8.1 Introduction

Product development and launching are complex operations yet they are happening every day in every food company, from producer, processors and manufacturers to food service organisations and retailers. The food system changes all the time - as we find in the fascinating histories of food and its production. Nowadays changes take place faster - it has taken many of us thousands of years to develop from a hunter-gatherer society to a supermarket society but some have done it in 30 years. Food product development is not new, but what we are trying to do is to fit it into an information and technology age. The aim of the industrial age - to produce large quantities of foods in continuous processes, using marketing techniques to distribute those large quantities, and so providing basic energy needs at low prices - may not be the correct aim for the information and technology age.

If the aim is to provide a balanced and healthy diet, then the methods of food product development need to change - they need to be based on the knowledge that is now widely available. It is a knowledge-based technology not an empirical craft. It is a complete technology based on science, engineering, nutrition and the social sciences, with an understanding of the global technology of food production and food eating. Product development requires knowledge of society and consumers as well as of the technical aspects of production and products.

8.2 Systems and success in product development

New food products have always been developed and this will continue. When the products are successful, certain basic principles occur often, some almost universally, in
this development. These principles transcend particular products and circumstances, and their adoption helps all companies to move towards the methodology of the best.

As food enterprises grow from the small company with a few entrepreneurial individuals running or indeed comprising it, the need for a more technology-based organisation increases and with that the need for explicit frameworks to maintain and expand the activity. Increasingly activities in the company, including product development, need new organisation and management methods. Systems emerge, are tested, and the best become widely accepted and formalised. Thus in product development, methods that succeed are noted and copied. This copying leads towards a tried and tested Product Development Process. Adapted to circumstances and improved, it evolves continually. A logical pattern emerges which is efficient and workable and which can be implemented by industry with a high probability of market success.

8.3 The Product Development Process

This book has attempted to demonstrate the Product Development Process as the overall technology for product development. It includes and integrates activities, outcomes and decisions. There are a variety of techniques which may be used in the activities, but these have only been mentioned in this small book and further details can be found in the textbooks listed at the end of this chapter.

The Product Development Process in this book is divided into four stages: product strategy development, product design and process development, product commercialisation, product launch and evaluation. The four stages give a direction and a focus to the product development project, setting a clear direction for the product strategy, creating the product in the product design, building this product into an operational system in product commercialisation and bringing it to fulfilment in the product launch.

It also recognises that the Product Development Process is one of decision-making, and the need to make decisions is part of the product development project. How and on what basis these decisions are made identifies the outcomes needed and therefore the selection of activities in the process. Decisions are made sometimes without full knowledge or only with the tacit knowledge in peoples’ heads and are not necessarily
based on explicit activities, but they must be recognised in the product development project. The selection of the knowledge needed for decision-making is related to the risk policy in the company and also to the particular aim of the product development, whether it be original product innovations, adopted product innovations, a new product platform, product improvements, or product line extensions. So there are no necessary set activities in the product development project, but there are generic activities that occur in so many projects that they are almost universal. These have been identified throughout the book.

8.4 The product development project

The product development project in many companies starts from the company's product development programme and finishes at the end of product commercialisation. But for major innovations in a company, it can include the whole Product Development Process from the initial building of the business strategy to the post-launch analysis. So the Product Development Process is the company framework on which are hung the individual product development projects according to their needs for knowledge.

The project always comes from the business strategy, either directly or indirectly through the general direction of the company. Its aims, objectives and constraints are developed from the business strategy, the company policy on the product development project and the decisions to be made by top management at the critical points in the project. At the core of the project aim are the type of new product and the target consumers. The outcome, what the product is to achieve for the company, is also stated, for example to encourage growth in a product area, to enter a new market, to extend a product line. The aim focuses the project while it does not restrict it.

The outcomes needed for decision-making by top management at the end of each stage are identified, and in large projects there may also be intermediate outcomes within the stages because of the risks and costs in the project. There are always constraints on a project: company, economic, social, legal and technical. These are recognised at the beginning of the project so that design time and resources are not wasted.

Important outcomes from the product strategy stage are the product concept and the product design specifications. The consumers, or in the case of industrial products the
customers, are directly involved in building these from the original product ideas. The consumers identify the benefits they need and want from the product and combine them in a product concept. From this, the consumers describe a product profile, defining the important product characteristics which are developed, with product and processing knowledge, into quantitative technical properties in the product design specifications.

