Product Innovation in the Swedish Food Industry

Harry Nyström[1]

Abstract: Product development strategies in 20 major Swedish food processing companies are described and evaluated from both company and consumer points of view. Three types of company outcomes are examined—technological, market, and commercial success. Company variables related to success are technology use, R&D cooperation, and marketing. Consumer outcome is studied in terms of price differences, convenience, taste, nutritional benefit, and medical value. Convenience and taste differences are the most common attributes of new products that differentiate them from existing products. As in previous studies of more research and technology intensive industries, cooperating with the outside research environment and combining technologies is shown to be clearly related to success in finding and developing new food products.

Introduction

This paper summarizes the main results from a study of product innovation in 20 leading Swedish food processing companies. Based on interviews with company executives, data were collected with regard to both company policy and product development. Altogether, 121 new products were included in the study, and those products were selected by company representatives to give a balanced picture of each company's overall product innovation during 1969-78. A wide range of food products are included in the study; dairy products, cereals, meat and fish, and fruits and vegetables being the main groups.

New products were required to be new from technical and marketing points of view, meaning that technical development work must have been carried out in the companies to arrive at new products that were directed towards satisfying needs not satisfied by existing products. Personal interviews with company executives responsible for new product policy and actual product development work were carried out as a basis for the study, and the interviews were supplemented with written material such as internal company reports and product specifications.

The aim of the present study was to describe and evaluate the success of different product development strategies used by the companies during the time period studied. The implications were analyzed from the points of view of the companies and the consumers of their products.

Framework

The framework utilized and elaborated on in the study has been developed over a 10-year period, based on studies of product development strategies in a wide range of industries (Nyström, 1979). The earlier studies are primarily concerned with research and technology intensive industrial markets, such as electronic instruments, chemicals, and pharmaceutical drugs. Comparing the results of the previous studies with the results of the present study, which is concerned with consumer goods in a low technology and low research intensive industry, is, therefore, of interest.

The general results of the earlier studies indicate, for instance, that research cooperation between companies and outside organizations (universities, research institutions, consultants, and other companies) has led to greater technical success in product development than the absence of such cooperation. Combining technologies was also associated with greater technical success than working within given technologies. In general, the results of the earlier work indicate that more open product development strategies based on cooperation with the external environment and flexible response to environmental change were associated with greater success than more closed strategies based more on efficient use of the companies' own resources.

This paper focusses on three strategy dimensions: technology use, R&D orientation, and marketing strategy. "Technology use" refers to the extent to which companies work within established technologies to find new products or try to combine different technologies to achieve more radical breakthroughs. Working within established technologies is "isolated technology use," while combining different technologies is "synergistic technology use." "Technology" is a relatively well defined and delimited area of technical knowledge, usually the basis for educational and professional specialization. Examples of technologies in the food study are freezing and heating. "Synergistic technology use" is interdisciplinary and makes necessary the bridging of information and communication gaps between different specialists and specialized areas of knowledge. "Isolated technology use" is intradisciplinary and may be more easily carried out by isolated individuals and

companies without going outside their established areas of specialization.

"R&D orientation" refers to the extent to which companies stress their internal versus external research environments in finding and developing new products. The more a company relies on its own knowledge and competence in idea generation and technical product development, the more internal its R&D orientation; the more a company depends on outside aid and assistance for those purposes (e.g., by cooperating with universities, consultants, or other companies), the more external its R&D orientation.

With regard to "marketing strategy," a basic differentiation is made between concentrated and diversified marketing. "Concentrated marketing" means that a new product fits into a company's existing product groups and is also mainly directed towards the needs of existing customers. "Diversified marketing" means that a new product falls outside the existing assortment of a company or is directed towards new customer groups.

Since the ultimate aim of this research is to establish how successful different product development strategies have been as a basis for future product development efforts, a number of outcome dimensions are employed. With regard to company outcome, technological, market, and commercial success are measured, while consumer outcome is based on a number of factors such as nutritional value, medical value, low price, taste, and convenience.

Technological success is measured by the level of technological innovation; i.e., the extent to which technically developing a new product has made necessary the use of new ideas and techniques not previously applied to the problem area. In other words, that outcome measure is used to indicate the level of technological creativity that a company had to achieve to be able to solve the critical technical problems in connection with developing a specific new product. Based on interview data for each product, the level of technological innovation was assessed on a scale from 1-5, with higher values indicating greater technological success. As regards the other measurements, the estimates were made independently of the interviews and validated against other indicators of technological success such as patents and development time.

Market success is measured by the competitive situation for a new product at the time of market introduction. The more unique a product was judged to be from a buyer point of view compared to the closest competing product on the market, the greater the market success, according to this definition. As in the case of technological success, a scale from 1-5 was used, with greater values indicating greater market success.

Commercial success was measured by the profit level of a new product as estimated by company executives. For products that had been on the market long enough to make such estimates possible, a scale from 1-5 was used to indicate the degree of commercial success. A product was judged to be a great commercial success (5), a fair success (4), break-even (3), a small failure (2), or a big failure (1).

