisement. This conclusion seems to contradict Kamins and Marks (1991), who state that the kosher claim², in an advertisement for a familiar brand, resulted in a negative affect toward the advertisement. Kamins and Marks (1991) speculate that this negative affect is related to the kosher claim in particular, and cannot be expected to arise from other endorsements of a more general character. Yet, despite this reservation, the question remains whether different non-company specific symbols will influence the intention of purchasing the advertised object.

Based on an analysis of eighty certification marks, representing a classification of five types of certifying agencies, Taylor (1958) concludes that the benefit to consumers of most marks is merely *secondary* and indirect. Given Taylor's (1958) consideration, it is notable that five of the six reviewed studies conclude that non-company specific symbols have a positive and, in my interpretation, an apparently direct influence on consumers' buying behaviour. However, the seemingly positive influences take effect under certain conditions. These are: 1) Presence of a *familiar* seal or certification of approval, *absence* of informational cues other than the

² "When a food is labeled as kosher, it is deemed fit for consumption and has been processed in accordance with Jewish dietary laws ..." (Kamins and Marks, 1991, p. 178).

seal/certification, and prevailing misunderstanding concerning the meaning of the seals/certifications (Parkinson, 1975). 2) Consumers using third party certification marks perceive them as providing *valuable* information (Laric and Sarel, 1981). 3) Presence of a *familiar* brand in the advertisement in which the kosher claim appears as a third party certification (Kamins and Marks, 1991). 4) Consumers associating *assets* with the quality labels (van Trijp, Steenkamp and Candel, 1997; Verbeke and Viaene, 1999). In fact, the only research with a conclusion rejecting the idea that a non-company specific symbol represents an aid to consumers, is that of Beltramini and Stafford (1993).

This brief review has pointed out the need for further investigations into the kinds of circumstances that determine whether non-company specific symbols influence consumers' buying behaviour. Moreover, the review justifies questioning how this type of symbol may influence consumers' choice process.

Certification marks - definition, purpose and problems

The non-company specific symbols mentioned in previous parts of this chapter are all generic marks, and will hereafter be more specifically referred to as *certification marks*. A certification mark is a non-company specific symbol certifying that a product has certain characteristics, and the mark is used by several independent producers agreeing on common rules for producing and marketing their products (cf. Menard and Valceschini, 1999). *Non-company specific* means that identical products would be eligible for the mark "regardless of the brand name under which they are sold" (Bennett and McCrohan, 1993, p. 405). The term *mark* is used to distinguish from mandatory product labelling policies. Broadly speaking, the most important certification marks for foodstuffs are divided into quality marks, quality & origin marks, origin marks, and ecological marks. Although less widespread, we may add ethical marks (cf. the fair trade concept) and environmental marks.

Two perspectives give the grounds for why the acquirement of a certification mark ought to be worthwhile for the brand owner. These are, firstly, the idea that the product will become more uniquely and convincingly positioned through the mark as a more compelling point-of-difference for the brand (cf. Keller, 1998). Secondly, the idea that through a new product concept a certification mark may be considered by brand producers as "a base-line level upon which they build competitive equity through strong brands" (van Trijp and Steenkamp, 1998, p. 61).

Despite the prospects, the potential value added to a product by virtue of it having a certification mark must be related to the mark having attributes of its own perceived by the consumer to be relevant and trustworthy (cf. van Trijp and Steenkamp, 1998). In this connection, it is argued that *credence* attributes (Ford, Smith and Swasy, 1988) and associated symbolic images (Thakor and Katsanis, 1997) are typical for most of the certification marks for foodstuffs. Although having a potential for differentiation, the fact that certain characteristics cannot easily be verified (seen, tasted or smelled) in the final product represents a particular problem in communicating the presence of those characteristics to customers in a credible way (Andersen, 1994).

Method

The target market for recruiting participants to focus groups represented consumers doing their frequent shopping in grocery shops and supermarkets. Participants were randomly selected from the telephone directories for the capital city, Oslo, and the county of Akershus, i.e. a geographically stratified sample. At the end of the recruitment, 27 persons constituted three groups (“young adults”, “parents with children” and “elderly”) with 9 participants in each, cf. table 1.

Table 1 Group composition

<i>Group no.</i>	<i>Composition</i>
1	<ul style="list-style-type: none"> • 5 women, 4 men • 5 single, 3 cohabiters (marital status unknown for one person) • 22-30 years
2	<ul style="list-style-type: none"> • 5 women, 4 men • 6 married/cohabiters, 3 single • 28-37 years • 1-3 children, 1-17 years
3	<ul style="list-style-type: none"> • 6 women, 3 men • 5 not married *), 4 married • 50-65 years

*) Marital status is based on the participant’s own definition. “Not married” means most likely single.

A discussion guide was structured into a *general* part and a *specific*. In the general section participants were asked to describe their own shopping behaviour and experience. Among the questions were issues such as criteria for product choice and uncertainty related to the purchase of foodstuffs. The more specific section of the guide asked about attitudes towards certification marks. In this section participants’ knowledge of four certification marks (representing quality & origin, ecological and ethical marks) was tested as unaided and aided recall. Moreover the specific section focused on the influence of certification marks on the decision process, i.e. certification marks as a choice criterion, and the apparent proliferation of such marks.

Findings

Despite a few remarks on uncertainty regarding products, in particular from participants in group 1, the main impression is that participants to a large extent felt confident about the safety of food products available in the grocery trade. Parents did not express any exceptional concern. The general confidence was thanks to faith in both the public food control and the Consumer Council.

The introductory test, conducted as unaided recall, revealed that the knowledge of certification marks is lacking. Consequently, participants said they had problems to distinguish certification marks from other types of symbols and logos. According to the aided recall, the recognition of the certification marks was varying and in some cases more meaning was attributed to marks than is justified by the issuers of the marks. However, most participants understood what the marks were intended to communicate, but they did not always believe in them. It is evident that certification marks have a credibility problem and it is assumed that this problem is caused by a lack of differentiation as well as insufficiently advertized identity and objectivity of the registrants of the marks. Additionally, a lack of knowledge regarding the criteria for awarding a particular mark contributes to the problem – likewise a lack of proven superiority by a quality mark.

A certification mark awarded to the *majority* of products of a particular type will lose its effect. This is due to the fact that the majority of the participants' considered a mark's credibility to be closely linked to strict criteria of award and, hence, exclusivity. A certification mark on the package should be distinctive and include a minimum of information about the mark. In addition, if a certification mark had some form of *guarantee*, primarily related to intrinsic product qualities, the mark would be meaningful. In other words, for a certification mark to acquire significance in the choice process, the consumer must feel that the mark has greater personal relevance and value than it has today.

It is a general impression that taste and price is most important when choosing one food product in preference to another. Today, certification marks are neither of significance to consumers nor perceived as added value to the product. The relative importance of factors leading to choice is suggested in figure 1.

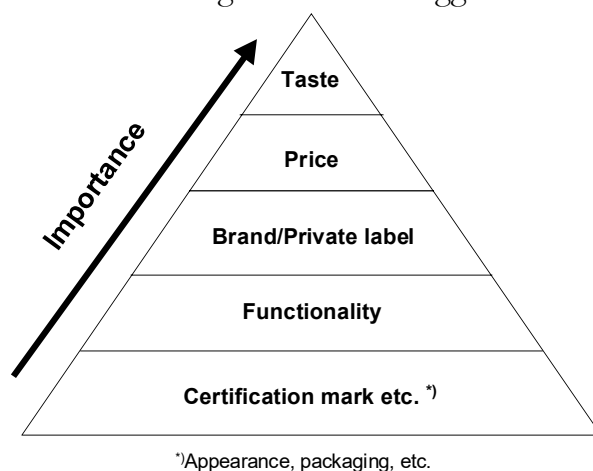


Figure 1 Relative importance of informational cues for choice

Regarding target groups, the fair trade (ethical) and the ecological marks are perceived as meaningful symbols by a few idealists. For such certification marks to be of significance to more shoppers, the focus-group participants believed that more emphasis has to be placed on fairness and conservation of the environment. However, such issues are assumed by adults to be more engaging to the younger

generation. Yet, the aided recall did not support such an assumption because it revealed that few participants in group 1 recognized the fair trade and ecological mark. While these two marks are believed to “speak” to idealists, other marks communicating origin and quality may be meaningful to the average consumer if communication of their meaning is improved.

Though discussions revealed that many participants were sceptical about the benefit of certification marks, participants considered primary produce – usually fresh food - as *the* most important category for which a certification mark could possibly make a difference.

Conclusions

Returning to the title of this paper, it is appropriate to ask whether the certification mark can then be considered a support to the brand? The answer is: “It all depends”. For the majority of the participants, certification marks seem to be anonymous and indistinctive. However, giving certification marks more publicity could change this situation, and could improve the position of brands and products if individual certification marks are implemented as a point-of-parity or, preferably, a point-of-difference. In any case, to be appreciated by consumers, attributes must be perceived as meaningful compared to the (normal) criteria associated with official approval of food production. As seen in this pre-study, many factors and conditions may influence the relationship between the use of a certification mark as a source of information and its antecedents and consequences. Further research should aim at finding a general relationship between variables in terms that allow aggregation over individuals.

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The Price of Cross Border Shopping

Randi Lavik and Arne Dulsrud¹

Introduction

It looks like the Norwegian tradition of shopping groceries, cigarettes, tobacco and alcohol in Sweden has become a problem of political significance. Even though it is hard to estimate the total extent of this kind of “import”, we know that many Norwegians are shopping in Sweden more or less regularly.

Two important tendencies have appeared during the last few years. One is that there are some indications that the price differences between Norway and Sweden have increased (Bakken and Henriksen 1999). Swedish prices have been harmonised to the Common Market, and a further fall in prices is expected there. The other tendency is that it looks like cross border shopping has been increasing, too. Currency data from a bank in Halden, shows an increase of 40 per cent in 1998, 40 percent in 1999, and 45 per cent the first three months of 2000 (Markedsrevy nr 8, 2/5-00). Even though this method of estimating cross border shopping has been questioned, the data seem to indicate an increase.

When cross border shopping reaches an unacceptable level, at least for some of the interests involved, it will increase the focus on a wide range of potential problems, like:

Governmental policy: agricultural policy, regional policy (low density populated areas), tax policy (general taxes, like VAT, special taxes, alcohol duties, environmental duties on fuel, canned duties, chocolate duties (luxury duty)) etc., competition policy, Norway is not a member of the Common Market, Import restrictions/regulations.

Producers, processing industry and retailers' behaviour: Low efficiency? Too little competition? Level of gross profit? High expenditures, Farmers' cooperatives?

Consumer behaviour: Whether consumers are price conscious or not, Norwegian consumers are used to high prices? Etc.

Previously, one could say that the absence of debate concerning food prices was related to welfare policy. As long as food expenditures were declining relative to total consumer expenditures (Engel's Law) in the post war period, public attention to food prices was almost non-existent, except for massive advertising by discount chains followed by a noisy debate in the mass media. What we now see is that the issue of food prices has moved from the realm of welfare issues into new areas.

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Now, food prices are linked to new discourses emphasising consumer issues, competition and public finance policy. Our assumption is that these new discourses change the foundation of financing agricultural policy, first of all by changing the legitimacy of using consumer prices as a financial instrument.

It is important to remember that Norway probably has one of the highest farm subsidy rates in the world. In 1997 the PSE (producers subsidy equivalents) was 71 per cent of the total market value in Norway, compared to 42 per cent in the European Union and 35 per cent in the OECD-countries (OECD 1998). Only Switzerland had a higher rate: 76 per cent. Like Norway, Switzerland is not a member of the Common Market. Together with import restrictions, this agricultural policy leads to consumer prices on agricultural products that are very high compared to other European countries. To what extent are these policies understood by ordinary people? Our hypothesis is that Norwegian consumers are not aware of the very complicated system of agricultural policy and its impact on the prices of agricultural products. In this paper we will look at different sources of data reflecting the status of the cross border issue. We will reveal some price differences between Norway and Sweden, we will show some results of correlation between consumers' attitudes towards farmers, towards agricultural policy and towards the consumers cross border shopping. Furthermore we will look at the consumers shopping in Sweden, and we will present the changes in food expenditures relative to total consumer expenditure in Norway and Sweden. In the end we will present some possible prospects for the future.

Price differences between Norway and Sweden

When we look at the PPP-studies (Purchase Power Parity), the difference in price-levels between the two countries was not that big (Norway=100, Sweden=88). However, if we look at a more typical food basket purchased across the border in Sweden, these grocery products are much cheaper in Sweden than in Norway. This basket contains a wide range of grocery products that are important in the Norwegian household, although not reflecting the average consumer pattern.

In November 1999, the prices of a number of significant grocery products were collected in Norway and Sweden. In Norway the prices were collected in Oslo and Halden, and in Sweden we registered the prices in Göteborg and Strömstad. Halden and Strömstad are two municipalities close to the border. We looked at the prices in 17 shops in Norway and 21 shops in Sweden. 52 products were chosen, 7 beef products, 5 pork products, 10 processed agricultural products, 6 poultry products, 15 dairy products, and 9 products of chocolate, drinks & tobacco. We believe that these are typical border shopping products. Border shopping products are products that consumers cross the border to buy because of substantial price differences. Many of these products are typical agricultural products. We also looked at producer prices where available. Furthermore, we registered the prices of 30 alcohol products. These registrations are presented and discussed more closely in our report (Lavik & Dulstrud 2000). It must be emphasised that the products chosen are not a representative food basket for the average Norwegian household,

but are typical cross border shopping products. However, the products chosen are significant products in Norwegian households.

Table 1 Differences in producer prices and consumer prices between Norway and Sweden. (Incl. VAT) Percent, Norway=100 (Positive sign: The price is lower in Sweden than in Norway)

	Producer price	Consumer price
Beef (pr kg)	45%	43% ²
Pork (pr kg)	47%	44% ³
Poultry (pr kg)		
- Eggs	42%	32%
- Chicken	65%	55% ⁴
- Turkey	(no registration)	52%
Dairy products		
- Milk	20%	41% (Low fat milk)
Feed pr 100 kg		
- Wheat	(no registration)	
- Rye	(no registration)	
- Barley	61%	
- Oats	53%	
Grain pr 100 kg		
- Wheat	62%	
- Rye	61%	
Processed meet products ⁵		51%
Poultry ⁶		55%
Dairy products pr kg ⁷		25%
Dairy products pr unit ⁸		23%
Chocolate, drinks & tobacco ⁹		39%

Source: Lavik & Dulsrud 2000

² Average differences of 7 products: Roastbeef, T-bonesteak, middle rib steak of beef, joint of beef, entrecôte, minced steak, minced meat.

³ Average differences of 5 products: Middle rib steak of pork, pork chop, spare rib (“nakkekoteletter”), roast leg of pork, spare ribs.

⁴ Average differences of 5 products: Fresh chicken filet, frozen chicken filet, fresh chicken, frozen chicken, chicken wings.

⁵ Average differences of 10 products: dinner sausage (‘falukorv’), wienerwurst, beefburger, ham, beef roll, bacon sliced, bacon, smoked sausage, salami, smoked ham.

⁶ Average differences of 6 products: Fresh chicken filet, frozen chicken filet, fresh chicken, frozen chicken, chicken wings, fresh turkey filet.

⁷ Average differences of 7 products: Brown cheese, white cheese Jarlsberg, white cheese 27%, edamer 27%, cream cheese 38%, cream cheese Høng, sugar.

⁸ Average differences of 8 products: Pizza Grandiosa, light milk, Letta 440 g (margarine), Yoghurt Litago 125 g, Yoghurt fruit 1 l, Kavli cheese spread, Philadelphia cheese spread, 12 big breakfast eggs 63-73 g.

⁹ Average differences of 9 products: Master Food Snickers 100 g, Coca Cola canned, Tea pr bag (Twinings Earl Grey 50 bags in Norway, 100 bags in Sweden), Light Beer (2,5% in Norway, 2,2% in Sweden), Beer (4,5% in Norway, 2,8% in Sweden), Petterøes mild nr 3 40 g tobacco, Rizla paper, Prince mild 20 cigarettes, snuff General.

The *producer price* is the price that the farmers receive for their products. These prices are a result of agricultural policies, which are very different in Sweden and Norway. In Sweden the agricultural policy is part of the Common Agricultural Policy (CAP) because Sweden is a member of the Common Market. In Norway there are annual agreements on agricultural producer prices and income (Agricultural Agreement). This agreement is required by the Basic Agreement for Agriculture, which was entered into by the Government and the producers' organisations in 1950. Market regulation required under the Agreement is largely managed by product-specific organisations (OECD 1993). The agricultural agreement costs between 10 and 12 billion NOK annually. The annual agricultural agreement for the year 2000 has not yet been settled because the farmers broke off the negotiations with the government.

Table 1 reveals considerable differences in consumer prices between Norway and Sweden. *Beef* and *pork* products are 43-51% cheaper in Sweden than in Norway. The main reason for these differences can be found in the left column, the differences in producer prices, where we find almost the same differences between Norway and Sweden for beef and pork. In general, agricultural policy explains the main differences between these products. However, the differences in consumer prices vary a lot. The biggest difference for beef is minced steak, where the prices in Norway are 60% higher than in Sweden, and the smallest difference is for middle steak of beef with a difference of 19% (Lavik & Dulsrud 2000). The biggest difference for pork products is bacon with a difference of 68%, and the smallest difference is for pork chops; 30% cheaper in Sweden than in Norway.

For *poultry* products we found the biggest average price differences; on average 55% higher consumer price in Norway than in Sweden. The difference in producer prices was 65% for chicken. Among the poultry products we also found the biggest price differences of all products: Chicken wings were 84% more expensive in Norway than in Sweden; on average in Norway the consumer price was NOK 96.11, and in Sweden NOK 14.93! The difference in producer prices cannot explain this substantial difference.

The difference between *dairy* products was less than for meat, on average 24%. Here the differences varied, too: The biggest was 43% for Edamer cheese, and the smallest was Pizza Grandiosa which is a Norwegian export product, maybe not exactly a dairy product, but this was 8% more expensive in Sweden than in Norway.

Grocery products of chocolate, beverages and tobacco were on average 39% more expensive in Norway, the most expensive was snuff General, which was 59% more expensive in Norway, and the smallest difference was Masters Food Snickers chocolate which was 20% more expensive in Norway than Sweden.

Some of these differences can be explained by different duties in the two countries, and some can be explained by the different VAT (value added tax). In Norway VAT is 23%, while in Sweden it is 12% for food articles. This indicates a potential drop of 8.9% in Norwegian food prices if the VAT in Norway was equal to that of Sweden, provided that the consumers benefited exclusively from such a

reduction. Sweden became a member of the Common Market 1. January 1995. 1. January 1996 Sweden reduced their VAT from 21% to 12%. It is also said that price differences between Norway and Sweden have increased in the period 1994 to 1998 (Bakken & Henriksen, 1999).

Aggressive Swedish price competition along the border

As we have pointed out above, we chose to identify the prices in Oslo and Halden in Norway, and Göteborg and Strömstad in Sweden. The reason for this was to find out whether the competition along the border had influenced the prices and given rise to intra country price differences. Our hypothesis was that Halden was cheaper than Oslo and Strömstad was cheaper than Göteborg.

Table 2 Price differences between regions, respectively in Norway and Sweden. Per cent. (Positive sign: the price is lower in Sweden than in Norway, negative sign: the price is higher in Sweden than in Norway)

	Price diff. Between Oslo and Halden Oslo=100	Price diff. between Göteborg and Strömstad GB=100	Price diff between Oslo and Göteborg Oslo=100	Price diff between Halden and Strömstad Halden=100	Average price diff between Norway and Sweden Norway=100
Beef	-1%	16%	38%	50%	43%
Pork	8%	20%	39%	47%	44%
Processed agricultural products	3%	18%	45%	55%	51%
Poultry	10%	9%	57%	53%	55%
Dairy products pr kg	3%	3%	22%	24%	25%
Dairy products pr unit	0%	0%	22%	23%	23%
Chocolate, drinks and tobacco	4%	-3%	40%	37%	39%

Source: Lavik & Dulsrud 2000

Our hypothesis was partly supported. We did not find any systematic differences between Oslo and Halden, but we found some differences between Göteborg and Strömstad, especially on beef and pork products. The conclusion is that Strömstad in the Swedish border area, kept the lowest prices.

One possible explanation was that Strömstad had more imported meat in their shops (from Ireland, Denmark, etc). These imported products were about 20% cheaper than the Swedish products (on average). It is important to emphasise that the imported articles were relatively few compared to the number of Swedish products, and that they explain relatively little of the average price differences between Norway and Sweden. When we compare only Norwegian and Swedish products, the differences are still tremendous. This is seen. e. g. in the differences between Oslo and Göteborg, as since Göteborg had very few imported meat products compared to Strömstad.

Therefore, retailers in Strømstad compete aggressively for Norwegian consumers. This is possible since the Swedish products are cheaper than the Norwegian, and certainly imported products from other EC-countries are extremely cheap.

Consumers' cross border shopping and attitudes toward the farmers

Norwegian consumers trust Norwegian food, and prefer this even if it is more expensive. But only to a certain extent. However, it is interesting to notice that the differences in prices must be very large and obvious before the competition forces affect consumer behaviour. Then the mixture of trust, belief and ideology favouring native farmers will be of secondary importance.

Norwegian consumers have great confidence in food produced in Norway, probably because they think it is more "clean" than agricultural products from other countries. At the same time 29 per cent of Norwegian households had bought groceries in Sweden in order to bring them home to Norway during the last six months (Gallup October 1999). 82 per cent *trust* food from Norway, 49 per cent *prefer* food from Norway, and 41 per cent *trust* food from Sweden.

Table 3 Trust in food from Norway and Sweden whether they have shopped in Sweden or not. Per cent (Gallup 1999)¹⁰

Shopped in Sweden or not (Yes – No)	Prefer food from Norway			Trust in food from Norway			Trust in food from Sweden		
	No	Yes	Tot	No	Yes	Tot	No	Yes	Tot
Is not true	15	26	18	3	3	3	20	14	18
Is partly true	32	36	33	16	13	15	31	29	31
Is absolutely true	53	38	49	81	84	82	34	56	41
Don't know	1	0	1	0	0	0	15	1	11
	100	100	100	100	100	100	100	100	100
	708	288	996	708	288	996	708	288	996
Sig Chi-square-test	P < 0.001			Not sig			P0.001		

Those who shop in Sweden have the *same trust* in food from Norway as those who do not shop. However, people who have shopped in Sweden *do not prefer* food from Norway in the same degree as those who have not shopped in Sweden for the last

¹⁰ In a representative survey from Gallup 1999, the respondents should consider three statements: "I prefer food produced in Norway", "I find the food I eat in Norway safe most of the time", "I find the food I shop in Sweden safe most of the time". The answer categories are: Not true, partly true, absolutely true.

6 months. The trust in food from Sweden shows an opposite tendency: Among those who have shopped in Sweden, 56 percent have absolute trust in Swedish food, while those who have not shopped in Sweden trust less. The causality is not considered.

Another survey about cross border shopping and attitudes towards farmers has been carried out by MMI, Norwegian Monitor. These data were collected in autumn 1999 and winter 2000 as a postal survey. The data are weighted by sex, age and regions.

We asked a question about how many times the respondents had been shopping in Sweden: *“If you look back at the last 12 months, how many times did you shop groceries in Sweden in order to bring back home?”*

During the last 12 months 45% had never been shopping in Sweden, 16% had been shopping more seldom than 3 times, 25% 1-3 times, and 13% 4 times or more.

In this MMI survey there were also some questions about farmers and agricultural policy.

Table 4 Which of these reasons do you think are the most important in supporting Norwegian agriculture? (More than one answer could be given). Proportion answer. Per cent (N=4084)

	Proportion yes
Keep low density populated areas	58%
Consider consumers need for safe food, a wide selection of goods, low prices, good quality, etc.	53%
Provide living condition in the different parts of the country	52%
Administer countryside,/preserve cultural heritage and variation	41%
Provide food security in state of preparedness	35%
Maintain a comprehensive agricultural production	33%
Reduce the costs, reduce the prices of agricultural products	33%
Preserve picturesque rural areas	22%

The most frequently cited reasons for supporting the farmers are connected with regional policy, like keeping low density populated areas (58%) and provide living condition in the different parts of the country (52%). Also the trust in the quality of Norwegian agricultural products has a high score (52%). This reflects the general trust in Norwegian food.

It is interesting to note that the argument “Reduce the costs, reduce the prices of agricultural products” was supported by as many as 33 per cent. If the prices had been low compared to other countries, it would have been understandable, but the prices of Norwegian agricultural products are not exactly low, as we have shown above. We interpret these findings as if the respondents are not reflecting on the price level in Norway and the peculiar connection to the substantial subsidies that the farmers receive from the government. These are questions that have just been introduced on the political agenda, especially the mass media have been focusing on these problems.

We have analysed the correlation between the attitudes toward the agricultural policy and the frequency of shopping in Sweden.

We found three bivariate relationships: The attitude as the dependent variable and the shopping frequency as the independent, fully aware that the causality may go in the opposite direction.

Table 5 Proportion of those who answered "yes" on the political attitude question, varying after shopping frequency to Sweden. Per cent

	Never	More seldom than 3 times a year	1-3 times	4+	Average
Keep low density populated areas	62	60	57	49	59 (3809)
Maintain a comprehensive agricultural production	36	33	30	26	33 (3811)
Reduce the costs, reduce the prices of agricultural products	30	32	34	41	33 (3811)

All significant at $p < .001$ (Chi-square-test)

The table should be read like this: 62% of those who have not been shopping in Sweden mentioned "keep low density populated areas", while hidden, not shown in the table, 38% did not mention this reason ($62\% + 38\% = 100\%$). The tendency is that the more frequently people shop in Sweden, the less they agree with agricultural policy as a tool of regional policy. There is also a negative relationship between the attitude to maintain a comprehensive agricultural production and the shopping frequency in Sweden. This means that those who support the farmers politically and ideologically, to a lesser degree shop in Sweden. They might be more political consumers?

The reduction of prices as a reason for agricultural support correlates positively with the cross border shopping frequency; the more people shop in Sweden, the more they believe that agriculture should be supported to reduce the prices of agricultural products. This could mean that they don't think that the billions in farm subsidies reduce the prices enough? Anyway, this answer does not indicate the same political ideology as the other two arguments, which correlate negatively with the shopping frequency. Reduced costs are a more individual interest, related to the household economy. These may be the more economical and instrumental shoppers?

Another attitude question towards agricultural policy was: *"Every year the Parliament votes between 10-12 billion NOK to the Norwegian agriculture. Do you think this is too much, just reasonable, too little or don't know?"*

Table 6 Attitude towards the agricultural subsidies after shopping frequency to Sweden. MMI 1999/2000. Per cent

	Never	More seldom than 3 times a year	1-3 times	4+	Tot
Too much	29	38	35	50	35
Just reasonable	40	34	36	28	36
Too little	12	9	9	5	10
Don't know	19	18	20	17	19
	100	100	100	100	100
	1694	609	946	498	3747

Sig for $p < .001$ (Chi-square-test)

There is a strong negative relationship between this attitude toward agricultural subsidies and shopping in Sweden. Among those who are frequent shoppers (4+) 50 per cent think that the farmers get too much, compared to 29% of those who have not shopped during the last 12 months. This means that the cross border shoppers agree less with Norwegian agricultural policy than those who have not shopped there.

Political attitudes toward farmers are related to cross border shopping patterns. Those who support the farmers on an ideological basis do not shop in Sweden to the same extent as those who care more about their individualistic needs and act in a more economical manner. Maybe the latter is the tendency of the future: Perhaps consumers will become more so-called rational and look for lower prices, especially if the differences between the prices in Norway and Sweden increase? In this case the consumers will be more individualistically oriented and sacrifice a more ideologically oriented consumer behaviour, like supporting Norwegian agricultural policy.

However, it is worth mentioning that only 1/3 (35%) of the Norwegian population think that agricultural subsidies are too high, while 38% think they are reasonable, and only 10% too low. About 1/5 has not formed an opinion. There is reason to believe that agricultural policy is difficult and complicated for the consumer to understand. If the agricultural policy is made clearer for the consumers and the citizens, it will be interesting to learn what direction consumer attitudes and behaviour will take. Again, will individual interests win over ideological behaviour?

Standard of living: Engel's law

One argument in the price-farmer debate has been that even if the prices in Norway are high, the proportion of household expenditures used on food is lower in Norway than in Sweden. Engel's law says that when the standard of living increases, the proportion of total household expenditures spent on food will decline. This is shown in the two figures from Norway and Sweden.

The price of the food will influence this proportion. In the Norwegian debate on food prices in general, and the price of agricultural products in particular, it is claimed that the high prices in Norway are not a big deal since the proportion of household expenditures spent on food is very small, and even smaller than in Sweden. When we look at the two figures, this seems to be true.

Table 7 Expenditure proportion of food over year in Sweden and Norway. Per cent ¹¹

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Sweden	17.7	17.5	17.2	16.3	15.3	14.7	15.1	15.2	13.9	14
Norway	15	15.3	14.9	14	14	14.2	13.6	13	12.6	12.3

In both Sweden and Norway there has been a small decline in the food proportion of total household expenditures. The food proportion should also be seen in connection with other product groups, what happens there with i.e. a price increase in product groups with low price elasticity, such as housing, energy or transportation costs? There was a significant reduction in the proportion of housing and energy costs in Norway in this period, while these have increased tremendously in Sweden. (WHY). Another big difference is the increase in the proportion of travelling and transportation costs in Norway, while these have been more stable in Sweden.

However, the *proportion* of food expenditures is one thing, another is the *amount of money* spent on food. In Sweden one-person households spent 15.700 SEK on food in 1996, while a couple with two children spent 45.100 SEK in 1996¹². For the period 1996-1998 one-person households spent 15.265 on food (Prices 1998), while couples with the youngest child between 0-6 years old (average household 4.08 – the most comparable with the Swedish category) spent 45.645 NOK (Prices 1998). If we don't consider the differences in currency and the fact that the prices are not from the same year, the money spent on food seems quite similar.

In Norway the average amount of money spent on food per household was 30.558 NOK (1996-1998, Prices 1998) (SSB¹³). Couples with children where the youngest child was between 7-19 years old spent 52.328 NOK on food. Since the prices are higher in Norway than in Sweden, the Swedes get more value for their money. This does not appear in the *food proportions*. An interesting question is therefore: What do the Swedish buy that the Norwegians don't? Maybe they buy products with higher price elasticity, like some expensive and luxurious raw materials, or more expensive processed products. Another explanation is that they buy larger quantities of food, but this is harder to believe. Anyway, a price reduction on food in Norway would be of some significance. One should also be aware that the amount of money spent on commodities will be influenced by the price level of the products in question, and the proportion spent on different

¹¹ Norway: expenditure proportion of product group (average expenditure per household), Sweden: Data from Sweden are based on the national budget. These two types of data are not quite comparable, so one has to interpret the differences between Norway and Sweden with care.

¹² <http://www.scb.se/ekonomi/priser/hushallensutgifter/utgiftsbarougbvaru.asp>

¹³ <http://www.ssb.no/emner/05/02/fbu/tab-1999-12-13-02.html>

product groups will also be influenced by the differences in relative price levels between the different product groups. The same logic will occur when we look at the development in proportions; different price index changes for different product groups will influence the relative proportion between the different product groups.

The reason why Norwegians spend a smaller *proportion* on food than the Swedes is probably a result of several factors. One we have already revealed: The Norwegians and the Swedes spend similar amounts of money on food, and when the proportion is smaller in Norway, the Norwegians have a higher total expenditure on consumer durables. Another is a very simple explanation; the Norwegians are better off than the Swedish.

Table 8 Gross domestic product at market prices per person in PPS (Nordic Statistical Yearbook 1999)

	1990	1992	1993	1995	1996	1997
Sweden	15762	15691	15663	17438	18031	18977
Norway	17514	19863	20247	21147	22827	24972

Since 1990 the gross domestic product, which is an indication of the standard of living, has been higher in Norway than in Sweden, and during the 90s the difference has increased.

Another indicator of the welfare of a nation, is the rate of unemployment.

Table 9 Unemployed aged 16-64 as % of labour force 16-64 (Nordic Statistical Yearbook 1999)

	1990	1992	1993	1995	1996	1997	1998
Sweden	1.65	5.25	8.25	7.71	8.05	8.03	6.48
Norway	5.3	6.02	6.05	4.95	4.87	4.1	3.16

The development of the rate of unemployment has been different in Norway and Sweden. In Norway it was rather high in 1990, 1992 and 1993. That was after the crisis in the economy had started in the end of 1987. In Sweden it was much lower in the beginning of 1990s, but whereas it has increased in Sweden, it has declined in Norway.

Therefore, if the Norwegians spend about the same *amount of money* on food as the Swedes, even with a more prosperous economy, it could mean that the high prices of food in Norway do influence Norwegian food patterns. Could this be an indication that food has high price elasticity?

Summary

In conclusion we can say that the Norwegians are not exactly suffering, even if the food prices are relatively high. However, one problem with an extensive cross border shopping is that it produces dissimilarities between different regions and different groups of people. We have a long border and many consumers have plenty of opportunities to cross it. Those who live too far from the border have

less access to lower price products. Another difference is that some households do not have a car (not many though), or for other reasons have less opportunity to cross the border in order to shop cheap agricultural product, tobacco or alcohol. The Norwegian retailers near the border are not very happy, and the state loses a lot of its incomes from taxes and duties.

The reasons for the tremendous price differences on some of the food products are many. The main reasons are different agricultural policies, district policy in a long and difficult country, different tax policies (VAT), different special assessments (alcohol, tobacco, canned duty, environmental duties, chocolate duty, etc.) between Norway and Sweden, protective duties (protectionism), etc. Another explanation may be the competition policy, i.e. the fact that Norway is not a member of the common market, and acts protectively against some products. Other explanations may be too little competition in Norway, low efficiency, the level of gross profit, a high cost level in general, etc.

And maybe the demand side has not been sufficiently price conscious, it has adjusted to the high prices. However, it seems like more and more consumers are becoming aware of the price differences between Sweden and Norway, and that they are acting “economically rational” in travelling to Sweden. This “rational” consumer behaviour, looking for low prices in an international market, may force the government, the farmers, the processing industry and the retailers to take action to meet this consumer challenge.

This development will not end here. When Sweden harmonises its prices to the Common Market, the price differences may become even bigger. We have a long border, and Norwegian consumers are very mobile. In a global world, governments cannot prevent their citizens from taking part in a competitive market. The cross border shopping phenomenon is also a part of a globalisation process. Håkon Thörn (1999) has discussed the difference between globalisation and internationalisation. While internationalisation is international capital circulating, but under the control of each nation, globalisation is superior to the national economies, and the national states are losing their control, both in a legal and economic sense. (This is the price of not being a member of the Common Market). So even if the food proportion of household expenditures in Norway is low, the high prices compared to other countries lead to a change in the public debate. The debate has shifted the focus from food prices as a part of a national welfare policy to a market oriented policy, and the consumers act according to the logic of the market.

