THE PROCESS OF DEVELOPING NEW PRODUCT CONCEPTS

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Competition in international markets is becoming focused increasingly on the firm's ability to develop new products and modify existing products to respond to changing tastes and other longer term changes in consumer markets. Though this may seem a truism, many companies fail to recognise this situation, or its implications. The vital importance of new product development is generally not appreciated by Irish firms and a great deal of dependence is placed on mature products [Sectoral Development Committee, 1985]. This deficiency is also noted in a report on the problems facing small companies which identified new product development as a difficulty in 70 per cent of the companies surveyed [AnCO, 1985]. The implications of these findings are highlighted in several studies on Irish new product development activity. One such study saw new product introductions in the food sector as infrequently as one for every five companies, every five years [McGinley, 1978]. Given the inevitable demise of their current portfolio, Irish companies must give its replacement serious consideration. This is especially true in international markets where competition is so much greater and where new product introductions are so much more frequent. Failure to develop new products and modify existing products can have very severe consequences for the firm, as evidenced by the following quote: "This is one of the saddest days of my life, a sad one for me, for our employees, officers and directors, indeed it is a sad one for the American public. Apparently there is just not the need for our product in todays scheme of living" [Martin Ackerman on the death of the Saturday Evening Post in 1969 as quoted in Friedrich, 1970].

A considerable amount of research has been carried out in the area of new product development and many "step by step" models have been developed. For example, Cooper (1981) considers there are seven stages – Idea, Preliminary Assessment, Concept, Development, Testing, Trial and Launch. This article focuses on one stage in that process – developing concepts. The ultimate judge of a new product is the customer. It is essential, therefore, that they have an input into the early stages of the development of that product. The concept stage is the first one

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where the consumer can, and should be involved. This article concentrates on this critical initial stage, producing a model for Concept Development and testing this model.

Research Study

The objective of the research study was to test the concept development model, by creating a new cheese concept for the Irish market and to identify the usefulness of the model for wider application in the dairy industry in the development of new products for the domestic and international markets. It is argued that while the study was carried out using data from the domestic market, the principles and lessons obtained from the approach suggested here are easily transferable to international markets even if the precise conclusions regarding specific dairy products are not. Given these objectives, a convenience sample of a relatively expert group was sought. This sample, of 180 consumers, was drawn from the membership of the Irish Country Women's Association.

Concept Development Model

Within the new product development process, the objective of the concept development stage is to evolve a well worked out and clearly stated product concept, from a basic "raw" idea. This concept should be described in terms of the key attributes on which the consumer will ultimately judge that product.

The model developed involves five basic steps. Exploratory consumer research is carried out as an initial attempt to understand the consumer buying process. Second, the market is mapped out from the consumers' perspective, in a competitive market study. A number of sources are then used to generate a list of attributes on which consumers might evaluate a product. Concepts are then built using a subset of those attributes and finally those concepts are tested with consumers. Each of these steps are discussed below. The attribute based concept then forms the basis for the development of prototypes, the next stage in the overall process.

Exploratory Consumer Research

The primary aim at this stage is to provide the marketer with some basic information on how consumers evaluate products in the area of interest. The most common approach used is focus groups, in which a group leader probes a group of six to eight consumers in the area of interest, in this case the purchase of cheese. While the results from

such small groups should not be generalised, they provide a useful insight into the consumer buying process.

In the cheese study, the main points to emerge from a focus group discussion on cheese purchase and consumption in general, were that there are two major factors which restrain cheese purchases. Firstly, with the high level of fat in most cheeses, the concern was related to consumption of high levels of cholesterol, rather than any weight watching consideration. Second, the high price of cheese was viewed as inhibiting consumption. Other factors to emerge suggested that processed cheeses were considered "plastic" and "tasteless", that Irish cheeses lack variety and are too expensive, and finally, while the housewife is the key purchaser, other members of the family have considerable influence on the type of cheese bought.

