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Developing an innovation strategy

Product development does not occur in isolation as a separate functional activity. It is a company philosophy, a basic company strategy and a multifunctional company activity. In recent years to show this all-encompassing basis, bringing together product, process, marketing and organisational innovations, there has been development of an overall innovation strategy. This innovation strategy is related to the company's overall business aims and strategy, as well as the social, economic and technological environment, and the company's own knowledge and skills. The business strategy also includes a product strategy outlining the products of the future. The combination of the innovation and product strategies is the basis for the product development strategy, and from this can be developed, with the company's technology strategy, the product development programme as shown in Fig. 2.1. In building business and innovation strategies, it is important to recognise that from them comes a product development programme both for many years ahead and for the immediate year.

The innovation strategy is built up in the business strategy from the innovation possibilities, but only after thorough coordination with the product, marketing and technology strategies. The product development strategy is then built from the innovation strategy, together with other parts of the business strategy such as product mix planning and marketing strategy. Finally from the new product portfolio and the product development strategy is built the product development programme. In this way the product development programme sits harmoniously with the strategic direction of the company, the company's technical and marketing capabilities, and the customers in its ultimate market.

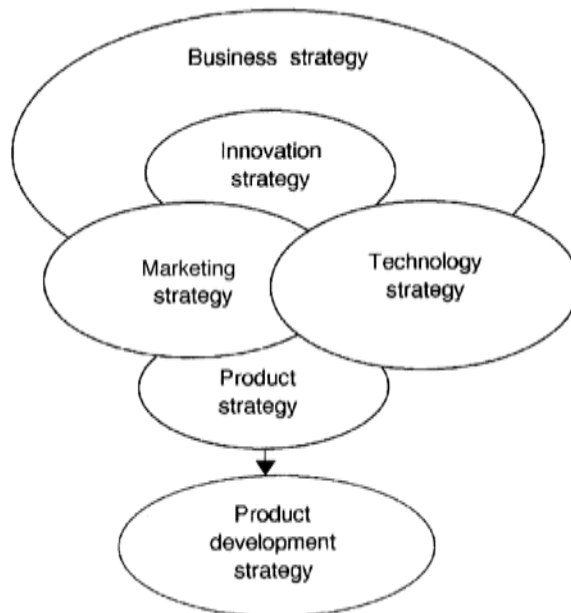


Fig. 2.1 Product development strategy generator.

2.1 Possibilities for innovation

Innovation is an integral part of society, and therefore an integral part of an industry and a company. There are three basic principles of innovation:

1. An innovation is an idea perceived as new by the individual (Rogers, 1962).
2. An innovation causes change, which can be technological or sociological but is probably a combination of both (Earle, 1997).
3. An innovation involves a wide range of people, in the company, the company's environment and the society (Earle, 1997).

Innovation is seen as the state of mind in the company (Kuczmarski, 1996). The traditional definition of innovation in companies as product development and process development has expanded to include all the other changes that can occur (Voss, 1994). Innovation can include ideas for different changes – philosophy, technology, methods, organisation, market, people. But it is important for the company to recognise that any of these changes will affect not only the company but also the other organisations in the food system, the consumers and the society. Innovations outside the company also cause changes inside the company; for example, the technological innovation of the supermarket changed food manufacturing and marketing, the social change of more women working caused an increase in convenience foods. So innovation is related to the climate within