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The Marketing Margin Calculations of Foodstuffs in 1997–1999

Marja Peltomäki¹

Introduction

The study examines the development of marketing margins and the consumer prices of foodstuffs over 1997–1999. Price margin calculations have been made for indicator products, which represent the most important food product groups.

Total margin refers to the share of the consumer price that remains to cover the costs and return demand of food industry and trade. Price margin calculations start from the producer price, i.e. the price paid by the food processing sector to the primary producer for the raw material. The price of the raw material paid by the producer, without tax, is calculated by deducting the price of the possible by-products (e.g. pelt, bran) from the producer price. Thus the direct support and support based on the production quantities to the farmers is not included in the producer price, while possible quality premiums and loss have been taken into account. By deducting the possible return on by-products from the producer price we arrive at the real purchase price of the raw material for the processing industry, including acquisition cost. This raw material price provides the most accurate picture of the price level at which food industry obtains the raw material.

In the study period 1997–1999 the value added tax on staple foodstuffs was 17% of the tax-free price and 14.5% of the taxable retail price.

Table 1 Structure of price margin calculation

Producer price
- value of by-products*
= Price of raw material (without tax)
+ value added tax paid to producer
+ margin of processing, transportation, packaging, whole-sale and retail trade
+ value added tax/sales tax on the margin
= Consumer price

* before 1996 a deduction on primary production was deducted from the producer price

Food market and calculations concerning different products

In 1998 private consumption in Finland grew by as much as 5.5%, in 1999 by about 3.5%, and in 2000 the growth is estimated at 4%. The share of food in the

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consumer expenditure of households has been about 13%, which is about FIM 19,000 per household. The share of food in consumer expenditure has been on the increase. Food consumption usually follows the general trends in the consumption so that food consumption grows more slowly than private consumption in general. In 1999, however, food consumption grew by about 2.0%. The rise in the consumer prices started to slow down in 1990. From 1994 until 1996 consumer prices increased by about 2%, in 1996 they rose by 0.6% and in 1997 by 1.9%. During 1997 food prices increased by 3.4%. In 1998 the consumer price index grew by 0.8% and the food price index by 0.3%. In 1999 the consumer price index rose but the food prices fell. In 1997–1999 the consumer prices of foodstuffs increased, on average, 18% less than the consumer prices of all commodities used in private consumption.

In the past two years the consumer prices of meat and meat products decreased by more than 2%. The price for milk fell by 2%, but the prices for cheese rose by a little over 1%. Cereal products, especially bread, cost more than before, and the prices of vegetables have risen by 9.5%.

The producer prices of foodstuffs fell between 1997 and 1999 in all products groups, except for fresh potatoes and eggs. The producer price for beef rose in the early part of 1997, but it fell considerably towards the end of the year, and thus the producer price development for beef was also negative.

Price margins for milk and dairy products

Increased competition between dairies and decrease in the prices have been reflected in the operations of companies in the dairy sector. The activities of dairy cooperatives have influenced the formation of the account prices. Whether the change in the account prices was positive or negative from the perspective of the farmer-owners depended on the dairy. The new competitive situation also lowered the consumer price as a result of the increase in the supply and price competition. First the competition in the dairy sector did not influence the producer price for milk in any significant way, but in 1999 the producer price fell, on average, by FIM 0.02/l.

In the cost calculation for dairy products the dairies use the quantities of whole milk and skimmed milk. From the beginning of 1995 the relative values used in the cost calculation were changed so that the value of skimmed milk accounts for 60% and that of fat for 40% of the producer price.

Table 2 Price margins of light milk and Edam cheese

	Formation of consumer price								Factors influencing in consumer price			
	1996		1997		1998		1999		96/97	97/98	98/99	96/99
	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	FIM/kg	FIM/kg	FIM/kg
Light milk												
Raw material	1,41	36	1,41	36	1,42	37	1,41	37	0	0,01	-0,01	0
Margin	1,90	49	1,93	49	1,89	49	1,83	48	0,04	-0,05	-0,07	-0,08
VAT	0,56	15	0,57	15	0,56	14	0,55	15				
Consumer price	3,88	100	3,91	100	3,87	100	3,79	100	0,04	-0,05	-0,09	-0,11
Edam cheese												
Raw material	16,62	45	16,62	45	16,71	44	16,54	44	0	0,11	0,20	-0,09
Margin	14,51	40	14,99	40	15,36	41	15,70	41	0,56	0,43	0,40	1,39
VAT	5,29	15	5,37	15	5,45	15	5,48	15				
Consumer price	36,42	100	36,99	100	37,53	100	37,71	100	0,67	0,63	0,21	1,51

Price margins for meat products

The animal disease crisis that affected the meat sector in spring 1996, the so-called mad cow disease (BSE) led to a collapse in beef consumption throughout Europe. During the crisis beef surpluses grew and producer prices fell, as many countries outside the EU closed their borders against European beef. The BSE scandal did not lead to any significant decrease in beef consumption in Finland, and it had no direct impact on the producer prices.

The crisis on the Russian market and termination of exports caused serious difficulties in the EU meat sector in 1998. Especially the pigmeat market was very strongly affected due to the rapid growth and the problems on both the Russian and Asian export market. This led to a decrease in the producer prices as well as consumer prices. Crisis in pig husbandry increased the pressures to import cheap meat from Europe as new markets were searched for in the EU area at extremely low prices. The entry of Danish ham to the Finnish Christmas ham market at giveaway price led to competition between products that clearly belonged to different price groups. The producer prices for pigmeat have fallen more rapidly than in the case of beef. Depending on the part of the carcass, the price for pigmeat raw material fell 14–18% in 1999, while the consumer prices for pigmeat fell by only 1–8%.

Table 3 Price margins for beef

	Formation of consumer price								Factors influencing changes In consumer price			
	1996		1997		1998		1999		96/97	97/98	98/99	96/99
	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	FIM/kg	FIM/kg	FIM/kg
Roast beef												
Raw material	11,41	22	10,59	21	11,45	23	11,52	23	-0,96	1,01	0,08	0,13
Margin	32,38	63	31,71	64	30,64	62	30,88	62	-0,78	-1,25	0,28	-1,76
VAT	7,44	15	7,19	15	7,16	15	7,21	15				
Consumer price	51,23	100	49,49	100	49,25	100	49,61	100	-2,04	-0,28	0,42	-1,90
Shredded roast												
Raw material	11,41	20	10,59	19	11,45	21	11,52	21	-0,96	1,01	0,08	0,13
Margin	36,58	65	35,34	66	34,19	64	34,27	64	-1,45	-1,35	0,09	-2,70
VAT	8,16	15	7,81	15	7,76	15	7,78	15				
Consumer price	56,16	100	53,74	100	53,40	100	53,57	100	-2,83	-0,40	0,20	-3,03
Minced beef												
Raw material	11,41	35	10,59	33	11,45	35	11,52	35	-0,96	1,01	0,08	0,13
Margin	16,63	50	16,74	52	16,41	50	16,29	50	0,13	-0,39	-0,14	-0,40
VAT	4,77	15	4,65	15	4,74	15	4,73	15				
Consumer price	32,81	100	31,98	100	32,60	100	32,54	100	-0,97	0,73	-0,07	-0,32

Table 4 Price margins of pigmeat

	Formation of consumer price				Factors influencing changes in consumer price							
	1996		1997		1998		1999		96/97	97/98	98/99	96/99
	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	FIM/kg	FIM/kg	FIM/kg
Chops												
Raw material	7,64	22	8,02	23	7,20	20	5,98	18	0,45	-0,96	-1,43	-1,94
Margin	21,28	63	21,89	62	22,39	65	21,67	67	0,71	0,59	-0,84	0,46
VAT	4,92	15	5,08	15	5,03	15	4,70	15				
Consumer price	33,85	100	34,99	100	34,62	100	32,35	100	1,33	0,43	-2,66	-1,76
Tenderloin												
Raw material	7,64	14	8,02	15	7,20	14	5,98	12	0,45	-0,96	-1,43	-1,94
Margin	36,67	71	36,32	70	36,15	71	34,03	73	-0,41	-0,20	-2,48	-3,09
VAT	7,53	15	7,54	15	7,37	14	6,80	15				
Consumer price	51,85	100	51,88	100	50,72	100	46,81	100	0,04	-1,36	-4,58	-5,90

Price margin for eggs

The main problem in egg production in Finland is the excess production in proportion to the domestic demand and low producer prices. Between 1996 and 1999 the consumer price for eggs varied from FIM 10.60/kg to 11.29/kg (Table 5). The consumer price increased the most in 1998, by 5%. During the EU membership the raw material price was at the highest level in 1996, when a kilo of eggs cost FIM 4.18. In 1999 the raw material price fell to FIM 3.81/kg. In 1996–1999 the price margin for eggs rose by 3%. The raw material price accounts for about a third of the price for a kilo of eggs, the share of processing and trade is about a half, and the rest is tax.

Table 5 Price margins for eggs

	Formation of consumer price								Factors influencing changes in consumer price			
	1996		1997		1998		1999		96/97	97/98	98/99	96/99
	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	FIM/kg	FIM/kg	FIM/kg
Raw material	4,18	38	3,62	34	3,84	34	3,81	33	-0,66	0,26	-0,04	-0,43
Margin	5,19	47	5,44	51	5,66	51	5,84	52	0,29	0,26	0,21	0,76
VAT	1,59	15	1,54	15	1,62	15	1,64	15				
Consumer price	10,97	100	10,60	100	11,12	100	11,29	100	0,43	0,61	0,20	0,37

Price margins for cereal products

The changes in the operating environment resulting from the EU membership and the adjustment to these affected very strongly the whole cereal sector. Changes in the market situation have become a significant factor in sectors that used to operate for the most part on markets protected by border controls. During the whole adjustment period strong pressures have been directed, in particular, at the pricing of products in the flour-mill industry.

Table 6 Price margins for cereal products

	Formation of consumer price								Factors influencing changes in consumer price			
	1996		1997		1998		1999		96/97	97/98	98/99	96/99
	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	FIM/kg	FIM/kg	FIM/kg
Wheat flour												
Raw material	1,09	32	1,02	28	1,00	26	0,97	25	-0,08	-0,02	-0,04	-0,14
Margin	5,19	47	5,44	51	5,66	51	5,84	52	0,21	0,35	0,02	0,59
VAT	1,59	15	1,54	15	1,62	15	1,64	15				
Consumer price	10,97	100	10,60	100	11,12	100	11,29	100	0,12	0,33	-0,01	0,43
French bread												
Raw material	0,68	5	0,64	6	0,63	5	0,68	6	-0,05	0,01	0,06	0
Margin	9,52	80	9,07	79	9,30	80	9,41	79	-0,53	0,27	0,1	-0,13
VAT	1,73	15	1,73	15	1,73	15	1,73	15				
Consumer price	11,93	100	11,44	100	11,66	100	11,83	100	-0,57	0,26	0,20	0,12
Rye bread												
Raw material	0,70	4	0,65	4	0,63	4	0,60	4	-0,06	-0,02	-0,04	-0,12
Margin	9,52	80	9,07	79	9,30	80	9,41	79	-0,13	0,15	0,70	0,73
VAT	1,73	15	1,73	15	1,73	15	1,73	15				
Consumer price	11,93	100	11,44	100	11,66	100	11,83	100	-0,30	0,13	0,67	0,61

Price margin for fresh potatoes

Since 1996 the consumer price for fresh potatoes has varied by 4–37% (Table 5). The variation in the consumer price is caused by the quantity and quality of the potato crop each year. The consumer price was the lowest, FIM 2.80/kg, after the good potato crop in 1996 and the highest after the poor crop and harvesting losses in autumn 1998, when the consumer price was FIM 4.87/kg. The difference between the lowest and highest consumer price is more than FIM 2/kg (43%).

Table 7 Price margin for fresh potatoe

	Formation of consumer price								Factors influencing changes in consumer price			
	1996		1997		1998		1999		96/97	97/98	98/99	96/99
	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	%	FIM/kg	FIM/kg	FIM/kg	FIM/kg
Raw material	0,65	23	0,66	23	1,00	28	1,29	26	0,01	0,40	0,34	0,74
Margin	1,75	63	1,82	63	2,04	57	2,87	59	0,08	0,26	0,97	1,31
VAT	0,41	14	0,42	14	0,52	15	0,71	15				
Consumer price	2,80	100	2,90	100	3,56	100	4,87	100	0,12	0,77	1,53	2,42

Conclusions

The opening of the Finnish food market as a result of the EU membership increased the impact of international markets in Finland. The development of the domestic prices depends on the level and trends in import prices. Even if in most sectors the share of imports in the consumption is quite low, the effect of imports on the price level of the domestic products may be considerable (Food industry memorandum 2000,5).

In 1997–1999 the consumer prices of food rose, on average 18% less than the consumer prices of all commodities used in private consumption. In 1999 the consumer price index grew by 2.0%, but the food prices fell by 0.2%. The decrease in the prices of especially meat and dairy products influenced this favourable development from the consumer perspective in a significant way. The impact of these products on the price of the food basket has increased, as the share of meat and dairy products in the food consumption in monetary terms is as high as 38%.

Retail prices can be considered to have adjusted to the changes due to integration already in the early part of 1995. The prices fell until the latter part of 1995, but the most dramatic change occurred in the beginning of January 1995. During the EU membership the variations in the producer and raw material prices in both Finland and the EU have influenced the producer prices.

The National Food Administration has made detailed studies on food prices in different regions as well as within regions. Food prices also vary depending on the location of the store. The group “nutrients” in the consumer price index may also be used to examine the price development. However, this includes products of both domestic and foreign origin, and thus this group alone does not provide an accurate view of the effect of the EU membership on food prices (Kettunen 1997). One reason for the price variation is the normal growth in the demand. The disposable income of consumers has increased considerably, which has increased the demand for foodstuffs to some extent, even if the effect of income on foodstuffs is usually quite small.

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Mapping the Price of Food – Norwegian Dairy Products

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Abstract

Much attention has been given to the farmer's share of the market price – and this share has typically fallen over time in most developed countries. This paper presents the main results of an empirical study of the price-margins in Norway for dairy products, from the farm-gate, through the various intermediary processes of processing and distribution, to grocery store retailing. The price-margin is defined as the difference between the sale price and the agricultural in-put cost. The price-margin then covers the cost of all other in-puts and any profits. Focusing upon single goods, and adjusting for taxes and subsidies, we follow the finished retail product back to the farm-gate using observed market prices from 1983-1999. We then aggregate the results up to the dairy goods in total. The Norwegian results differ somewhat from the results in many other countries, the main difference being that the producer's share has not fallen during the given time-period 1983-1999.

Introduction

Price-margin studies are performed in many countries. This type of study has two main functions, first of all as monitoring studies, such as the Swedish studies from Livsmedelsekonomiske Samarbetsnämndens indexgrupp, that has traced price indices for various intermediary agricultural products and inputs since the seventies. When the studies show unexpected results, this prompts further investigation. The second function is simply as part of gathering data for further analysis. This present project incorporates both functions. Establishing a permanent monitoring of food related price developments in Norway, has recently been discussed (Strøm, 1999).

The project is financed through The Norwegian Research Council (NFR), through the Culture and Society section, from the program for Living Conditions, Development and Restructuring in Agriculture. SIFO is co-operating with the Foundation for Research in Economics and Business Administration (SNF) in Bergen, with Frode Steen and Tommy Staahl Gabrielsen. The project has four parts, and runs from 1999-2001. This paper covers the empirical price-margin studies for milk, while the results for beef and pork will be presented later this fall. The data that have been collected will also be used to test for market power,

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focusing upon the vertical relations in the distribution channel (Steen, forthcoming, based upon Steen, 1999). In addition, SIFO has done a smaller qualitative project on the introduction of two new non-coop dairy companies (Aas 2000, forthcoming), and SNF has an ongoing project relating to private labels in grocery retailing. This price-margin study is a continuation of Strand (1996), and the parallel project from the Norwegian Institute for Agricultural Economic Research, NILF (Nævdal, 1996). In Strand (1996) price-margins were calculated for dairy, beef and pork for 1983-1995, and for fruit and vegetables in 1994.

The paper will first briefly discuss some of the numerous methodical challenges such studies offer, followed by a short presentation of some of the main changes within the Norwegian Food system during the period. We then present the main results for the dairy products in total. We further analyse the results for the two main groups of dairy products, and we compare the results both between the two groups and with the results for the dairy group in total. Using single goods, we investigate how the changes in public policies affect prices. The full paper is available in English from SIFO, Strand and Aas (2000).

Methods

It is obvious that the choice of products in the study will affect the results. It may be less obvious that the point of departure for such studies will also affect the results – two main methods are food baskets and commodity studies. Food baskets entail following specific consumer products back to the producers of the agricultural commodities that make up the ingredients in the products, while commodity studies attempt to follow the various uses of the farm-gate commodity to final consumption. In this study we combine the two approaches, by following key consumer goods within commodity markets, back to the producer, presenting results for both single goods and for the commodity group in full. Food baskets will emphasise the price structure for the main consumer goods – i.e. what most people eat, and may include imports. Commodity studies will emphasise the distribution of total income within the distribution channel, and will present the farmers total share of the final sales income – including exports. Few studies actually encompass the entire food basket or farm-gate share, so that most studies are only partial in this regard. The other participants in the distribution channel will always be misrepresented in the study since they market, or consume, other product combinations than the product combination chosen at the point of departure.

Calculations of the price-margins are based upon prices that have been gathered from each stage in the distribution channel. The retail price minus the purchase price for the agricultural input factor gives the gross margin for a stage in the distribution channel of a product. We call this gross margin for a price-margin since it is derived from the prices of single products. The price-margin covers all the other input factors - and profit - other than the purchase price for the agricultural input under observation. Due to the lack of input costs for the farmer, the producer's price-margin is in reality merely a residual, and is noted as such in the

figures. We emphasise that using the farm-gate price is the most common way to estimate the farmers' share, but this is not a true price-margin.

The price-margins are presented both as shares, and in nominal kroner. The share shows the development in the price-margin relative to the sum of the price-margins. These shares will add up to 100. The shares show the distribution of the flow of money through the distribution channel. Changes in the shares over the course of time will show changes in the distribution of the flow of money between the stages. The results are presented primarily in the form of shares, and this makes comparison over the course of time and between the different products easier. Usually time-series of nominal prices are deflated. Since we are interested in the differences in the price developments over time between the different levels in the distribution channel, finding a good price deflator is difficult. One cannot use a common one, such as a Consumer Price Index (CPI), because that would not reflect the differences in price developments for the different levels. One could use deflators that were appropriate for each level in the distribution channel – but it is difficult to find deflators that exactly match the different levels. A priori determining how much a price reduction at the farm-gate “should” be reflected at the grocery store retail level requires assumptions about how large the mark-ups “should” be. In addition, so far this discussion has not included the effects of demand and supply elasticities, or the degree of competition in the market. To complete the confusion, partial analysis is complicated by the continuous changes in public policies, other costs and so on. Steen's follow-up study will answer some of these questions.

Other methodological choices are either inherent within the distribution channel or have external causes. Inherently following the process from farm-gate product to retail product forces you to make certain choices:

- finding comparable units of a product; this is a challenge for the products with a certain level of processing, like cheese
- the treatment of production processes in which a raw material results in more than one end product, like processing input milk to skim milk and cream
- refinery processes in which more than one raw material is involved, like yoghurt with fruit.

In these calculations, the above mentioned issues have been handled by starting with a unit of the finished product at the retail level, and following this product back to the required amount of input milk at the farm-gate necessary to attain the finished product. When two or more products result from the same processing, the common input costs have been apportioned between the products by the amount of finished product at that level. Note that this method allows the mark-up to vary between the products that result from a common process. There are only two other alternative ways to calculate separate mark-ups, either by holding the mark-up in nominal kroner constant for all the products, or by holding the percentage mark-up constant. Several dairy production processes have cream as a concomitant product,

the total required input for cream is adjusted accordingly, and butter is calculated from the cream figures.

Externally founded methodological problems include subsidies, taxes and trade barriers. We have:

- added price supports and subtracted taxes and fees, from the price-margin where they occur. We are therefore focusing upon the distribution of the total cash flow within the distribution channel, and not just the market income
- have not explicitly included the effects of trade barriers, though subsidised exports have been an important part of regulating the market in Norway, and tariffs (earlier quotas), have afforded an almost completely insulated market for certain agricultural commodities, though this effect has been reduced in recent years.

A more detailed discussion of the methodological aspects may be found in Strand and Aas (2000), and in Norwegian in Aas and Strand (2000) and Strand (1997).

Several data sources for the prices in the stages of the distribution channel have been used. These include selection surveys such as the CPI from Statistics Norway, price lists and statistics from TINE Norwegian Dairies, the Norwegian Farmers Meat Marketing Association and the Budget Committee for Agriculture. Some data has also been gathered in directly from other participants in the market. Different forms of public publications, such as White Papers (st.prp) have also been used.

Previous research in this field includes Norwegian studies, and similar studies have been done in many other countries. For example, Sweden, Finland and the USA have been active here. A recent Finnish study, Peltomäki (2000), shows falling producer shares in relation to the grocery retail price – excluding the effects of subsidies. These studies are usually published in the native language, and are often not published as reports as such, but exist as unofficial papers or in government statistics. This complicates international comparative studies. In addition even minor differences in methods may lead to substantial differences in the results. We briefly present some of the Norwegian studies here, a more extensive survey may be found in Norwegian language report, Aas and Strand (2000). The NILF study by Strøm (1999) is the most recent Norwegian study. This study especially focuses upon the retail level, following commodity groups from the farm-gate to the retail level. The classic Norwegian study, Sagelvmø and Nesheim from 1968, can be mentioned in particular, having inspired much of the following work. Others include Haglerød and Gladhaug (1996) and Gustavsen (1995), Kvakkestad (1972), the Agricultural Co-operative's Joint Office (Landbrukssamvirket, 1984,1987a, 1987b,1988). Sweden has had other series of studies, such as the ones from Lantbrukarnas Riksförbund (1993). An OECD (1981) report from a conference on the subject, gives a broad presentation of the many possibilities, and the variation in such studies between countries.

The Changing Norwegian Food System

The time-series covers a period with substantial changes within the Norwegian food system. Agricultural policy has seen many changes, such as the move away from price supports towards direct payments, and other policy measures that attempt to reduce distortion of production. The restructuring of trade policy after the Uruguay round will continue to affect the competition in the market. Substantial restructuring within the farmers' co-op system and the decline in the number of farms are other salient changes. This period has also been a period of change for the food-industry, with tougher competition, stronger and more argumentative retail chains, and the possible threat of increased foreign competition. The Norwegian Dairy Co-op, TINE, has seen the establishment of new competitors, such as Synnøve Finden (hard cheese and other products), and also non-co-op, nevertheless very small, dairies. The retailers and wholesalers have been both horizontally and vertically integrated during this period, so much so that only 4 major organisations remain. Norwegian retail chains are forming international alliances, promising more drastic change when trade increases. These organisations have increased their bargaining power versus their suppliers in the food-industry and the farmers-coops (Jacobsen and Dulsrud 1994), though the idea of counter-vailing power has been challenged by Dobson and Waterson (1999). The introduction of discount stores in the eighties is another important development. During all these processes, a certain amount of rationalisation has also taken place, some of it a direct consequence of the changes that have already been discussed. The various stages of production and distribution in the distribution channel have experienced different degrees of rationalisation during this time. There is every reason to expect substantial changes in the price-margins during this period.

Table 1 Dairy product consumption pr capita

	1983	1985	1990	1995	1998	1999
Milk	177,14 l	171,93 l	159 l	143,85 l	128,57 l	121,54 l
Yoghurt	3,21 l	3,23 l	4,16 l	5,42 l	6,65 l	6,72 l
Cream/Sour Cream	7,55 l	7,78 l	7,87 l	7,78 l	8,13 l	8,22 l
Cheese (all kinds)	12,42 kg	12,69 kg	13,37 kg	14,77 kg	15,1 kg	14,75 kg
Butter/Margarine	4,66 kg	4,73 kg	3,99 kg	4,05 kg	3,93 kg	3,89 kg

l = litre, kg = kilo

Source: Annual reports TINE NM BA

Norway shows the typical pattern of a falling budget share for food – from 29,6% in 1967 to 12,9% in 1996-98 (Statistics Norway). Real incomes have also risen during this period, and there has also been some change in consumption patterns, as shown in the table above. This is only an overview of some of the changes that have taken place during the past 20 years, and with so many changes taking place at once it is difficult to isolate the effect of one specific change. This has bearing upon the interpretation of the results. As expected, the mark-ups do fluctuate during this period, but not always in the expected direction.

Before we present the results, we want to emphasise an important aspect of using relative shares. The calculated shares for the stages in the distribution channel must add up to 100%. If the share of one stage in the distribution channel falls, at least one other share must rise. An increase in a share does not mean that the price-margin has increased – it may well be that another price-margin has decreased. Changing shares are not necessarily a problem, as the distribution of the shares at the beginning of the period is not automatically given to be the ideal one. This paper does not evaluate whether the changes in the shares are ideal or not, but merely attempts to describe these changes.

Main Results

The producers, Norwegian Dairies (TINE NM) and the grocery retailers make up the distribution channel for dairy-products. There is also a separate stage of wholesaling for cheese and butter. TINE's market share for input milk is about 99%, while their market share for hard white cheese has fallen to 83% in 1999 (Annual Report 1999) – mainly due to competition from the non-co-op company Synnøve Finden.

The study includes the following products, separated into “liquids”, i.e. products with a short shelf-life, and “solids”, i.e. products with a much longer shelf-life. The other main difference between these two groups, is that TINE mainly distributes the “liquids”, while other wholesalers distribute the main bulk of the “solids”. Often the grocery store chains have their own distribution functions.

Table 2 Consumer products included in this study

Liquids	Solids
1. H-melk (Whole milk)	6. Norvegia F45 (whole fat gouda)
2. Lettmelk (Reduced fat milk)	7. Jarlsberg F45 (whole fat)
3. Skummet melk (Skim milk)	8. Smør, normalsaltet (regular butter)
4. Kremfløte 38% (Cream 38% fat)	
5. Fruktiyoghurt (Yoghurt with fruit)	

During the period 1983-1999, dairy producer prices rose in nominal kroner until 1992, and have since fallen some. The real price for milk has increased around 40%, cheese around 15%, while cream and butter has decreased by about 5-6%. The real price of yoghurt has fallen during our short time-series, 93-99. There is a delay of a year or more between the first falling producer prices and the first falling prices in the following stages of the distribution channel. We will now present the main results for the dairy products total exclusive yoghurt:

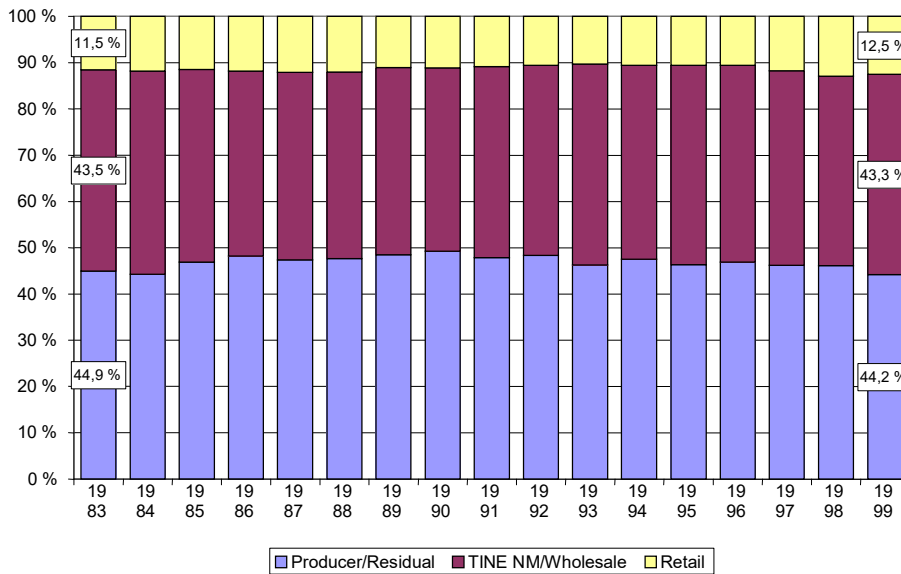


Figure 1 Relative shares for dairy products 1983-1999

The shares for the stages of production and distribution in the distribution channel for dairy-products show an interesting development over time – the shares at the end of the period are almost identical to the beginning of the period for the aggregated dairy products. In short, the producer’s share rises during the eighties, and falls during the nineties. The percentage point changes are in the low single digit range, the highest share in 1990 is 4,5 percentage points higher than the share in 1983 – and almost 5% higher than the share in 1999. Corollary, the share for TINE including the distribution function, falls in the early eighties, and rises again in the nineties, ending up at approximately the same share in 1999. The lowest share is also in 1990, which is a little less than 4 percentage points lower than in 1983 and 1999. The share for retail fluctuates slightly in the eighties, and falls steadily if by only a maximum of little more than half a percentage point, in the early nineties - with an abrupt increase again from 1997, ending up 1 percentage point higher in 1999 than in 1983. We will now disaggregate the results and study the “liquids” and “solids” separately:

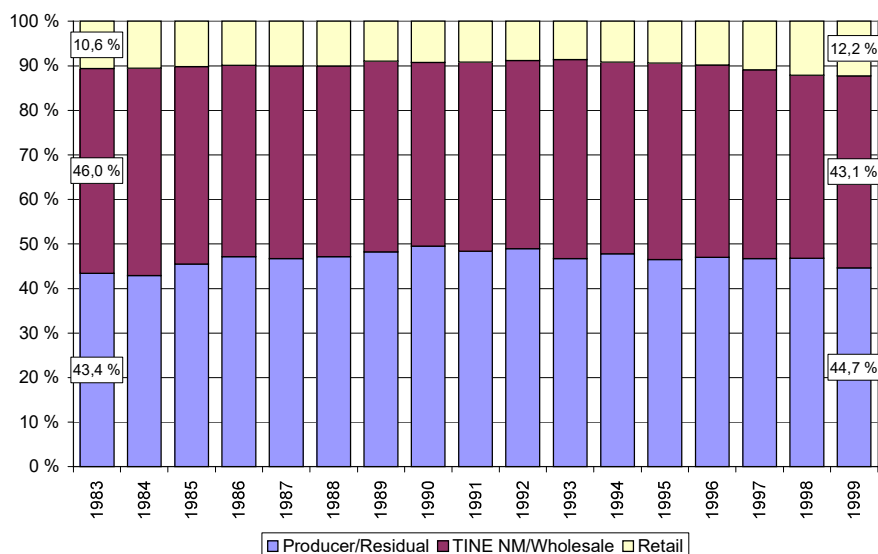


Figure 2 Relative shares for "liquids" 1983-1999

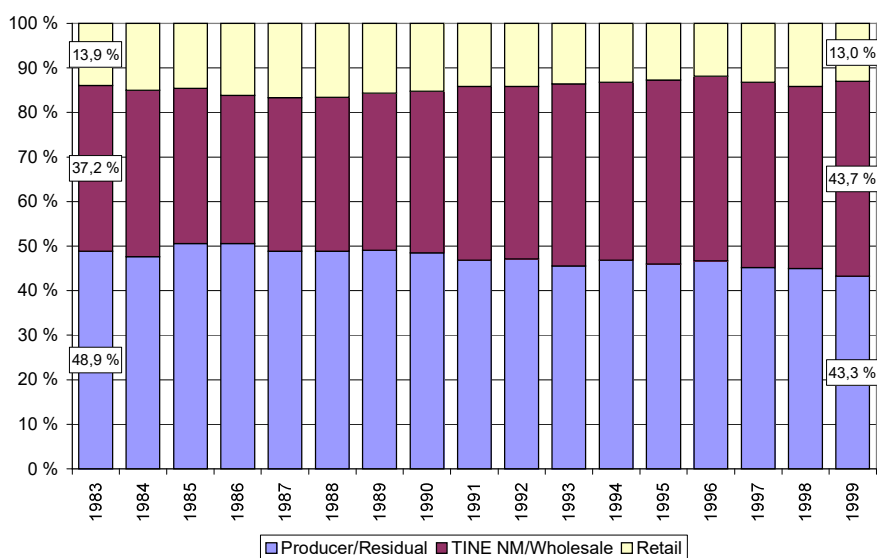


Figure 3 Relative shares for "solids" 1983-1999

The two groups of dairy products, liquids and solids, show very different trends. For liquids, we see that TINE's share falls dramatically in the eighties, and though it does increase again during the nineties, it is still 3 percentage points lower in 1999 than in 1983. The retail share at first decreases slightly, but from about 1993, it steadily increases and ends up almost 2 percentage points higher in 1999 than in 1983. The producers share increases substantially in the eighties, decreases again, but still ends up more than one percentage point higher in 1999 than at the beginning of the period. For the liquids – the largest single category, TINE has a substantially lower share in 1999 than earlier.

The results for the solids are quite different. First of all, TINE does not distribute these products, and we have a separate share for the distribution. In the figure above we have shown TINE's share including the distribution function. The distribution share was constant during the time-period. Observing that TINE's

share in the figures cover the same functions for both product groups, we see that during most of the period the level of the shares for the solids is higher for the producers and retail, and lower for TINE, than for the liquids. The higher share for the producers is not unexpected, these products require a large amount of input milk, and the differences in market value for liquid and solid dairy products is well established. Given that the solids have a much higher retail value pr unit, the higher share for retail is interesting. The nominal retail margin pr litre or kilo in 1999 was 1,07 kr for liquids and 7,56 kr for solids. The turnover rate is much higher for liquids, at least the milk, but this is still a substantial difference.

Returning to the developments in the shares over time, we see that the share for the producers has dropped by 5,6 percentage points during our time-period, and TINE' share has increased by 6,4 percentage points. The share for retail shows the typical pattern of increasing in the eighties and falling in the early nineties, with an increase again from 1997. The distribution share fluctuates, but is almost the same in 1999 as in 1983. The dominant change here is the shift from the producers to TINE in the nineties. These results are counteracted by the liquid results, so that in the total shares, we see that the producers and TINE's share has hardly changed from the beginning to the end of the period, while the retailers share has slightly increased.

We repeat the main result – the shares have fluctuated in the time period 1983-1999, but the end result is very similar to the beginning. The products in our study are well-established products with raw milk as the main input and a comparatively low degree of processing compared to ready meals for instance. TINE has launched many new products during the time period for our study. We have one example of a product where raw milk is not the only material input – yoghurt with fruit. We only have a very short time-series, from 1993-1999. These results show a producer's share in 1999 of approximately only 14%, while the producers share in the total results is 44%. The share for TINE is 64% versus 43% for our dairy products in total, and the share for retail is 21% percent versus 13% for our dairy products in total. The shares for the producers and for TINE have fallen from 1993 to 1999, while the share for retail has increased by 4 percentage points in 6 years, more than the 3,7 percentage points for the liquids in the same time frame.