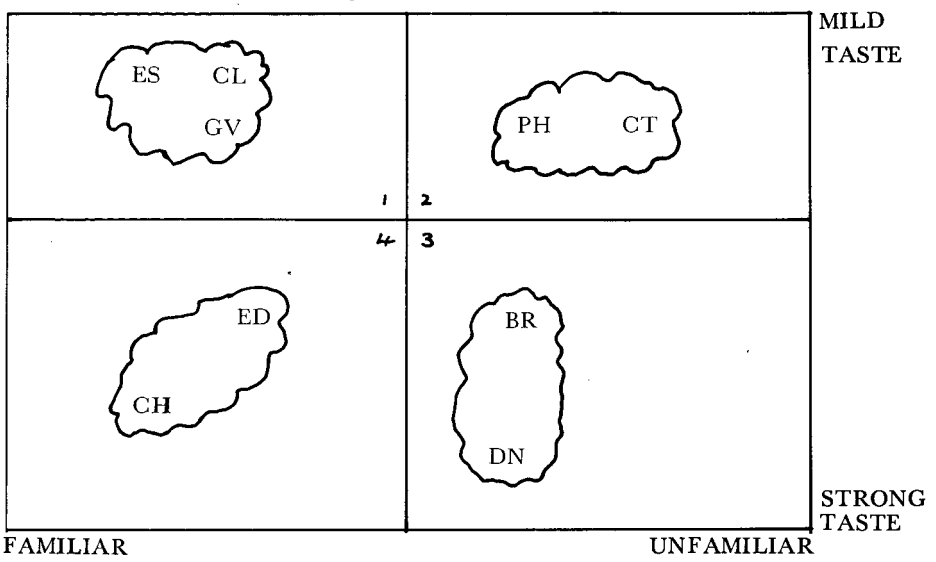
Competitive Market Study

The next step in the process is to get a better understanding of the structure of the existing market, from the consumers' point of view. A "map" of the consumers' perception of the market identifies first, the key attributes on which they evaluate existing products and, second, any gaps that may exist in that market.

One of the most useful techniques for market mapping is Multidimensional Scaling (MDS). MDS scales consumers' view of a product on a number of dimensions. The input to MDS is a series of consumer comparisons of 8 or 9 of the products, two at a time. This information can be analysed using a number of different computer packages which separate out the relative similarities between each pair. The output is a map of the relative positions of each product on several dimensions. These dimensions represent product attributes. For example, Cheddar could be considered similar to cottage cheese in price, but different in fat level. The main drawback of MDS is that it cannot help identify the attributes that make up the dimensions, as it is merely mapping the products on their relative perceived similarity. Expert judgement is required to label these dimensions.

In the cheese study, nine products currently available on the Irish market were considered. The 116 respondents were presented with the 36 possible pairs of these cheeses and asked to mark them on a five point written scale, "1" being very similar and "5" being very dissimilar. The results were analysed using a package called INSCAL-S [Coxon, 1981]. Figure 1 outlines the map produced by the analysis. As can be seen, four very distinct clusters exist.

Figure 1. *Market Map*



Legend:
CH = Cheddar
ES = Easi Singles
BR = Brie
ED = Edam
PH = Philadelphia
DN = Danish Blue
CL = Calvita Triangles
CT = Cottage Cheese
GV = Golden Vale

Cluster 1: This contains Easi-Singles, Calvita Triangles and Golden Vale Processed Cheddar. All these cheeses are processed red cheddars and well known and used brands. They are mild tasting and favoured by children.

Cluster 2: The two cheeses in this cluster are Cottage Cheese and Philadelphia. Both are white cheeses and are fairly mild in taste. They are considered slightly unusual and not heavily consumed in Ireland.

Cluster 3: This contains Brie and Danish Blue. Both are foreign cheeses tending to be fairly strong in taste (especially Danish Blue). These cheeses are usually only consumed on special occasions.

Cluster 4: Both Edam and Cheddar are hard well known cheeses in common use. While Edam is fairly mild, Cheddar tends to be a bit stronger, considered strong by a very sensitive Irish palate.

As pointed out earlier, the MDS process does not identify the attributes used and researcher judgement has to be used. In the case of the first dimension, Cheddar is at one extreme with some of the processed cheddars, and Philadelphia and Danish Blue at the other end. This suggests that this axis is a type of familiarity dimension. When the positions of the cheeses are compared to market shares, the fit is very good for all except Edam, which is considered more familiar than its

sales suggest. Overall however, the label of "familiarity" is a good description of the dimension.

Taste is chosen as the label for dimension two, with Easi Singles (Mild) and Danish Blue (Strong) at either extreme. While it cannot be depicted pictorially, a third dimension was identified with Danish Blue and Philadelphia at one end and Cottage Cheese at the other. This suggests that this is clearly a fat dimension. Overall, 72 per cent of variance seen was accounted for by the first two dimensions, and 80 per cent, if the third is included. This point highlights the limited number of attributes on which products are evaluated by consumers.