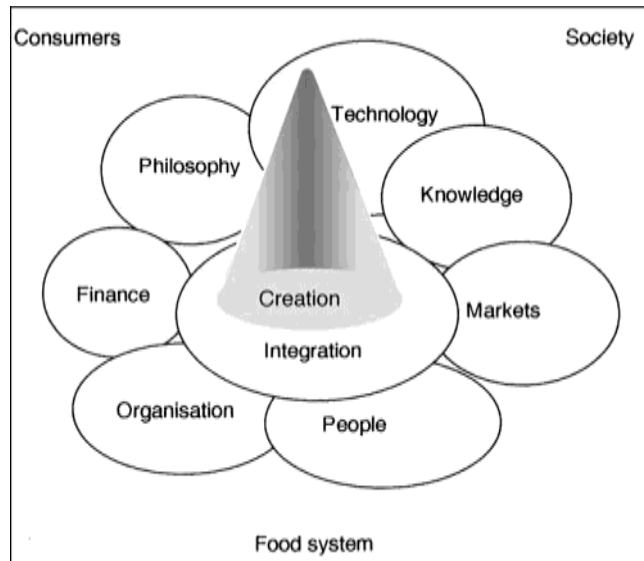


Fig. 2.2 Climate for innovation.

the company and also that surrounding it in the food system and the society as shown in Fig. 2.2. It is important to observe the changes already occurring outside and inside the company, and to predict the possible changes that can achieve the aims of the company to survive and grow. One of the great difficulties is to differentiate between the true, long-term changes and 'fashions' which die quickly. Judging wrongly may adversely affect the company.

The rate of innovation in a company depends on its ability:

- to sense possibilities and to perceive and assess the likely outcomes of feasible changes;
- to evaluate and rank such outcomes strategically and operationally, in relation to company objectives;
- to make decisions on the basis of such information and prepare appropriate strategies;
- to implement plans and changes in managerial and technical terms (Frater *et al.*, 1995).

These steps are shown in Fig. 2.3.

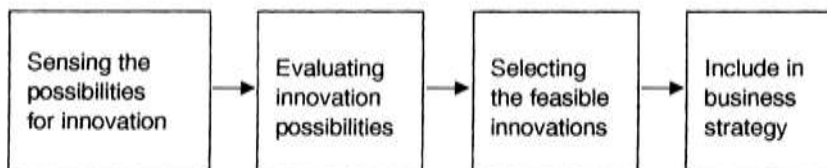


Fig. 2.3 Innovation chain.

Table 2.1 Changes in society leading to food innovations

Major long-term living patterns: urbanisation, suburban and in-city living
 Working patterns: increase in office workers and decrease in blue collar workers
 Sex roles: women working, women in former male-dominated positions, women in senior positions
 Economic status: increasing incomes, more equal distribution or more unequal distribution of incomes
 Educational status: knowledge growth from education and the media
 Age structure: increasing percentage of old people in Europe and of young people in South America

Source: After Earle, 1997.

2.1.1 Sensing the possibilities for innovations

In sensing the possibilities, it is important to study the major changes that are taking place or predicted in society, in technology, food system, the marketplace and the consumers. Only then can the possible company initiatives be created.

Social and political changes cause changes in the food industry or may even prevent innovations in the food industry. Eating food is a universal activity and therefore the food industry perhaps more than any other industry is enmeshed in the social and political systems in every country. Society changes in many ways as shown in Table 2.1.

The political systems and their attitudes to the food industry also change with societal changes. In 1982, Throdahl suggested that the most important governmental method of encouraging innovation in the food industry was to reduce the adverse impact of regulations on innovation but did add ‘without sacrifice of social objectives’. This has been the food industry’s dilemma for the past 100 years and even earlier – innovation with or without consideration of society. The political system itself can encourage or discourage innovation, by placing trade barriers or subsidies which encourage local food production and discourage imports. National policies, based on societal concerns, needs and wills, can create a reactive environ-