One of the major changes within the dairy industry in Norway has so far not been apparent in the presentation of the results. TINE now has substantial competition within hard cheese – Synnøve Finden being the main competitor, but also some private labels exist. Since even our total results are presented pr unit of dairy product, we have not seen the change in market shares. TINE's market share for hard cheese has dropped from almost 100% to 83% in 1999 according to TINE's own annual report. As we can see in the figure below, there is a sudden dip in the total sum of margins in 1999, reflecting the drop in TINE's cheese sales. This happens because we only use data for TINE NM.

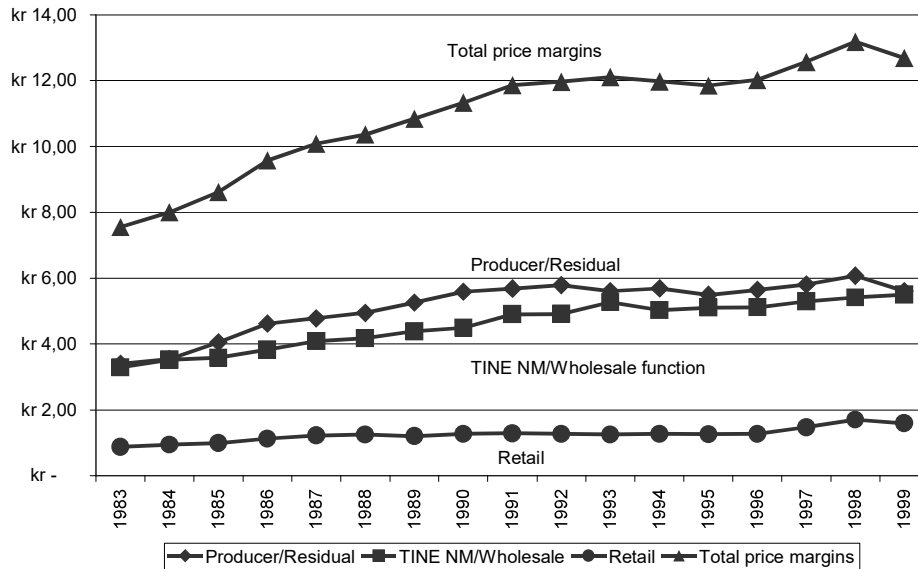


Figure 4 Total nominal price-margins for the dairy sector 1983-1999

Public Policy and Price Development

We have adjusted the price-margins by adding the price-supports and subtracting taxes and fees. Since these calculations are based upon the individual products and the price-margins, we have not included direct payments. This methodological choice is critical since agricultural policy has seen a shift from price supports towards direct supports. The dairy products receive less price-supports than earlier, and this affects the price-margins. The best way to see how this change in public policy affects the price margins is to take the sum of the price supports, subtract taxes and fees, and show this sum as a share relative to the retail price including VAT (Value added tax).

The share goes from being positive with 21,6% in 1983, to being negative with 18,4% in 1999. This means that in 1983, dairy products received substantially more in price supports than was paid in taxes and fees. In 1999, dairy products paid more taxes than was received in price-supports. Direct supports are not included here. Since the VAT was 23% in 1999, having risen from 20% in 1983, the VAT alone is -18,7% of the retail price in 1999. With VAT increasing, price-supports falling and the other, quite small, fees stable, we get the picture shown in the figure.

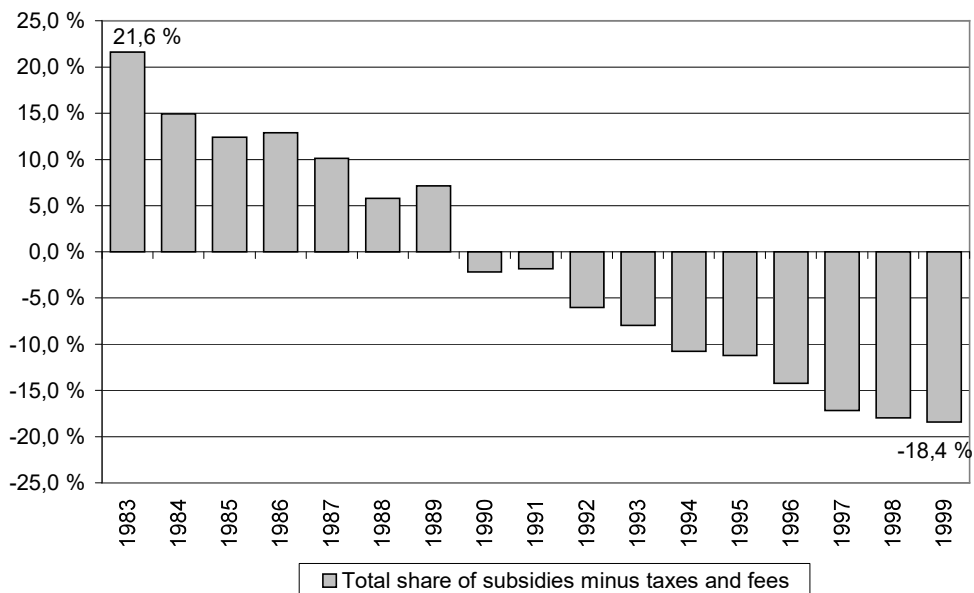


Figure 5 The total of price-supports minus taxes and fees, shown relative to the total retail price including VAT, for the total of dairy goods from 1983-1999

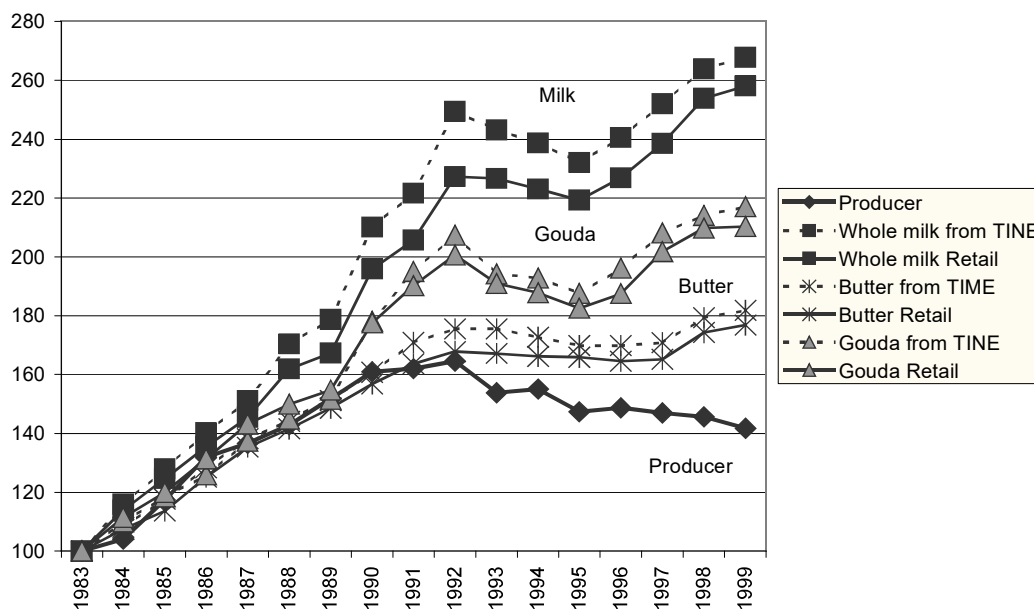


Figure 6 Nominal price indices 1983-1999 for the producer price, and price from TINE to retail and retail price incl. VAT for Whole milk, Gouda cheese and butter (1983=100)

We further discuss the implications of the move from price supports to direct supports in agricultural policies by studying the development in the nominal price indices shown above. Remembering to be cautious with this type of comparisons, we only look for changes in the direction of the development over time, and we do not expect exactly matching percentage changes at the different levels. The figure shows the development in the producer price, the price from TINE to retail for Whole milk, Gouda and butter, and the consumer prices for the same goods. All the prices are shown as nominal price indices. We see that the nominal producer

price indice follows the rise of the other price indices during the eighties. In the nineties, the producer price indice decreases from 1992 and onwards. For milk, butter and Gouda we have traced both the consumer price, the unbroken lines, and the price from TINE, the dotted lines. We see that these two price indices follow each other closely for each good. In the nineties we see that milk has a substantially larger increase than Gouda cheese, while butter has a development more reminiscent of the producer price indice. For milk we see that the price indices increase steeply in the late eighties and early nineties, while there is a considerable drop again from 1992 until 1995, with an increase from 1996. For Gouda there is a distinct fall again from 1992, and an increase again from 1996.

While we do not have a complete picture of all the causes of this development, we do know that the fall between 1992 and 1995 coincides with a substantial increase in the direct price supports for cheese. Also the increase from 1996 of the prices for Gouda and milk coincides with an abrupt fall in the price supports for these products. In addition, the VAT rate increased from 22% to 23% from 1995 (and from 20% to 22% in 1993). Butter, a product that has received less price supports and has at times had large surpluses, has a marked different development. We see here the importance of studying the individual products as well as the total of dairy products. The changes in the subsidy- and tax policies complicate the comparison of the producer prices and the downstream prices.

To fully see how these changes affect the prices, we will further study two individual goods; Whole milk (H-melk) and Gouda cheese (Norvegia F45). Compared with figure 5, we find that the total of price supports minus taxes for these two goods, has two different courses. While Whole milk starts out with a positive percentage of 39%, Gouda only starts with 8%. This means that whole milk received substantially larger price supports than Gouda. The percentage later decreases to -18% for both of the goods. It turns out that this simply reflects the differences in one single subsidy between these two goods, the VAT compensation subsidy. All other subsidies, taxes and fees, especially the VAT, affect the goods more or less the same. We therefor study the development of the VAT compensation subsidy separately for each good, and compare it's share of the retail price including VAT to the development of the retail price including VAT.

We have plotted the VAT compensation as a percentage of the retail price for each good, and we also show the nominal retail price indice for each good as well. We see that the VAT compensation is 50% of the retail price including VAT for Whole milk in 1983 – while it is only 20% for Gouda cheese. Until 1992, this percentage falls much more rapidly for Whole milk than for cheese. In 1992 there is no VAT compensation for cheese, and only a small sum for Whole milk. Between 1993 and 1996, when the subsidy is discontinued, the two percentages follow each other.² Shifting our attention to the price indices, with it's scale given on the right-hand side of the figure, we see that the price indice for Whole milk rises more rapidly than the price indice for Gouda during the full period, but the

² Strictly speaking, this particular price supports was denoted as a consumer price support in the period 1983-1993, and from July 1st. 1993, the price support was changed into a VAT compensation price support (Merverdiavgiftskompensasjon).

development of the two price indices follow each other more closely after 1992. We see that the development in the retail price mirrors the development in the subsidy. Considering the dramatic fall in the Whole milk subsidies, one may wonder that milk has not increased even more relative to Gouda cheese - though concomitantly the sales for Whole milk especially, and milk in total, are falling, while the sales of cheese in total is rising. Again, breaking down the results for the total of dairy products reveals a surprising diversity between the various dairy products.

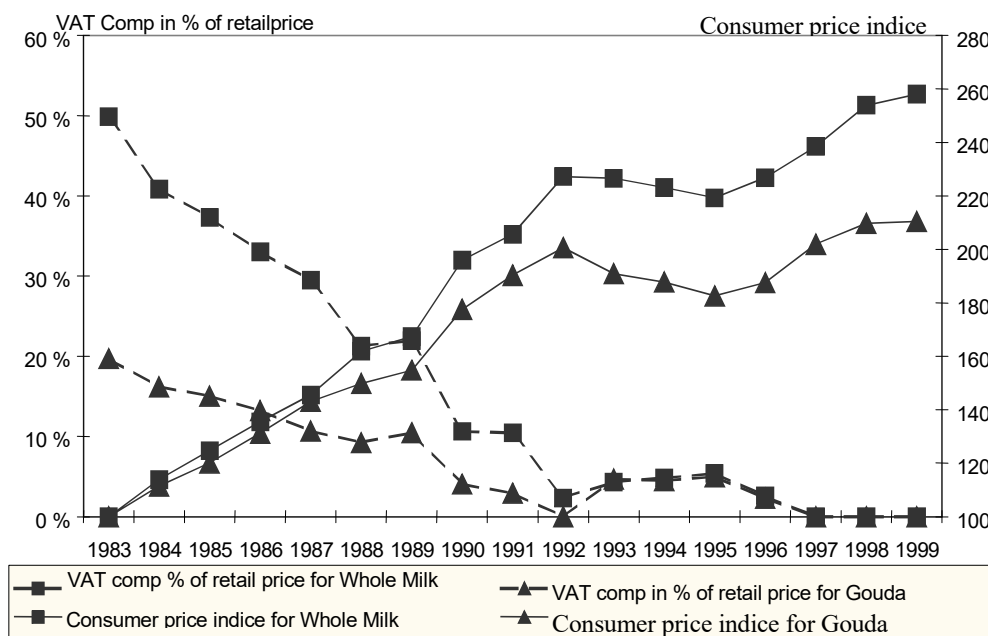


Figure 7 VAT Compensation in percent of the retail price incl. VAT (left scale), and nominal retail price indices (1983=100) (right scale) pr unit (kilo/litre) Gouda (Norvegia F45%) and Whole milk (H-melk) 1983-1999

Whether the reduction in producer prices has reached the consumers, and by how much, has been a point of recent debate in Norway. The price margins and retail prices have changed during the period of time that has been examined here. There has been a substantial fall in real producer prices, and even a nominal fall. Following the time-series, we see that a fall in the producers' price-margin is not followed up by the subsequent agents until the next period – so that the producers' share falls at first, and then we see a small correction upwards of the producers' share. This adjustment does not fully counteract the change, it merely moderates the trend some. The results show a substantial fall in the nominal producer price and the lack of a corresponding fall in the nominal margins from TINE and retailing. Of course, as discussed earlier, the period also displays substantial changes in the subsidies and taxes. This complicates the analysis, as shown above with the roughly opposite developments in one important subsidy and the retail prices. SNF will use these data to test for market power between the agents in the distribution channel. These results are expected early next year, and should answer some of

these questions. Another possibility is to study the variation in the price-margins more directly as in Gordon and Hazledine (1995).

Concluding Remarks

Table 3 Summarised results for the different groups of dairy products 1983-1999

	Farm-gate share	TINE's share	Retails' share
Dairy in total	1983 ≈ 1999	1983 ≈ 1999	1983 (↑) 1999
"Liquids"	1983 ↑ 1999	1983 ↓ 1999	1983 ↑ 1999
"Solids"	1983 ↓ 1999	1983 ↑ 1999	1983 () 1999

The lack of change is the most striking aspect of the total results. We find that the results are almost exactly the same in 1999 as they were in 1983, excepting a small increase of 1 percentage point in the share for retail. Yet there has been some fluctuations in the shares during the time-period. This study is a follow-up study, the original study included the time-series 1983-1994 for the dairy products. Looking at our present time-series, we see that the main trend until 1994, namely that retail had decreased its share, has been counteracted by the time we reach 1999. The producer's rising share until 1994, has fallen again by 1999, and while TINE's share has risen back to its original level by 1993, and continues to fluctuate till 1999.

The differences between the two groups of dairy products are masked in the total results. Liquids is by far the larger group, and as such the changes there affect the total results more. The changes in the shares for the solids are of a larger magnitude than those for the liquids, but since the group has smaller sales we see that they do not dominate in the total results. The relative development in the nominal margins in kroner for retail and the farm-gate are similar for the two groups – but TINE's margin in nominal kroner, has increased significantly more for the solids than for the liquids. This increase leads to an increasing share for TINE for solids, and decreasing shares for both retail and the farm-gate. The differences between groups of products and single products are important since the composition of TINE's total sales is rapidly changing, whereby the shares for dairy products in total will also be in constant change.

Our results for the dairy products in total shows several surprising trends:

- The producers share has not fallen since 1983 – but this may in part be due to the selection of products in the study. The available long term data sets for retail prices severely restrict the number of products in the study. The products that are not included are those with a higher degree of processing and less milk input, where one would expect the producers' share of the total adjusted income to be smaller. The bias in the selection of products in the study will affect the results. The question of falling producer shares needs to be specified as to whether the producer's share is falling within a product category, or falling because new product categories have higher processing costs as well as higher retail value

relative to the amount of input milk. Our results show the possibilities of both. The producer's share for "solids" fell while TINE's increased, and this was a change within a category. The results for yoghurt with fruit show that the producer's share is at a much lower level, at a mere 14-15% of the retail price including VAT pr unit. Higher shares of input from other goods, like fruit, and higher production costs will explain much of these differences. A shift from milk-intensive products to products that are more labour intensive and also include other inputs, will automatically reduce the producer's share.

- The retail share has not fallen over the period as a whole and has actually increased in nominal kroner until 1999. Considering the drastic restructuring that has been going on in grocery retailing since the early eighties, and the promises of benefits to the consumers due to rationalisation that the retail chains have promised, this lack of change is surprising.
- TINE's total share has fluctuated, but is the same in 1983 as in 1999. The nominal price-margins rose until 1993, and have since fluctuated. The TINE system has also been through a drastic restructuring process, where many dairies have been closed, these changes have also been justified by the need for rationalisations. These changes are not easy to identify in the development of TINE's margins and shares.

These results raise more questions than they answer, and clearly show that the function of such studies is to monitor developments and raise questions – and that further study is necessary to identify the factors that have given rise to the observed developments. More details are included in the comprehensive report from the project, available in Norwegian, Aas and Strand 2000, *Prispåslag for meierivarer 1983-1999*, SIFO Working Paper 12-2000 from SIFO. This report will present the results in full.

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Different Forms of Key Account Management

Mogens Bjerre¹

Abstract

This chapter presents a framework for developing different forms of key account management. Theoretically it is based on describing the supplier's investment in key account management structured in accordance with different types of asset specificity. Utilizing different governance structures, four different forms of key account management are described. The chapter is based on the author's work as an industrial research fellow and interviews with more than 30 firms.

Key words: Key account, key account manager, key account management, transaction cost economics, asset specificity, resources.

Background

Statements related to key account management and trade marketing used to be quite clear and simple. The concepts of key account management was introduced in the Fast Moving Consumer Goods (FMCG) sector during the 1970's in USA and during the 1980's in Europe (Randall, 1994). The majority of ideas and tools were, at that point of time, developed and refined in other business-to-business sectors such as the computer hardware and software industry (Langdon, 1995).

Many suppliers face the 80/20 axiom (Barret, 1986) - 80% of the turnover comes from 20% of the customers, some a 50/5 axiom (Miller & Heimann, 1991), and some even a 90/10 axiom. The consulting company AC Nielsen published a survey in 1993, indicating that if the turnover of the top 10 retailers in any of the European markets were added they accounted for more than 50% of the total turnover in the FMCG-sector.

A number of different approaches to key account management have been developed by various researchers and implemented by different suppliers. Furthermore, the existing literature concerned with key account management is limited (Davies, 1995). Having examined the existing literature, there does not seem to be a common definition of the concept.

Although key accounts are the basic element of key account management, they are given different labels and there is not a common list of criteria to identify key accounts. Thus, this type of customers is identified as international accounts (Langdon, 1995), key customers (Lawrence, 1983), large accounts (Lawrence, 1983),

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large customers (Moore, 1994), national accounts (Bjerre, 1995), special accounts (Randall, 1995), and so forth.

The overall result of these different levels is, therefore that the term key account management carries a number of labels with varying contents. Furthermore, my initial studies of practical cases and my own experience in the field showed considerable differences between what different suppliers considered to be key account management.

To sum up, the major issues in relation to key account management are that:

- Existing literature represents one-sided definitions, as key account management is defined from the supplier's point of view.
- Existing definitions do not discriminate between different types of key account management – therefore little common ground is found.
- Existing literature focus on inter-organizational structures, not on intra-organizational structures, thus internal organizational adaptations or requirements are not identified.

What is a Key Account

Some authors call these customers for key customers, large accounts, large customers, national accounts, special accounts etc. (Barett, 1986, Corstjens & Corstjens, 1995; Lawrence, 1983; Moriarty and Shapiro, 1980, 1981, 1984; Randall, 1994; Rottenburger-Murtha, 1992; Stevenson, 1980, 1981). Key accounts are customers recognized by the supplier as the most important customers. The importance may stem from a number of different characteristics, among which Lawrence (1983, p. 35) points to the following:

“... a key account is a not just a large customer with many branches and a wide geographical coverage. ... But the important thing is that they are all coordinated into one “account”, which pays the bills, combines the buying power, and conducts the negotiation”.

Barett (1986) also points to size as important and mentions that this can be measured in terms of sales volume. According to Bjerre (1995) a key account is not just characterized by size and/or sales volume, but adds:

- Having a centralized decision making process, and/or
- Possessing future potential, and/or
- Good image - seen from a supplier's point of view.

In other words, certain criteria has to be fulfilled if the customer is to be regarded as a key account - and these criteria's are defined by the supplier. Thus, these customers are offered special attention, as pointed out by Stevenson (1981, p. 119):

“... when very large and/ or important customers are afforded special treatment and special status.”

Rottenberger-Murtha (1992) takes this further by adding that the demands of the key account is important (p. 40):

“... certain major accounts that have unique demands and expectations requiring similar specific solutions and special attention.”

Thus, existing literature on key account management appears to be dominated by sales oriented “supplier perspective” in which suppliers need to make adjustments according to individual customers, if these customers fulfill certain criteria. Furthermore, it has become quite apparent, that existing literature concerned with key account management neglects the strategies and interests of the key account completely.

Although key accounts are recognized as important customers it is often difficult to describe their value to the supplier. Lawrence (1983, p. 36) states the importance of key accounts to the supplier should be compared to the importance of brands to a supplier of branded goods:

“The immediate consequence is that each major account assumes an importance to the supplier, in terms of contribution to total sales volume and to profit, probably equal to or even greater than any one of his product lines. Obviously the large account therefore merits the same degree of planning, nurturing and monitoring as any product - in other words the same degree of marketing attention.”

This statement marks an important change within most sales and marketing organizations, as strategies, planning, and monitoring traditionally have been a marketing domain. Developing strategies, plans and monitoring individual key accounts will therefore imply that marketing techniques are implemented in relation to the management of key accounts. Miller and Heiman (1991, p. 4) presents importance as:

“... if you consider it important, it's by definition a Key Account”.

Miller and Heiman (1991) further introduces key accounts as “external assets”, and makes the point, that they should be managed as all other important assets, such as the supplier’s brands. Regarding key accounts as assets has been carried even further by Moore (1994) who introduced the concept of “account equity” which would be structured along the principles of brand equity. Moore (1994) provides an extensive definition of key account management focusing on the elements of the relation:

“... the managerial role in relation to objectives, strategies, standards, monitoring, the coordinating role in relation to distribution department, financial department, sales, consumer marketing, trade research, trade promotion, customer buying, customer stock control, customer merchandising, customer distribution department, customer finance department, the informative role internally and externally and finally as responsible for customer negotiations.”

It is difficult to identify elements and responsibilities in relation to a key account, which are not covered by this definition. Thus Moore appears to view key account management as a total concept, implying that the key account manager is totally responsible for all aspects relating to the key account.

Key Account Manager

The titles used in relation to key account management may to some extent reflect the differences in managerial focus and asset specificity. However differences in titles typically reflect the way in which the supplier perceives its customers, the key account manager's charge, the key account manager's geographical responsibility, the number of key accounts, and other responsibilities. Thus the key account manager's title are often a combination of the elements listed below:

- Subject - Account, Business, Client, Client Business, Customer, Customer Business, Key Account. Large Account
- Charge - Director, Manager, Senior
- Geographical area - International, National, Regional
- Responsible for one or more key accounts
- Other responsibilities, such as staff responsibility.

The key account managers personal attributes has been discussed by several authors - and there has been a tendency towards making lists containing every positive trait possible.

Davies (1993, pp. 196-197) lists the attributes identified by himself and Thomas², and adds that differences among various authors may be determined by their different views on key account management. Therefore a list is drawn of personal attributes, such as: capable of building long-term relationships, intellectual, usually graduate level, a business strategist, numerate and financially literate, good presentation and inter-personal skills, good at building personal relationships, service orientated, understands retailing as a business, understands the motivation of retail buyers, able to coordinate the activities of the manufacturer to suit the retailer's needs, creative and resilient, and able to influence senior management in both manufacturer and retailer

The level of authority is often mentioned as a key element in understanding key account management – and customers often complain, that the key account managers do not possess sufficient authority internally, i.e. they do not have the full responsibility of the key account. Furthermore the level of authority is typically not discussed in detail, as the individual author basically does not operate with more than one type/form of key account management. Recruiting and training of key account managers also differ widely among firms – some firms have developed minutely detailed career-path systems to reach the position as key account manager, whereas other firms recruit externally when the need arises.

² Thomas, H. (1989), *Grand Nationals*, Marketing, June 1, p. 29.

Theoretical basis for different forms of Key Account Management

Focusing on the supplier's investments in key account management is based on the notion of assets, of to more precise specific assets (Williamson, 1975). However, Williamson also presents the three governance structures; the market, the hybrid and the hierarchy. When they are combined with a discussion of ex ante and ex post limitations to competition (Peteraf, 1993) it is possible to present four different forms of key account management.

Asset specificity

Asset specificity has become a central concept with transaction cost economy and is the most important factor when explaining differences in transaction costs, thus: “– that the principal factor that is responsible for transaction cost difference among transactions is variations in asset specificity.” (Riordan and Williamson, 1985, p. 367). This factor was introduced by Williamson (1979), and is later referred to as the principal factor (Williamson, 1981), and is introduced in a mathematical model (Riordan and Williamson, 1985). These investments can be characterized by the degree and type of asset specificity, as the asset specificity refers to the degree of which an asset has a lower value for alternative use or alternative users (Williamson, 1991, p. 281).

Degree of Asset Specificity

Using the example of the hubcap manufacturer, it could - somewhat simplified - be presented as a choice between an investment in general applicable technology or an investment in a specialized technology, i.e. a very asset specific investment. The first investment will represent the standardized technology available everywhere in the market. The machine can without costs be switched to producing other private label products and with some difficulty even be switched to producing other items. The manufacturer can with the standardized technology reprogram the production at any time without value-loss.

This can be compared to Porter's concept of switching costs; however, Porter (1980) based the concept on a power and relation oriented perspective to study the implications and possibilities for the individual firm, whereas Williamson is focusing on the comparative analysis and the structural implications. Porter uses the concept as a way for the manufacturer to tighten relations to customers without necessarily providing the customer with any advantages. The customers should therefore seek to avoid switching costs as they limit their opportunities and gives the manufacturer a better negotiating position.

The degree of asset specificity thus describes to what degree an asset is specific. If the specificity is regarded as a continuum, then the two extreme ends will be one where asset are non-specific and the other where assets are totally-specific – idiosyncratic, while the assets in between are compounded specific. Non-specific assets do not loose value in alternative use or to alternative users. This will often characterize standardized assets such as a standard vehicle, a standard computer, a standard pallet etc. Idiosyncratic assets have no value in alternative use or to alternative users. This will often characterize the time invested by a specific

employee in understanding a customer's logistic system, the marketing system etc., the investment in specific advertising campaigns related to a customer event etc. Idiosyncratic assets are often found in exclusive dealerships, franchise systems, etc.

Type of Asset Specificity

Asset specificity is not merely a technological concept as it is not just the production assets that are transaction specific, this could also be employees, patents, processes, planning systems, etc. Williamson has gradually developed the concept of asset specificity and added new types of asset specificity. Originally Williamson made a distinction between three types (Williamson, 1981, p. 555) mentioned as the first three, and later added three more (Williamson, 1985, p. 55; Williamson, 1989, p. 143; Williamson, 1991, p. 28):

- Location specificity
- Physical specificity
- Human specificity
- Dedicated assets
- Brand specificity
- Temporal specificity.

Williamson (1989, p. 143) underlines the fact that types of asset specificity is not an exhaustive list and that there might be other types that should be considered.

Location Specificity. The degree of location specificity depends on the mobility of the asset, i.e. the more costly it is to dismantle and to move an asset, the more location specific the asset is. Location specificity is especially important in relation to placing two elements of a chain close to one another in order to reduce storage and transportation costs (Williamson, 1985, p. 95). A classical example is to place the assembly line in a car production as a natural continuation of the body production of the cars (Klein, 1988).

Physical Specificity. Physical specificity is related to the physical characteristics beyond the mobility limitations. A physical specificity could be a special machine used to produce special components to interior decorations of a specific retailer. The machine can only be used to produce this special component and has no alternative use.

Human Specificity. Human specificity arises for instance in relation to investments in specialized training and in relation to the effect of “learning-by-doing” (Williamson, 1979, p. 240). An example could be the time an employee spends understanding the specific demands from a customer in relation to a product, a service, or a process. Human specificity is closely related to the concept of the learning curve.

Dedicated Assets. Dedicated assets are related to investments in other assets than the existing ones that cannot be described within the types mentioned above. An example could be the manufacturer investing in a storage facility on request from a major customer and in relation to this invests in loading trucks.

Brand Specificity. Brand specificity are resources invested in a brand linked to a specific product, a specific product group, or a specific customer segment, i.e. investments in brands that will only have limited value in alternative use (Williamson, 1989, p. 14). An example could be a licensee brewing Carlsberg beer in Sweden and the licensee's investment in marketing the Carlsberg brand in Sweden.

Temporal Specificity. Temporal specificity is a type of specificity related to incidents in which it is of importance that certain assets and capabilities are present at a specific place and at a specific time (Masten, Meehan & Snyder, 1991, p. 9). Temporal specificity is not necessarily part of other types of specificity but can be so.

Ex ante and ex post limitations

According to Peteraf (1993) competitive advantages are based on resources that must fulfill the following four conditions:

- Resource heterogeneity - resulting in Ricardian or monopoly rents
- Ex post limits to competition - necessary to sustain the rents
- Imperfect resource mobility - ensures that rents are bound to the firm and shared by it
- Ex ante limits to competition - prevent costs from offsetting the rents.

Resource heterogeneity is according to Barney (1991), an important element in understanding the resource-based perspective (p. 105):

“A basic assumption of resource-based work is that the resource bundles and capabilities underlying production are heterogeneous across firms.”

Peteraf (1993, p. 182) defines the difference between Ricardian rents and monopoly rents as follows:

“What distinguishes monopoly profits from Ricardian rents is that monopoly profits results from a deliberate restriction of output rather than an inherent scarcity of resource supply.”

Regardless of the nature of rents, sustained competitive advantage requires that the condition of heterogeneity can be preserved. If the heterogeneity is a short-lived phenomenon rents will likewise be difficult to maintain. Since strategies are primarily concerned with longer periods of time, the condition of heterogeneity must be durable to ensure that value continuously is added. This implies that there are ex post limitations to competition. Furthermore, another condition must be met if a firm is to have competitive advantage (Peteraf, 1993, p. 185):

“There must be ex ante limits to competition as well.”

This point is mentioned by Barney (1986) as he argues that the economic performance of firms depend not only on the returns from their strategies but also on the cost of implementing those strategies. Without imperfection in strategic factor

markets, in which the resources necessary for implementation of the strategies are acquired, firms can only hope for normal returns.

A Typology based on Governance Structures & Ex Ante and Ex Post

Three different basic types of key account management will support the three different governance structures (Williamson, 1975): one that supports the market, one that supports the hybrid, and one that supports the hierarchy.

The largest governance structure³ – the hybrid can be divided into two: one that is passive (ex post adaptation), and one that is pro-active (ex ante adaptation)

Thus, there are four different types of key account management that can be compared to the four supplier-retailer alignment levels:

- Contact key account management
- Passive coordination key account management
- Pro-active coordination key account management
- Integration key account management.

The degree of asset specificity can be described as a continuum between the two extremes: non-specific and idiosyncratic. The non-specific asset is generally applicable as opposed to the idiosyncratic asset that is so specialized, that it has no alternative use. The types of specificity are:

- Financial
- Physical
- Technological
- Organizational
- Brand
- Temporal.

Implications for Key Account Management

Based on the earlier presentation of key account management the definitions proposed in this chapter are:

- A key account is a customer that the supplier handles as a market *per se*, and has decided to invest in, in the same way as the supplier invests in other markets.
- The criteria for identifying key accounts are equal to the criteria used to identify other markets.
- Key Account Management is the integration of business processes from supplier to end-user aiming at adding value to the supplier's customer.
- As there are four different alignment levels, four different levels of key account management exist.

³ See Williamson (1979).

- The key account manager is the person handling the supplier's investment and integration of business processes towards a key account.

Based on the initial discussion of existing definitions and detailed description of the four types of key account management, four important implications can be drawn:

- Key account management does not just depend on the supplier's strategies and plans – strategies pursued by customer are also influential.
- It's thus possible and necessary to distinguish between different types of key account management.
- The type of key account management applied may change over time.
- Some elements of key account management can be acquired others have to be developed internally.

The four types of key account management can be characterized by:

- KAM is based on human and organizational asset specificity recognizing the internal and external need for focus on the key account(s) supported by varying degrees of financial, technological, reputational, brand and temporal asset specificity.
- Contractual strength and type depends on the type of key account management applied.

Contact key account management is characterized by:

- All key accounts are large customers, that are identical (principally).
- Low degree of human and organizational asset specificity, offering the key account(s) one contact into the supplier's organization focusing on increasing the supplier's sales.
- Specific asset may be acquired and used immediately.
- Adaptations are made within the supplier's organization at a superficial level to meet demands from key accounts.

Passive coordination key account management is characterized by:

- Some key accounts demands and gets more than others.
- Limited degree of human and organizational asset specificity focusing on increasing the supplier's sales to the key account.
- Specific assets may be acquired and used at short notice.
- Adaptations are made to meet demands from key accounts, at the lowest possible cost.

Pro-active key account management is characterized by:

- Some key accounts have more potential than others.
- Limited degree of human and organizational asset specificity focusing on the key account's profitability.

- Specific assets are developed internally, although they may be based on externally acquired assets.
- Adaptations are made to meet demands from key accounts, to support their market position.

Integrator key account management is characterized by:

- Key accounts are regarded as markets.
- Idiosyncratic human and organizational asset specificity.
- Specific assets are developed internally and in some cases in cooperation with the key account solutions are developed to strengthen the key account's strategies and to support their market position.

Thus, the four types of key account management differ in the degree of asset specificity and in the elements of this degree. However, there may be a need for strategic and managerial coordination if several types of key account management are applied within the supplier's sales and marketing organization.

The definitions do not discriminate between national and international key account management, as the number of markets does not affect the principles. There may be some additions in organizational asset specificity in the individual market but they do not relate to the type of key account management, they relate to internal role of the international key account manager.