Food design is developing from an 'ad hoc' recipe-trying procedure to a systematic, knowledge-based design procedure. The product design and the process development are integrated because the product characteristics are built from the raw materials and their changes in the process. Also there is a recognition that the consumers need to be involved in the testing of the product prototypes, to measure acceptance as well as changes in the technical qualities. During food design, the basis of the marketing strategy is also researched so that the product qualities and the production are related to the product image, the market channels and the promotional methods. There needs to be careful incorporation of any legal standards and also any ethical needs of the community. Costs are an important feature of the design from two aspects - the costs of the project and the predicted costs for the product as related to the targeted product price range.

In product commercialisation, these costs become even more important because the project costs increase markedly at this stage and the feasibility of going on with the project depends on the predicted costs and sales revenue. In commercialisation, the major factor is the coordination of the product, production, marketing and financial research. There are obvious areas needing coordination, for example between researching product preservation in the physical distribution system and researching the market channel needs in selling the product. But there are other areas for coordination in research: production costs with pricing, product and packaging qualities with the product image for promotion, production capacity with sales revenues. Finally all the production, marketing and finance operations for the product launch are coordinated in an operational plan, providing specific targets for the launch.

The product launch is a time of ending the product development project and beginning the absorption of the new product into the company's product mix. It is still experimentation, but using the company's whole operational system, or if this is a new venture, the new company's total system. To follow what is happening in the company's
production and marketing, there should be monitoring of sales (where, how many), consumer and retailer reactions, costs, needs and shortcomings in the new product. The problems in the product launch can show up the company's weaknesses and strengths in knowledge, skills, organisation, finance, personal relationships and technology. Most importantly it can show strengths and weaknesses in the company's product mix, especially if it has been some time since the last product audit.

The product launch is a time to build up concepts, image, impact, momentum and enthusiasm in the company, which can be observed by the company's environment from the consumer to the banker to the politician.

### 8.5 Managing product development

In food companies there are various ways of managing product development:

1. Top management can organise and control it; it can be planned as part of the business strategy and then the different groups are either organised in project teams or the activities of the various departments is combined, and reporting is to top management.

2. Top management can give a budget for product development and then leave middle management to organise it; reporting can be to the marketing manager or the research and development manager.

3. It can be completely left to the people responsible in the product areas, usually the product or brand managers.

The importance and urgency of new product development to the company determines which method is used.

There are two major considerations in managing product development, the integration of the multi-disciplines involved and the control of the timing and resources in the product development project. Failures usually result from poor integration or poor timing. In the larger food company, there is often not just one product development project but several running side by side. This needs very good coordination and control so staff and facilities are not cycling through quiet and busy periods. The timing and the resources of all projects have to be carefully controlled so that efficiency and quality are maintained in the overall programme as well as in the individual project.
Although all the stages in the Product Development Process should always be considered, the type and quantity of research in each stage varies. This is related to the degree of innovation in the product, the resources available, the knowledge and expertise in technology and marketing, the size of the company and the risk-taking attitude in the company. Low-risk takers do more research, high-risk takers do less research; this is usually dictated by the top management through the amount of resources they give to product development.

Decisions to be made by top management at the end of each of the four stages in the Product Development Process have to be clearly identified as in Figure 8.1, so that the product development team knows exactly what information they have to produce and in what form. If management want comprehensive information at other times in the project, this needs to be specified at the beginning. There should also be a system for warning top management if there are overruns in time or resources or difficulties in producing a suitable product, or if the quality of the project is below standard, so that quick actions can be taken to identify and rectify the problem.

Basically all product development is the four stage process in Figure 8.1, but there are differences in activities, organisation and management according to the type of product: agricultural and marine materials, industrial products, food service products and consumer products, and for different levels of innovation: me-too, product line extension, product improvement, product re-launch and product innovation. The product development process should be regarded as a framework, on which the company builds the organisation of their own specific product development projects.
### Figure 8.1 Decisions by top management and the relevant information need