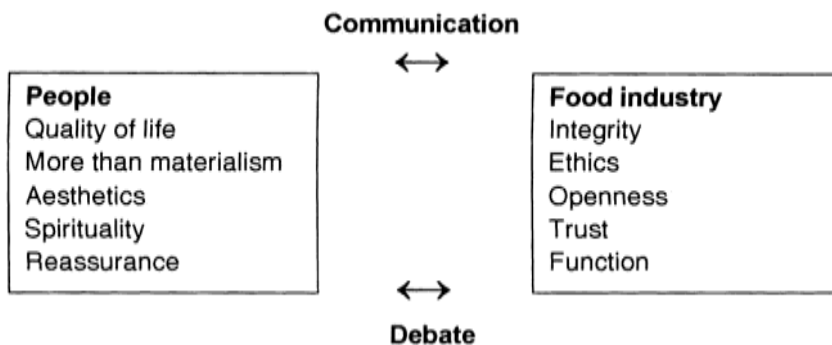


Fig. 2.4 Human values and the food industry

(Source: From Earle and Earle, *Building the Future on New Products*, © LFRA Ltd, 2000, by permission of Leatherhead Food RA, Leatherhead, UK).

ment for innovation in the food industry. In looking for innovation possibilities, food companies need to be aware of changes in societal attitudes that fuel political changes as well as food changes. The social and related political changes have caused food innovation in the past and will continue to do so in the future. Food companies need to have methods of monitoring social changes and predicting future changes (Earle and Earle, 2000). There needs to be greater recognition of human values in developing innovation strategies as outlined in Fig. 2.4.

Think break

1. Identify important social and political changes occurring in your company's external environment.
2. What changes could be made in the company to relate to these changes so that the company not only survives but also grows?

Technological innovation spans a broad spectrum of areas from the new crop and the newly farmed fish, through new refining methods, new preservation methods, new manufacturing methods, new distribution methods, new retailing methods, new cooking and preparation methods. But it also includes changes in technologies of other industries, particularly in those related to the food industry such as the processing technologies in the pharmaceutical and chemical industries, in the home appliance technologies and in the electronic and information technologies. There also needs to be consideration of new scientific knowledge that may be the basis for new technologies in the future. Companies, even very large food companies, are often based on one technology; for example emulsion technology may be the main emphasis and this covers a very wide spectrum of foods from margarine to mayonnaise to ice cream to sausages. Their knowledge is extensive in this one technology and it is often more successful to seek innovation from this basis. When going to a new technology, a great deal of knowledge has to be found as quickly as possible; this means building up resources either by learning or by buying a company already using the technology. It is important for companies to select a basic technology that can lead to many different types of products to satisfy different markets. Some of the technological areas for innovation (Rizvi *et al.*, 1993) are shown in Fig. 2.5.

Think break

1. What would you identify as major technological developments in the processing and distribution of food products in your company's present technological system?
2. What new technological developments in other parts of the food industry or in other industries at the present time might cause changes in your company's technology?

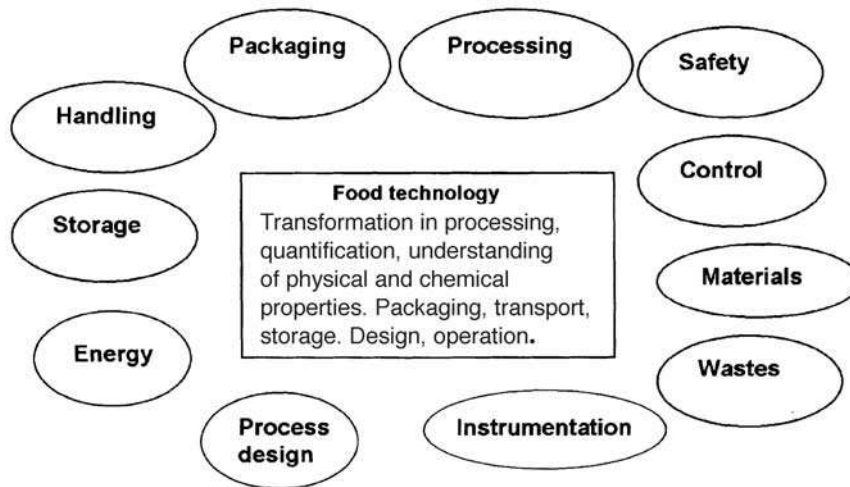


Fig. 2.5 Technological areas for innovation.