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The Changing Consumer on the Food Markets. What may Organizations do to Handle the New Consumers?

Karin Hakelius¹

Introduction

The modern consumer puts individual requirements on, for example, food products. He views his consumption as a way of signaling to others who he is. The increasingly individualized consumption pattern builds upon the emergence of a new set of values — the *postmaterialistic values* – which puts the individual in focus. Individuals who possess this type of values find it difficult to be part of a collective of any kind. Instead, they want to constantly being able to decide for themselves what to do, without having to consider what others might think.

Earlier generations of consumers have not felt this need for a highly individualized consumption pattern. Instead, they have strived for an increasing materialistic standard of living. As tools for this endeavor, they have accepted homogeneous products and accepted only a few product varieties to choose from. These consumers possess the so-called *materialistic values*, which have been dominant throughout the 20th century. A person who has materialistic values does not protest against becoming a part of a collective – for example in a cooperative – as long as his standard of living increases.

In addition to the changing consumer *values*, there are also other changes, for example:

- Consumers are continuously exposed to advertisements (TV, the Internet, radio, magazines, etc);
- Products are more complex than before;
- Competition is rising and markets growing. Hence, organizations have to strive for more effective production processes, and preferably also towards controlling the entire value chain.
- Societies in the West have changed demographically, implying a need for increased segmentation.

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The new consumer profile implies that organizations dealing with, for example, food products have to listen closely to the consumers, i.e., market segmentation becomes very important.

The main objective for the paper is to theoretically analyze how organizations acting on food markets may improve their position. Important factors in this analysis will be consumer requirements, organizations' way of handling market signals, and improvements that can be made within these organizations in order for them to become stronger on the food markets.

The paper will focus on food markets where farmer cooperatives are active. First, a literature review is made, concerning the changes in consumer requirements and ways to study these, what organizations may do to handle the consumer requirements, and in what way farmer cooperatives may be changed. Second, some conclusions are drawn, concerning factors that need increased attention from farmer cooperatives.

Consumer demand trends and ways to handle these

Consumer requirements

Already in 1977, Inglehart described a phenomenon that is central to this paper (p 3):

“The values of Western publics have been shifting from an overwhelming emphasis on material well-being and physical security toward greater emphasis on the quality of life. The causes and implications of this shift are complex, but the basic principle might be stated very simply: people tend to be more concerned with immediate needs or threats than with things that seem remote or non-threatening. ... Current changes enable them to play an increasingly active role in formulating policy, and to engage in what might be called “elite-challenging” as opposed to “elite-directed” activities.”

Inglehart describes changes in *individual values* (from materialistic to post-materialistic) as well as change in the *skills* of the young generation. The change in values stem from “economic and technological development”, “distinctive cohort experiences”, i.e., the young generation has not experienced a great trauma, such as a war, and “rising levels of education”. The improved skills in handling complex issues and politicians originates from the increased educational level and from the “expansion of mass communications” (both the developments in IT and the increased mobility of people) (ibid., p 5-11).

A person possessing the new values will act differently when he is a consumer of victuals, compared to the traditional buyer. van Raaij describes the “major postmodern conditions in consumption” (1993, p 562) as being (italics added):

- **“Fragmentation”**: Due to the new values, many different sets of values, norms and lifestyles develops within a society. The development of many ways to lead one's life is expressed through, for example a strive for *“disjointed experiences and moments of excitement”* (ibid., p 552), segmented production, and segmented media.
- **“Hyperreality”**: The new consumer will look for ways of showing what person he is through what he buys, as a result, the product's image becomes central. The

image is added over time through advertising, and may, for example, imply that a shampoo is said to lead to beautiful hair, which will lead to popularity and give a chance to live a certain way of life. Van Raaij labels this “hyperreality” and: “*In postmodern terms, the image does not only represent the product, but the product represents the image.*” (ibid., p 555)

- **Value realization later in the consumption “cycle”:** Traditionally, production of a good adds value and consumption of the good destroys the value of the product. In an era when people are more or less what they consume, to consume becomes central and also what brands one consume. Some authors have even gone so far as to say that in the future, we will not be able to distinguish between the producer and the consumer. Toffler (1980) coins the term “prosumer” into this discussion as a description of the new way of acting on the market, namely that “*almost all services and products require an active input and participation of the consumer to enjoy the benefits. ... Products are there to allow the achievement of human goals.*” (p 558)!
- **Paradoxical juxtapositions of “opposites”:** In a society with many different values, ideologies and ways of life, paradoxes will develop. “*Anything may be combined with and juxtaposed to anything else.*” (p 559) It is not necessary to have the product itself in the ad, instead the company may choose to transmit a feeling that they want their product to contain to the consumer.

Allen and Ng (1999) made interesting study, dealing with consumer values. They hypothesized that (p 5):

“... values would have a direct influence on product choice when consumers attend to a product's symbolic meaning and make an affective judgement, and have an indirect influence (via tangible attribute importance) when consumers attend to a product's utilitarian meaning and make a piecemeal judgement.”

Based on the meaning of the product, in combination with the “judgement used to evaluate this meaning” (p 13), a person's values can influence – either indirectly or directly – what product that person chooses. The indirect path of influence encompasses utilitarian and piecemeal factors (see table 1); the direct factor contains symbolic and affective meanings held by the product.

Table 1 Product meaning and type of judgement associated with the direct and indirect influences of human values on product choice. *Source: Allen & Ng, 1999, p 15*

	Routes of human value influence on product choice	
	Indirect	Direct
<i>(Via tangible attribute importance)</i>		
Product meaning	Utilitarian	Symbolic
Content	Overt function and utility	Social categories and cultural principles (e.g., ideas, values, traits)
Location	Separate tangible attributes	Product Whole
Focus	Objective: product-focused	Subjective: self-focused
Breadth	Specific/Narrow	Abstract/Broad
Conceptual clarity	Clear	Vague
Judgement type	Piecemeal	Affective
Reasoning	Logical, comprehensive, and systematic attribute-by-attribute analysis	Holistic, intuitive and approximate goodness of fit to exemplar
Response type	Piecemeal-based	Category-based
Affect latency	Delayed	Immediate
Affect intensity	Low: evaluative	High: emotional states

Allen and Ng found that their hypothesis was possible to validate, even though there still remains some issues to address in future research in order to develop a model concerning the link between human values and product ownership (ibid., p 34):

“... the results show that an individual's preference for utilitarian meaning and a piecemeal judgement to symbolic meaning and an affective judgement was greater when his or her values have an indirect influence (via tangible attribute importance) on product choice than when values have a direct influence.”

Consumer's *search strategies* enter into focus for future organizations. Mazursky (1998) has investigated what search strategies are adopted once a consumer realizes that he has invalid product information. He found that the nature of the reaction on invalid information (p 261):

“... influence the search strategies concerning the invalidated and additional alternatives. The search process following invalidation was more extensive, the invalidated attribute was accessed more frequently, and the search sequence appeared to alter during the search process.”

There have also been attempts by scientists to create *indexes* that could be used to indicate what consumers would want to spend money on in the future (Eppright et al 1998). One such index is the University of Michigan Index of Consumer Sentiment and Consumer Expectations, another is the Conference Board Index of

Consumer Confidence and Consumer Expectations. Eppright et al tested whether such indexes “*can be used to anticipate changes in different types of aggregate buyer activity*”. Their conclusions imply that indexes can be used to predict future consumption patterns.

Thøgersen has studied consumers’ behavior from a perspective of to what degree *environmental issues* influence these in their purchasing patterns (1999a, b). Central to his research is the link between the expressed attitudes and the final behavior. Several studies show that it is difficult to predict final behavior, expressed in consumers’ attitudes towards environmental issues, in terms of consumers choosing an environmentally friendly alternative instead of a less environmentally friendly product. This has led some researchers to the conclusion that it is not possible to predict this kind of consumer behavior and hence to draw the conclusion that this way of working is not feasible. Thøgersen sees the following negative consequences if this conclusion is drawn (1999a, p 8-9):

“Inconsistency between expressed attitudes and actual behaviour has a number of negative consequences. It reduces the usefulness of attitude research for would-be entrepreneurs in the environmental field (and other fields plagued by seemingly unreliable attitude measurement). Even more seriously, it reduces producers’ faith in the economic defensibility of investing resources in developing environmentally friendlier products and services. Inconsistency between expressed attitudes and behaviour also reduces the political system’s ability to predict the effectiveness of interventions in order to promote environmentally responsible behaviour, such as information, education, economic incentives, and direct regulation.” (Zaltman, 1974)

Thøgersen does not want to give up his attempts to understand the link between consumer attitudes towards environmental aspects of products and their final behavior. Hence, he uses Ajzen's theory of planned behavior (Ajzen, 1985, 1988, 1991) to map this relationship. This model (see figure 1) includes the individual's attitude towards a certain act (AB), a factor describing the social pressure on that individual to act in a certain way (SN), and also a factor measuring the degree of perceived control (PC). These three factors lead to a behavioral intention, which in turn leads to a certain behavior. The original model only contained AB and SN. By adding the PC-factor, it has been found that it is possible to predict behaviors in a wider array of situations (Ajzen 1991). When doing so, it is possible to include “*environmentally sensitive behaviours such as recycling (Taylor & Todd, 1995 a, b), buying organic food products (Sparks & Shepherd, 1992), and investing in conservation technology (Lynne, Casey, Hodges & Rahmani, 1995)*” (Thøgersen 1999a, p 12).

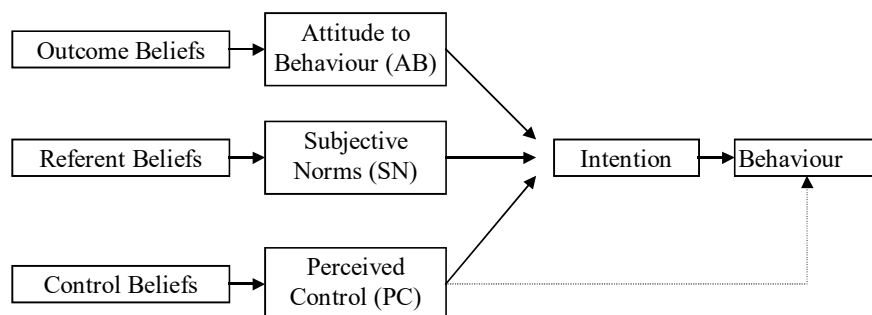


Figure 1 The Theory of Planned Behavior. Source: Kalafatis, et al 1999, p 444

The AB and the SN are composed of:

- *salient beliefs*, i.e., beliefs “that are easily brought to mind by respondents” (Kalafatis et al, 1999, p 444),
- combined with a *subjective measure*: For the attitude the individual adds a weight for the outcome’s desirability and for the subjective norm, a weight is added to the salient belief, showing what he thinks other think about the outcome and to what degree he cares about what others think.

An attitude may be strong or weak. What determines the strength of an attitude is to what degree the individual is *capable to deliberate* and what *motivation* he has in a specific decision situation (see Fazio 1990 & 1995). This phenomenon has been found to be central in decision processes that include environmental issues. Additional characteristics that have been found to play a vital role in such processes are (Thøgersen, 1999a, p 14):

- attitude accessibility (Alwitt & Berger 1993; Berger 1993)
- ambivalence (Herberlein & Black 1981)
- affective-cognitive discrepancy (Smith et al 1994)
- the antecedents experience (Berger & Kanetkar 1995)
- knowledge (Kallgren & Wood 1986).

As a conclusion, the individuals’ value sets have changed, making consumers’ requirements more heterogeneous and complex. One important task for producers is to try and measure the different requirements, and adjust their production of goods and services in a way that makes the new consumer satisfied.

The organizations handling the consumer requirements

Organizations have to adjust to the current changes in consumer demands. These adjustments include, for example, surveys on consumer needs and attitudes, diversified production, a flexible production process, and tailor-made marketing efforts. Hence, organizations need to adjust their *goals*, production *processes*, and their *structure*. In addition, structural changes on several markets will probably have to take place, targeted at becoming a stronger actor and to come as *close to the consumer* as possible.

Another important change-process is to move from only considering the *environmental* impact caused by the production process itself, towards including also the impact on the environment once the product is consumed. Since the new consumer consumes not only the product itself, but also its “meaning”, and since many consumers care about what environmental impact both production itself, as well as the waste disposal process has, it will not be possible for organizations to continue as they have done during the 1970 through 1990's. Gradually, societies want organizations to take an extended producer responsibility, i.e. to also take into account what effects their products have on the environment after they have been consumed.

The need for *supply chain management* most probably will increase in the future. The basic idea here is that the organization has to know what the consumer will demand in the future and have the product ready for the consumer when he wants it. In order to succeed in this strive, the organization has to focus on *production chains* and not on the *enterprise* as such. Contracts, time bargains, and combinations of these will play an increasingly important role in the future. Hence, the production has to become more tailor-made and effective, hereby economizing on transaction costs.

Markets will become more global, implying a need for standardized products, global organizations and global marketing efforts, adjusted to local circumstances. This implies a conflict: How can organizations handle the need for *standardized production*, on one hand, and *cultural differences* on the other? van Raaij suggests a four-level division of the standardization, which leads to that the marketing efforts may be adjusted to different cultural traditions (1997, p 265):

- “*mission*”: The organization’s identity and vision is summarized in an objective.
- “*proposition*”: Following the objective of the organization, a more detailed objective may be formed, creating a relationship between the producer and the consumer.
- “*concept*”: The proposition is translated into a form that the consumer understands, perhaps through metaphors.
- “*execution*”: The layout and the mode of communication has to be determined and executed.

In this process, the organization has to determine whether all or only some of these levels should be standardized (see Table 2). If total standardization is not acceptable, a decision has to be made, concerning which levels should be diversified. In this process, key factors such as (pp. 266-269):

- “*target groups*”,
- “*topic, product or service*”,
- “*environment*” (market structure, competition, distribution structure, etc), and the way the organization itself is structured has to determine the choice between standardization or diversification of market communication.

Table 2 Global, adaptation, differentiation and local strategies for communication.
Source: van Raaij, 1997, p 266

	Global	Adaptation	Differentiation	Local
Mission	Identical	Identical	Identical	Identical/different
Proposition	Identical	Identical	Identical	Different
Concept	Identical	Identical	Different	Different
Execution	Identical	Different	Different	Different

Hence, in order for an organization to be successful on future consumer markets, it has to become more effective on *reading the consumer*, diversify its production and still economize on each production line, and also to adjust its way to communicate with different consumer-groups. Put differently, organizations have to focus on *creating improved value* for the consumer (e.g. Kyriakopoulos 2000; Day 1990, 1991; Drucker 1954; Porter 1980; Shapiro 1988). This “extra” value offered is the key to success and is *gauged* by the consumer, which makes the task even more challenging. Kyriakopoulos summarizes the task for modern organizations as (2000, p 55):

“... *understanding all the factors that affect the value chain in order to increase the perceived benefits and reduce the perceived costs, including the whole supply chain, competitors, regulatory framework, etc ...*”.

In this process, organizations need two tools: A *market analysis* and a *strategic plan* for how to best benefit from the market. In addition, organizations need to include the process of *organizational learning* into their mode of acting (see Fiol & Lyles 1985; Huber 1991; Levitt & March 1988). It implies (see Kyriakopoulos 2000, pp 65-67):

- *acquisition of information*: Both internal and external information is needed in order to become a successful actor on the market.
- *dissemination of information*: To spread the information to the relevant part of the organization is crucial.
- *interpretation of the information*: Having the information is not enough – it is necessary to interpret what the information tells the organization and, based on this interpretation, to decide what actions need to be taken.
- *storing experiences into the organization*: Here, individuals, statutes, routines, and the organizational structure may be used.

Implications for Farmer Cooperatives

For traditional farmer cooperatives, being structured and run through a system of unallocated capital and democratic governing structures (one vote per member), often geographically tied to a certain part of a country, is required that:

- members become aware of that the *market is changing* and that consumers look for additional values in the products,
- intra-organizational systems are created which
 - allows *market signals* to go between members and the consumers,
 - facilitate *organizational* as well as *market learning*,
 - facilitates organizational *flexibility*

- the farmer cooperative itself, as well as members, are encouraged to act as *entrepreneurs*,
- farmer cooperatives are run by *directors* who are *capable* of running the multi-facetted cooperative organization
- *members' commitment* to the cooperative is increased/maintained through a
 - *financial structure* which only has a small proportion of unallocated capital,
 - tailor-made *voting schemes*, giving those members who are most reliable in the cooperative's success the greatest influence on the decision process,
 - *education* of future elected representatives,
 - more professional mode of conducting business.

It will also be necessary for cooperatives to *merge* with other organizations, or to at least *collaborate* with others more frequently than is the case at present. This is needed due to that future markets will be more or less global and in order to be competitive on these markets, farmer cooperatives have to be larger than they are today.

Conclusions

Due to an ongoing value change among the young generations of the West, new and more complex demands are put upon, for example, farmer cooperatives of the traditional type. When young people act as consumers of food products, they look for (1) the product as such, but also for (2) intrinsic values of the product, for example:

- *how* the product has been produced,
- by *whom* it has been produced,
- what *brand name* the product has,
- what *image* the product has,
- how *far* the product has been transported,
- *how* the product has been transported,
- how the *retailer* has treated the product,
- what effect the product might have for *health* – both in the short run as well as in the long run.

These intrinsic product values are shown to others when the product is consumed. Generally, the great challenge for any organization acting on the food markets is to find out what different consumers want to signal through their consumption, to continuously monitor changes in consumer preferences, to produce and distribute these products as cost effective as possible. For farmer cooperatives, there is an additional factor to include in the process: The member/owner. The cooperative has to find marketing solutions that keep members interested in committing themselves to the cooperative!

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Potential Benefits of Price and Flow Fixing Contracts in the Traditional Two Site Hog Production System

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Abstract

This paper presents estimates of farmer incentives to switch from the traditional two site hog production system towards vertically coordinated and integrated systems. These incentives are related to risk management, capacity utilization, and behavioral issues such as adverse selection. The risk related incentives are given from the investors point of view using quasi options approach. The extent of capacity utilization under alternative organizational systems is based on farm survey. Carcass quality is used as a proxy for animal quality in examining the adverse selection issue in the market for weaned piglets.

The estimates suggest that simple price and flow fixing contracts have potential to significantly decrease volatility of the returns to hog production facilities. Besides price risks, efficient capital utilisation is an important factor driving the hog industry into vertically co-ordinated and integrated systems. It has been common that delivery problems in the traditional two site system have increased capital costs in finishing units by 10%. No significant differences in animal quality were found between the alternative production and marketing systems.

Introduction

The predominant structure of hog production in Finland is the two site system in which relatively small farrowing farms and fattening farms scattered throughout the feed grain production areas of the country. These individual farrowing and finishing units trade weaned piglets at the open spot market. Although the open market does not coordinate the two stages of production efficiently, evidenced by the high volatile piglet prices, at the beginning of 1990 more than three fourth (77%) of pork in Finland was still produced in this two site system. Nevertheless, recent development of the hog industry structure is characterized by firms leaving the two site system and moving toward vertically coordinated and vertically inte-

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grated systems. In 1990's 40% of hog production moved from the two site system to the vertically integrated system in Finland. In 1998 alone, 10% of investing hog farms, initially specialized either in farrowing or fattening stage, switched into vertically integrated operations, which accounted for 3% of the aggregate (total) hog production.

It is interesting to investigate producers' economic incentives that are driving the rapid structural and organisational development of the industry. These incentives include, but not limited to, the benefits from investment risk reduction, the production efficiency improvement, and the elimination of adverse selection and moral hazard behaviour problems. The objective of the paper is to examine each of the three types of incentives.

The structure of this paper is as follows. First we cite the risk reducing incentives that are estimated in Pietola and Wang (2000). These incentives indicate how much potential the vertical integration or a simple price and flow fixing contract has to decrease risks of investments in hog production units. The approach focuses on risks from the investors' point of view because the industry structure is changed through investments, and also because in hog sector marketing and production systems are linked. The results provide an important complement to the existing literature (e.g. Dorward 1999) on applying risk programming methods to contract choice and design.

Second, the efficiency related incentives are approximated by survey results on the level of capacity utilisation under alternative organisational systems. It is expected that open market does not co-ordinate animal quantities efficiently, which results in decreased capacity utilisation and increased costs. And third, the behavioural issue is examined by testing the differences in hog carcass qualities produced in vertically integrated and traditional two site production systems.

Risks

The risk reducing incentives of insuring investment in hog production units through vertical coordination and vertical integration are measured by the difference between two optimal investment rules: (1) investment under open market coordination and (2) investment under certain price and flow fixing contract. Both of these investment rules are threshold returns to capital that trigger investment when returns to capital are subject to ongoing uncertainty. These threshold returns to capital are estimated using the quasi (real) option approach as, for example, in Kamrad and Ritchken (1994) and Grenadier (1995). Thus, the value of the contract is the difference between the quasi option values of the two investment alternatives (1) and (2). Because the option values are driven up by volatility of the returns to investment, the value of the contract depends on how much it decreases the volatility of these returns. The more volatile is the market and the more the contract can reduce this volatility the more valuable it is.³

³ We skip here the formal derivation and presentation of the option values. They are based on McDonald and Siegel (1986), Dixit and Pindyck (1994) and can be also found in Pietola and Wang (1999).

Five cases are presented for alternative operation and marketing choices (Table 1). Results of Azzam (1998) indicate that there are no scope economies between the farrowing and finishing stages. Thus, under constant returns to scale technology, vertically integrated system is a linear combination of co-ordinated farrowing and fattening units, and is not therefore estimated separately. The price fixing contract is defined simply as a contract that fixes the ratio of the price of weaned piglet (FIM/ 20 kg piglet) to the price of finished hog (FIM/kg) at 40. Forty is the average price ratio over the sample period.⁴

Table 1 Five operation-market structure cases

Piglet marketing structure	Production operation	
	Farrowing (<i>S</i>)	Finishing (<i>F</i>)
Open spot market (<i>O</i>)	<i>O.S.</i>	<i>O.F.</i>
Contracting (<i>C</i>)	<i>C.S.</i>	<i>C.F.</i> (suspension not allowed) ^a <i>C.F.'</i> (suspension allowed)

^aUnder the contract, the finishing operation is not allowed for temporarily suspending the production

A simple price fixing contract has potential, particularly in farrowing units, to significantly decrease the returns volatilities. The optimal investment threshold for farrowing unit under open market co-ordination is 27.2%, provided capital cost is 15% and the returns are expected to prevail at their current level (Table 2). In other words, if the investment is expected to yield at least 27.2% returns to capital it pays to invest. Otherwise, it pays to wait as is shown later in Figure 1. Because suspension of a farrowing unit is not a realistic alternative, the corresponding estimate under the price fixing contract is 19.9%. Value of the price fixing contract is, therefore, estimated at 7.3% (=27.2%-19.9%) from the investment outlay (*I*).

Under open market co-ordination, the investment threshold for a finishing unit is 27.1%. Open market allows for suspension of production in finishing unit without reactivating costs if prices fall below variable costs. Production can be started without any reactivating costs once prices move favourably. Under the price and quantity fixing contract (temporal suspension not allowed) the corresponding threshold is estimated at 24.4%. The value of this contract is therefore 2.7% (=27.1%-24.4%) from the investment outlay (*I*). Value of the option to suspend the finishing unit is estimated at 1.6% from the investment outlay.

⁴ Alternative fixed ratios would result in identical option values since they are estimated in geometric form. Note also that there are no futures nor options markets for trading price risks of hog production in Finland. Price fixing contracts are emerging between individual farmers and between the slaughter houses and farmers. These contracts are not well developed yet and were not, therefore, taken in this analysis.

Table 2 Investment thresholds and the values for contracts under alternative capital costs

The sum of capital cost and decay rate ($r + \alpha - \delta$) ^a	Investment threshold returns to capital, R/I (%) evaluated at σ ^a			Value of the price and quantity fixing contract ^c	Value of the option to suspend ^d
	Open market (O) ^b	Contract			
		No suspension (C)	Suspension ($C.F.$)		
10% :					
Farrow (S)	20.6	14.1	-	6.5	-
Finish (F)	20.5	18.1	16.7	2.4	1.4
15% :					
Farrow (S)	27.2	19.9	-	7.3	-
Finish (F)	27.1	24.4	22.8	2.7	1.6
20% :					
Farrow (S)	33.5	25.5	-	8.0	-
Finish (F)	33.5	30.5	28.7	3.0	1.8

^a R= returns, I=investment outlay, r= discount rate, δ =depreciation rate, α = decay rate of the returns. If $\alpha = 0$ returns are expected to prevail at their current level.

^b Suspension of production allowed at finishing.

^c (O) - (C), measured as % share form the investment outlay

^d ($C.F.$) - ($C.F.$), measured as % share form the investment outlay

The results show that the risk related incentives for vertical coordination and integration are substantial when irreversible investments and technology choices are made. There is large potential to decrease risks by price fixing contract terms. While fixing prices, the shipped animal quantities may also need to be fixed because otherwise the fixed price does not clear the market. Sufficient incentives for fixed quantities and efficient flow scheduling can be incorporated into contracts through decent discounts and/or premiums in the prices of weaned piglets. If the investment outlay for a finishing unit is Euro 420 and three batches of hogs are grown annually, the farmer who gives the option to suspend production should get a discount of Euro 2.2 ($=1.6\% \cdot 420/3$) in the price of weaned piglets. This discount corresponds to 4% of the current price quotation for a 20 kg piglet.

The optimal investment thresholds are demonstrated graphically in Figures 1 and 2. Capital cost is the dotted horizontal line and the optimal investment threshold is the upward sloping curve. The value of the investment option is the difference between the dotted horizontal line (capital cost) and the upward sloping curve (optimal investment threshold). This option value increases at an increasing rate with the volatility of the returns movements. The point estimates for the threshold returns to capital, conditional on the volatility estimates under alternative marketing systems, are in the intersection of the curve and the vertical lines.

A contract that decreases returns volatility moves the optimal investment threshold point to the left and also downwards. The value of the contract is, therefore, the difference of the point estimates for the investment thresholds between the contract and open market co-ordination.

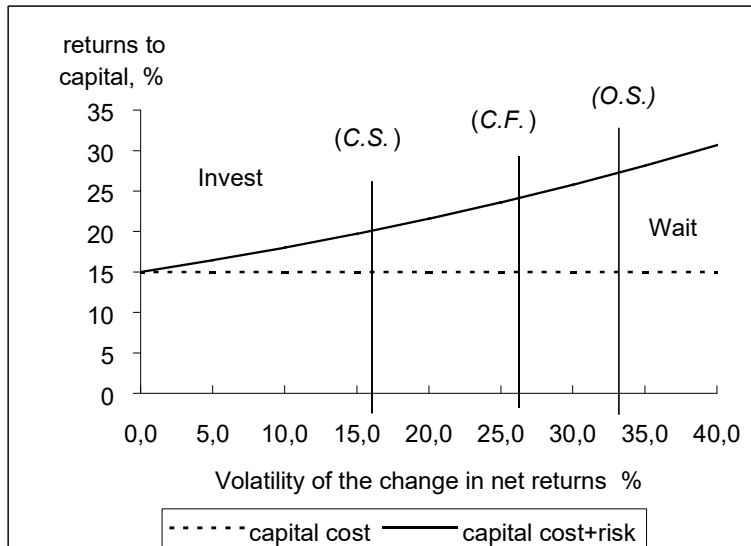


Figure 1 Volatility estimates and Investment thresholds for farrowing units under open market (O.S.) and contract co-ordination (C.S.), and for finishing units under contract co-ordination (C.F.). Temporal suspension is not allowed

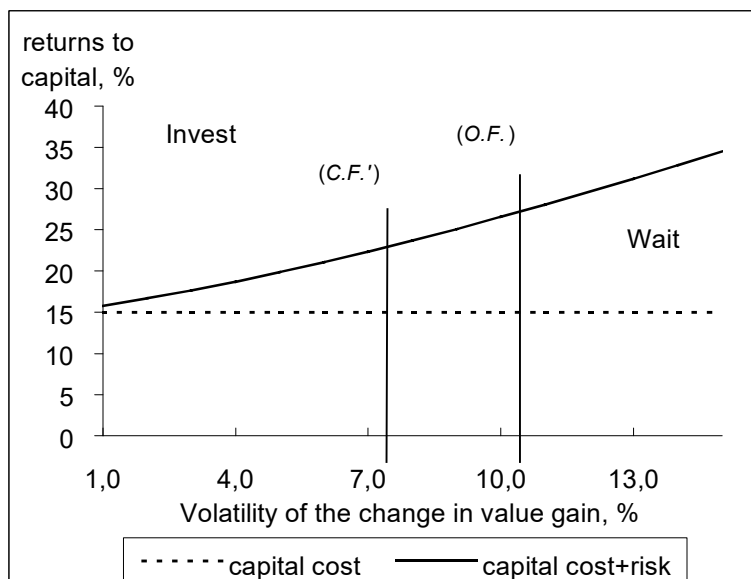


Figure 2 Volatility estimates and investment thresholds for finishing units under open market co-ordination (O.F.) and at fixed ratios of weaner price to pork price (C.F.'). Temporal suspension is allowed

Capacity Utilisation

Hog production is capital intensive and the level of capacity utilization has a significant effect on hog production costs. When output prices exceed the marginal cost of production a hog producer has incentive to produce at full capacity. Producing at full capacity will result in the lowest hog production costs. But if animal flow coordination is inefficient the rate of capacity utilization is decreased and costs are increased. The potential value of a flow fixing contract can, therefore, be estimated through its effects on the rate of capacity utilisation and hog production costs.

The current level of capacity utilisation in years 1997-1999 was surveyed on the farms in the FADN sample. The results indicate that the co-ordination problems in the open market for weaned piglets have decreased capacity utilisation particularly in the finishing units.

In 1999, the average delay of departure of the weaned piglets in farrowing units was two days. The longest delay experienced in 1999, averaged over farms, was 13 days. In the finishing units the average delay in piglet arrivals was 7 days, which means finishing units have been forced to wait for piglets 7 days longer than required for cleaning and doing standard maintenance in the unit. The delay was usually between 4 and 13 days, but the longest delay the farms experienced in 1999, averaged over farms, was 18 days. This Spring (Spring of 2000) the market has performed even worse. Excess demand for piglets has been so strong that the piglet deliveries to the finishing units have been delayed by 3-4 weeks and in some cases even a month.

If weaned piglets would arrive optimally in the finishing units, the capacity utilisation would increase in average by 6%, and more than 10% increase would be common. In some cases there would be potential to increase capacity utilisation by more than 20%. Optimal flow management that increases capacity utilisation by 10% would decrease capital costs, which depend only on passage of time, per finished hog accordingly by 10%. The total production cost would decrease by 1% in a finishing unit that grows three batches a year (Figure 3). This benefit would correspond to Euro 1.2 per hog (either a weaned piglet or a finished hog).

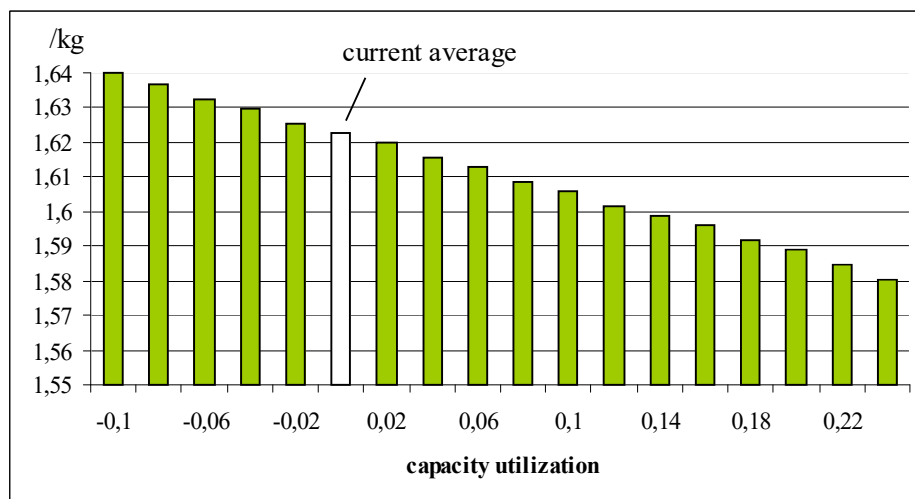


Figure 3 Hog production cost conditional on the rate of capacity utilisation in a representative finishing unit. The numbers below the x-axis denote the proportional deviation of the capacity utilisation from the current average (=0)

Carcass Quality

In vertically integrated system no behavioral problems, such as adverse selection, should exist because both benefits and costs from better animal quality and animal husbandry realize within a single firm. Significant behavioral problems in the market for weaned piglets should, therefore, imply lower carcass quality in the traditional two site system than in the integrated system.

Behavioural problems were studied by testing the differences of carcass qualities between the vertically integrated and the traditional two site system. The carcass quality was measured as the share of red meat in the carcass. Each observation in the sample represented the farm's average share of the red meat in 1999. The sample included 362 farms and, thus, 362 observations. There were 193 observations representing the two site system and 169 observations representing the integrated system.

The average carcass quality turned almost identical in both production systems (Figure 4). But variance of the carcass quality was larger in the group of vertically integrated units than in the group of units representing the two site system. In the former variance was estimated at 1.2 and in the latter at 0.44. Among the vertically integrated units there are farms with very high carcass quality while at the other end some integrated farms seem to have severe quality problems. Very high carcass quality in some vertically integrated units suggests that there is potential to increase the quality and value of the carcass by investing on better animal breeding and better animal husbandry. This potential is not fully utilised in the hog sector as whole. But the quality problems may not be directly linked to the organisational structure of the hog farms and they do not necessarily imply adverse selection problems in the open market for weaned piglets.