With regard to consumer outcome, price, convenience, taste, nutritional value, and medical value were analyzed. Price refers to whether or not new food products (at the time of market introduction) had a higher or lower price than the closest comparable competing products on the market. Convenience refers to whether or not new products are easier to prepare, handle, or store compared to the closest competing products. Taste refers to such factors as sweetness, flavour, and saltiness. Nutritional value was assessed on the basis of fat, fibre, protein, and sugar content, while medical value refers to direct value for medical treatment of, for instance, stomach disorders or diabetes. In the present study, consumer outcome was assessed on the basis of company assessments, but the results are largely consistent with a subsequent follow-up study of similar products based on consumer interviews.

Empirical Results

In this section, the empirical results are summarized. For a fuller description, see Nyström and Edvardsson (1980). In addition to the analysis of strategic variables related to performance, a number of other relations between overall company variables and product development success were studied. To begin with, the latter results are discussed.

Starting with company size (measured by sales), larger food companies appeared to have employed more innovative technological strategies, and smaller companies more innovative marketing strategies. With regard to product development outcome, larger companies were more successful than smaller companies from technological, market, and commercial points of view, but the differences are fairly small (Table 1).

Table 1—Company Size in Relation to Technological, Market, and Commercial Success

Size Group*	Number of Companies	Technological Success	Market Success	Commercial Success
Largest	6	2.5	3.7	3.4
Middle	8	2.4	3.4	3.3
Smallest	6	2.3	3.3	3.3

[*Size measured by average annual sales during the 10-year period studied. Note: Higher numbers indicate higher technological, market, and commercial successes.]

Looking at research intensity (R&D expenditures/sales), high research intensity had no tendency to be more associated with greater attempts by companies to develop new markets and technologies than low research intensity. Instead of mainly spending R&D funds on developing new technologies and markets, highly research intensive companies appear to have given even greater priority to developing their established markets and technologies than less research intensive companies. With regard to product development outcome, the more research intensive companies (as might be expected) were technologically and commercially more successful than the less research intensive companies, but as in the case of company size, the differences are quite small (Table 2).

Table 2—Research Intensity in Relation to Technological, Market, and Commercial Success

Research Intensity*	Number of Companies	Technological Success	Market Success	Commercial Success
High	6	2.7	3.5	3.4
Intermediate	8	2.4	3.4	3.3
Low	6	2.3	3.5	3.3

[*Research intensity measured by average annual expenditure on R&D in relation to average annual sales. Note: Higher numbers indicate higher technological, market, and commercial successes.]

Table 3—Ownership in Relation to Technological, Market, and Commercial Success

Ownership	Number of Products	Technological Success	Market Success	Commercial Success
Cooperatives:				
Consumer	3	2.5	3.3	3.5
Producer	4	2.5	3.6	3.5
All	7	2.5	3.5	3.5
Private companies:				
Swedish dominated	7	2.3	3.5	3.3
Foreign dominated	6	2.5	3.4	3.2
All	13	2.4	3.4	3.3

[Note: Higher numbers indicate higher technological, market, and commercial successes.]

Turning to ownership (Table 3, page 161), cooperative companies as a group were technologically and commercially more successful in their product development than private companies. Producer cooperatives were more successful than consumer cooperatives from the market point of view, while little difference existed from technological and commercial points of view. Swedish dominated private companies were more successful in their product development from market and commercial points of view, while the foreign dominated private companies were more successful from the technological point of view.

In the analysis of strategies (Table 4), synergistic technology use was clearly related to greater technological and market successes and also to somewhat greater commercial success than isolated technology use. For the Swedish food processing companies, synergistic technology use thus appears to have been a successful expansion strategy. Also, external R&D orientation was associated with greater technological and market successes than internal R&D orientation. With regard to commercial success, however, internal R&D orientation was associated with greater commercial success than external orientation.

Table 4—Technology Use, R&D Orientation, and Market Strategy in Relation to Technological, Market, and Commercial Success

Strategy	Number of Products	Technological Success	Market Success	Commercial Success
Synergistic technology use	54	2.9	3.8	3.4
Isolated technology use	67	2.0	3.3	3.3
External R&D orientation	27	2.7	3.5	3.1
Internal R&D orientation	94	2.4	3.4	3.4
Diversified marketing	45	2.4	3.6	3.0
Concentrated marketing	76	2.5	3.4	3.5

[Note: Higher numbers indicate higher technological, market, and commercial successes.]

Stressing their own competence in product development while utilizing the outside research community evidently led to more profit and more unique products from technological and market points of view. One reason for that could be that customers, by and large, are unwilling to try unfamiliar food products.

With regard to marketing strategy, the data show that a concentrated marketing strategy was, on the average, associated with somewhat greater technological success than a diversified marketing strategy. A diversified marketing strategy, on the other hand, was associated with a somewhat greater market success. With regard to commercial success, a concentrated marketing strategy was clearly associated with greater success than a diversified marketing strategy. Developing new products similar to existing products and directed towards existing consumer needs was apparently more profitable than diversifying the assortment or market orientation. The implications of diversification for technological and market success are less clear from the data.