Changes in the structure of the food system are also an important source of ideas for innovation possibilities. There are often changes in the importance of the various parts – production, ingredient processors, food manufacturers, retailers, food service – and the pressure for innovation moves from one section to another. Recently there has been increased new product activity in the ingredients industry, which is being transmitted to both producers and food manufacturers. Both vertical and horizontal integration have occurred in the last 50 years, and caused major innovations. For example vertical integration in the chicken industry led to chicken as major meat, and to the development of many new products; horizontal integration led to many new products in the baking industry.

A change in one part of the food system leads to new products in other parts. In particular, innovations in the primary producing industries produce new ingredients, which then advance to new consumer products. Canola seed was developed with low erucic acid, and these seeds were used to produce oil with high polyunsaturated/low saturated fatty acids, and the oil was then used to develop oil-based consumer products which were more attractive nutritionally.

The food system changes slowly. During the last century changes were incremental with some major changes, and the radical changes were well spaced. This may be caused by:

- maturity of the industry – compared with the innovative industries such as electronics, it is more difficult to invent new products;
- consumers – many are cautious and suspicious in judging new foods; food consumers change slowly unless they recognise marked benefits in the new product, and new benefits are more difficult to design than in other industries, for example information technology;

- biological product development – it takes time to develop a new plant, a new animal, a new fish, and even a new safe process, and these are the basis of the radical changes. Because of the expense of these developments, they were mainly funded by governments in the past (Earle and Earle, 1997), which also led to slowness;
- marginal returns on new food products – compared with other industries, for example the pharmaceutical industry, the profits on new food products are small.

So it may be that this has been the most suitable innovation method – mostly incremental product changes, some major changes and a few radical changes. But with today's high rate of technological change in other industries, there may be change in the rate of innovation in the future.

The knowledge and understanding of technology in the total food system is continuing to grow rapidly and, if this is recognised by the industry, it will impact on new products, new processes and new manufacturing systems but more important on the consumers' and society's attitudes and behaviour towards food. However, if acceptance by the consumers is to be widespread and willing, then they must see obvious overall benefits to themselves; this needs, among other things, full and clear information. A striking lesson in the difficulties that may arise is to be seen in the introduction of genetically engineered foods. The bundle of products and services that the food company calls an innovation is now in the eyes of the consumers an experience, which they hope is safe and enjoyable (Pine and Gilmore, 1998). The food industry has gone through:

Commodities --- Products --- Services --- Experience

Innovation occurs today at all these levels in the various parts of the food system.

Think break

When searching the food system for innovations, some leading questions are:

- What are the changes in the relative importance of the various sections in the food system?
- How is the capacity of the industry changing?
- What are the changes in the ownership structure?
- Are there predicted take-overs in the industry?
- Are there predicted take-overs from outside? Hostile? Friendly?
- Are there predicted investment changes?
- Are there new companies entering the industry?
- Who are the innovators in the industry?

1. Try to answer these questions.

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2. Identify possibilities for new products in your company based on this information.
3. What new technological developments are predicted in the food system that could affect your company?

Marketplace changes provide a rich source of innovation possibilities (Earle, R.L. and Earle, M.D., 1999). There needs to be searching for long-term possibilities, as well as tactical thinking for the immediate marketing plans. Four areas to consider when looking for long-term marketing possibilities are:

- international comparisons;
- product and service developments;
- market specialisation;
- new distribution methods.

Looking internationally, it is important to take a broad look over many markets and compare them. The home market in the USA or Europe may be static, but markets in Asia are increasing rapidly. Alternative possibilities are either in the home market to increase a market share or to have higher value products, or in the new market to relaunch the old basic products. As can be seen with McDonald's and Coca-Cola, relaunching on a new market is successful in the long term, but there is a need to keep the home market viable as the basis for the new venture. The reverse also occurs: products on an overseas market can produce ideas for the new product in the home market.