The reliability of the study was tested by splitting the sample into three subsets and producing a map for each one. In each case, the map was similar. While no formal validity test was used, the mere fact that all the products were split into such homogeneous groups suggests that the approach is valid. At this stage in the process some additional background information was sought about general attitudes towards cheese from a larger sample (i.e., the one used in the MDS study). The main findings were that most consumers consider cheese to be fattening, most felt that processed cheese is best used in sandwiches and that cheese is considered nutritious. These support the views of the focus group and show that if certain problems could be overcome, there is a lot of consumer goodwill towards cheese as a product, and its role in the household diet.

Attribute Generation

As the final product concept is to be described in terms of attributes used to evaluate it, attributes must be generated. The approach taken is to use as many sources as possible to develop a comprehensive list of potential attributes. In the cheese study, the following sources were used:

1. Focus group discussion;
2. Direct questioning – after comparisons were made in the MDS study, respondents were asked on what basis they compared the products;
3. Market map – the three dimensions generated here are evaluative criteria. That is, if a consumer considered Brie and Philadelphia to be similar, that consumer must consider the attribute on which they are similar (i.e. fat level) to be important.
4. Technical opinion – industry experts were questioned on what attributes they felt were important.

While the last point may not seem relevant in consumer research, it allows technical innovations to be tested out on consumers. At the end of the process, the four sources generated a total of 17 attributes. These are listed in Figure 2.

Figure 2. *Attribute List-Cheese*

TASTE	PACKAGING
TEXTURE/BODY	PROCESSED (vs. NATURAL)
FAT LEVEL	SMELL
PRICE	DURABILITY
FAMILIARITY	CONSISTENCY
APPEARANCE	SUITABILITY FOR COOKING
COLOUR	COUNTRY OF ORIGIN
SHAPE	BRAND NAME
SURFACE	

Concept Building

In order to build concepts, the above list of attributes must be reduced to a more manageable level. When consumers are evaluating repeat purchase goods prior to purchase, they tend not to have a written or mental check list of 25 or 30 attributes against which each product is evaluated. Basic consumer behaviour research suggests that the benefits of doing this, for this type of purchase, are outweighed by the time and psychological investment required. Hence consumers tend to focus on a small number of key attributes in making their decision.

A number of key questions have to be answered to ensure that the concept testing process closely models a real life purchase situation:

1. How many attributes to use?
2. Which attributes to use?
3. At what levels they should be considered?

In choosing the number of attributes to use, a balance had to be struck between using as small a number as possible, for ease of consumer evaluation, and as large a number as is needed to understand consumer behaviour. Judgement and precedence in this type of research suggested five should be used. Based upon their apparent importance in the earlier phases of the study, the five selected were taste, fat level, price, texture and packaging. The levels selected were:

Taste:	Strong, medium or mild
Fat Level:	Low, Medium or Full Cream
Price (per lb):	£1.50, £2.00 or £2.50
Texture:	Hard or Soft
Packaging:	Block or Individually Wrapped

Concept Testing

Given the above five attributes, at either two or three levels, an approach had to be used to extract the following information:

(a) the most important attributes in the evaluation of the product in question;
(b) the preferred level of each attribute.

The process used is called conjoint analysis. The consumer is presented with a number of hypothetical product concepts, built on a number of attributes. They are then ranked in order of preference and conjoint analysis separates out the exact effect of each attribute on the overall preference rating for that concept [Green and Sainivasan, 1978].

Consider again the cheese study. Based on the above attributes and levels, 108 possible combinations exist. As it would be extremely unrealistic to expect respondents to rank in order this large number of concepts, a subset of these 18 was chosen by use of a technique called orthogonal arrays [Addelman, 1962]. This technique ensures that a sufficient balance between the attributes and levels exist to enable computer analysis to extract the underlying preferences.

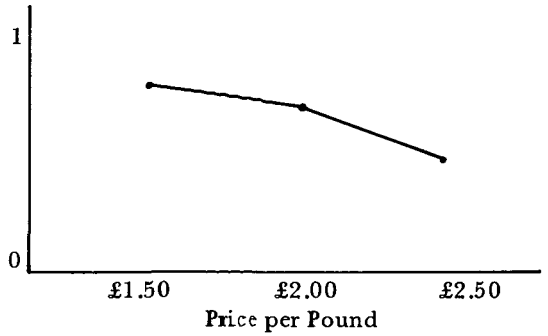
These 18 concepts were presented to consumers on small index cards. For example, one such concept would be:

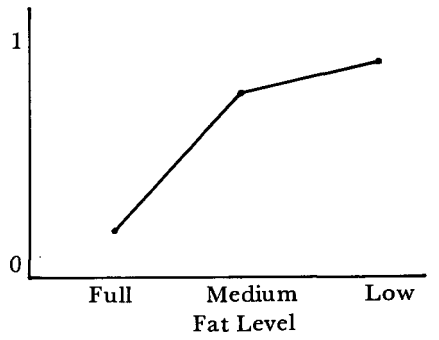
Taste:	Strong
Fat Level:	Medium
Price:	£1.50
Texture:	Soft
Packaging:	Block wrapped