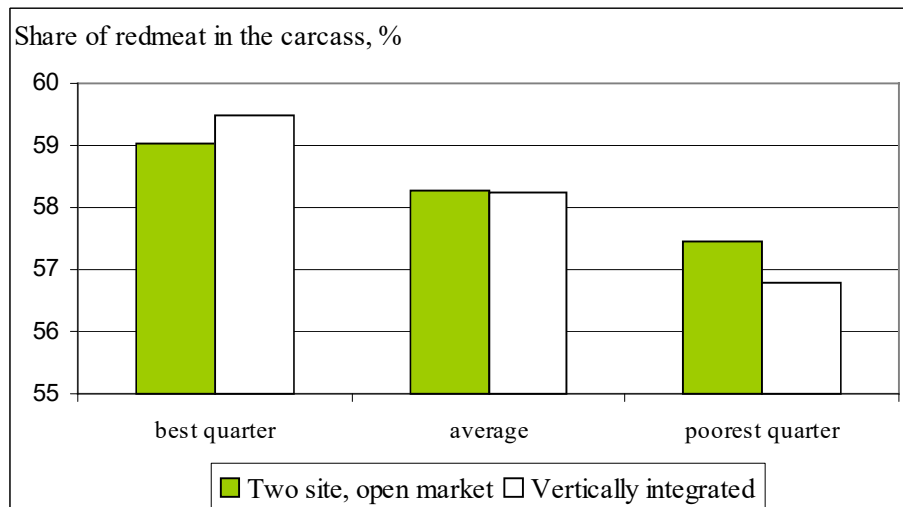


Figure 4 Share of red meat in the carcass in two site and vertically integrated hog production systems in 1999

Concluding remarks

The results suggest that simple price and flow fixing contracts have potential to significantly decrease volatility of the returns to hog production facilities, which is consistent with earlier findings of Martin (1977). The volatility can be decreased at both farrowing and finishing stages. Thus, those farmers who do not have access to fair contracts have high incentives to integrate farrowing and finishing stages into a single farm. This result is also supported by the recent industry development. The Finnish hog industry is concentrating into integrated (from farrow to finish) production systems. Therefore, self insurance mechanism gained through integrated production system dominates the efficiency gains from continuing in the two site system.

Besides price risks, efficient capital utilisation is another important factor driving the hog industry into vertically co-ordinated and integrated systems. It has been common that delivery problems in the traditional two site system have increased capital costs in finishing units by 10%. Efficient flow scheduling combined with investments on better animal breeding has potential to increase capacity utilisation even by one fifth and decrease the hog production costs by Euro 0.04 per kilogram.

Incentives required for efficient flow scheduling, which is a prerequisite for price fixing, can be gained by reasonable discounts in the prices of weaned piglets. Those finishing units who sign a contract, which does not allow for suspension of production, should get weaned piglets at a lower price than those who like to have the option to suspend production. The value of the option to suspend a finishing unit was estimated at Euro 2.2 per weaned piglet.

The sample on hog carcass qualities did not support significant behavioural problems in the open market for weaned piglets.

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Contract production on the Finnish cereal market

Taneli Rytsä¹

Keywords: cereal market, supply chain, information economics, contracts, incentives

Background

This study analyses a current role of contract production on the Finnish cereal market. Contract production has a long tradition in Finland and it has been described as a first step towards more coordinated food chains. In contract production farmer and cereal buyer agree quantity and variety of cereal produced. In some cases price and variety is also decided in advance. By means of contract production supply chain has stronger control for quality, quantity and delivery. Agriculture is being transformed from an industry that produces and processes commodities to one that manufactures specific attribute products for unique end-use markets i.e. from growing raw material to manufacturing biologically based specific attribute raw materials (Boehlje 1999). Changing consumer demand is also driving the evolution away from open market coordination to tighter vertical linkages (Sporleder 1992). Tighter coordination on the supply chain guarantee homogeneity and quality of products delivered by hundreds, even thousands of independent producers (Menard 2000). This paper describes critical points of the cereal supply chain as well as farmers' motives and incentives for contract production. The paper also defines main components of the optimal contract design from the farmers' point of view: determinance of the price, length of a contract, determinance of different premiums, price-premium relationships and binding commitments.

Cereal production in Finland has some special characteristics compared to many other countries. Production costs in cereal production are higher in Finland than in many other EU countries, mainly due to the climatic conditions. Average yield level is low (table 1). The average farm size of 25 hectares is also quite small. While the average size of farms has grown, the size of base parcel has not. The small average

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farm size combined with the distance and size of arable areas poses great challenges for logistic and information systems in Finnish cereal chain.

As a result of the Agenda 2000 policy reform direct subsidies play increasingly important role on farmers' total incomes. It is not sure whether farmers has incentives to improve the efficiency of cereal production in the new policy situation. Despite the fact that support package compensates farmers income, there remains the problem of lacking stimulus for production. Such a policy creates a challenge for cereal supply chain to motivate farmers to produce high quality crop for the market.

This study is concerned with contract production between a farmer and cereal merchandisers as well as between a farmer and the processing industry. The aim of study is to design an innovative governance structure and to clarify principal-agent relationships in cereal supply chain.

Cereal market in Finland

Total yield in Finland lies normally between 3,5-4,0 million tonnes. During the last years the quantity of cereals entering to the market has been laid between 1,5-1,8 million tonnes (table 1). About 80% of that amount is produced under contractual arrangements. The Finnish cereal market is small and concentrated, and there are only few bigger cereal trader and industrial organizations buying cereal. Farmers' possibilities to compare different buyers are scarce. A contract usually includes the quantity, species and, in some cases the variety. A farmer can also make a forward contract, in which the price is determined in advance. On the Finnish cereal market there are typically two business orientations; logistic alliances in which the trade is organised by cereal merchandisers, and a partnership relationship between farmers and the industry.

Table 1 Total yield, average yield and the cereal quantity coming to the trade

Year	Total yield (Million kg)	Average yield (kg/ha)	cereal coming to the trade	
			(million kg)	%
1996	3666,6	3444	1662	45,3
1997	3758,3	3418	1835	48,8
1998	2737,5	2400	1499	54,8

Table 2 Cereal purchases from farmers in year 1996–1998 milj. kg.

	1996	%	1997	%	1998	%
Trader						
Wheat	318,1	76	295,3	78	283,3	75
Rye	43,5	76	32,3	73	21,6	71
Barley	665,5	83	822	87	609,3	83
Oats	355,9	93	459,9	97	325,6	92
Industry						
Wheat	100,6	24	81,1	22	93,2	25
Rye	14	24	11,8	27	8,7	29
Barley	138,2	17	116	13	122,7	17
Oats	25,4	7	12,9	3	29,1	8

Farmer can make a contract with both cereal merchandisers and industry, and there is also possibility of selling the crop to the intervention. The cereal merchandisers is mainly organized by trader. Traders' share for cereal purchases in 1996-1998 lied between 71-92%, depending on the cereal variety. Traders have the greatest share in coarse grains. Industry buys yearly 8-29% of the yield. Farmers direct contracting with industry is mainly based on malt barley and bread cereal contracts. The share of the intervention is only 1-2%.

Theory

Cereal contract production can be described as a contractual relationship between farmer and cereal buyer. Generally the problem of motivating a person to act on behalf of another is known as the principal-agent problem. The principal's objective is to maximise his utility knowing that the agent is free to reject the contract entirely and that the contract must give the agent an incentive to choose the desired level (Rasmusen 1989). Principal's problem is to design a contract that induces the agent to act an behalf of the principal's interest. The principal can solve this problem by use of incentives. Through hidden action the activity choice is not observable to the principal. Thus, the principal, who has to pay the agent for his contractual activity, can make the payment depending on the realized gain but not on the activity chosen (Keser & Willinger 2000).

The study utilises approaches which are related to the information economics: transaction cost, vertical coordination and contracting. Transaction costs have been studied, for example, by Williamson (1979). Frank and Hendersson (1992) identified transaction costs as a factor in U.S. food industry vertical coordination. Contracting and imperfect information in the food system have been investigated by Sheldon (1996).

Transaction costs are considered as one of the main motives for coordination. Transaction cost includes both coordination and motivation costs. The choice of

the coordination may be discouraged by relatively high idiosyncratic investment resulting from asset specificity. Such specificity in crop production may be, for example, investments in harvester and drying. Another significant argument for vertical coordination may be the nature of the resource dependency (Sporleder 1992). In the Finnish circumstances it could mean that the competitiveness of cereal chain is dependent on raw materials produced in Finland.

The main problem of economic organization (motivation problem) arises because individual's private interests are rarely perfectly aligned with those of other parties involved. Theoretically, motivation problems arise because not all plans can be described using a complete contract. Such a contract would specify precisely the distribution of realized cost and benefits in each contingency so that each party individually finds it optimal to abide the contracts terms (Rasmusen 1989). A complete contract would solve the motivation problem. A contract can be seen as a mechanism to achieve binding commitments, which the parties can rely on in their planning. The problems of actual contracting are due to difficulties in modeling of complex human behavior and economic imperfections, namely due to bounded rationality, opportunistic behaviour, imperfect commitment and asymmetric information.

There are various types of exchange arrangements. In the open market system price is the primary coordinating mechanism. Several market instruments are used in the Finnish cereal market today –internet-trade and trade between farmers are examples for open price system. Marketing contracts, warehouse contracts and contract production between farmer and both industry and trade are examples of contracts used in the Finnish cereal market. According to the fundamental theorem of welfare economics, if market-clearing prices can be found and certain other conditions are satisfied, the market allocation is guaranteed to be efficient (Milgrom & Roberts 1992).

Traditionally contractual arrangements have been an instrument for both parties to reduce the risks. Stiglitz (1974) has studied for optimal incentive compensation contracts in sharecropping. According to Stiglitz the sharecropping system may result in the economy not being productively efficient, i.e. the effective labour/land ratio may differ on different plots of land. On the other hand sharecropping system is adopted because of its incentive effects and its risk-sharing features. He also noted two main difficulties (a) the presence of conflicts of interest and (b) the difficulties in providing correct incentives.

More integrated supply chains have better risk handling including price risk, quantity, quality and timing of delivery. Coordination control over supply chain and transparency for the supply chain increase. The principal and the agent both have to face the market risk. Substitution exchange mechanism such as open markets, contracts and vertical integration affects both amount of risk from these sources as well as the distribution of risk (Sporleder 1992). By means of contractual relationship the price risk may be shared.

Data and some insights into the results

The data given in the study are based on information obtained from AERI bookkeeping farms and on interview with key persons directly involved in the merchandise of cereals. AERI bookkeeping farms includes totally about 1000 farms of which about 100 are specialized in crop production. Altogether 152 farms answered to the questions.

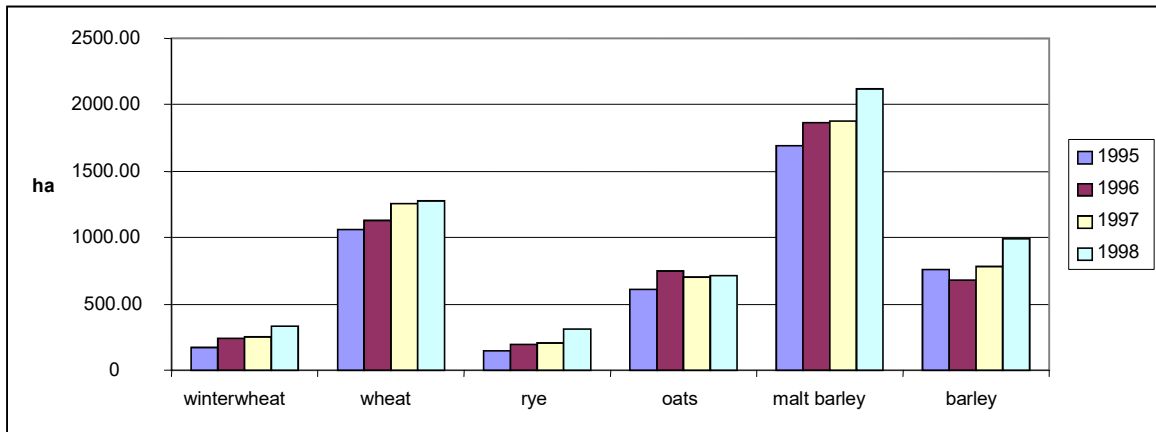


Figure 1 Development of the contract area in bookkeeping farms in 1995-1998

Contract area has increased for the part of all cereals in bookkeeping farms during the year 1995-1998 (figure 1). In particular the area under malting barley contracts has grown. The production of malting barley is traditionally based on contract production. Bread cereals are also mainly produced under contractual arrangements.

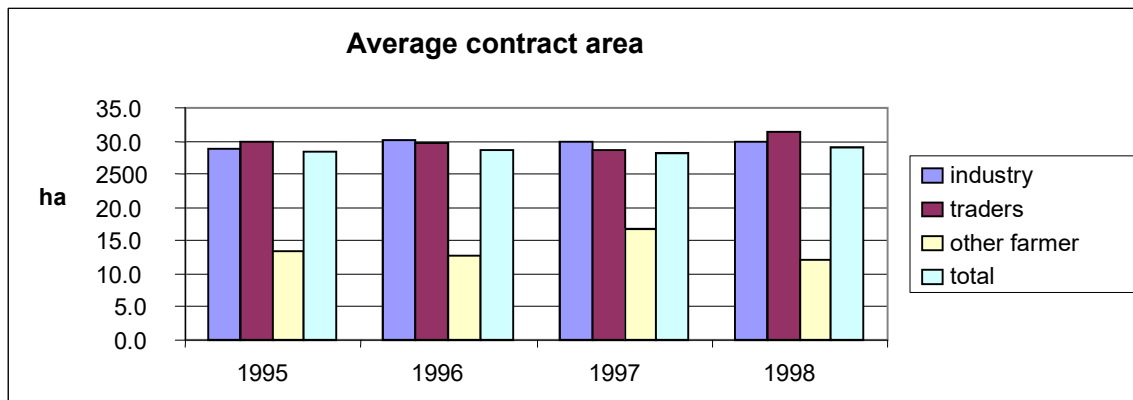


Figure 2 Average contract area

Average contract area of bookkeeping has increased slightly from 28,4 hectares in 1995 to 29 hectares in 1998. Average area in contract for industry and traders are about the same, about 30 hectares, while the contract area with other farmer varied between 12,1 and 16,8 hectares.

The main problems of contract production are related to the risk and uncertainty. If the price is not determined in advance, both the seller and the buyer face price risk and uncertainty. If the price is determined in advance, uncertainty concerning a farmer's individual price level disappears but, obviously, the level of the market price remains unknown. In Finland especially climatically induced risks destabilize production levels and thus cause difficulties in fulfilling agreed contracts. Other main factors affecting the effectiveness of contract production are control measures concerning the cereal supply and information between the contract parties.

On the farmers side the study analysed the motives and incentives for contract production, and another main objective was to establish an incentive contract design. The main components for the contract are ordinary price, premium structure, relationship between ordinary price and premiums, length of the contracts, commitment of the contracts and minimum area for contract production.

According to the questionnaire price determinance in advance was important especially for bread grains and malting barley contracting. Spot-market price was preferred for coarse grains. A year was regarded as an appropriate length of the contract period for all cereals. Higher premiums and lower market price were preferred in the case of malting barley, rye and wheat.

Farmers were also asked about the contract design for incentive contract structure. The most important incentive was the premium structure (Figure 3). Also the ordinary price and relationship between ordinary price and incentives plays crucial role.

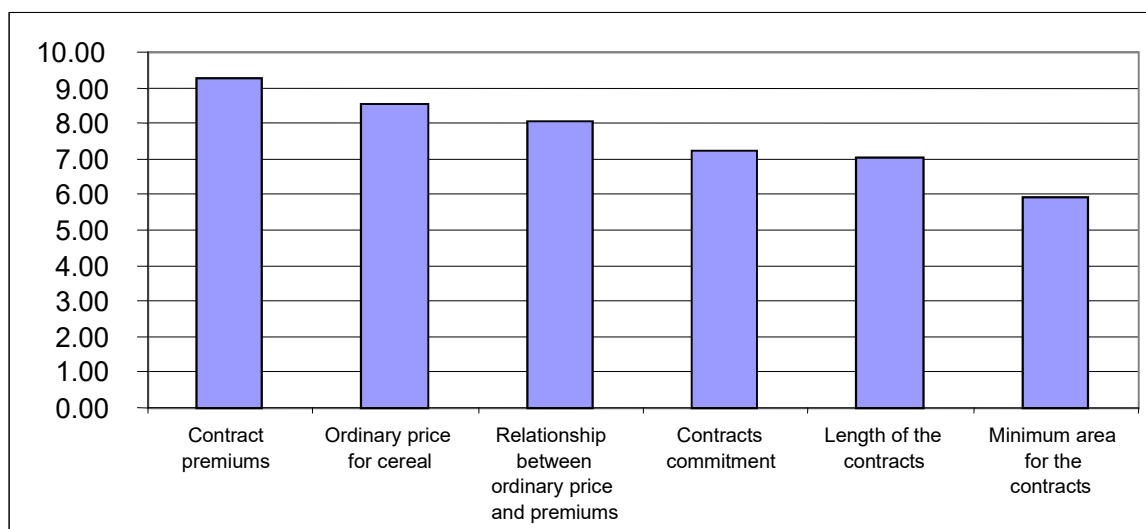


Figure 3 Farmers insights for the relevance of various elements for designing contract incentives (1=no importance... 10= very important)

Table 3 Farmers insights of elemets for incentive contract design

	Price		Price-premium relationship			Premiums	
	market price	contract price	higher price lower premiums	lower price higher premiums	quality	contract fee	quantity premium
Wheat	3,5	3,85	3,62	3,13	4,62	3,89	2,79
Rye	3,49	4,18	4,01	3,02	4,66	4,08	2,84
Malt Barley	3,22	4,19	3,81	3,25	4,63	4,01	2,89
Coarse grains	3,60	3,55	3,92	2,80	4,53	3,80	2,72
Starch grains	3,08	3,57	3,88	3,17	4,51	3,80	2,73

(1= no relevance... 5=very relevant)

Conclusion and discussion

The goal of this study is to analyse contract production between farmer and cereal buyers. Contracting is one way to coordinate relationship between farmers and both industry and trade.

In Finnish agriculture the base problems for farmers are low yield level and high production costs. Small average farm size and the field structure creates also challenges for cereal chain. The base motives for cereal traders/industry concerns price risk, quality as well as quantity control. Due to the low cereal prices it might be a serious threat that farmers lack incentives to produce cereals of sufficient quality in terms of processors' requirements. By means of tighter coordination it might be possible to guarantee the homogeneity and quality for cereals. Contract production is one way to organize cereal chain. Also resource dependency may be main reason for tighter coordination in finnish cereal chain.

For farmers the contract production secures the marketing channel for cereal. There are also open-market systems, which are organized for example via internet. Transaction costs are usually hold as a main argument for coordination choice.

Contract production provides a possibility to deepen co-ordination between farmer and cereal buyers. The main task for an efficient contract is to solve the motivation problem between participants. It can be solved by means of effective incentives. Optimal contract design is one way to raise farmers motivation. The diversity of contractual arrangement is also motivated by obligation of transparency associated with quality and environment.

The pricing for cereals might have an evolution toward "real component value of the cereal for the processor". For example, in malt processing the homogeneity of the quality has a crucial role for and it might be important to motivate farmers for homogeneity in malt barley production.

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Contracts for Co-ordination: Classical or Renewable?

Øystein Strøm¹

Introduction

A closer co-ordination of the activities in the food value chain has been observed by a number of authors, for instance Boehlje and Scrader (1998), as practices such as the just-in-time and “efficient consumer response” (ECR) (King and Phumpiu, 1997) have been gaining ground. At the same time, retail chains have achieved market power in many countries. For instance, in Norway four chains control close to 100% of the retail market in food.

The purpose of this paper is to investigate what governance mechanisms emerge between supplier and customer in this situation, and to explain why the specific mechanism is chosen. It is straightforward that closer co-ordination implies the need for predictability in the relation, and therefore, greater dependence between the parties. Due to high switching costs (Klemperer, 1987), this may lead to what Williamson (1975) called a lock-in situation. When the customer is locked in to the supplier, the danger is that the supplier acts opportunistically, and thus demands a higher price than a given market price. Thus, the problem of closer co-ordination of the activities in the value chain is opportunism. The task is to find a governance mechanism that alleviates or removes the problem.

The companies can make a choice of governance mechanism among a number of discrete alternatives. In this paper, these alternatives are summarised as different forms of contracts. First of all, the retail chain may choose to buy on spot contracts, it may integrate upstream to achieve vertical integration, or it may enter into some form of long-term relationship with a limited number of suppliers. This last mode Hennart (1993) called “the swollen middle”, indicating that some form of repeated, long-term relationship is the most common transaction mode in most Western societies. Williamson (1991) characterised the middle ground as the “hybrid forms”, because they were neither pure market transactions nor exchanges between supplier and buyer organised within a company, although they lent some specific features from both.

In this paper, a closer focus is put on the swollen middle as well as vertical integration in the analysis of the choice of governance mechanism of the exchange relationship. Four different modes are identified. These are the classical long-term contract; internal contracts, or vertical integration; long-term, renewable contracts;

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and lastly, implicit contracts or networks. Evidence from the Norwegian food market that indicates that some form of long-term transaction mode is indeed the preferred mode among retail chains is presented, and it turns out that the classical and the long-term, renewable contracts are the most common.

Why is a specific governance mechanism chosen? This is the question of the second part of the paper. An investment perspective is taken in the comparison of the classical and the long-term renewable contract, so that the companies maximise the value of the current contract plus the expected value of the contract in the next period. It turns out that important differences between the two contracts emerge. The long-term renewable contract shows that at least some of the interests of the supplier and the customer may be aligned. Thus, the theory attaches greater importance to the mutual benefits that a closer co-operation may bring and less to the avoidance of its adverse effects.

Empirical material on the food sector in Norway is used illustratively. The data is mainly qualitative, stemming from interviews with managers of food manufacturers and of the retail chains (Strøm, 1998), secondary data as well as observations of the food chain.

The paper is organised as follows. First an overview of various governance mechanisms is given, secondly, the prevailing contracts of the Norwegian food sector is presented, and lastly, a brief discussion on the difference between the classical and the long-term renewable contract is presented.

Types of contracts

“The swollen middle” covers a number of different modes. These are given different names in the literature. For easier reference, contracts are used as the common denominator of the transaction modes. The spot transaction mode is excluded from discussion. It will become apparent why this is not an interesting case in the Norwegian food chain.

The classical contract

This type of contract has the following characteristics:

1. It is a formal contract.
2. The contract is supposed to be comprehensive, that is, covering all contingencies that may occur during the contract period. In this sense, the contract will never need to be revised or complemented (Holmström and Tirole (1989)).
3. In case of disagreement over the contract, the court is the prime conflict resolution medium.

Of course, the great challenge of this kind of contract is to foresee all the contingencies that might occur. Dixit (1996) has noted that writing such contracts may be very costly, or impossible, for three reasons:

...(1) the inability to foresee all the possible contingencies, (2) the complexity of specifying rules, even for the numerous contingencies that can be foreseen, (3) the difficulty of objectively observing and verifying contingencies so that the specified procedures may be put into action.

In many cases, the cost of writing such contracts, as well as the costs of its monitoring probably prevents the use of the comprehensive contracts in many business situations.

Furthermore, the classical contract has unfavourable incentive effects. The supplier knows that the contract extends for only the specified period. After that, a prolongation of the contract is usually put up for an auction. Being uncertain whether the contract will be renewed or not, the supplier does not make relation specific investments, but in general assets instead, which may be used for other customers as well. Also, the supplier may “work to contract”, that is, make no extra efforts beyond what is required by the contract. On the other hand, the supplier may instead invest in relation specific assets and fulfil the contract in the best interest of the customer so as to increase the probability of renewing the contract, may be in the end becoming an indispensable supplier. If this situation occurs, the supplier may act opportunistically by raising prices or lowering the quality level.

In both cases, the relationship is characterised by gaming, that is, each party tries to come into a position which brings advantages to him at the expense of the other party. Mudambi and Helper (1998) called this a close, but adversarial relationship.

The internal contract – Vertical integration

The impossibility, or great expense, of writing and monitoring a comprehensive contract led Williamson (1975, 1985) to suggest that “hierarchy” replaced the “market”, or that former market transactions were performed within the company. In the case of a supplier-customer relationship, this means that two (or more) stages in a value chain came under the same ownership. The new company was vertically integrated. Williamson further pointed to repeated transactions with the same supplier as well as the need for investing in relation specific assets as causes of vertical integration.

The question of vertical integration may be seen as a question of the limits of the firm, starting with Coase’s article in (1937). Lately, this has been followed up by among others Grossman and Hart (1986).

The long-term, renewable contract

Of course, the “myriad mixed of intermediate modes filling the range” (Williamson (1985), p. 16) between spot transactions and vertical integration were recognised. Here, particular attention is put to the long-term, renewable contract. The contract is specified for a number of years. As we shall see, contract lengths of 10 years have been entered into in Norway. Furthermore, the contract is renewed, if the supplier has performed well in the previous period.

Other aspects of the long-term, renewable contract may be summed up as follows:

1. Less formality than the classical contract. Thus, all imaginable contingencies are not specified within the contract, but uncertainties are resolved as they occur through negotiations.
2. Rules for information disclosure. The contract may specify the disclosure of information on a number of aspects, including pricing and cost data. This is done in order to reduce the scope for opportunistic actions.
3. Co-operative attitude. The attitude of the parties is important. Willingness to change, and generally to “work with” the customer is seen as important determinants of a successful contract. A problem-solving and collaborative attitude is fostered.

This kind of contract is known in the Japanese car industry (Nishiguchi (1994)). Taylor and Wiggins (1997) have contrasted the “Japanese system” with the “American”, which comes closer to what we have called the classical contract here. In particular, the contracting period was shorter in the “American” system, and contract renewal was not made contingent on the performance of the last period, but was decided in an auction.

The contrast between the two types of contracts has other aspects as well. In the classical contract, the supplier has a fairly specified order to fulfil, which will increase its predictability. However, it is not certain that another contract will be landed after the current is terminated. Therefore, the supplier will not invest in relation specific assets. The contrast to the supplier in a long-term, renewable contract is evident. The supplier usually has to accept some flexibility as to deliveries, both in terms of volume and mix. However, a customer is assured for a rather long-term. The contract may be renewed. This aligns the interest of the supplier with the interests of the customer.

The “strategic network” concept of Jarillo (1988) comes close to the description of the long-term, renewable contract. He describes this as “...long-term, purposeful arrangements among distinct but related for-profit organizations that allow those firms in them to gain or sustain competitive advantage vis-à-vis their competitors outside the network.” The term “purposeful” indicates that some form of contract is basic to the network. Also, Jarillo insists that the network has a “hub firm”. As will be apparent, the retail chains may be seen as such a hub firm.

The implicit contract – Networks

In this case, the contract between customer and supplier is not spelled out in a formal contract, but the parties transact with each other on a long-term basis. Two reasons for the implicit contract may be specified.

The first is that implicit contracts arise because of social embeddedness. Granovetter (1985) maintains that personal relations based on trust uphold complex transactions in the market, thus obviating the organisation of the transactions within the firm. In this case, the transactions between firms are «embedded» in personal relations. When transactions between parties are embedded, this means that norms and inter-personal relations determine from whom the customer

purchases, as well as the manner in which the transaction is conducted. Social relations substitute for explicit contracts.

The second is that the implicit contract is a simple continuation of a former relationship which had been set down in a formal contract. With the implicit contract, one would expect long-term relationships being conducted without any formal contract. Gulati (1998) found this to be the case, as business relations developed from one based on contract to one increasingly based on trust between long-standing business partners. Thus, transactions will be renewed with the suppliers within the network, although no contract has been set out to specify such a renewal.

Bradach and Eccles (1989) have identified trust among companies as a governance mechanism in addition to the price mechanism of the market and the authority mechanism of the hierarchy. Trust is taken to be the central differentiating variable in the networks literature. Thus trust replaces a formal contract, and transactions are performed according to some implicit contract.

Thus, the parties hold long-term prospects for the relationship, although no formal ties bind them to continued transactions within the network.

Governance mechanisms in the Norwegian food sector

It is possible to speak about “the” Norwegian food chain, as the overwhelming part of the internally produced agricultural goods is consumed domestically, and at the same time, imports of competing goods are in practice close to zero due to high customs barriers.

Furthermore, parts of the food sector are heavily concentrated. As already noted, four retail chains have nearly 100 per cent of the sales to the domestic consumer. The dairy sector has been a monopoly until recently, dominated by Norske Meierier, a farmers’ co-operative. In the meat sector, another farmers’ co-operative, Norsk Kjøtt, holds about 70 per cent of the slaughtering business (excluding poultry) and an increasing share of cut meat. Aside from Norsk Kjøtt, a number of meat processors are to be found. Only one major actor, Fatland Skjeggerød, integrates slaughtering as well as processing. In addition, in the dairy and the meat sectors the co-operatives are given the responsibility of regulating the market. In the poultry business, a fully integrated farmers’ co-operative is rapidly gaining market share. A privately held food processor, Orkla Foods, has a strong position within its segments, for the most part beverages.

Although important parts of the food processing is strongly concentrated, leaving little choice to the retailers, the retailers nevertheless buy from one or two suppliers even when there is a choice. Thus, buying on spot is not an alternative. Furthermore, the ongoing transactions are regulated within a contract. Therefore, the implicit contract is excluded as well. Let us take a closer look at the remaining contracts, the classical, the internal and the long-term and renewable contract.

The internal contract – vertical integration

Four chains dominate the Norwegian food retailing business. These are NorgesGruppen, Hakon Gruppen, NKL and REMA. NKL is a consumers' co-operative, Hakon Gruppen and REMA have been established by young retailers, while NorgesGruppen is a merger of the smaller retailers that remain. Each chain has created its own distribution channel from the manufacturer to the retail outlets, that is, also including the wholesale function. Only one of the chains has rather extensive production facilities for its own outlets. Thus, contracts are the most important vehicle of transferring goods from manufacturer to retailer.

Two cases illustrate the situation, one dealing with the fruit and vegetable sector, the other a merger of a wholesaler and a retail chain. In the fruit and vegetable sector, Gartnerhallen, a farmers' co-operative, had a major part of the wholesale distribution of fruit and vegetables. Its position was being undermined by privately owned wholesalers, such as Norgesfrukt and Bama. The customer of Norgesfrukt was the retail chain REMA, while NorgesGruppen was the main customer of Bama. Norgesfrukt sold its shares to Hakon Gruppen, who thereupon terminated its contract with Gartnerhallen (which was up for renewal). Suddenly, Gartnerhallen had lost a major part of its market. In this situation, Norgesgruppen stepped in for rescue operation of Gartnerhallen. It took over the wholesaling function of Gartnerhallen as well as its production facility. After a year, the wholesaling and production had been consolidated with Bama, and NorgesGruppen sold its controlling interest in Gartnerhallen.

The same pattern was repeated in a merger of NorgesGruppen and its major wholesaler, Joh. Johannson. The wholesaling function was integrated within NorgesGruppen, while Joh. Johannson's production of coffee and other consumer products were kept separate.

On the other hand, NKL has quite extensive production facilities, of jam, other preserves, coffee and it rents production facilities with Norsk Kjøtt, the farmers' co-operative in meat processing. However, the internal supplier is preferred only if its prices match those of external suppliers.

The conclusion is then that only one retail chain follows a strategy of vertical integration. The other chains have integrated upstream to the factory gate, so to speak, but have shied away from taking an active responsibility of production.

The conclusion is that vertical integration has only in a small measure extended beyond the distribution function and into the production function. This may seem surprising, given the evidence on vertical integration found especially in the United States (Frank and Henderson, 1992; Hennessy, 1996) as well as in other industries characterised by repeated transactions (Joskow, 1985; Levy, 1985; Monteverde and Teece, 1982a, 1982b).

The classical and the long-term, renewable contract

Transactions between supplier and retailers are regulated within contracts. Thus, the implicit contract is ruled out here. The contracts may be categorised according to longevity, prolongation and specificity. We look at these in turn.

Longevity. The three chains interviewed had all three year contracts as their norm. However, NorgesGruppen has entered into contracts of considerably longer duration. One was done with Bama/Gartnerhallen, lasting for 20 years, that is, beyond a likely date for the repeal of import restrictions in the fruit and vegetable market. With two meat packers, Gilde (Norsk Kjøtt) and Fatland Skjeggerød, it has signed 10 year contracts. Beyond this, the one year contract is still in use, but it seems to be on the decline.

The contract usually has termination clauses. The contract may be terminated during the contract period with a gestation period of three months. This may be interpreted so that the contract is for only three months. However, the point is that if the supplier is competitive, he is assured a market for his products in the contract period. This makes it a long-term contract.

Prolongation. The contracts are more often than not prolonged. Often a supplier is declared to be the number one or number two supplier of the chain. If the supplier lives up to expectations, the contract is prolonged.

Gartnerhallen may be said not to have lived up to the expectations that the retailers set. As a consequence, it had lost market share for a number of years. Hakon Gruppen terminated the contract and switched to another supplier, and as we have seen, gained control of the distribution chain in the process. The general opinion of the interviewees was that Gartnerhallen had lost its competitive edge by insisting on its old ways of doing business, and had not been willing to adjust to the requests of the retail chains. Also, this had been evident for some years, still Hakon Gruppen stayed with Gartnerhallen. Probably, high switching costs (Klemperer, 1987) can explain this.

Specificity. In contrast to the classical contract, the contracts are not specified down to the last detail. In fact, during the interviews the importance of the contract was downplayed, while the importance of co-operation was underlined. For the suppliers, the ability to serve its customers was seen as far more decisive for future work for the same retailer than the contents of the legal document. For instance, flexibility was highly valued. Norske Eggsentraler, the poultry producer interviewed, had invested in several parallel lines in order to meet this desire for flexibility.

Furthermore, the importance of information exchange during the contract period was stressed. In all three chains interviewed, meetings are held at all levels with the corresponding level with the supplier. The chief executive officers meet, the sales manager and the purchasing manager meet and so on. The meetings are held at regular intervals and when the need arises. The chief executive officers tend to discuss broad, strategic issues, while operative issues of different generality are on the timetable for other managers. In these negotiations, the suppliers are required to document the need for price increases, and these costs are compared to

costs in other companies and the costs last year. This procedure is followed towards the monopoly dairy company as well. In fact, this implies the emergence of a negotiated, cost-plus pricing policy.

Together with the contract's long-term nature as well as the renewal of the contract, this is evidence against the classical contract. Should the classical contract prevail, the participants would have stressed other aspects, like contract fulfilment, conflicts over alleged breach of contract and so on.

Why choose the long-term, renewable contract?

The interesting feature is to contrast the classical with the long-term renewable contract. We'll do so by first viewing the two contracts as investments under uncertainty, and then discuss the incentive effects of the contracts.

Uncertain investments

Both a classical contract and a long-term renewable contract may be terminated, and both may be prolonged. They differ in the way this is done. The current contract period may be seen as an investment period, the later period or periods as pay-back periods, for simplicity. Assume that the cost of capital is zero, and that the companies are rational, risk neutral maximisers.

The companies may invest in either relation specific capital or in general capital. The customer next period may be either the current customer, assumed to be one for simplicity, or some other customer. There is competition for the contract from other suppliers, but the contract is constructed so that the "winner takes all", that is, the company winning the contract gets the whole contract. There is a probability for winning the contract, and therefore, the companies maximise the value of the current plus the expected value of the next period's contract. Should the supplier win the contract, he cannot at the same time deliver to another customer.

Let us now examine the effect on investment in relation specific assets in this set-up has applied to the classical contract. A supplier under such a contract will:

Maximise[The value of the current contract
+ (The probability of winning a renewal)(The value of the renewed contract)
+ (The probability of winning a new customer)(The value of a new contract)].