Changing the ratio of product to services is another way of identifying innovations. Once the new product was the main innovation in consumer marketing but increasingly service has become important. How far does the food manufacturing company go in providing services for the consumer; how far does the ingredients company go in providing services for the food manufacturer? Certainly innovation can be found; for example in food service providing the materials and the recipe for the dish opens up a whole range of new products to be supplied to small restaurants; providing complete chilled meals, ready-to-heat, in supermarkets again leads to many new products.

Market specialisation has gained increasing recognition in searching for innovations. In the past the food companies tried to provide a wide range of foods, and their innovation growth was often achieved by buying or amalgamating with other companies. Today should marketing be more focused and the innovations aimed at specific target markets? In other words, should variations of a product be developed for different market segments, so that the new products are more focused on the people in that market?

Distribution has always been an area for major new developments – from the grocer's shop to the supermarket to the mega-market – and one would predict that there are going to be major changes in the next ten years with the introduction of e-commerce and other uses of the Internet. The information age

Box 2.1 Some future consumer needs predicted in 1969

- Increasing importance of smell in foods
- Foods light in substance but strong in flavour
- Texture a more important featured characteristic
- Packaged goods accepted as norms
- Dieting and slimming will become an increasing occupation
- The family mealtime will break down
- Strong conservatism in food taste progressively breaks down
- Better nutritional standards eliminate the danger of between meal hunger
- Meal nibbling for social/psychological reasons increases
- Increased public sophistication in dietary and nutritional matters

Source: After Hedges, 1969.

is certainly having a strong effect on all aspects of marketing technology – the distribution system, the places for selling food, the communications, the promotion, the sales methods. New food products will certainly come from the four consumer trends: using the Internet to buy food, food shopping as entertainment, food shopping for freshness and food shopping for health, all of which will affect the distribution system (Earle and Earle, 2000).

In searching for the long-term market possibilities, the basic research is to study the consumers and in the case of the food ingredients company also their immediate customers. There is a need to take a broad look at the possible consumers and their future needs, wants and behaviour (Earle and Earle, 2000). The research is about people – how they think, feel and behave, and why they think, feel and behave in these ways, and then to relate this to their needs in future products as shown in Box 2.1 (Hedges, 1969). It is interesting that this paper was published over 30 years ago, and how many of the predictions have become reality. An interesting question today is: are the consumers’ knowledge and attitudes pushing the food industry towards the product quality standards of the pharmaceutical industry, guaranteeing the safety and the effectiveness of the food products? What innovation possibilities does this uncover?

Think break

1. Identify eight innovation possibilities for your company, two under each of the following areas:
 - (a) society changes
 - (b) political changes
 - (c) technological changes
 - (d) food system changes

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- 2. Select an important product area for your company and study it for:
 - (a) international comparisons
 - (b) product and service developments,
 - (c) market specialisation,
 - (d) new distribution methods

From this identify eight innovation possibilities.

2.1.2 Evaluating the innovation possibilities for the company

The innovation possibilities may be market related, e.g. a new market niche, a growing market area; technology related, e.g. a new process, increased automation; resource related, e.g. a new crop, a new ingredient; society related, e.g. increased income, poorer health; consumer related, e.g. single complete meals, children-friendly meals. These innovation possibilities need to be analysed against the company's capabilities and the company's objectives. The company evaluates from 'might do' to 'can do' to 'should do'.

The company's climate and capabilities are a major evaluation factor in studying innovation possibilities. One company may be very conservative, and not want change, so it chooses a low level of innovation as the company climate and therefore in its business strategy. Another company may want to be at the forefront of change, so it has a company climate of innovation, and includes innovation as a major part of its business strategy. This incorporation of innovation into the company philosophy sets the basis for the product development. If the company has low-level innovation, product development consists of cost cutting and minor product improvements; at high-level innovation, product development is searching for a unique product that will cause a major change to industry, market and consumers. Many companies have a mixture of innovation and conservatism.