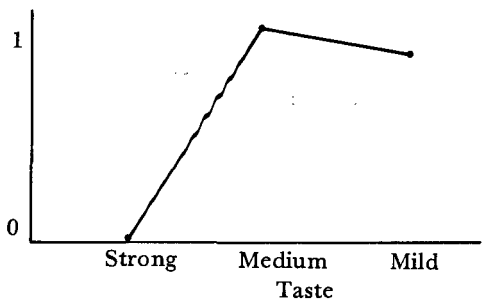
The 56 respondents who participated in this stage of the research were asked, in a step-by-step process, to rank order the 18 concepts. An analysis of variance programme (ANOVA) was used to extract, first, the proportion of the total variance between preferences accounted for by each attribute and hence its importance and second, the preferred level of each attribute [Nie et al, 1975]. Figure 3 illustrates the results. The bottom table highlights the percentage of preference variance accounted for by each attribute. Hence, 59.7 per cent of differences shown between ranking of any pair of concepts was accounted for by a variation of taste. This highlights the following descending order of importance — taste, fat level, packaging, price and texture.

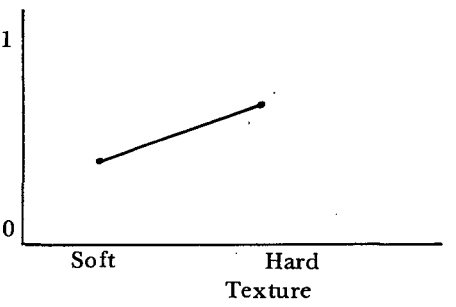
The individual diagrams for each attribute indicate consumer preference for each level, higher scores relating to the most preferred. Hence, medium tasting cheese is marginally preferred to mild, whereas strong

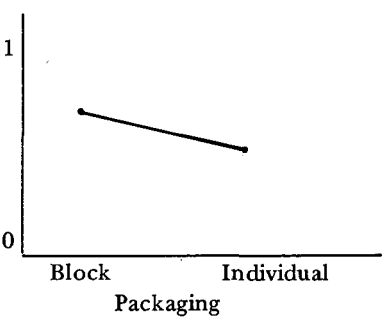
Figure 3. *Preference Levels*











Attribute	Percentage of variance Accounted for by attribute
Taste	59.7
Fat Level	29.8
Price	3.6
Texture	2.8
Packaging	4.1

Legend:

1 = Most Preferred

0 = Least Preferred

is totally rejected. Overall, 87 per cent of the preference variance was accounted for by the five component attribute model. Within the variance explained, 90 per cent was accounted for by two factors, again reinforcing the view that consumers evaluate repeat purchase consumer goods on a limited number of attributes. Analysis of the results showed consistency among respondents in their ordering of the top two attributes. As with the competitive market study, a reliability split test was applied.

Implications

The study, based on a limited sample, identified that two product attributes are considered of key importance in the purchase of cheese among those surveyed – taste and fat level. Both the competitive market study and the concept testing studies pointed to this same fact. It is towards these factors that attention should be primarily focused. As suggested earlier, the next step in the process is prototype development. With cheese, as with other food products, these prototypes are built for taste testing. The implications of the research described in this article is that it enables the firm to focus attention at this stage. Clearly, efforts should be concentrated on developing a number of low fat prototypes with a taste that is neither too mild nor too strong. Such taste tests should also take into account other factors observed in the research such as packaging and texture. Recall that the actual results obtained refer to the domestic market only but that the concept development model was shown to have considerable merit in developing new products for international markets.

Conclusion

New product development is an optimistic statement of a business. It accepts the inevitability of the product life cycle, and lays the foundation for the long term future of the company. The current approach of many Irish companies unfortunately lacks the systematic methodology required for successful new product development resulting in few successful new product introductions.

This paper outlines a consumer-based model for systematically developing new product concepts. Its strength lies in the identification of the key attributes on which consumers evaluate the product in question and the priority and weight of those attributes. The development of a new cheese was chosen as a case study in this paper. However, the applicability of the model is not limited to the dairy industry nor to the domestic market. Indeed its usefulness may be much greater in applications in new product development for international markets.

While the owner of the Saturday Evening Post may not have been at fault for the death of his paper – he was at fault for his failure to anticipate its demise and to provide a suitable replacement.

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