The supplier may assume that the probability of winning a renewal is rather small, because the new contract will be put up for an auction, and may be the customer does not want to be tied to the same supplier for too long. On the other hand, the supplier may try to improve the probability of winning a renewal by investing in relation specific assets, and to reap benefits from the increased dependency in the following period. The customer will see through this strategy, and the supplier will know that the customer does. At the same time, should the supplier invest in relation specific capital, he will diminish his chances of winning a contract from other customers.

The upshot of this is that the supplier will invest in general capital in order to hold other options open. By investing in general assets he is diversifying his risks.

In the long-term renewable contract the supplier will:
 Maximise[The value of the current contract
 + (The probability of winning a renewal | The performance in the current
 period)(The value of the renewed contract)
 + (The probability of winning a new customer)(The value of a new contract)].

The crucial difference lies in the probability. It is now a conditional probability, conditioned on the performance the company has shown in the current contract period. In this case, if the performance is up to the expectations set, the contract will be renewed. The company can influence the probability of winning a renewed contract by investing in relation specific assets in the current period. Thus, both in the current and in the subsequent periods benefits from this specialised equipment will accrue to both supplier and customer.

Thus, the long-term renewable contract may be seen as a case of incentive alignment.

Incentive effects

Other incentive effects may be noted as well. Given that the supplier under a classical contract has a low probability of renewal, he will maximise the value of the current contract. This means that he will act opportunistically in areas not regulated by the contract. The flip side of this is that the customer needs to install a number of control mechanisms in order to make sure that the supplier does not take advantage of the situation. The supplier may not be willing to show a collaborative attitude on emerging issues, thereby slowing down decision processes. Lastly, the conflict resolution mechanism is slow, to a large extent relying upon third party intermediation or judgement.

In the long-term renewable contract the supplier has an interest in the relationship extending beyond the current contract. By acting opportunistically he will improve his chances of contract renewal. On the other hand, he will have an incentive to collaborate on for instance promotion of his goods or implementation of cost-reducing equipment, because this will make the supplier-customer relationship to which he belongs more competitive in the marketplace.

Conclusion

We have discussed the choice of governance mechanisms applied to the Norwegian food sector and found that a long-term renewable contract was the most common. Compared to the classical contract, the long-term renewable contract reduces the extent of opportunism and assures the investment in relation specific assets. The contract's incentive is to nurture a problem-solving, collaborative "atmosphere" in the relationship between supplier and customer.

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Deregulation of the Norwegian Market for Dairy Products

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Abstract

The Norwegian dairy policy is based on price discrimination. Monopoly profit is passed on to the farmers by raising the average price of milk. This procedure increases milk production, and involves cross-subsidization. Using a numerical model of the Norwegian agricultural sector we show that substantial efficiency gains may be achieved by deregulating the dairy sector, mainly due to the elimination of exports. It is estimated that a transition to cost based pricing may increase the economic surplus by 2.6 billion NOK, which is 22% of value added in agriculture.

Keywords: Norwegian dairy policy, price discrimination, cross-subsidization, deregulation, numerical model. Introduction

Introduction

The dairy sector is heavily regulated and subsidized in nearly all industrialized countries. According to an estimation for 1994 (OECD, 1996), total support to the dairy industry measured in producer subsidy equivalents (PSE) amounted to 61% of the total value of production as an OECD average. As a comparison, the average percentage PSE for all agricultural commodities was 42%. Dairy sector support is especially high in countries like Japan, Switzerland, Iceland and Norway, with PSE-rates above 75%. New Zealand is the only OECD country with an insignificant level of support.

Although the exact policy instruments and institutional arrangements may vary, there are some common features characterizing the dairy policy in most OECD-countries. Firstly, market price support accounts for a substantial part of total support. As a principal rule domestic market prices are supported by a combination of import barriers and intervention arrangements where product surpluses are

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purchased at established floor prices, like the Dairy Price Support Programme in the United States or the national intervention boards in the EU. To get rid of surplus dairy products, export subsidies are used. Many countries also apply production quotas to limit surplus production of milk.

Secondly, price discrimination between different uses of the milk is common. In the United States, for example, the Federal milk marketing order system implies price discrimination between fluid and industrial milk, and in the United Kingdom the recently abolished Milk Marketing Boards set prices on milk to the dairies according to end use. As price discrimination leads to unequal profitability between products, receipts from sales are usually pooled and the farmers are paid a single price adjusted for composition and quality.

As we will thoroughly explain in the next section, the Norwegian dairy policy has strong parallels to the general OECD dairy policy. It is based on price discrimination. Monopoly profit is passed on to the farmers by raising the average price of milk. This procedure increases milk production, and involves cross-subsidization. Using a numerical model of the Norwegian agricultural sector, the main purpose of this paper is to estimate the national welfare losses induced by this policy. We show that substantial efficiency gains may be achieved by deregulating the dairy sector.

The Norwegian dairy policy

Most of the regulations in the Norwegian dairy sector are based on a law from 1930, which cleared the way for an organized processing and marketing of dairy products through a dominating cooperative owned by the milk producers.⁴ On behalf of the government, the dairy cooperative was given the responsibility to regulate the dairy market in order to ensure all milk producers, regardless of localization, a reasonable and stable price of milk.⁵

Today, nearly all milk farmers are members of the dairy cooperative, and the cooperative resembles a monopoly in the end market, protected by prohibitive import barriers⁵. Thus, in order to raise the farmgate price, the cooperative is in a position to price discriminate between different uses of the milk (e.g. drinking milk, cheese, butter and milk powder) and between different markets (domestic and foreign). This price discrimination is, however, restricted by price caps on the final products.

The dairy cooperative is a non-profit organization, and the revenue gained by price discrimination is therefore shared by the farmers, i.e. the owners. Two main methods of revenue sharing are discussed in the economic literature, depending on

⁴ Regulations for the benefit of cooperatives, were also introduced in other countries in the 1930s, e.g. in the United States (see Ippolito and Masson, 1978). Cooperatives were promoted by two reasons: First, to offset the monopsony power local buyers of milk obtained due to high transportation costs, and second to raise and stabilize the raw milk price, which in many countries almost collapsed during the depression in the 1930s. To raise the raw milk price, different kinds of price discrimination schemes were introduced, taking advantage of the relatively inelastic market for fluid milk products.

⁵ The import tariffs, resulting from the Uruguay Round of Multinational Trade Negotiations (GATT, 1993), are in the range of 250-400 per cent. Minimum access opportunities equal to 5 per cent of domestic consumption in the base period, are established at lower tariffs.

whether the cooperative pays the farmers a price according to net marginal revenue product (NMRP) or net average revenue product (NARP) (see e.g. Helmberger, 1964 and Taylor, 1971). With reference to the Norwegian dairy sector, Figure 1 illustrates the difference between these two methods.

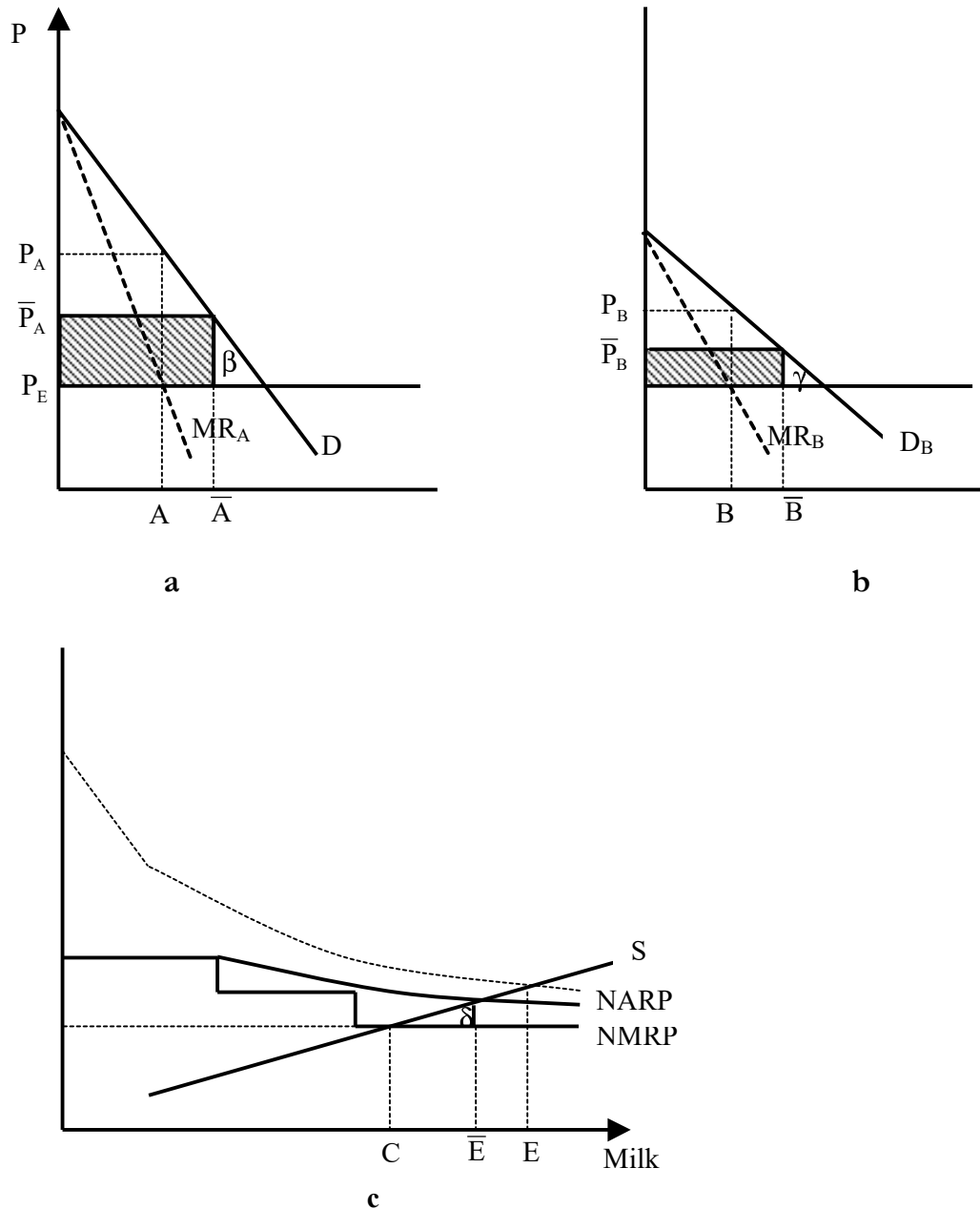


Figure 1 Methods of revenue sharing: NMRP versus NARP

In panel a domestic demand for drinking milk is represented by D_A , while D_B in panel b is the demand for other domestic uses of milk (cheese, butter, milk powder, etc.). D_B is assumed to be more elastic than D_A . MR_A and MR_B are the corresponding marginal revenue curves. P_E is the export price. If the cooperative

were free to set domestic prices, it would sell A units of milk as drinking milk at a price P_A and B units of milk for other domestic uses at a price P_B . Any milk produced in excess of $A+B$ would be exported. However, the cooperative is facing price caps \bar{P}_A and \bar{P}_B . In panel c the stepwise curve labelled NMRP is the constrained aggregate net marginal revenue product curve. S is the farmers' supply curve of milk, including subsidies paid directly to the farmers. We assume that the cooperative has constant marginal costs in inputs other than milk, for simplicity normalized to zero.

In order to maximize farmers' surplus, subject to the price caps \bar{P}_A and \bar{P}_B , the cooperative has to purchase C units of milk from the farmers, of which \bar{A} and \bar{B} units should be sold in the two domestic markets and the remainder $(C - \bar{A} - \bar{B})$ in the export market. To limit the production to C , the cooperative cannot pay the farmers more than the price P_{NMRP} , which is equal to the cooperative's net marginal return. This means that the cooperative profit, $(\bar{P}_A - P_{NMRP})\bar{A} + (\bar{P}_B - P_{NMRP})\bar{B}$, has to be divided between the farmers independently of delivered quantity (see e.g. Staatz, 1987).

The Norwegian dairy cooperative, however, pays the farmers a price according to the net average revenue product (NARP), which means that all revenue gained by price discrimination is passed on to the farmers in the form of an increased price of milk. Thus, the farmgate price of milk is a weighted average of the net return obtained in different markets. Referring to Figure 1, this principle results in a farmgate price, P_{NARP} , given by the intersection of the farmers' supply curve, S , and the solid curve, NARP, defined as:

$$NARP = \alpha_A \bar{P}_A + \alpha_B \bar{P}_B + (1 - \alpha_A - \alpha_B) P_E$$

where α_i , $i = A, B$, is the share of total production sold in the i^{th} domestic market.

As Figure 1 illustrates and which will be demonstrated empirically in section 3.3, NARP pricing results in higher production than NMRP pricing, \bar{E} . In the absence of price caps NARP would be given by the dotted curve in panel c, resulting in an even higher production, E . The surplus production is exported at a price lower than the marginal costs in production, which means that the farmers as a group can do better by choosing NMRP pricing. In the case of Norway, about 16% of the total milk production is exported at a loss (see section 3.3).⁶ This loss is financed through the higher price imposed on domestic consumers. The government does not directly participate in the financing of export subsidies through budgetary outlays.

The price discrimination inherent in both NMRP pricing and NARP pricing leads to a net welfare loss illustrated by the triangles β and γ in panels a and b,

⁶ As a means to limit the surplus production of milk, a production quota system is applied at the farm level, but the total production level still exceeds by far the quantity necessary to maximize the farmers' surplus.

whereas NARP pricing leads to the additional loss of producer surplus equal to the area δ in panel c.

Price discrimination, exploiting differences in demand elasticities between different final products, leads to unequal profitability between different lines and local dairies. NARP pricing is a way of pooling revenues and costs in such a way that all dairies have the same ability to pay for the farmers' milk. Obviously, this method involves cross-subsidization. As will be shown empirically in section 4, domestic products like butter and milk powder are cross-subsidized by drinking milk and cheese, while foreign consumers are cross-subsidized by domestic consumers. Furthermore, small dairy companies in rural areas, unable to exploit economies of scale and with high transportation costs, are cross-subsidized by bigger companies closer to the consumers and farmers.

A regulatory system based on cross-subsidization is threatened by cream skimming from entrants (private dairy companies) preferring to supply the most profitable products or markets and leaving the incumbent (the cooperative) to supply the less profitable. Until recently, cream skimming from private dairies has been avoided by different kinds of institutional entry barriers⁷. However, as a part of a new milk marketing scheme introduced in June 1997, most of the institutional entry barriers have been removed⁸. To avoid cream skimming in a market with no institutional entry barriers, dairies producing profitable products are obliged to pay a levy in proportion to the number of units produced, for example per litre drinking milk produced. This levy is, i.a., used to subsidize unprofitable products, export, small regional dairies and transport.

The main objective of the new milk marketing scheme is to strengthen competition in the dairy sector by removing institutional entry restrictions. As such the scheme is a response to the general criticism that monopolies tend to have low efficiency, and also a response to results of economic research that suggest cooperatives are less efficient than other organization forms (Porter and Scully, pp. 511-12, 1987). However, the new milk marketing scheme implies no major change in the practice of cross-subsidizing export and some domestic products by imposing a levy on other domestic products, especially drinking milk. The only change in this respect is that the previously implicit levies and subsidies have been made explicit. Hence, the issue of welfare losses due to price discrimination and cross-subsidization, is just as relevant as before the reform.

⁷ It was almost impossible for entrants to get milk supplies from farmers since all the existing milk farmers were members of the cooperative and legally unable to change dairy company. Milk supplies from new farmers were also ruled out as a result of a closed quota system. Potential entrants in the dairy sector were therefore obliged to buy milk from the cooperative, which would be their rival in the end market. Another severe barrier to competition was the cooperative's dual role as competitor in the market place on one side, and administrator of the pool system on the other side.

⁸ By repealing the law which made it difficult for farmers to change dairy company and by introducing tradeable production quotas at the farm level, the new marketing scheme makes it easier for entrants to receive supplies from the farmers. The scheme also facilitates competition by moving the administrative responsibility for the pool system from the cooperative to a separate marketing board («Omsetningsrådet»).

The model

Description

In order to estimate the efficiency loss due to the Norwegian dairy policy, we will use a price endogenous, partial equilibrium model which includes the most important products and factors in the Norwegian agricultural sector. It is a partial equilibrium model in the sense that input prices as well as export prices are determined outside the model and treated as given. However, domestic linear demand functions for the main agricultural products are included, hence the name price endogenous (see McCarl and Spreen, 1980).

A short description of the model is presented in the appendix.⁹ In this section we focus on some important details regarding the model representation of the dairy sector. Seven dairy products or aggregates are modelled: Cow milk, goat milk, cheese, brown cheese¹⁰, butter, milk powder and drinking milk. The first two are intermediary products delivered from milk farms to dairies.¹¹ The remaining products are aggregates delivered from dairies to wholesale or retail dealers.¹² Cow and goat milk are converted into dairy products by four different dairy processes or model dairies. The model dairies are characterized by fixed conversion coefficients for milk into each product. The conversion coefficients and processing costs for each model dairy are presented in Table 1. Note that all model dairies have butter as a by-product.

Table 1 Production processes in the dairy sector

Product	Process			
	Cheese and brown cheese	Brown cheese	Milk powder	Drinking milk
Cow milk (litre)	-11.302	-8.705	-4.607	-1.041
Goat milk (litre)	-0.319	-1.494		
Cheese (kg)	1			
Brown cheese (kg)	0.250	1		
Butter (kg)	0.145	0.155	0.076	0.007
Milk powder (kg)			1	
Drinking milk (litre)				1
Processing costs (NOK)	16.34	13.44	8.87	2.01

⁹ The model is designed to perform policy analyses, and has as such been used by the Norwegian Ministry of Finance and the Norwegian Ministry of Agriculture. A detailed description of the model is given in Brunstad et al. (1995a).

¹⁰ Brown cheese is a traditional Norwegian product produced by boiling down milk and whey. Most of the goat milk is used for this product.

¹¹ At the farm level, milk production is represented by about 75 model farms of varying size (from 6 to 200 cows) and location (9 production regions), each characterized by fixed input and output coefficients.

¹² The most important product, drinking milk, is an aggregate of fluid milk of different fat content, cream and yoghurt.

The domestic demand functions are linearized to go through the price/quantity combination of the base year (1990) using the following demand elasticities: cheese and brown cheese (0.5), butter (1.0), milk powder (1.0) and drinking milk (0.3). These elasticities correspond to the common assumption that the demand for drinking milk is less elastic than the demand for butter, milk powder and cheese, and are roughly in line with several existing studies. Cross-price effects are neglected as we use broad product aggregates which hardly are close substitutes in consumption, except for cheese and brown cheese.

The base solution: Net average revenue product pricing

Using the model, we have simulated the actual agricultural policy in Norway by implementing the actual system of subsidies and import barriers in the base year 1990.¹³ In the simulation we assume perfect competition in all sectors but the dairy sector. In the dairy sector we allow the cooperative to practise price discrimination between different uses of milk and between different markets. This price discrimination is restricted by the price caps applied to the final products in 1990. Furthermore, we assume that the net revenues gained by price discrimination is passed on to the farmers in the form of an increased farmgate price of milk (NARP pricing).

The results of this simulation, which is called the base solution, are presented in Column 2 of Table 2, and may be compared to the actual situation in the base year 1990, reported in Column 1 of Table 2. It appears that the simulation of the actual policy gives results which are close to the observed situation. Observe that the level of support given to Norwegian agriculture is extremely high (19.2 billion NOK or 2.5 billion USD). Since agriculture employs about 85,000 man years, the support per man year is about 225,000 NOK (30,000 USD). Apart from grain, Norway is self sufficient or has a surplus in agricultural products. For dairy products there is a considerable surplus. As will be demonstrated in section 3.3, exports of cheese and butter correspond to about 290 million litres of cow milk (16% of the cow milk production).

¹³ At the farm level, the Norwegian agricultural policy is based on different kinds of subsidies. First, there are substantial budget transfers in the form of general price subsidies, regionally differentiated price subsidies, subsidies differentiated by farm size, acreage and headage payments, disaster payments, transport subsidies, structural adjustment measures etc. Second, support is also given in the form of tariffs. Third, a system of tradeable production quotas gives regional protection. It should also be noted that the subsidies favour small farms in scarcely populated areas. Consequently, the Norwegian agricultural policy is to a large extent directed at rural employment and protection of the family farm. For a detailed description of the Norwegian agricultural policy, see OECD (pp. 52-61, 1990).

Table 2 fra Brunstad, Gåsland, Vårdal inn her
(liggende tabell)

Net marginal revenue product pricing

To demonstrate the difference between the two methods of revenue sharing discussed in section 2, we have simulated the market solution with NMRP pricing. As explained in section 2, NMRP pricing implies that the revenue gained by price discrimination is allocated to the members independent of delivered quantity. Compared to the base solution, which assumes NARP pricing, Column 3 of Table 2 shows that NMRP pricing results in lower milk production, higher cooperative profit, higher surplus to producers and lower total budget support. To be more specific, cow milk production is reduced by about 290 million litres (-16%), as exports of cheese and butter are eliminated.¹⁴ This is due to the fact that export prices are way below production costs, in spite of substantial subsidies at the farm level.¹⁵ Consequently, when the cross-subsidization inherent in the NARP pricing strategy is abolished, the dumping of dairy products stops. The domestic consumption of dairy products is unaltered, as we assume the same price caps.

The elimination of exports raises cooperative profit by 1.1 billion NOK. This amount, which in Figure 1 is illustrated by the shaded rectangles in panel a and b, should be allocated to the members. If allocated equally to the about 29,000 milk farms, each farm will receive approximately 38,000 NOK, which illustrates that the farmers can do substantially better by choosing NMRP pricing.

As shown in Table 2, the switch to NMRP pricing has limited effects on other agricultural sectors. The production of coarse grains is, however, reduced by 8% due to lower demand from the milk sector. The production of beef and veal is also negatively affected (-5%), as beef and veal are largely produced in combination with milk. Due to cross-price effects between meat products, the production of sheepmeat and pigmeat increases slightly as a response to higher prices on beef and veal.

The overall increase in economic surplus is 2.1 billion NOK, of which 0.8 billion NOK is due to higher producers' surplus, while 1.3 billion NOK can be explained by lower budget support, mainly because of lower milk production and fewer farms. Note that the increase in producers' surplus is closely related to the raise in cooperative profit. Domestic consumption and prices, and thus consumers' surplus, are largely unaltered.

An obvious question to ask is why the farmers fail to choose NMRP pricing. One possible explanation could be that the cooperative's objective is to be as big as possible without losing money, rather than to maximize the total surplus of the member farmers. According to a public choice approach, this may be the goal of a firm's management or the goal of altruistic or idealistic farmers.¹⁶ A second possible explanation is that surpluses from NMRP pricing must be allocated to the members

¹⁴ A small quantity of butter is still exported, which is due to the fact that butter is a by-product from the production of drinking milk, cheese and milk powder.

¹⁵ Average prices on dairy products exported from Norway are: cheese (16.85 NOK), brown cheese (31.03 NOK) and butter (9.77 NOK). The production costs, including subsidies, are: cheese (37.25 NOK), brown cheese (38.66 NOK) and butter (22.81 NOK); see section 4, Column 5 in Table 3.

¹⁶ See Bateman, Edwards and LeVay (1979a, b) and LeVay (1983) for more detailed discussions of alternative objectives of cooperatives.

as lump-sum transfers, which may be difficult to achieve. A final reason not to choose NMRP pricing, could be potential ratcheting effects inherent in the yearly negotiation system between the government and the farmers' organizations concerning the subsidy level. If the milk farmers' income increase strongly over time due to a transition to NMRP pricing, it is reasonable to believe that the government will respond by withdrawing subsidies.

A deregulated dairy sector

We have demonstrated that exports of dairy products are unprofitable and give rise to substantial welfare losses. In this section, we focus on additional efficiency losses caused by Harberger distortions in the domestic market. We assume free competition, and consequently obtain prices which are equal to marginal costs. Import restrictions are maintained, which means that we focus on an internal deregulation. At the farm level, we assume that the government subsidies are the same as in the base solution.

The exact framing of the deregulation is beyond the scope of this paper, but removal of institutional entry restrictions and government interventions in the product market are basic conditions. As explained in section 2, institutional entry restrictions have already been removed as a part of the new milk marketing scheme, but interventions in the product market are still present in the form of levies and subsidies.

The results of the experiment are presented in Column 4 of Table 2 and in Table 3. As we observe from Table 3, cross-subsidization in the base solution does not only apply to exports, but even to butter and milk powder in the domestic market as well. Deregulation of the dairy sector means an increase in the domestic prices of butter and milk powder by 12% and 60% respectively. Furthermore, Table 3 shows that most of these subsidies are financed by levies imposed on cheese and drinking milk in the domestic market. In the base solution, these two products are overpriced by 12% and 32% respectively. Naturally, the consumption of cheese and drinking milk increases as a result of the transition to cost based pricing, while the consumption of butter and especially milk powder decreases.

Table 3 Domestic consumption (million kg or litres) and wholesale prices (NOK per kg or litre)

Product	Domestic consumption			Domestic wholesale prices		
	The base solution	A deregulated dairy sector	Percentage change	The base solution	A deregulated dairy sector	Percentage change
Cheese (kg)	43.5	46.2	+ 6.2	42.36	37.25	- 12.1
Brown cheese (kg)	13.1	13.4	+ 2.3	39.98	38.66	- 3.3
Butter (kg)	16.9	15.1	- 10.6	20.42	22.81	+ 11.7
Milk powder (kg)	30.4	12.1	- 60.2	13.68	21.95	+ 60.5
Drinking milk (litre)	740.0	812.2	+ 9.8	6.56	4.44	- 32.3

Compared to the base solution, cow milk production is reduced by 357 million litres (-20%), of which 290 million litres stem from the elimination of exports (see

section 3.3), while the remaining reduction is due to a lower domestic demand when the price discrimination is eliminated.

As a result of deregulation, the economic surplus increases by 2.6 billion NOK, while total agricultural support decreases by 2.9 billion NOK. The increase in economic surplus is a measure on the efficiency loss inherent in the present system with price discrimination and cross-subsidization. Nearly 80% of this efficiency loss (2.1 billion NOK) can be attributed to exports, while the remaining efficiency loss (0.5 billion NOK) is caused by distorted pricing in the domestic markets.

Consumers and taxpayers are the main gainers of the deregulation. As a result of lower domestic prices on drinking milk and cheese, and despite higher prices on milk powder and butter, the consumers' surplus increases by 1.6 billion NOK. The taxpayers gain 1.5 billion NOK, mainly because of lower milk production and fewer farms, and thereby lower total subsidies to the milk farmers. The producers' surplus decreases by 0.5 billion NOK because of the decline in the milk production.

An objection to our model simulation is that deregulation will hardly lead to free competition and cost based pricing. Although institutional entry barriers are removed, there are many kinds of technical and strategic entry barriers which may continue to hamper competition, such as economies of scale, sunk costs and transport costs.¹⁷ The industry norm is, as noted by Sexton (1990) and Tennbakk (1995), that cooperatives coexist with other firms in markets that are structural oligopolies or oligopsonies. Thus, the estimate in this section should be interpreted as the maximum gain by deregulating the dairy sector.

Concluding remarks

Norwegian dairy policy is based on price discrimination. Monopoly profit is passed on to the farmers by raising the average price of milk. This procedure increases the milk production of the farmers, and involves cross-subsidization. Model simulations presented in this paper show that substantial efficiency gains may be achieved by deregulating the dairy sector. It is estimated that a transition to cost based pricing may increase the economic surplus by 2.6 billion NOK, which is 22% of value added in agriculture. Elimination of exports explain nearly 80% of this efficiency gain, while the remaining gain is due to elimination of Harberger distortions in the domestic market. Cow milk production is reduced by more than 350 million litres (-20%).

Cooperatives which set prices according to NARP without restricting the farmers' supply, are often seen as procompetitive forces in the economic literature. The surplus that is retained as profits in an investor owned firm (IOF), is passed on to the farmers in the cooperative by raising the price of raw milk. In response they increase their production and the cooperative supplies more than an otherwise

¹⁷ Since the introduction of the new milk marketing scheme, three private dairies have expanded production rapidly. However, they still have low market shares, especially at the farm gate level (about 1%). The highest market share is in the wholesale market for cheese (about 10%). Other entrants have tried to enter the market, but have failed. The entrants accuse the cooperative of predatory pricing.

identical IOF. In oligopoly and oligopsony situations, cooperatives may thus, as noted by Helmberger (1964), Cotterill (1987) and Sexton (1990), play an important yardstick role in moving output and price levels closer to those of perfect competition. However, this paper illustrates that the outcome may be adverse if the cooperative is allowed to price discriminate between domestic and export markets. In this case the cooperative tends to behave just like a monopolistic IOF in the domestic end market, but, unlike an IOF, it also generates surplus production that is exported at a price below the marginal costs of production.

A final question, when evaluating the regulations, is whether there are social benefits to outweigh the substantial costs of the current policies. There are several alleged benefits of regulation, spanning from the original objectives in the 1930s, namely to raise and stabilize milk prices and offset monopsony power, to current objectives related to rural employment and farm incomes. However, at the present market conditions it is hardly probable that these benefits justify government interventions of the magnitude described in this paper. The regulations may have been relevant at the time when they were passed, i.e. during the depression in the 1930s, but they are now out-of-date due to technological development and structural change. For example, farmers' bargaining power towards dairy companies has increased due to lower transportation costs and better conservation methods. The rationale for price stabilizing interventions in the market is also weakened, partly because the farm level production has become more predictable, and partly because technology makes it easier to transfer milk products in time (storage) and space (trade). Regarding rural employment, it might be argued that deregulation will have a negative effect on agricultural employment in rural areas, estimated to about 11,600 man-years (-22%).¹⁸ However, it is well established that the most efficient way to achieve rural employment is by means of general income support to all inhabitants or general wage subsidies to all industries in a particular region (see e.g. Winters 1989-1990), and not by support confined to a single industry. If the authorities still want to pay specific support to agriculture, production neutral support is more efficient than price support of the kind used in the Norwegian dairy sector.

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Appendix

The model is a partial equilibrium model of the Norwegian agricultural sector. For given input costs and demand functions, market clearing prices and quantities are computed. Prices of goods produced outside the agricultural sector or abroad are taken as given. As the model assumes full mobility of labour and capital, it must be interpreted as a long run model. A more technical description of the model is given in Brunstad et. al (1995a).

The model covers the most important products produced by the Norwegian agricultural sector, in all 14 final and 9 intermediary products. Most products in the model are aggregates. Primary inputs are: land (four different grades), labour

(family members and hired), capital (machinery, buildings, livestock) and other inputs (fertilizers, fuel, seeds, etc.). The prices of inputs are determined outside the model and treated as given.

Supply in the model is domestic production and imports. Domestic production takes place on the model's approximately 400 different "model farms". The farms are modelled with fixed input and output coefficients, based on data from extensive farm surveys carried out by the Norwegian agricultural economics research institute. Imports take place at given world market prices inclusive of tariffs and transport costs. Domestic and foreign products are assumed to be perfect substitutes. The country is divided into nine production regions, each with limited supply of the different grades of land. This regional division allows for regional variation in climatic and topographic conditions and makes it possible to specify regional goals and policy instruments. The products from the model farms go through processing plants before they are offered on the market. The processing plants are partly modelled as pure cost mark-ups (meat, eggs and fruit), and partly as production processes of the same type as the model farms (milk and grains).

The domestic demand for final products is represented by linear demand functions. These demand functions are based on existing studies of demand elasticities, and are linearized to go through the observed price and quantity combination in the base year (1990). Between the meat products there are cross-price effects, while cross-price effects are neglected for all other products for which the model only assumes own-price effects. The demand for intermediary products are derived from the demand for the final products for which they are inputs. Exports take place at given world market prices.

Domestic demand for final products is divided among 5 separate demand regions, which have their own demand functions. Each demand region consists of one or several production regions. If products are transported from one region to another, transport costs are incurred. For imports and exports transport costs are incurred from the port of entry and to the port of shipment respectively. In principle restrictions can be placed on all variables in the model. The restrictions that we include, can be divided into two groups:

- (1) *Scarcity restrictions*: upper limits for the endowment of land, for each grade of land in each region.
- (2) *Political restrictions*: lower limits for land use and employment in each region, for groups of regions (central regions and remote areas), or for the country as a whole; maximum or minimum quantities for domestic production, imports or exports; maximum prices.

Different types of objective functions are used, dependent on what kind of market structure that is simulated. When assuming perfect competition total economic surplus (consumers' surplus, producers' surplus and importers' surplus) of the agricultural sector is maximized. When simulating the market structure of the dairy sector, only producers' surplus and importers' surplus are maximized (subject to price caps on the final products). In either case the maximization is performed subject to demand and supply relationships and the imposed restrictions. Which

restrictions are included depends upon what kind of simulation that is attempted. The solution to the model is found as the prices and quantities that give equilibrium in each market. No restrictions must be violated, and no model farm or processing plant that is active, must be run at a loss.

Determining the Size of an Open Marketing Cooperative in Duopoly

Berit Tennbakk¹

Abstract

The paper offers a game-theoretic explanation why we observe mixed market structures in agricultural markets. The players of the game are a large number of independent farmers who are price-takers, an open-membership marketing cooperative and a private wholesaler. The farmers can choose whether to be members of the cooperative or patronize the private wholesaler. It is shown that any distribution of farmers between wholesalers can be sustained as an equilibrium solution. Moreover, in the specified game, the private wholesaler's choice of wholesale price determines its market share. How large, then, the cooperative will be, depends on the slope of the industry marginal cost curve. Total production in the mixed market is found to be greater than in monopoly, but less than in first best.

Introduction

According to Sexton (1990), the industry norm in the marketing of agricultural products is that cooperatives coexist with other firms in oligopoly or oligopsony markets. Despite its commonness, however, the existing literature offers little explanation as to how such a mixed market structure can prevail as equilibrium.

Although cooperatives enable members to coordinate supplies, they are different from cartels because they are not believed to be able to control the individual members' production. Therefore, it is traditionally assumed that when a cooperative is present in a market, total output is increased and efficiency enhanced, compared to the unregulated private solution. Moreover, farmers are certainly better off as members of a cooperative, than when dealing individually with

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wholesalers exercising market power.² Why is it then that we observe mixed market structures? Why do not all farmers form cooperatives, and why do not all farmers join into one powerful cooperative? This paper shows that private firms can strategically adjust to the competition from a cooperative, and be able sustain profitability in the market.