The company may think of change as technical, but it is the commercial change, particularly as related to the consumer, that is the important change. This spectrum is also related to risk-taking: companies can vary from aversion to risk to seeking risk. It is important to recognise the present level of innovation in the business strategy and also the philosophy for risk-taking in the company.

Companies cannot quickly change from one level of innovation to another. Before viewing the innovation possibilities for the company, it is often interesting for the company to take a look at itself:

- Is it blinded by the glare of the oncoming future, trying to muddle along in its present markets and technology?
- Is it searching fearlessly and widely for new opportunities?
- Is it moving in a focused direction with a strong sense of purpose?

There are basic company qualities that affect evaluation of possibilities such as size of the company, financial status, type of product mix, place in the market, standard of production and marketing. But when judging the innovation possibilities, it is more important to study the company's experience, expertise and knowledge in innovation. It is important to make a quantitative analysis of the company's rating in innovation, and it is helpful to use a set of innovation indices and compare these, if possible, with the ratings of other companies or the industry in general. Various suggestions have been made for innovation indices, including the success of new products, new product development effectiveness and the innovation level of the company as shown by Kuczmariski (1996). He suggested that the following indices should be determined over a three-year period.

1. Success rate of new products:
 - (a) survival rate: new products still on market/total number of products commercialised,
 - (b) success rate: new products exceeding revenue forecasts/total number of products commercialised,
 - (c) innovation sales ratio: cumulative annual revenues from new products/total annual revenues.
2. New product development effectiveness:
 - (a) R&D innovation effectiveness ratio: gross profits from commercialised new products/R&D expenditures to new products,
 - (b) return on innovation: cumulative net profits from new products/cumulative new product total expenditures for all commercialised, killed and failed new products,
 - (c) process pipeline flow: number of new product concepts in each stage of the development process at year-end,
 - (d) innovation revenues per employee: total revenue from new products/number of employees devoted to innovation initiatives.
3. Innovation level:
 - (a) R&D innovation emphasis ratio: R&D expenditure to new products/total R&D expenditure,
 - (b) newness investment ratio: expenditure to new-to-world products/new products total expenditures,
 - (c) innovation portfolio mix: percentage of products new-to-the-world, line extension, repositioning, new-to-company, product line improvements.

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Table 2.2 Company innovation indices in New Zealand manufacturing over five years

| Innovation indices | Highly innovative | Moderately innovative | Least innovative |
|--|-------------------|-----------------------|------------------|
| Number of new products | 26 | 9 | 8 |
| Number of improved products | 48 | 22 | 5 |
| New products, % of total sales | 42 | 19 | 18 |
| Improved products, % of total sales | 32 | 25 | 15 |
| Success of new products* | 4.0 | 4.6 | 3.5 |
| Change production processes [†] | 2.6 | 2.5 | 1.9 |
| Change management, marketing, support systems [†] | 3.5 | 2.7 | 2.4 |
| Comparative status of plant equipment [†] | 2.9 | 2.9 | 2.1 |

* Scores, 1 (most failed) to 5 (highly successful).

[†] Scores, 1 (not at all) to 4 (completely).

[†] Scores, 1 (more than 10 years behind) to 4 (fully up to date).

Source: From Campbell, 1999.

These are quantitative measures (metrics) of new product development success and effectiveness, and of the innovation level of the company, and these can be used to compare the company's performance with that of other companies. Campbell (1999) studied innovation in manufacturing companies in New Zealand over a five-year period using a simple comparison of product success:

- number of new products;
- number of improved products;
- new and improved products as percentage of total sales;

and asked the companies to state their level of success in new products and their level of change in technology as shown in Table 2.2. These are mean scores for New Zealand manufacturing companies in a variety of industries so are not typical scores for the food industry. But they show the differences that can be found between the most innovative and the least innovative companies. The innovative companies tended to be innovative in all parts of their business, as can be seen from their much higher scores, than least innovative companies, for change in production, plant equipment, marketing and support systems. It is interesting to note that the highly innovative companies launched more products but had a slightly lower success score than the moderately innovative companies. It was found that these highly innovative companies tended to have a truncated product development process and missed some of the evaluation steps, while the moderately innovative tended to have more stages and more analysis.