<table>
<thead>
<tr>
<th>OUTCOMES (KNOWLEDGE NEEDS)</th>
<th>DECISIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1: Product Strategy Development</td>
<td></td>
</tr>
<tr>
<td>PROJECT AIM, OBJECTIVES, CONSTRAINTS</td>
<td>PROJECT ACCEPTANCE</td>
</tr>
<tr>
<td></td>
<td>RESOURCES FOR INITIAL INVESTIGATION</td>
</tr>
<tr>
<td>PRODUCT DESIGN SPECIFICATIONS (OR PRODUCT CONCEPT)</td>
<td>PRODUCT IDEA ACCEPTANCE</td>
</tr>
<tr>
<td>PRODUCT REPORT</td>
<td>RESOURCES FOR DESIGN</td>
</tr>
<tr>
<td>- technical feasibility</td>
<td>PROGRAMME TIMING</td>
</tr>
<tr>
<td>- marketing suitability</td>
<td>HARMONY WITH BUSINESS</td>
</tr>
<tr>
<td>- consumer acceptance</td>
<td></td>
</tr>
<tr>
<td>- project costs, risks</td>
<td></td>
</tr>
<tr>
<td>Stage 2: Product Design and Process Development</td>
<td></td>
</tr>
<tr>
<td>FINAL PROTOTYPE PRODUCT</td>
<td>ACCEPTANCE AS NEW COMPANY PRODUCT</td>
</tr>
<tr>
<td>FEASIBILITY REPORT</td>
<td>RESOURCES FOR COMMERCIALISATION</td>
</tr>
<tr>
<td>- target consumers</td>
<td>TOTAL COMPANY INVOLVEMENT</td>
</tr>
<tr>
<td>- product qualities</td>
<td>HARMONY WITH BUSINESS</td>
</tr>
<tr>
<td>- processing method</td>
<td></td>
</tr>
<tr>
<td>- marketing strategy</td>
<td></td>
</tr>
<tr>
<td>- predicted sales</td>
<td></td>
</tr>
<tr>
<td>- predicted costs</td>
<td></td>
</tr>
<tr>
<td>- project costs, risks</td>
<td></td>
</tr>
<tr>
<td>Stage 3: Product Commercialisation</td>
<td></td>
</tr>
<tr>
<td>COMMERCIAL PRODUCT</td>
<td>ACCEPTANCE AS NEW PRODUCT IN PRODUCT MIX</td>
</tr>
<tr>
<td>COMMERCIAL REPORT</td>
<td>LAUNCH AGREEMENT</td>
</tr>
<tr>
<td>- production plan</td>
<td>CAPITAL INVESTMENT</td>
</tr>
<tr>
<td>- distribution plan</td>
<td>ACCEPTANCE INTO COMPANY ORGANISATION</td>
</tr>
<tr>
<td>- marketing plan</td>
<td></td>
</tr>
<tr>
<td>- financial plan</td>
<td></td>
</tr>
<tr>
<td>- risk analysis</td>
<td></td>
</tr>
<tr>
<td>- capital investment</td>
<td></td>
</tr>
<tr>
<td>- human resources</td>
<td></td>
</tr>
<tr>
<td>- effect on company</td>
<td></td>
</tr>
<tr>
<td>- effect on society</td>
<td></td>
</tr>
<tr>
<td>Stage 4: Product Launch and Evaluation</td>
<td></td>
</tr>
<tr>
<td>MARKETED PRODUCT</td>
<td>LONG-TERM ACCEPTANCE INTO PRODUCT MIX</td>
</tr>
<tr>
<td>FINAL EVALUATION REPORT</td>
<td>FEEDBACK TO FUTURE BUSINESS STRATEGY</td>
</tr>
<tr>
<td>- product quality and position</td>
<td>FUTURE PRODUCT DEVELOPMENT</td>
</tr>
<tr>
<td>- production efficiency</td>
<td>RESOURCES FOR FUTURE PRODUCT DEVELOPMENT</td>
</tr>
<tr>
<td>- distribution efficiency</td>
<td></td>
</tr>
<tr>
<td>- costs against targets</td>
<td></td>
</tr>
<tr>
<td>- sales against targets</td>
<td></td>
</tr>
<tr>
<td>- indicative return on investment</td>
<td></td>
</tr>
<tr>
<td>- effect on company</td>
<td></td>
</tr>
<tr>
<td>- market acceptance</td>
<td></td>
</tr>
<tr>
<td>- society acceptance</td>
<td></td>
</tr>
</tbody>
</table>
8.6 The diffusion of innovation

In product development, there needs to be an understanding of how an innovation spreads through a company, a market, a society, so that the new product is not presented with an insurmountable barrier such as the managing director's lack of future vision or fear of risk-taking, fierce and unprincipled activity by competitors, retailers' inability to accept a concept outside their experience, consumers' fear of a new technology, and so on. Examples are the initial failure of liquorice ice-cream because retailers could not accept black ice-cream, the divestment of aspartame as a sweetener from the original company because it did not fit, and consumers' fear of biotechnology in Europe which slowed down the introduction of genetically modified foods.