The results from the analysis of consumer outcome are summarized in Table 5. A majority of the new products (78 percent) had about the same price as the existing closest substitute on the market, considerably fewer (16 percent) a lower price, and very few (6 percent) a higher price. One important reason why companies introduce new products, obviously, is to avoid price competition. Convenience is also an important aspect. Almost half of the products (40 percent) were judged to be superior to existing competing products from the point of view of convenience, and almost none inferior (2 percent). About one-third (33 percent) were judged to be more attractive to consumers with respect to taste, and only a few (6 percent) were judged to be less attractive. After convenience, taste was the most frequently mentioned consumer attribute of new food products. About a quarter (26 percent) of the new products were judged to be beneficial from the point of view of nutritional value, and very few (2 percent) detrimental. Medical value was attributed to a relatively small proportion of new products (14 percent).

Table 5—Consumer Outcome

Consumer Outcome	Price	Taste	Convenience	Nutritional	Medical
		Number (percent)			
Favourable	20 (16)	40 (33)	49 (40)	31 (26)	17 (14)
Neutral	94 (78)	74 (61)	70 (58)	87 (72)	104 (86)
Unfavourable	7 (6)	7 (6)	2 (2)	3 (2)	0 (0)

Note

[1]Swedish University of Agricultural Sciences.

References

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Discussion Opening – *José Egea Ibañez*

Taste, nutrition, and medical value are driven by biological needs; convenience and price are social adjustments. Delagneau's "origin concept" represents a social adjustment that brings suppliers and buyers to a transaction point. But suppliers and buyers run different roads at different speeds, creating divergencies, convergencies, and crossroads. So, we are here faced with qualitative characteristics of turbulences.

In the marketing analysis by Nyström, are price, taste, convenience, and nutritional and medical value sufficient to define the practical market situation? What is the importance of other residual factors? One system that we find every day in advertisements (image-information-communication) produces shadows on real concepts. The "origin concept" pointed out by Delagneau tries to substitute taste and nutritional and medical value by only one concept. The book *Agricultura General*, written by Alonso de Herrera in 1513, was reprinted in 1818 with an addendum containing a list of Spanish products by regions ("origin concepts"). At that time, people had an elementary idea of geography and brands of products. And the "origin concept" was a way to classify products by buyers. That method worked in other countries like Germany, France, and Italy, especially for wines. For that reason, it may also be true today that suppliers put "origin specifications" for buyers who are influenced by traditional cultures.

An analogy between ecological systems and the market can be found in the theory of general systems. In situations of turbulence, an ecological system becomes simplified with a few species of plants and animals, as we find today in the demand for food products among poor segments of the population. In stable and rich environments, on the other hand, species and luxuries are abundant. Applying this simple analogy, we can ask whether new types and brands in a market signify growth and development. Can we take the number of new products introduced to be an index of development and stability?

All agricultural economists know that prices influence farmers' decisions, especially farmers' production adjustments, but the feedback created by price information has different solutions that convert the subsequent price adjustments into a process with different strategies. In the short term, farmers adjust by changing current inputs; in the medium term, solutions come by changing technologies and scale dimensions. So Jones and Alexopoulos' statement that "buildings were more important than birds" is not too surprising. But, is it better to study price-supply response in a simple way or by going through supply-demand equations to systems dynamics and simulation?

General Discussion – *Franco Rosa*, Rapporteur

Nyström's paper raised several questions regarding product innovation in a very complex framework of technological-market relations. Even though the paper presented a methodology for studying the innovative strategies of companies operating in the food sector, the institutional approach could better explain the adoption of external technologies and the synergistic effect of technology on marketing performance. Technology cannot be separated from the market, given that technology is an environmental component used to convey information on consumer needs; separating technology makes prices irrelevant. Furthermore, average consumers in industrial-linked countries have marketing perceptions that allow them to explicitly state their food preferences. Cooperation in research and development for product innovation is a matter of how a company can compete in its own market situation. Then the question is: What are the structural dimensions of the firm that determine the choice for internal rather than external research and development?

Nyström pointed out that separating technology from the market is difficult but not impossible. Technology can be internal or external, and that may vary for different types of companies. An external orientation deals with the degree of interaction with outside institutions; e.g., universities and other research institutions. Internal development is usually faster than external development, but new technologies, especially in small companies, usually require at least some degree of external development. Another concept of technology, that of isolated or synergistic technology, is also important. Technology is, of course, a special form of capital but is not treated as such in traditional capital theory. Technology can be defined as specialized knowledge used by the companies to gain competitive advantage. Innovation in the input industry is notably slower with respect to processing or distribution; however, that can be explained in terms of motivation and competition.

Participants in the discussion included G. Caponera, S.W. Hiemstra, P. Ollila, J. Strak, and J Viaene.