Think break

1. Compare the innovation scores either between your company and other companies in the industry, or if this is not possible between different product areas in your company.

For the last five years, collect the following information:

| | | |
|---|-------|--------------|
| Sales growth over last 5 years | _____ | |
| Number of new products | _____ | |
| Number of improved products | _____ | |
| New products – proportion of sales | _____ | |
| Improved products – proportion of sales | _____ | |
| Success of new products | | |
| All failed | _____ | 100% success |
| Changed production processes | | |
| Not at all | _____ | Completely |
| Changed marketing methods | | |
| Not at all | _____ | Completely |
| Changed company organisation | | |
| Not at all | _____ | Completely |
| Age of technology | | |
| More than | _____ | Fully |
| 10 years behind | | up-to-date |

From these results, how do you rate your company – highly innovative, moderately innovative, not innovative?

2. In what areas do you think your company has the knowledge and skills for innovation in the future – raw materials, processing, products, distribution, marketing, communications, consumer experience?
3. In what areas do you think your company has the financial resources for innovation in the future – raw materials, processing, products, distribution, marketing, communications, consumer experience?
4. What do you see as your company's barriers to innovation?

The **company objectives and goals** are also important in studying innovation possibilities. What is the company wishing to achieve, where and when? The innovation possibilities need to be ranked against these objectives – in particular innovation possibilities need to fit into the general direction of the company and not involve technologies, markets and finances, which are well outside the objectives of the company.

The innovation possibilities are screened to choose the most suitable for further study. In selecting the innovation paths, it is important to retain contact with the twin areas of business and society, as shown in Fig. 2.6. The factors used for screening vary with the company and the types of innovations, but

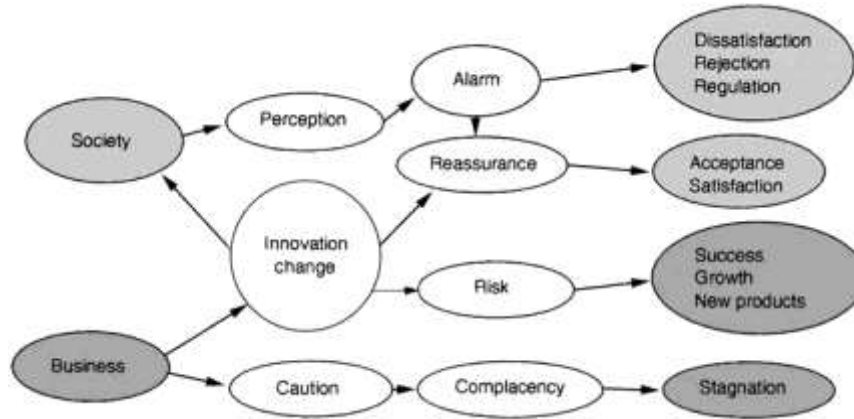


Fig. 2.6 The business and societal decisions for innovations.

important factors are related to the company, market, technology, society, predicted outcomes, project needs and company resources. Some important evaluation factors for innovation possibilities (Kuczmariski, 1996) are shown in Table 2.3. Major factors are those that are important in evaluation while critical factors are those that are directly related to product success and must be

Table 2.3 Evaluation factors for innovation possibilities

| Major factors | Critical factors |
|----------------------------------|---|
| Company | |
| Fit with strategic objectives | Exploits internal strengths |
| Impact on existing business | |
| Market | |
| Consumer need intensity | Product/service uniqueness/differentiation |
| Source of competitive advantage | |
| Technology | |
| Company competence in technology | Relation to present technologies in company |
| Society | |
| Impact on ethical constraints | Agreement with religious rules |
| Impact on political constraints | Agreement with government regulations |
| Predicted outcomes | |
| Sales and profits potentials | Return on investments |
| Degree of risk | |
| Needs and resources | |
| Financial needs | Financial resources |
| Knowledge needs | Knowledge resources |

Source: After Kuczmariski, 1996.

evaluated. The remaining innovation possibilities after screening are incorporated into the building of the business strategy.