There is a need when studying diffusion to look at the total food system for the product from farmer/fisher to consumer, as the blocks to diffusion can occur at any place in the food system. Diffusion occurs through the complete channel from the land and sea production, to ingredient processor to food manufacturer to distribution to retailer to buyer to consumer and even to the waste disposal organisation. Change at any point reverberates along the channel, may be mildly but often strongly. So in studying diffusion there is a need to consider the whole channel.

Timing is very important for a new product, not just the season but the time to market in relation to a change in society. This is sometimes a problem - the product may be too early or too late. Consumers can sometimes be ahead of the food manufacturers and sometimes it is the reverse. Consumers may have changed their life style or ideas, for example consumers were interested in the ingredients in foods and their nutritional values, but food manufacturers took some time to realise this and labelling regulations were introduced. Also they may have new cooking methods or/and appliances, for example the introduction of microwaveable food products lagged behind the introduction of microwave ovens. Sometimes the food manufacturer can be ahead with some new technology and consumers cannot adapt their lifestyle or their basic philosophy to accept it, for example food irradiation never became a widespread preservation method because of consumer fears; vegetable protein products did not replace meat because of their low class image and today, the introduction of genetically modified cereals in Europe because of consumer doubts.
Also there is a need to consider the time that people take to adopt a product, whether it is the factory staff, the salespersons, the retailers or the consumers. There is a learning curve and this needs to be factored in when planning product development projects.

There are five crucial aspects of diffusion which need to be considered when designing and marketing new products:

- nature of the new product (raw materials, production, packaging, marketing);
- communication about the new product;
- social system and the place of the target consumer in the social system;
- timing of the new product and of the consumer’s acceptance of it;
- fit of the product to the current market culture.

In product improvement and me-too products, the barrier to innovation is that the consumers are often perfectly happy with the present product and do not want to make the change because they do not see that it has any other benefits that they want. So they have to be shown and convinced that there are new benefits so that they do not grow resistant not only to the product but the brand. If it is a new product they may be suspicious, they may not see how they can use it, or they may not even want to change their cooking and eating habits for it. The communication in this case needs to be educative, reducing unease and promoting ease of use. Recipes and cooking demonstrations are common methods of doing this.

### 8.7 The climate for innovation

For successful innovation to occur, an encouraging climate is required both inside the company and in the environment surrounding the company. The level of innovation and type of innovation are also determined by the attitudes, wants, behaviour and knowledge in both the internal and the external environments. There are people who can break through both these environments; we are all familiar with the stories of the enthusiasts who started in the garage and built up a completely new area of technology. But even they have problems maintaining the truly innovative atmosphere once the initial waves have passed and they have a successful company.
Vision is important, the ability to be aware of the present situation and to look ahead into the future - where society is moving, where industry is moving, where consumers are moving, where technology is moving - and to relate these visions to an achievable future for the company. The company has to decide if it is to be:

- an innovator at the beginning of the market;
- an improver of present products once the new market starts to evolve;
- a 'me-too' copier of what is already on the market; or even
- a die-hard, ignoring innovation completely.

The company has to decide if it wants to make significant jumps in technology, or to develop slowly from the base it has. How the company organises and resources the product development project depends on these decisions, which should be made explicit so the team can work effectively in its own environment.

The outside environment also affects the method of innovation and the type of innovation. There is movement and change in the food system and its different parts. At the present time, the structure of the food system consists of a few large multinational companies with large proportions of the market together with lots of little companies. In some cases, there is vertical integration from the producer to the retailers and sometimes even to the consumers. Often in the past, innovation in the food industry has started in small companies which then amalgamated into large companies. With the present structure, more of the innovations will come from the large companies, which therefore need to develop new products for large markets. This is not always easy for a product innovation may take several years to grow into a large market.