Although cooperatives' "competitive yardstick effect" (Sexton, 1990) has repeatedly been pointed out in the existing literature, the existence of mixed market structures has more or less been treated as off-equilibrium situations. The notion that cooperatives have a countervailing effect on monopoly power in agricultural markets has, e.g., been formally stated by Helmberger (1964, 1966) and Helmberger and Hoos (1962). Assuming an open membership cooperative where surplus is distributed to farmers according to production, they show that, in the short run, the cooperative equates the wholesale price to the average cost. Thus, the cooperative organization expands production and forces the private firms to raise their price. In the long run, all firms produce at minimum efficient scale and farmers are indifferent between supplying the private firm and the cooperative. Hence, cooperatives are expected to have a relatively short life cycle (LeVay, 1983).

If the industry is a natural monopoly and the monopoly is a cooperative, it is argued that production will be too high. The cooperative solution is, however, closer to the competitive solution than the private monopoly solution. Lacking the tools of game theory, Helmberger informally draws the conclusion that the open membership cooperative tends to have a procompetitive effect in oligopoly (Helmberger, 1964). He does, however, not rule out that even a cooperative will have an incentive to collude with private firms to exploit consumers.

A basic feature of the Helmberger/Hoos approach is the notion that the cooperative distributes all revenue through the price paid to farmers, i.e., utilizes so-called NARP-pricing.³ If, instead, farmers are paid a per unit price according to marginal cost and a fixed amount independent of production, i.e., NMRP-pricing⁴, the cooperative will be able to restrict its members' output.⁵ Such a pricing policy enables the cooperative to maximize the revenue from the end market in the same manner as a private firm. If farmers take the total farm surplus into account and not only the price per unit, more farmers will join the cooperative. Hence, if the cooperative employs an open membership policy, it will grow. The question is whether this process is likely to continue until the cooperative controls the whole market.

Based on the Helmberger approach, Rhodes (1983) argues that the open membership cooperative is powerless in the market. He argues that the cooperative

² Tennbakk (1994) show that in a market where an exclusive marketing cooperative competes with one private wholesaler in duopoly, the nonmember farmers are worse off than in private duopoly. If these farmers can not become members of the existing cooperative, their rational response is to set up their own cooperative.

³ Net Average Revenue Pricing; $NARP = p - f/Q$, where p is the price in the final market, f is the fixed cost of marketing, and Q is the total quantity marketed by the cooperative.

⁴ Net Marginal Revenue Pricing, NMRP.

⁵ Zusman (1982) shows that cost distribution rules involving marginal cost pricing can be attained through majority voting.

is able to act strategically since it is not obliged to market all of its members' supplies. Nevertheless, in the long run, the private firms competing with a cooperative will suffer a steady loss in market share and lower margins, and will gradually move their activities elsewhere. Eventually, the market will consist of one cooperative or several cooperatives. Thus, neither Helmberger nor Rhodes explain the mixed market as an equilibrium market structure in oligopoly.

This paper develops a model where the equilibrium is a mixed market where both the open membership cooperative and the private firm make positive revenues, and farmers are indifferent as to which processor to patronize. The model employed is similar to some of the horizontal integration literature, e.g., Perry and Porter (1985) and Gaudet and Salant (1992). In this setting, however, the number of farmers constituting the cooperative (integrating horizontally) is endogenous.⁶

The problem can be summarized in the following game structure: At the outset the market consists of N independent farmers, one marketing cooperative and one private wholesaler. For simplicity it is assumed that the wholesale or processing plants are already set up and costs are sunk. The agents make their choices in three sequential moves: 1) the private wholesaler offers a wholesale price, w , to farmers; 2) the farmers choose whether to become members of the cooperative or to patronize the private wholesaler; and 3) the cooperative chooses its quantity. This choice of game structure is based on the intuition that the cooperative will, for a given membership, set its quantity to maximize its members' return, that the farmers will choose whether to be cooperative members or supply the private wholesaler based on the profit they earn in the two alternatives, and that the private wholesaler knows the strategy of the cooperative and the choice criteria of the farmers when choosing what wholesale price to offer.

The Basic Setting

The model is based on the same cost structure as the one employed in Perry and Porter (1985). Let the industry costs of production be expressed by the cost function $C(Q,L)$, where Q is the final product and L is a necessary input in production. The production function exhibits constant returns to scale and the cost function implicitly includes the input prices of all variable factors.⁷ The cost function is thus linearly homogeneous in Q and L . Marginal costs are homogeneous of degree zero in Q and L . Let L be the supply of land, and let the supply of land be fixed and normalized to 1. Then the marginal cost function $C_l(Q,1)$ is increasing in Q . The marginal cost function thus expresses the industry competitive supply curve.

The fixed factor is distributed among a large and finite number of farmers, N , who produce the raw product on independent farms. Total production is given by

⁶ Kamien and Zang (1990) endogenize the decision to merge. In their model, however, the insider firms must approve of one more firm being part of the merger.

⁷ $C = C(Q, L) \equiv \min_z v z$ s.t. $[Q - f(z, L) \leq 0]$ where v is the vector of input prices for the variable inputs z , and f is the production function.

$Q = \sum_i q_i$, $i = 1, \dots, N$, where q_i is the production at farm i . All farmers own an equal share of the fixed factor and have identical cost functions. Since the industry marginal cost function is homogeneous of degree zero, the individual cost structure mirrors the industry cost function. Moreover, the industry competitive supply curve does not change with the distribution of the fixed factor between firms. Hence, the identical farm cost functions are characterized by

$$(1) \quad c_i = c(q_i) \quad c_i' > 0 \quad c_i'' > 0$$

where c_i' is the individual farm's supply function.

There are economies of scale in distribution or processing, exceeding the scope of the individual farm. Two alternative marketing channels are available to farmers: a marketing cooperative jointly owned by the member farmers, and a private profit maximizing wholesaler. The farmers who become members of the cooperative market all their production through the cooperative, and the cooperative markets only the production of its members. The cost function of the wholesale activity is assumed to exhibit constant marginal costs, for simplicity normalized to zero.⁸

Let the number of farmers who are members of the cooperative be n , $n \leq N$. The cooperative determines its total production and the production of each member.⁹ The aggregate cost function of the cooperating farmers is

$$(2) \quad C(Q_C) = nc(q_i^C)$$

Farmers are identical and each member will produce an equal share of the cooperative quantity.

The private wholesaler offers a price, w , for the purchase of the raw input and maximizes the profits from the wholesale operation. The surplus on the farms does not directly enter the private wholesaler's objective function.

For simplicity we consider a market where the inverse demand function is linear and is expressed by

$$(3) \quad p = 1 - Q$$

The industry cost curve is assumed to be of the simple quadratic form

$$(4) \quad C(Q) = \frac{1}{2} Q^2$$

Assuming all farmers own an equal share of the fixed factor and have otherwise identical cost functions, the individual cost functions read

⁸ Helmberger (1964) and Rhodes (1983) both argue that diseconomies are rarely encountered in food processing.

⁹ It is assumed that the cooperative can achieve this by adopting a surplus distribution rule involving marginal cost pricing and side payments, cfr. note 5.

$$(5) \quad c(q_i) = \frac{N}{2} q_i^2 \quad \text{and} \quad c'_i = Nq_i$$

Benchmarks

Assume that all farmers jointly organize a cooperative marketing firm, i.e., $n = N$. Hence, the cooperative is in a monopoly position towards the final market and solves

$$(6) \quad \max_Q \Pi^M = p(Q)Q - \frac{1}{2} Q^2$$

by restricting output to the monopoly or cartel solution, Q_M . Each farmer earns a profit of Π^M/N . With the specified demand and cost functions the monopoly price is equal to $p^M = 2/3$, the total quantity produced is $Q_M = 1/3$ and the marginal cost is $C_1^M = 1/3$. The cooperating farmers earn an equal share of the monopoly profit, $\pi_i^M = 1/(6N)$.

If farmers are price takers, this market situation will have an undesirable incentive structure. It is clearly profitable for an individual farmer to deviate from the cooperative solution, where $c'_i < p$, and expand output until $c'_i = p$. In fact any $q_i > q_i^M$ as long as $c'_i \leq p$ will give extra profits. It is, however, assumed that the individual farmer cannot market his production on his own. Provided that fixed costs are not too high, there is, however, a rationale for a private wholesaler to establish business.

The “opposite” market structure can be thought to be a competitive market, or a market in which the private wholesaler is a monopsonist and also a monopolist. In both cases, the incentives on the side of farmers to form a cooperative are clearly present. Compared to the competitive solution farmers can gain through cooperation, and in many countries they can legally engage in such cooperation.¹⁰ On the other hand, if all farmers cooperate, each has the incentive to break out and free ride on the gains from the coordination of all other farmers. Thus, none of the corner solutions are equilibria. In the next section, the existence of internal equilibria is discussed.

The first-best solution is where $p^F = C_1^F = 1/2$, the total quantity produced is $Q_F = 1/2$, and each farmer earns a surplus of $\pi_i^F = 1/(8N)$.

¹⁰ This “right” is often associated with an obligation to employ open membership policies.

Solution to the Game

The game is solved through backwards induction.

Stage 3:

Let Q_C be the quantity marketed by the cooperative and Q_P the quantity marketed by the private wholesaler, thus, total market supply is $Q = Q_C + Q_P$.

If n farmers are members of the cooperative, the aggregate cost function of the cooperative is

$$(7) \quad c(Q_C) = nc(q_i^C) = \frac{N}{2n} Q_C^2$$

where $Q_C = nq_i^C$, $i = 1, \dots, n$. Note that N/n is the inverse share of farmers who are members of the cooperative as well as the inverse share of the fixed factor owned by the cooperating farmers. Let us denote this share by s . Thus, the share of the fixed factor that is owned by the farmers patronizing the private wholesaler is $(1-s)$.

Since the cooperative is an open membership cooperative, it cannot choose its membership. For any number of members, however, the cooperative determines the quantity to be produced on each farm. For n members, the joint profit of the cooperating farmers is:

$$(8) \quad \max_{Q_C} \Pi^C = (1 - Q_C - Q_P)Q_C - \frac{N}{2n} Q_C^2$$

where $Q_P = (N-n)q_j^P$, $j = n+1, \dots, N$. The optimality condition can be restated as the cooperative's best response or reaction function

$$(9) \quad R^C(Q_P, n; N) = Q_C = \frac{n(1 - Q_P)}{2n + N}$$

As for the usual Cournot reaction function

$$(10) \quad \frac{\partial Q_C}{\partial Q_P} < 0 \quad \text{and} \quad \frac{\partial Q_C}{\partial n} > 0$$

Each member earns an equal share of total profits, $\pi_i^C = \Pi^C / n$, $i = 1, \dots, n$. The cooperative quantity is increasing in n , because the total cost of producing any amount of output is decreasing in n .

Stage 2:

Since farmers are price takers and profit maximizers, a farmer supplying the private wholesaler earns a profit of

$$(11) \quad \pi_j^P = \max_{q_j^P} wq_j^P - c_j(q_j^P)$$

Facing a price offer of w , the farmer will supply a quantity according to $w = c'(q_j^P)$. Thus, $q_j^P = w/N$ and Q_P and Q_C can be expressed as functions of w and n :

$$(12) Q_P(n, w) = \left(1 - \frac{n}{N}\right)w \quad \text{and} \quad Q_C(n, w) = \frac{n \left(1 - \left(1 - \frac{n}{N}\right)w\right)}{2n + N}$$

where $\frac{\partial Q^P}{\partial w} > 0$ and $\frac{\partial Q^P}{\partial n} < 0$. The sign of the first derivative follows directly from the maximization problem of the private farmers, equation (11). Moreover, for any given w , the private wholesaler's quantity declines when more farmers join the cooperative. The private farmers must produce more than the cooperating farmers in order to make the same revenue,

$$(13) \left| \frac{\partial Q_C}{\partial n} \right| < \left| \frac{\partial Q_P}{\partial n} \right|$$

The farmers choose whether to become members of the cooperative or to patronize the private wholesaler. The choice is made according to what maximizes the individual farmer's profit, thus

$$(14) \pi = \max[\pi_i^C, \pi_j^P]$$

In a mixed equilibrium farmers are indifferent between being members of the cooperative or patronizing the private wholesaler. The condition for a mixed market Nash equilibrium can be stated as follows

$$(15) \pi_i^C(n, w) = \frac{\Pi^C(n, w)}{n} = wq_j^P(w) - c(q_j^P(w)) = \pi_j^P(w)$$

Equation (15) implicitly defines n as a function of w . The derivative of n with respect to w is

$$(16) \frac{\partial n}{\partial w} = - \frac{\frac{1}{n} \frac{\partial \Pi^C}{\partial w} - \frac{\partial \pi_j^P}{\partial w}}{\frac{\partial (\Pi^C / n)}{\partial n} - \frac{\partial \pi_j^P}{\partial n}} > 0$$

Details are available from the author.

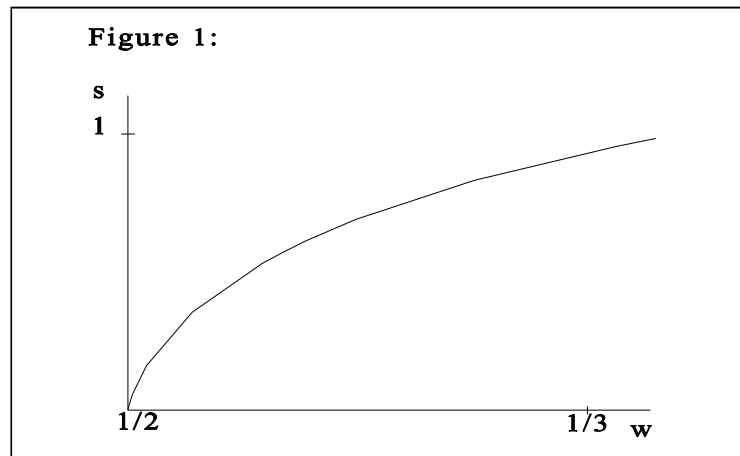
Rearranging terms defines the equilibrium s for different values of w

$$(17) s(w) = \frac{n(w)}{N} = \frac{2w - 1 + \sqrt{2w(2w - 1)}}{w}$$

From 17, the share of farmers who patronize the cooperative, $s = n/N$, is independent of N , and

$$(18) \frac{\partial s}{\partial w} = w^{-2} + \frac{\sqrt{w(2w-1)}}{w^2(2w-1)\sqrt{2}}$$

Thus, s is increasing in w for $w > 1/2$. Being members of the cooperative, the farmers have to earn more than in the competitive solution. For the “private” farmers to be equally well off, the offered w must be greater than in the first best solution. In section 2 the competitive wholesale price, and thus the lower value of w , is calculated to $\bar{w} = 1/2$. On the other hand, $s = 1$ determines the upper value of w , from equation (17) $\bar{w} = 1/\sqrt{3}$.



In words, equation (17) states that when the private wholesaler makes a higher price offer to farmers, more farmers choose to be members of the cooperative. This may seem counterintuitive, but is explained by the following argument based on the Nash equilibrium concept: When more farmers are members of the cooperative, its market power is greater and the cooperating farmers make more money. Thus, the private wholesaler has to make a higher price offer to match the cooperative. Given that all players have perfect information, the game is equivalent to a game where the private wholesaler makes his price offer w to a share $(1-s)$ of farmers. Foreseeing the equilibrium, all the $(1-s)N$ farmers accept the price offer, and in the resulting market equilibrium no farmer will wish to change his wholesaler affiliation. The relationship between s and w is depicted in figure 1.

Now, quantities, prices and profits can be expressed as functions of w alone. Generally, since, from (10), the total cooperative production, Q_G , is increasing in n , it is increasing in w as well. The production of each cooperative member is, however, decreasing in w . For high values of w , more farmers are members of the cooperative, and the cooperative has more market power and restricts the output of each farmer to increase joint surplus. The total production of the cooperative, however, increases.

In sum, the total quantity marketed by the private wholesaler, Q_p , decreases in w (details are available from the author). Moreover, the total quantity supplied to the

market decreases in w , approaching the monopoly quantity as n approaches N . As n approaches 0, w approaches 1/2 and the total quantity approaches the competitive quantity. Hence, the price in the final market increases in w , ranging from the competitive price to the monopoly price.

Stage 1:

The private wholesaler's profit can now be expressed as a function of w alone. Hence, the strategic choice to be made by the private wholesaler is

$$(19) \quad \max_w \Pi^P(w) = p(w)Q_P(w) - wQ_P(w)$$

The private wholesaler buys however much the farmers want to supply at that price.

The first order condition for profit maximization is thus

$$(20) \quad \frac{\partial \Pi^P}{\partial w} = \frac{dp}{dw} Q_P + (p - w) \left(\frac{\partial Q_P}{\partial w} + \frac{\partial Q_P}{\partial n} \frac{\partial n}{\partial w} \right) - Q_P = 0$$

Hence, changing w has three effects on the private wholesaler's profit. The first term on the right-hand side of equation (20) is a *price effect*, which is positive. Raising w triggers an adjustment in total quantities such that the total quantity marketed by the wholesalers decreases and the price in the final market increases. The second term summarizes the *quantity effect*. The new price cost ratio of the private wholesaler is now earned on a smaller quantity. Hence, this effect is negative. The last term expresses the *cost effect*, i.e., for every unit purchased by the private wholesaler, it must pay the higher price, w .

Figure 2 depicts the private wholesaler's profit as a function of w . In the relevant range of w -values only one real root exists, thus there is a unique choice of w solving equation (19) in the relevant range.

Proposition

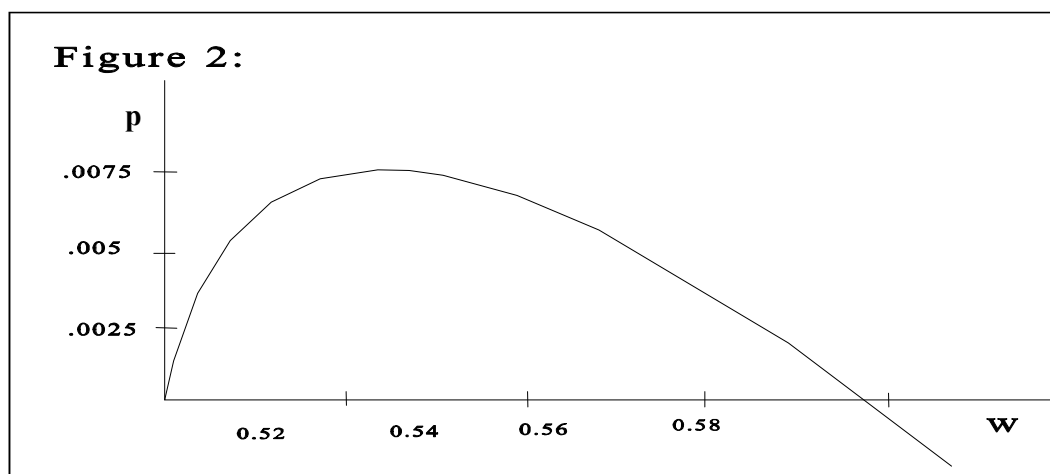
When the private wholesaler sets his wholesale price in the first stage, farmers are price-takers and the cooperative determines its quantity in a Cournot-Nash fashion, then the private wholesaler's profits are maximized by a wholesale price, w , which yields a unique mixed market equilibrium.

Proof

The profit of the private wholesaler is

$$(21) \quad \Pi^P = \frac{(2w-1) \left(3w - 5w^2 + \sqrt{2w(2w-1)} - 2^{\frac{3}{2}} w \sqrt{2w-1} \right)}{5w - 2 + 2^{\frac{3}{2}} \sqrt{w(2w-1)}}$$

Solving $\partial \Pi^P / \partial w = 0$ yields one feasible solution which is $w = 0.53$. The second derivative is negative in this point. Hence, $w = 0.53$ is a maximum point for equation (19) and the only maximum in the relevant w range. QED.



As could be expected, the cooperating farmers prefer the cartel solution. So do per se the private farmers, too; it is when n is high that the potential gain from free-riding is greatest (per farmer). However, as can be seen from figure 2, the private wholesaler is best off at some intermediate n . When n is high, the cooperative's profit is high, and the private wholesaler has to pay a high price and buy a large quantity from each of the free-riding farmers. When n decreases, the cooperative's market power decreases, and the private wholesaler can pay a lower price. If n is too small, however, the cooperative's market power is weak, and it is not able to maintain a high market price. The private wholesaler faces a trade-off between weakening the cooperative and free riding; as the private wholesaler increases its market share, the very basis of its free-riding is weakened.

An interesting corollary is that any distribution of framers can be sustained by choosing the proper private wholesale price, w .

Corollary

For all s , $0 < s < 1$, there exists one value of w that yields a mixed solution where all farmers are equally well off and the private wholesaler earns positive profits. Given this distribution, no farmer will wish to change his wholesaler affiliation.

Proof

$\Pi^P = 0$ for $\underline{w} = 1/2$ and $\bar{w} = 1/\sqrt{3}$, $\partial \Pi^P / \partial w$ is not defined for $w = 1/2$, but is positive for $w \rightarrow 1/2^+$ and zero for only one w value in the relevant range. Thus all distributions, $0 < s < 1$, yield positive profits for the private wholesaler, and can be sustained as equilibria in the sense that the cooperating farmers and the private farmers are equally well off. QED.

Assume that the size of the cooperative is arbitrarily chosen; some initial group of farmers got together and formed a cooperative. If the private wholesaler acts as a price taker towards the rest of the farmers, there is, for any initial s , a price offer, w , that makes the $(1-s)N$ remaining farmers equally well off outside the cooperative. This may be even more plausible if the private sector contains more than one firm and these firms constitute a competitive fringe in the market. In that case, the model is similar to a cartel with competitive fringe model.

Welfare comparisons and comparative statics

For the specific cost function employed, the equilibrium solution is $w = 0.53$ and $s = 0.62$, in words, 62% of the farmers are members of the cooperative. The total production of the cooperative is $Q_C = 0.20$, and the total quantity marketed by the private wholesaler is $Q_P = 0.22$. Thus the private wholesaler has a market share of 52%, but is patronized by only 38% of the farmers.

Total production in the market is thus $Q = 0.42$, which is between monopoly and perfect competition. The equilibrium price is $p = 0.58$. The private farmers are paid $w = 0.53$ per unit supplied, equal to their marginal cost. In contrast, the marginal cost of a cooperating farmer is 0.35. The ratio of $q_j^P/q_i^C = w/c_i^C = 1.51$, thus, the private farmers produce 50% more than the cooperating farmers on the same amount of land.

The steeper the marginal cost curve of the industry, the greater is the optimal market share of the private wholesaler. The corresponding elasticity of supply is smaller, and it is less costly for the private wholesaler to match the cooperating farmers' surplus. When marginal costs are constant there is no business potential for the private wholesaler because there is no potential for free riding. For any price above marginal cost he will receive an infinite quantity. For $w = c_p$ the farmers will stick to the cartel solution; all farmers continue to patronize the cooperative.

Introducing fixed costs of marketing would change the equilibrium condition (14), since it directly affects the revenue of the cooperating farmers. The intuition is that this will weaken the cooperative in terms of membership. The private wholesaler can pay a lower price to keep farmers happy outside the cooperative. Again, it is relatively cheaper for the private wholesaler to grow, but this time because the profit earned as a cooperative member is lower, *cet.par.* On the other hand, it is clear that the magnitude of the fixed cost will set a lower and upper limit to the size of the market share of the private firm. Thus, the corollary does not hold for low and high values of s , how low or how high depends on the magnitude of the fixed cost.

The total social surplus, W , in the mixed market is calculated according to

$$(22) W^{mix} = \int_0^Q (1-t)dt - c(Q_C) - c(Q_P)$$

In the relevant range, the welfare function is continuous and decreasing in w and, thus, in s . If all farmers are members of the cooperative, the cooperative produces the monopoly quantity, whereas when no farmers are members of the cooperative, the model yields the competitive solution. $W^F = 0.25$ in perfect competition, $W^M =$

0.22 in monopoly, $W^{MM} = 0.19$ in the private monopoly/monopsony solution and $W^{mix} = 0.24$ in the mixed market solution. Helmberger's conjecture that the mixed solution would be closer to first best than the monopoly/monopsony solution is thus verified. Total production in the mixed market, however, is not greater than in first best. The reason is that the cooperative has the opportunity to exercise market power - it is not rendered powerless in the final market as in Helmberger's model.

The results contradict Rhodes' intuition that the private firm will eventually move its business away from a market in which a cooperative is present. Even when the cooperative is an open membership cooperative, the total quantity marketed and, hence, total welfare, is restricted compared to the first-best competitive equilibrium.

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Technical Efficiency and Production Risk in the Swedish Slaughter Pig Production

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Abstract

Empirical evidence indicates that farmers are facing a choice on whether maximise output or reduce output variance given actual technology use. An alternative is that farmers become engaged in a trade-off between maximal output and output variance. This study concerns with the measures of technical efficiency and production risk for the special case of Swedish slaughter pig production that by international comparisons the pig industry has been experienced for the last two decades a rather stringent animal welfare legislation and quality policy programs. The estimated results indicates a technical efficiency for the observed sample and period of 87.5%. That a positive relation between the intensity production level and technical efficiency is found. However the risk involved in the applied technology sets is not always in conformance with the objective measure of technical efficiency. In a short term perspective it is also apparent that a technology that is increasing technical inefficiency and reducing production risk may have negative effects on production however, in a long term smoothing production seems to be vital to secure productive performance in the production process.

Introduction

Growth production is a stochastic process depending on pigs individual characteristics as well as the applied technology set. Farmers may be able to control growth production by using actual technologies. However within and across herds farmers may still experience variations on output levels due to technology sets. There is a production risk involved in the technology set that cannot be eluded no matter farmers preferences on risk. Farmers risk attitude becomes relevant when adopting new technologies. Ramaswami (1992) shows that there is a positive relation between marginal production risk and input levels in optimal input decisions under the assumption of risk averse.

This problem addresses the special case of Sweden that by international comparisons the industry has been experienced for the last two decades a rather

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stringent animal welfare legislation and quality programs (Hoffmann et al 1997). The propose of the regulations is to improve animal welfare concerns during the production process and to secure a high quality pork. Heshmati et al (1995) compare the productive performance at the farm level for the entire Swedish pig industry during the period 1976 to 1988. The mean technical efficiency for the industry and period is found to be 94%. The study also measures technical change over time. It is found a positive technical trend for the period between 1976 and 1980. However the technical trend turns to decay for the remanding period 1981 to 1988. That is the period when regulations are introduced into the industry. However the study is conducted on aggregated data levels disregarding the effect of specific production technologies and managerial decisions. The study of Sharma et al (1999) include the effects of various farm specific factors when they study technical, allocative and economic efficiencies of the pork production in Hawaii. The study confirms that firm specific factors such as managerial decisions do affect productive performance levels. However, the study does not consider the production risk involved in the technology use at the farm levels.

The aim of this study is to investigate farmers actual technology sets affecting technical efficiency and production risk. Production inputs are specified by initial weight, total feed intake and labour. Technology sets denoting farm and time specific effects describe technical efficiency and production risk at the farm and production levels. These are technologies describing farmers and production characteristics. Provided that efficiency effects follow a stochastic process, the vast literature on stochastic production frontier approach allows us to model technical inefficiency effects as deviations from the stochastic production frontier due to farm and time specific effects (Kumbhakar 1995, Heshmati et al 1995, Battese and Coelli 1995, Coelli, Rao and Battese 1998, Sharma et al 1999). On the other hand production risk denoting variance output due to implemented input levels according to Just and Pope (1978). This model has been widely used by among others Griffiths and Anderson (1982), Ghosh et al (1994) and Tveterås (1999).

This study offers an improved understanding on the composition of farmers technology sets. Empirical evidence indicates that farmers are facing a choice on whether maximise output or reduce output variance given the actual technology use. An alternative is that farmers become engaged in a trade-off between maximal output and output variance. To the best of my knowledge no one has attempt to empirically investigate the relationship between technical efficiency and production risk or either attempt to explain technical efficiency and production risk in the slaughter pig production at a very farm and production levels.

Theoretical framework

Growth production is specified as:

$$(1) \quad y_{ij} = (f(\mathbf{x}); \boldsymbol{\varepsilon}_{ij})$$

y_{ij} is annual pork production per place, $f(\mathbf{x}_{ij})$ is a vector of input factors and ε_{ij} is the random process. The \mathbf{x}_{ij} -vector production inputs are measured in annual terms. These are initial weight q_{ij} , total feed x_{ij} and labour l_{ij} for the i -th farm and the j -th produced batch, for $i = 1 \dots N$ and $j = 1 \dots M_j$. The number of produced batches across farmers M_j are not equal across producers hence, it represents an unbalanced panel data. The total number of batches for a year is $\tau = 365/t$ where t is the number of days required to produced a batch.

Technical Efficiency

As an illustration to the stochastic production frontier modelled by Coelli, Rao and Battese (1998) consider the production function denoted by equation (1). The random process $\varepsilon = v-u$, is a function of two components. v is uncontrollable to farmers due to animal's individual metabolism and a systematic part u denoting farm and time specific effects such as technology sets and the number of batches during a production year. In figure 1, $y_0 = f(\mathbf{x}_0)$ denotes the deterministic part of the model with no random process and complete technical efficiency. A farmer producing output y_1 using input factor x_1 (*) is facing a stochastic production frontier defined by $y_1 = f(x_1) + \varepsilon_1$. This point marked by (\otimes) indicates that in some extent the farmer is not able to control the production random process by the applied technology. The uncontrollable part of the process is larger than the systematic part $v_1 > u_1$. Similarly $y_2 = f(x_2) + \varepsilon_2$ corresponds to a negative randomness $\varepsilon_2 < 0$ denoted by (∇) . It indicates the farmers ability to control the stochastic process by the applied technology set $v_2 < u_2$ (Coelli, Rao and Battese 1998).

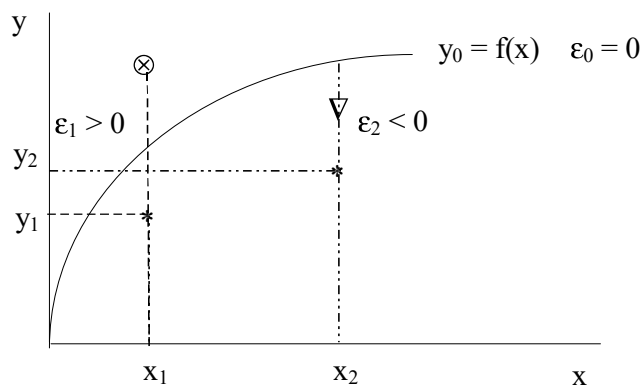


Figure 1 The Stochastic Frontier Production

Thus the general production form represented by equation (1) becomes:

$$(2) \quad y_{ij} = f(\mathbf{x}_{ij}; \alpha) \exp(\varepsilon_{ij})$$

the $f(\mathbf{x}_{ij}; \alpha)$ is the deterministic part of the model, α :s are unknown parameters to be estimated and $\varepsilon_{ij} = v_{ij} - u_{ij}$ is the random part. The v_{ij} are assumed to be iid

$N\sim(0, \sigma_v^2)$ independently distributed of the u_{ij} . Technical inefficiency u_{ij} defined by equation (3) is defined by non-negative random variables. These are assumed to be iid $N\sim(\mu, \sigma^2)$ with $\mu = \delta \mathbf{s}_{ij}$ and variance σ^2 . The \mathbf{s}_{ij} -vector allocates technical inefficiency among farmers and produced batches. It includes farm and time specific effects. The δ are unknown parameters to be estimated. Production operates at a full technical efficiency level $\delta = 0$ and the random process of production depends only on uncontrolled effects v_{ij} . On the other hand, if $\delta > 0$ production operates at a technical inefficiency level while $\delta < 0$ denotes a less technical inefficiency level. Technical inefficiency is defined as:

$$(3) \quad u_{ij} = g(\mathbf{s}_{ij}; \delta) + w_{ij}$$

the random term w_{ij} is defined by the truncation of the normal distribution $N\sim(0, \sigma^2)$ with the truncation point at $w_{ij} \geq -\delta \mathbf{s}_{ij}$. These assumptions are consistent with u_{ij} being a non-negative truncation of the $N\sim(\mu, \sigma^2)$. Since technical inefficiency effects u_{ij} are unobservable, the best predictor for u_{ij} is the conditional expectation of u_{ij} given the value of \mathbf{s}_{ij} . Technical efficiency for the i -th farm and j -th produced batch is then:

$$(4) \quad TE_{ij} = \exp(-u_{ij})$$

Technical efficiency reflects the ability of each farmer to obtain maximal output given technology set denoted by farm and time specific effects.

Production risk

Further, the technology set denoting time and farm specific effects are factors hypothesised to cause variation on production levels.

In order to incorporate production risk into the arbitrary chosen equation (1) the production function takes the form as the one developed by Just and Pope (1978) with a slightly modification. In the paper of Just and Pope (1978) the production risk depends on the same input factors that the deterministic part of the model where the model is in a general form disregarding specific effects. However in this paper farm and time specific effects are disaggregated. Thus the production function becomes:

$$(5) \quad y_{ij} = f(\mathbf{x}_{ij}; \alpha) + h(\mathbf{z}_{ij}; \beta)e_{ij}$$

where $f(\mathbf{x})$ is the annual mean function or deterministic part of the model and $h(\mathbf{z})$ is the variance function or risk part of the model. The \mathbf{z} -vector includes production inputs outlined in the \mathbf{x} -vector and the specific effects in the \mathbf{s} -vector. Hence the effects on the random process are perturbed in such a way that the relationships of inputs with risk are not just determined by the relationships of production inputs and the expected output but also by the relation of farm and time specific effects

and the expected output. In the empirical specification model the β are unknown parameters to be estimated and e_{ij} denotes the random process. The expected random term is zero valued, $E(e_{ij}) = 0$ with variance $V(e_{ij}) = E(e_{ij} - E(e_{ij}))^2 = \sigma_{eij}^2$ and covariance $E(e_i, e_k) = 0$ where $h \neq k$. The expected annual production level and its variance is:

$$(6) \quad E(y_{ij}) = f(\mathbf{x}_{ij}) \quad V(y_{ij}) = h(\mathbf{z}_{ij}) \sigma_{eij}^2$$

The specification in (5) allows us to observe marginal risk with respect to a specific technology effect. These marginal effects are interpreted as technology effects that are risk increasing/decreasing (Just and Pope 1978):

$$(7) \quad MR_k = \frac{\delta V(y_{ij})}{\delta z_k} = 2h(\mathbf{z}_{ij})h_k \sigma_{eij}$$

equation (7) denotes the marginal production risk with respect to input k . The partial specific input effect on the expected value $\delta E(y)/\delta x_k$ will depend on the α -parameter values while the sign of the marginal risk with respect to a specific input $\delta V(y)/\delta z_k$ depends on the β -parameter values.

The data set

The empirical data is available in the RASP-management information system² Swedish Meats (1997) including observations for 726 produced batches from 69 Swedish herds. Each herd produces between 1 and 28 batches for the period 1995 to 1997. Information on technology sets is representative for the period 1995-1996 that technological changes cannot be observed. However the batch length allows us to observe time specific effects. Additional information on farmers is obtained by a survey study for producers in the RASP- system.