A global philosophy and management are appearing in the design, development, production and marketing of foods. Although central product development is still important in the large companies, there is increasing tendency for products to be designed, developed and produced in the most suitable geographic area and then transferred to the other market areas of the company. The chemical and pharmaceutical companies are introducing new food ingredients and their methods of product development may move into the food industry. They spend very large amounts of money on research to find the successful innovation, which can make large returns with high prices in the short term and because of patent protection can also make substantial profits in the long term. This is the opposite of food product development practice, but
maybe the development and experience of nutriceuticals and functional foods may lead the food industry towards the methods of pharmaceutical companies. Increasing population and urbanisation are also leading to larger-scale manufacturing which needs new technology.

Consumers pull the Process by their wants and needs as their knowledge grows from education and the media. They are increasingly polarised by their economic status into two groups:

- the over-fed affluent and comfortable;
- the poorly-fed underclass.

In some countries the gap between the two is decreasing, in others widening. It is largely related to the proportion of food costs to total income in the family unit. These groups present different targets for food product development. The affluent are worried about obesity and are increasingly concerned about the nutritional value of food, the safety of food, the health effects of food and also being bored by food. Product development for them puts an emphasis on difference - it has to be more knowledgeable and creative. For the other group, perhaps product development should be a continuation of much of the product development of the past - aiming for quantity, cheapness and sufficiency.

### 8.8 Ethics in product development

Ethics basically refer to a systematic study of moral choices, and it is related to, but distinguished from, morals and laws.

- Morals are a set of principles used to distinguish right from wrong. Ethics conform to these moral principles.
- Ethics constitute a system of principles of personal behaviour that a person and a company adopt in daily life. Laws are developed politically based on the ethical pressures of the society.
- Laws are a set of rules passed by a government, consisting of both restraining and enabling legislation which is interpreted by courts and regulatory agencies.

The food industry has been slow over the last 100 years to move with society needs and have been subjected to many food regulations which are being constantly up-dated.
Workers in food product development have the dilemma of aligning what is 'right' according to cultural standards with company policy. Generally speaking, each person in product development has their own set of standards which comes from their society and usually abides within them in their work practice. Why then is some of the behaviour of the food industry considered by society as unethical, so that many food regulations are imposed? The problems are that society lacks commonly accepted standards of behaviour and often the unethical behaviour can be profitable in the short term. Standards vary from country to country, industry to industry and even from one situation to another. The product developer has a responsibility to evaluate society's ethics and abide by them, and sometimes taking account of more demanding standards which may be asked in the future. There may also be a dichotomy between the society's ethics and the company's ethics which the product developer has to reconcile.

There is a need for social responsibility by the company and by the individual in product development based on the ethical standards of both the company and the society.

8.9 Summary of the book

This book is only an introduction, a bird’s eye view of product development. The aim was to show someone coming into food product development the Product Development Process and the aims, activities, outcomes and decisions as the product development project moves through the Process. Some notable points to remember are:

- Companies must set long term goals for product development and aims for individual PD projects.
- A systematic Product Development Process increases the likelihood of product success.
- The generic Product Development Process of four stages - product strategy, product design and process development, product commercialisation, product launch and post-launch evaluation – can be adapted for different levels of innovation; consumer, industrial and food service product development; and tailored to company resources.
• Technological knowledge of product, production, distribution and marketing is the basis of product development.
• Consumers’ needs, wants, attitudes, behaviour and ergonomic requirements are studied at the beginning and throughout the product design process.
• Product design and process development need to be integrated in the product design process.
• Product commercialisation needs to be effective in launching the optimum product and efficient in controlling costs and time.
• Product commercialisation is not technology transfer but technology integration.
• Coordination of the product, marketing and processing technologies throughout the project is essential.


Product development is a major activity in a food company, because of the consumers constantly seeking new foods for either satisfaction or nutritional purposes or just for variety and interest. Successful new products can also generate profits and growth for the company. Top management has to recognise the need for product development, provide a climate for it and the necessary resources, and an organisational structure. They need to be actively involved in the decision-making.

Everyone needs to accept the knowledge and skills of the other people involved and to cooperate in a controlled, efficient system with the opportunity for creativity. The Product Development Process can achieve this when it is used to guide the product development project.

Changes in the food industry and also the needs of the consumers are changing internationally and companies need to recognise this in their product development strategy. Technological knowledge needs to increase to face the challenge of the future.
8.10 Textbooks in product development

*General*


**Food**