The variables aimed to explain total annual produced pork y_{ij} are annual measures per pig. These are initial weight q_{ij} total amount of feed f_{ij} and hours of labour l_{ij} . Labour includes daily care, feed preparation, insertion of piglets, delivery of finished pigs to slaughter houses and cleaning between batches.

The batch length, τ is a measure of the number of days required to produce a batch applying the “all in – all out” method. Age s_{i1} , and time experience s_{i2} , are included as farm specific effects.

Technologies in the barns, feeding systems and managerial practices contained in the \mathbf{s} -vector are in accordance with information in the available literature. A good exposition of these production technology factors is in Andersson et al (2000). Technologies regulating the climatic conditions in the barn such as air partition s_{i3} , evacuation of toxic gases originating from the manure s_{i4} , ventilation system s_{i5} , and

² Analysis results on slaughter pig production. RASP Resultat analys för slaktsvinsproduktion.

dimmer s_{i6} , appear to be important for the health and welfare of the pigs (Algers et al 1978, Nilsson et al 1987).

The cross-trough s_{i7} is specially designed for wet feed. Good hygienic conditions tend to be more difficult in the cross-trough compared to long-trough pen. However the cross-trough pen usually contains a larger manure area relative to the long-trough system (Boterman et al 1994). Studies by Randolph et al (1981) and Lindemann et al (1988) show the importance of space for achieving a good productive performance in pig production. Trough length s_{i8} , in meters per pig may indirectly serve as a measure of the space available per pig.

A common and less expensive alternative source of nutrients is various forms of the by-products s_{i9} , originating from food industries such as chips, bread, potato starch etc. However, disadvantages using by-products are many. Wet feed system s_{i10} , is the most common among Swedish producers. The system enables producers to alternate between cereals and by-products in order to balance nutrient levels and to reduce costs (Simonsson et al 1982).

Data describing managerial factors at the farm level reflect the importance of operating as integrated s_{i11} , or intermediate s_{i12} , herd systems in contrast to specialised herds. The particularities of operating integrated or intermediate herds when raising slaughter pigs are inherently connected with farm size and financial strength due to a high level of integration with other enterprises. In addition a batch-wise production system at the farrowing and finishing stages requires high skills levels in controlling environmental conditions. Choosing an intermediate system is hypothesised to require additional managerial skills in the negotiation process with the supplier(s) of piglets. In the sample 86% of producers belongs to the BIS-quality program s_{i13} . However no more than approximately 40% of the total Swedish volume is produced in accordance with the BIS-program. The BIS-program was introduced in 1995 as an extension of the Scan-H program and it requires adherence to a multitude of animal welfare concerns. The program defines detailed regulations for breeding, animal health, forage, building designs and managerial practices at farm level (Hoffmann et al 1997). Membership in the BIS-program is hypothesised to provide an edge in the managerial process apart from requiring rather advanced building technology and production practices. Disinfecting more than once a year s_{i14} , may be a sign of infection problems in the barns which is time demanding. Table 1 presents a summary statistics.

Table 1 Summary statistics

Variables	Variable names	Mean	Std dev	Min	Max
Y_{ij}	Total pork	260.18	25.51	170.54	404.58
q_{ij}	Initial weight	29.07	4.83	16.43	59.02
f_{ij}	Total feed	751.80	57.47	507.64	934.67
l_{ij}	Labour	1.30	0.96	0.25	5.07
τ	Batch length	107.91	10.75	64.00	167.00
s_{i1}	Age	45.68	8.58	30.00	77.00
s_{i2}	Experience	15.22	9.99	1.00	49.00
s_{i3}	Air partition	0.78	0.42	0.00	1.00
s_{i4}	Ventilation	0.85	0.35	0.00	1.00
s_{i5}	Manure gas evacuation	0.84	0.37	0.00	1.00
s_{i6}	Dimmer	0.31	0.46	0.00	1.00
s_{i7}	Cross-trough pen	0.34	0.48	0.00	1.00
s_{i8}	Trough length	0.33	0.05	0.26	0.58
s_{i9}	Wet feed system	0.85	0.36	0.00	1.00
s_{i10}	By-products	0.38	0.49	0.00	1.00
s_{i11}	Integrated herd	0.20	0.40	0.00	1.00
s_{i12}	Intermediate herd	0.42	0.49	0.00	1.00
s_{i13}	BIS-program	0.85	0.36	0.00	1.00
s_{i14}	Disinfecting	0.20	0.40	0.00	1.00

Empirical analysis and results

Technical Efficiency

The stochastic production function outlined in equation (2) is defined as a log-linear Cobb-Douglas production function as:

$$(8) \quad \ln y_{ij} = \alpha_0 + \alpha_1 \ln q_{ij} + \alpha_2 \ln x_{ij} + \alpha_3 \ln l_{ij} + \varepsilon_{ij}$$

where α_0 is the model intercept and $\alpha_1 - \alpha_3$ are productivity elasticity measures with respect to each input. The random term ε_{ij} is utilised to predict technical inefficiency effects as the conditional expectation of u_{ij} , where u_{ij} is defined as:

$$(9) \quad u_{ij} = \delta_0 + \sum_{k=1}^{15} \delta_k s_{ijk} + \delta_\tau \tau + w_{ij}$$

At a first stage the deterministic part of the model equation (8) is estimated by OLS-method disregarding technical inefficiency effects. Then in a second stage the stochastic production frontier and technical inefficiency effects equations (8 and 9) are simultaneously estimated by an Iterative Maximum Likelihood procedure. The log-likelihood function is expressed in terms of the variance parameters $\sigma_s^2 \equiv \sigma_v^2 + \sigma_u^2$ and the γ -parameter $\gamma \equiv \sigma_u^2 / \sigma_s^2$. The latter is a measure of the explanatory power of the systematic variance in relation to the stochastic process in the model with a value between zero and one (Battese and Coelli 1995). The results are presented in Table 2.

The software program FRONTIER version 4.1 (Coelli 1997) was used to estimate the model. The ML-function converged after 100 iterations and the log likelihood function is $L = 1527.2$. The γ -parameter is estimated to be $\gamma = 0.0024$. It is not found to be statistically significant at a 5% significance level. It indicates that just 0.24% of the residual variation is due to the variance of technical inefficiency effects, the systematic part of technical inefficiency. The total estimated variance is $\sigma_s^2 = 0.000851$, it is found to be statistically significant at a 1% significance level. Further the hypothesis of that inefficiency effects are absent from the model $\delta = 0$ is tested by a Likelihood Ratio test with the χ^2 -distribution. The one-sided LR-test statistic is found to be 916.1. The $\chi_{3,0.95}^2$ -value = 12.6 strongly rejects the hypothesis of that there are no inefficiency effects in the model at a 5% statistical significance level. The hypothesis of that the inefficiency effects are not stochastic is also rejected at the 5% significance level with $\chi_{15,0.95}^2 = 25.0$.

Table 2 Estimated results for the stochastic production frontier by ML

Parameters	Variable names	Coefficients	t-values
α_0	Intercept	2.992813	19.72
α_1	Initial weight	0.173357	19.22
α_2	Total feed	0.319701	14.63
α_3	Labour	0.003644	1.46
δ_0	Intercept	-0.419571	-16.36
δ_τ	Batch length	0.005558	41.34
δ_1	Age	0.000306	1.69
δ_2	Experience	-0.000357	-2.14
δ_3	Air partition	0.010492	2.83
δ_4	Manure gas evacuation	-0.015258	-4.58
δ_5	Ventilation system	-0.006260	-1.92
δ_6	Dimmer	0.006223	1.38
δ_7	Cross-trough pen	-0.000814	-0.31
δ_8	Trough length m/pig	-0.106944	-3.23
δ_9	Wet-feed system	-0.014160	-2.93
δ_{10}	By-products	0.007089	1.74
δ_{11}	Integrated herd	-0.017171	-4.61
δ_{12}	Intermediate herd	-0.008005	-2.13
δ_{13}	BIS-quality program	0.009131	2.09
δ_{14}	Disinfecting	-0.005087	-1.26
σ_s^2	Total variance	0.000851	17.49
γ	gamma-parameter	0.002488	0.32

The signs of the coefficients in the stochastic frontier are as expected. The coefficient of initial weight indicates that increasing piglets weight by 1% correspond to an increase in total pork produced of 0.17%. Similarly increasing total feed by 1% signifies an increase in total pork of 0.32%. The labour coefficient suggests that increasing labour time by 1% implies an increase in total pork

produced by 0.004% however, this is not found to be statistically significant at a 5% significance level.

The signs of the coefficients in the inefficiency model are satisfactory and most of them highly statistically significant. The variables dimmer, cross trough pen and disinfecting between batches are not statistically significant. The coefficient of age indicates that older farmers tend to be more inefficient than younger ones, while the negative coefficient of experience signifies that farmers with more experience tend to be less inefficient than farmers with less production experience.

It is expected that building with air partition has negative effect on growth due to persistent infection risk in herds using this technology. The result indicates that a building with air partition tends to be more technical inefficient relative to farms not using this technology. A similar result is obtained for the use of dimmer. The dimmer technology is primary intended to reduce the level of dust in the barns. Nevertheless, it seems that production without dimmer is less technical inefficient than productions using this technology. The use of manure gas evacuation and ventilation systems are expected to contribute to a good climate condition in the barns and thereby to the pigs welfare. The use of manure gas evacuation respective ventilation systems tend to reduce technical inefficiency. Raising slaughter pigs in cross trough pen indicates less inefficiency compared to the use of other types of pen. Considering the effects of space in the pens, the coefficient on the variable trough length indicates that production with increased trough length in m/pig tends to reduce inefficiency.

The coefficients of wet feed systems and by-products are as expected and statistically significant. The use of wet feed systems tend to reduce inefficiency while, the use of by-products tends to increase technical inefficiency. The last result may be due to variations in the quality of nutrient and energy contents in the by-products.

Operating integrated herds lessens technical inefficiency as expected as well as operating an intermediate herd system. Participation in the BIS-quality program tend to increase technical inefficiency in relation to participating in the Scan-H program. This is an unexpected result since it is expected that farmers associated with the BIS-program have a better technology than farmers associated with the Scan-H. However, one explanation might be that the technology requirements of the BIS-program which is intended to ensure a high animal welfare level and a good product may fail to implement the desirable improvement in management strategies. Managerial practices indicating health problems in the batch through the coefficient of disinfecting more than once a year tend to yield less inefficiency compared to disinfecting in accordance with recommendations by quality policy programs that, although this result is not statistically significant.

The time specific effects denoted by the coefficient of batch length indicates not unexpectedly that farmers with a larger production length tend to be more inefficient than farmers producing batches during a less period of time.

The mean technical efficiency in the slaughter pig production for the observed sample and period is found to be 87.5%. The range of technical efficiency for the produced batches in the sample is between 62.1 and 100.0%. Table 3 presents the

relationship between total annual production and technical efficiency respective production length and technical efficiency. The relation between total annual pork and technical efficiency is positive. The relation between production length and technical efficiency turns to be negative. It implicates that intensive operation systems tend to be more technical efficiency than otherwise.

Table 3 Total annual production, production length and technical efficiency

Total annual pork in kilo/pig	Technical efficiency	Frequency	Production length	Technical efficiency	Frequency
< 217	73.55	18	< 85	100	20
217 - 264	85.35	416	85 - 105	91.33	253
264 - 311	90.60	268	105 - 125	85.61	410
311 - 358	99.13	18	125 - 145	77.39	39
> 358	100	6	> 167	67.29	4

Production risk

Following the procedures outlined by Just and Pope (1978), Griffiths and Anderson (1982) and Tveterås (1999) the risk model outlined in equation (5) becomes:

$$(10) \quad \ln y_{ij} = \alpha_0 + \alpha_1 \ln q_{ij} + \alpha_2 \ln x_{ij} + \alpha_3 \ln l_{ij} + \left| \beta_0 + \sum_{k=1}^{18} \beta_k z_{ik} \right| + e_{ij}$$

The β -parameters represent the effects of the deterministic model as well as farm and time specific effects. The model is estimated in two stages. First the deterministic part of the production function is estimated by the OLS-method as a log-linear Cobb-Douglas function disregarding the risk part of the model. As a second stage, the square residuals from the deterministic part of the model are used to estimate the risk model as a semi-log Cobb-Douglas function as:

$$(11) \quad \ln u_i^2 = \beta_0 + \sum_{k=1}^{17} \beta_k z_{ik} + \beta_\tau \tau + v_i$$

Due to the sample composition it is assumed that there are heteroscedasticity problems in the model thus the α -parameters estimated by OLS become efficient but not consistent estimators. The sources of heteroscedasticity are unknown and difficult to predict. In order to obtain consistent and efficient estimators of α - and β parameters the White standard errors are computed (Greene, 1993) for both the deterministic and risk model. The results for the deterministic production model and the risk model are presented in Table 4 as well the marginal risk is calculated as in equation (7).

Table 4 Deterministic, risk model and marginal risk

Variables	Deterministic model		Risk model		Marginal risk
	α -coefficients	t-values	β -coefficients	t-values	
Intercept	-0.073453	-0.33	-0.002681	-0.30	-0.015778
Initial weight	0.349544	21.17	0.000188	2.78	0.032132
Total feed	0.673249	21.02	-7.9e-006	-1.73	-0.035022
Labour	0.006022	1.83	-0.000152	-0.93	-0.001156
Batch length			8.1e-005	1.61	0.051613
Age			-3.5e-007	-0.02	-9.3e-005
Experience			4.8e-005	2.12	0.004259
Air partition			-0.000674	-1.26	-0.003086
Manure gas evacuation			-0.000364	-0.69	-0.001829
Ventilation system			-0.000338	-0.60	-0.001665
Dimmer			-0.000917	-2.24	-0.001687
Cross-trough pen			-0.001138	-2.73	-0.002296
Trough length m/pig			-0.006856	-2.10	-0.013439
Wet-feed system			0.000277	0.46	0.001383
By-products			0.001983	4.30	0.004486
Integrated herd			0.001286	2.24	0.001543
Intermediate herd			7.8e-005	0.15	0.000194
BIS-quality program			-0.000376	-0.69	-0.001871
Disinfecting			0.000364	0.85	0.000431

The estimated α -parameters show positive effects upon each input factor on annual pork production. These effects are statistically significant at least at a 10% significance level, except for the model intercept and consistent with the estimated values of the deterministic part of the stochastic production frontier.

The estimated β -coefficients denote input effects, farm and time specific effects on variance output. The relationships are quite weak since the estimated coefficients are small relatively compared to their standard errors. The effects of input factors suggest that increasing piglets weight tends to increase output variance thereby it signifies an increasing marginal production risk due to initial weight. The effects of total feed respective hours of labour imply a reduction on output variance with marginal risk reductions with respect to total feed respective labour.

The effects of the age and experience coefficients suggest that older farmers tend to produce at a reduced output variance compared to younger ones while experienced farmer tends to produce at a larger output variance relatively to an inexperienced farmer. These results imply a reduced marginal risk effect with respect to age and an increased effect compared to experience. However the effect of age is not found to be statistically significant.

Technology in the barns regulating climate conditions as well as space requirements on pens reduce output variance, implying that each technology related to barn equipment reduces marginal risk. The effects of air partition, manure gas evacuation and ventilation systems are found not to be statistically significant.

The feed system depicted by the variables wet-feed system and the use of by-products increase output variance increasing marginal risk with respect to the use

of wet-feed system respective by-products. However the coefficient on wet-feed system is not statistically significant.

Managerial practices such as disinfecting between batches more than once a year tend to increase output variance, although it is found not to be statistically significant. The estimated coefficient on the BIS-quality program is of interest. It suggests that participating in the BIS-quality program reduces output variance in relation to the Scan-H program. It signifies a reduction on marginal risk for producers affiliated with the BIS-quality program. Operating with integrated or intermediate herds increase output variance implying an increase on marginal production risk. Finally, increasing the batch length increases output variance as expected.

To summarise results the estimated farm and time specific effects denoting technology sets in production can be classified in order to observe the relationship between technical inefficiency and production risk. These results are presented in table 5.

Table 5 Farm and time specific effects by technical inefficiency and production risk

	Reducing Technical inefficiency	Increasing Technical inefficiency
Reducing Production risk	- Manure gas evacuation - Ventilation system - Cross-trough pen - Trough length	- Age - Air Partition - Dimmer - BIS quality program
Increasing Production risk	- Experience - Wet feed system - Disinfecting - Integrated herd - Intermediate herd	- Batch length - By-product

Technologies reducing technical inefficiency at a reduced production risk may increase productivity at smooth production levels. These technologies are manure gas evacuation system, ventilation system, cross-trough pens and trough length. Technologies reducing technical inefficiency at an increased production risk tend to increase productivity but at an increased variation on production. These are experience, wet feed system, disinfecting, operating integrated and intermediate herds. On the other hand the effects of age, air partition, dimmer and BIS-quality program tend to reduce productivity at a reduced production risk. Finally the use of by-products and production length correspond to increase technical inefficiency and production risk.

Conclusions

This study concerns with the measures of technical efficiency and production risk in the Swedish slaughter pig production. The estimated technical efficiency for the observed sample and period is found to be 87.5%. It is also found a positive relation between the intensity production level and technical efficiency. However the risk involved in the applied technology sets is not always in conformance with

the objective measure of technical efficiency. It signifies that farmers are facing a trade-off between productive performance and production variance in the actually technology choice.

In accordance to results technologies reducing technical inefficiency and production risk are in line with an economic rational production. When the use of technology sets implicates a trade-off between technical inefficiency and production risk it is of interesting to analyse the effects of participating in the BIS-quality policy programs that involves the most of the applied technology factors. The participation in the BIS-program increases technical inefficiency at a reduced production risk. The primary concern of the BIS-quality program is with animal welfare issues that in fact reduces output variation levels. It seems that in order to smooth production quality by any technology factor has directly effects on productive performance. A similar conclusion can be made for the use of air partition that is a precautionary technology due to infection risks in the pig barns. Thus analysing whether a technology is just technical efficient appear not to be sufficient to understand farmers decisions on technology inputs. In a short term perspective it is also apparent that a technology that is increasing technical inefficiency and reducing production risk may have negative effects on production however, in a long term perspective smoothing production seems to be a necessary action in order to secure productive performance in the production process.

As this study offers an explanation of the production effects due to specific technology set in the production of slaughter pigs, there is nothing said about the problem of adopting new technologies that may depend on farmers attitude to risk.

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Cost Efficiency and Concentration in Swedish Food Processing

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Abstract

A positive relation between seller concentration and profitability have been found in many early empirical studies within the industrial organisation field. Researchers have used these results to support the hypothesis that high concentration facilitates collusion. However, monopoly prices is only one possible explanation to supra-competitive profits. High profitability may also be a consequence of cost efficiency, i.e. that a more efficient scale of production can be attained in the long run since fixed costs can be adjusted.

The Swedish food processing industry is to a large extent characterised by concentration. For example, the eight co-operative dairies together accounted for 99.7 percent of the total milk intake in the last period. Although there is some competition concerning storable products, the markets for fresh products can be described as regional monopoly markets. The market structure is less concentrated in other food processing industries, as meat and cereal processing. Nevertheless, many markets consist of a few rather large processors.

The aim of this study is to assert if there is any relationship between cost efficiency and high concentration in some Swedish food processing industries. In contrast to previous studies where a concentration variable is added into the model to estimate industry concentration, we follow the study of Dickson (1994) and derive an aggregated Cobb-Douglas cost function for the food processing industries. Interaction effects between the Herfindahl index and industry costs are considered. From the empirical model, cost-output and cost-concentration elasticities are obtained. Annual industry data for a span of 16 years is collected for Swedish meat and dairy processing firms including firm output and exogenous input prices. The empirical estimation is conducted using time series techniques.

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Introduction

A positive relation between seller concentration and profitability has been found in many early empirical studies within the industrial organisation field. Researchers have used these results to support the hypothesis that high concentration facilitates collusion. However, monopoly prices is only one possible explanation to supra-competitive profits. High profitability may also be a consequence of cost efficiency, as the non-competitive firm may produce a level of output higher than the one produced by each individual competitive firm. To the extent that there are economies of scale, a monopolist will produce at lower cost providing efficiency gains compared to a competitive market structure (George and Lynk, 1995).

The performance of food-processing industries may be measured by marketing margins, or farm-retail price spreads. These price spreads are defined as the difference between the farm price and the retail price of agricultural/food products (Azzam, 1992). Both monopoly and monopsony power may affect the magnitude of the price spreads, in addition to the marginal cost of processing the raw product into a final product. The characteristics of consumer demand is also influential on price spreads, since the processor's demand for inputs is derived from consumer demands.

The trade-off between market power and cost efficiency was first modelled by Williamson (1968a), who derived a partial equilibrium model for computations of cost reductions necessary to outweigh inefficiencies due to monopoly pricing. The first paper was followed by two more (Williamson, 1968b; 1969) where the basic model was expanded to account for consolidation over time. Empirical studies of concentration and cost efficiency include e.g. Azzam and Schroeter (1991, 1995) and Dickson (1994). Schmalensee (1989) summarises studies performed before the 1990s. The present paper is the first empirical study of the Swedish food industry where interaction effects between the Herfindahl index and industry costs are considered in order to explain relations of market power effects and efficiency effects in high concentrated markets.

Figures concerning prices in the Swedish food chain (Livsmedelsekonomiska samarbetsnämnden, 1993, 1997) clearly indicate increasing price spreads the last 15 years. While the producer price index for the food industry has increased by 155 percent from 1980 to 1995, the corresponding figure for farmers' producer price is 57 percent. The tendency is stable within individual product branches⁴.

The Swedish food processing industry is characterised by a high degree of concentration. For example, the eight co-operative dairies together accounted for 99.7 percent of the total milk deliveries in the last period. Although there exists some competition concerning storable products, the markets for fresh products can be described as regional monopoly markets. The market structure is less concentrated in other food processing industries, such as meat and cereal

⁴ The price indexes for dairy products and meat (beaf, pork and other meat) have increased by 167 percent and 124 percent respectively in the period 1980-95. The producer price indexes for farm milk and slaughter animals show more moderate increases, 68 and 21 percent respectively.

processing. Nevertheless, many markets consist of a few rather large processors. There has also been a clear tendency towards increased concentration within the last 15 years, especially within the dairy and slaughter industries (see Hermansson, 1996 for a description of structural changes in the slaughter industry).

Before the internal deregulation in 1991, the agricultural sector in Sweden was regulated and in reality detached from foreign competition. Especially the dairy sector was extensively supported by government. Producer prices were determined in negotiations between representatives for consumers and for farmers. Increased costs were partly compensated by higher prices, thus reducing cost-efficiency incentives.

Farmers' co-operatives are strong actors on the food market in Sweden, especially in the dairy and slaughter industries. A regulated agricultural policy in combination with a strong political position for farmers as well as the existence of favourable competition laws for co-operatives⁵, makes an assumption of less efficient food processing firms reasonable.

However, structural change has been ever present since the 1960s and was accentuated by the increased competition associated with the Swedish membership in the European Union. Clearly, competition has increased in the market for food, forcing farmers as well as processing firms to be more efficient. In order to be internationally competitive, processing firms merge together with increased concentration as a result. For example, the number of dairy processing firms has decreased from twenty-seven in 1980 to eight in 1995 (Swedish Dairy Association, 1981-1996) while the number of co-operative slaughter firms has decreased from ten to six in the same period (Köttbranschens riksförbund, 1981-1996).

The aim of the present study is to conduct an explorative study in order to examine if there appear to any relationship between cost efficiency and high concentration in some Swedish food processing industries. In contrast to the traditional structure-conduct-performance (SCP) studies where a concentration variable is added into the model to estimate industry concentration, we follow the model by Dickson (1994) and derive an aggregated Cobb-Douglas cost function for each of the food processing industries. Interaction effects between the Herfindahl index and industry costs are considered. From the empirical model, cost-output and cost-concentration elasticities are obtained. Annual industry data for a span of 16 years is collected for Swedish meat and dairy processing firms including firm output and exogenous input prices. The empirical estimation is conducted using econometric techniques.

Empirical results from the present study indicate cost efficiency effects associated with concentration in Swedish dairy and slaughter industries. An increase of processed volumes yields a less than proportional increase of total costs while enhanced concentration reduces costs for both industries studied. Although statistical price figures show increased farm-retail price spreads for both dairy and meat products, there need not be a problem of monopoly pricing.

⁵ In Swedish competition law, 6 § which prohibits agreements that restrict competition is not applicable to some activities within the farmers' co-operatives (see KL 18 a-c §§).

Aggregation of the Cobb-Douglas function

Following Dickson (1994), the Herfindahl index of concentration is included into the aggregate cost function. In this manner, a measure of the cost-concentration elasticity can be achieved directly from the estimation in addition to the more common cost-output elasticity. Behind the inclusion of the Herfindahl index is an aggregation procedure, that may need some explanation. A Cobb-Douglas cost function for firm i can be expressed as:

$$c_i = Aq_i^\alpha w^\beta \quad (1)$$

where c_i is total cost for firm i , q_i is output from firm i and w is a vector of exogenous input prices encountered by all firms. Cost and quantity data are usually only available on the aggregate level, implying that aggregation of the cost function is required. But generally, aggregating output over all firms in an industry do not correspond to the specification of the aggregated Cobb-Douglas cost function. Imposing a correspondence of constant returns to scale at individual firm level in total output, $\alpha = 1$ such that each firm's output share is constant over time is a necessary condition in aggregating output firms over the entire industry. Thus, if firm i total output is $q_i = s_i Q$ where $s_i = q_i/Q$ is the firm's output share and $Q = \sum q_i$ is the industry total output equation (1) is re-formulated as:

$$c_i = Aw^\beta (Qs_i)^\alpha \quad (2)$$

Sum over all firms in the industry in order to obtain the aggregate Cobb-Douglas cost function:

$$C = Aw^\beta Q^\alpha \prod_{i=1}^n s_i^\alpha \quad (3)$$

The Herfindahl concentration index is defined as $H = \sum_{i=1}^n s_i^2$. Thus assuming equal firms in the industry the relation between the output share and the Herfindahl index become $s_i = H_i^{-1}$, implying that $\prod_{i=1}^n s_i^\alpha = \prod_{i=1}^n H_i^{-\alpha} = H^{-\alpha}$. Substituting this relation the aggregated Cobb-Douglas cost function, it becomes:

$$C = Aw^\beta Q^\alpha H^{-\alpha} \quad (4)$$

Since firms are not equal size, the $H^{-\alpha}$ is just an approximation of $\sum s_i^\alpha$. However, it involves size distribution effects on industry costs, making it as an almost legitimate approximation. The cost function can be estimated with aggregated data. From the estimation can measures of elasticity of costs with respect to concentration, quantity and input prices be directly derived.

Data and empirical model

Data collected includes annual information for the period 1980 to 1995 concerning Swedish dairy and meat industries. The information set includes observations on total industry operating costs (Statistics Sweden, 1982-1997), total industry processed quantities of milk and meat as well as processed quantities for the individual processing firms (Swedish Dairy Association, 1981-1996 and Köttbranschens riksförbund, 1981-1996), and indexes of input prices including labour, energy and material.

There were no available information on input prices of labour and energy for the specific dairy meat industries. Instead, labour prices are represented by an index of average hourly earnings for workers in manufacturing of food, beverages and tobacco (Statistics Sweden, 1984b-1997b). Energy prices are represented by a price index of domestic resources (ITPI) for petroleum and coal products (SNI 69, 353-4) (Statistics Sweden, 2000). Material prices are producer (farm level) prices for milk and slaughter animals respectively (Livsmedelsekonomiska samarbetsnämnden, 1993, 1997).

Herfindahl indexes were calculated as yearly sums of squared shares of the processed volumes for each firm in the industry⁶. For this purpose, average weights of carcass concerning cattle, pigs, and sheep (Statistics Sweden, 1981c-1996c) were needed in addition to the quantity figures.

The dairy sector includes a range of twenty-seven processing firms in 1980 to eight in 1995, all are farmers' co-operatives. In the meat sector, there are several investor-owned processors of varying size. However, the slaughter market is dominated by the farmers' co-operatives with market shares about 70 percent. The number of co-operative slaughter firms has decreased from ten in 1980 to six in 1995. A statistical summary for the sample is presented in *table 1* where costs are expressed in million SEK and volumes are in thousand metric tons. The input price indexes have 1990 = 100 as a base year.

⁶ $H = \sum_{i=1}^n (s_i)^2 = \sum_{i=1}^n (q_i / Q)^2$, where q_i is the volume from firm i (Shy, 1996). H is expressed in the range zero to one.

Table 1 Summary statistics

Variables	Dairy industry				Slaughter industry			
	Mean	St dev	Min	Max	Mean	St dev	Min	Max
Total costs	29618	3141	25475	38237	21276	7662	10080	31245
Total volume	3390	154	3130	3678	45488	34858	39900	49900
H-index	0.381	0.039	0.350	0.443	0.151	0.042	0.119	0.247
Labour price	82.3	24.7	46.5	119.3	89.2	12.8	63.4	104.7
Material price	91.0	13.9	60.0	107.1	82.3	24.7	46.5	119.3
Energy price	99.8	19.3	72.4	137.6	99.8	19.3	72.4	137.6

The model is estimated in a log-linear form of equation (4):

$$\ln C = \alpha_0 + \alpha_1 \ln Q + (\alpha_1 - 1) \ln H + \sum_{i=1}^3 \beta_i \ln w_i + \delta + \varepsilon_t \quad (5)$$

where C is total costs and Q is total produced quantities. w_i ($i = 1, 2, 3$) are respectively the price indexes of labour inputs, material inputs and energy. t is the time trend and ε_t is the model error term which is assumed to be $N \sim (0, \sigma^2)$.

The parameter α_1 is the elasticity measure of costs with respect to output, indicating economies of scale in the industry if $\alpha_1 < 1$. Further, cost elasticity with respect to concentration is measured by $(\alpha_1 - 1)$. Holding industry output constant, this cost-concentration elasticity indicates reduced industry costs if concentration is increased in the presence of economies of scale. The β_i parameters represent elasticity of cost with respect to each input price and are expected to be positively related to costs. Finally, δ is measure of possible technical progress/regress and changes in total costs over the sampled period.

Results

Equation (5) was estimated as an Autoregressive model, AR(1) due to auto-correlation problems by Ordinary Least Squares techniques (OLS), for the dairy and slaughter industries. In both cases the assumption of linear homogeneity in factor prices, $\sum_{i=1}^3 \beta_i = 1$, was imposed. The estimated results are presented in table 2 (t-ratios in parenthesis).

Table 2 Estimation results

	Dairy industry	Slaughter industry
Variable	Coefficients	Coefficients
Intercept	3.229864 (1.05)	-9.139504 (-2.06)
Total output, $\ln Q$	0.875666 (1.30)	0.690029 (2.85)
H-index, $\ln H$	-0.124334 (-0.18)	-0.309971 (-1.28)
Labour price, $\ln w_1$	2.098401 (5.28)	-0.095016 (-0.15)
Material price, $\ln w_2$	-1.004352 (-2.91)	1.006922 (1.74)
Energy price, $\ln w_3$	-0.094049 (-0.62)	0.088094 (0.61)
Time trend, t	-0.052923 (-3.25)	0.037032 (1.87)
R-squared	84.54%	96.25%
DW-statistics	1.96	1.61

The estimated industry models are indicating a high explanatory power where the R-squared for the dairy industry is 84.5 percent and for the slaughter industry is 96.25 percent. The hypothesis of autocorrelation in the residuals is tested by the Durbin-Watson d-statistica rejecting the presence of autocorrelation in the residuals for the dairy industry model but not for the slaughter industry model⁷.

The results show a weak statistical significance, where some of the coefficients of factor prices for the both industries are not as expected, being negative signed. For the dairy industry model the coefficient of total output and the Herfindahl index are not found to be statistically significant. However, results can be interpreted as well. As α_i for the dairy industry is less than 1.0, results indicate economies of scale in processing. In fact, increasing total aggregate output by 1.0 percent signifies an increase in total costs by 87.6, *ceteris paribus*. Consequently, the cost-concentration elasticity is negative, implying that increasing concentration by 1.0 percent correspond to a reduction in costs by 12.4 percent.

⁷ Estimation results for the slaughter industry were adjusted for autocorrelation by the same method as the estimation results for the dairy industry. However, the adjusted results were even worse than before the adjustment. The model has a specification problem and could probably be improved by adding some more relevant variables.

Labour and material prices and the time trend are found to be statistical significant at the 5 percent level. However, the coefficient signs for material and energy prices are not as expected. The estimated coefficients for the input price indexes may be interpreted by some caution. They indicate that the price of labour tends to augment total costs for the dairy industry, while costs decrease with respect to material and energy prices. Finally, the technical change in the dairy industry measured by the time trend variable indicates a small cost-saving technical progress over the observed period.

Similar results are obtained for the slaughter industry, where only the coefficients for the model intercept and total output are statistically significant at the 5 percent level. Estimated parameter values for material price and time trend are significant at least at a 10 percent significance level, though. The sign of the coefficient for labour price is not as expected, although statistically insignificant.

The slaughter industry exhibits even more extensive economies of scale, with a cost-output elasticity of 0.69. Accordingly, increased concentration has a potential of large cost reductions with an cost-concentration elasticity of 0.31. The labour price coefficient is negative, although not significantly different from zero. In contrast to the dairy industry, the technical change for the meat industry shows a cost-increasing technical progress over the observed period.

Conclusions

Although, there are some problems with the statistical inference and the results ought to be interpreted with caution. It is also doubtful to what extent the data and the model formulation capture some of the complicated economic interaction that occur in these industries. The study indicates some cost efficiency effects in the food industries studied. Estimation results although not statistically significant show that increased volumes gives a less than proportional increase of costs while increased concentration, tends to reduce total costs for both the dairy and slaughter industries in Sweden. It is also found that cost efficiency effects with respect to the industry concentration level appear to predominate in the slaughter industry. The results indicate that any positive relation between concentration and profitability found in Swedish dairy and slaughter industries may at least partly be due to cost efficiency effects. Although statistical figures show increased farm-retail price spreads over time, there need not necessarily be a problem of monopoly prices since cost efficiency may be the main reason for increased profits.

However, there may be other effects than a decrease of costs associated with an increased concentration. If the number of firms in an industry are small enough, collusion is clearly facilitated and prices may reach supra-competitive levels. To consider the explicit relation between profitability and cost-efficiency associated with increased concentration, further studies are needed. Following Azzam (1997), the market power effect from concentration could be separated from its cost efficiency effect in a next step. Another important aspect could be an extended examination of multiproduct nature of the problem.

Another line of future research could examine the effects of non competitive pricing of labour which is an important input, specially in the slaughter industry.

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