2.2 Incorporating innovation into the business strategy

The innovation strategy/strategies are formed within the business strategy, along with other strategies such as product, technology and marketing, as shown in Fig. 2.1. The formulation of company goals and strategies is very much an iterative process, integrating the various strategies in the direction of the business goals, and using forecasts and analysis of possible outcomes, with an understanding of the company's capabilities.

Top management develops an **innovation blueprint** – a vision that defines the future role that innovation plays in the long-term goals of the company (Kuczmariski, 1996). The basis of this is an understanding of how innovation affects the company's main stakeholders – consumers, staff and shareholders; how it is related to the value of their company – capital value, share price; and how it is related to the value of their brand(s). This blueprint is the standard for accepting an innovation possibility into the business strategy.

The top innovation possibilities are combined with the blueprint to develop an **innovation summary**, which is built up with the product, marketing and technology strategies into an **innovation strategy**.

2.2.1 Combining strategies – product and innovation

The product strategy develops a balanced and rolling programme for the product mix during at least the next five years, with an outline product mix for later years. The forward planning of the product mix depends on the culture and size of the company, volatility of the market and the rate of technological development. In a large company with a reasonably stable market and slow change of technology, planning can be ten or more years; in a small company with few resources it can be one or two years.

In the product mix planning, there is recognition of today's breadwinners and also of the future breadwinners, the place in the product life cycle of the product areas, the competitive status of the products now and in the future. This identifies the areas for product improvements, line extensions, repositioning, new innovations in the present product system and radical new products outside the present system. There needs to be a constant interplay between the innovation summary and the development of the product mix, so that out of it will come the product development strategy that will be the basis for the product development. It is also important at this time to predict the effect on products that other innovations will have – for example, a new processing line, or a restructuring of part of the company. Often these are analysed separately, especially the company reorganisation, with little thought of how this would affect the product strategy and therefore the financial outcomes of the company in the future. There can be

very adverse outcomes. They may be cost saving at the time, but may have severe impacts on the new product planning and the future returns.

Think break

1. What are the basic product areas in your company's product mix? In the product mix, identify today's breadwinners – the products providing the main part of the sales revenue and tomorrow's breadwinners. What is the place of the other products in the product mix?
2. From your study of the product mix, what types of product innovation do you predict for the next few years?

2.2.2 Combining strategies – technology and innovation

The technology strategy for the company is also interwoven with the innovation strategy. In building the technology strategy it is essential first to identify the competence of the company with the present technologies and the ability to develop new technologies. A systematic method is used, comparing the technological competence of the company against other companies. This gives a truer indication of how technologically skilled the company is, rather than using subjective statements of company staff who may have vested interests in the present technology. It is difficult for outside consultants to assess the company's abilities for new technological areas. A combined project team with company staff and consultants using quantitative analysis is probably best for analysing technology competence throughout the company – raw materials, processing, distribution, marketing, and products. There is a need to study:

- base technologies that are necessary for the chosen product–market mix;
- key technologies which provide competitive advantage;
- new technologies, which could become tomorrow's key technologies.

A technology mix needs to be developed for the future incorporating all of these. The technology strategy is related to the innovation possibilities that have been selected in the innovation summary, the product mix and the technology mix as well as the company's technological capabilities as shown in Fig. 2.7.

A technology strategy can identify:

- new base or core technology that may lead to a range of new products;
- base or core technology that is needed for an original new product;
- key technology change that will be a unique competitive chance for the company;
- improved technology that will lead to higher product quality, more varieties of products or cost reductions.

In developing a technology strategy, it is important to relate it to the products, consumers and markets. Sometimes a new processing or production technology

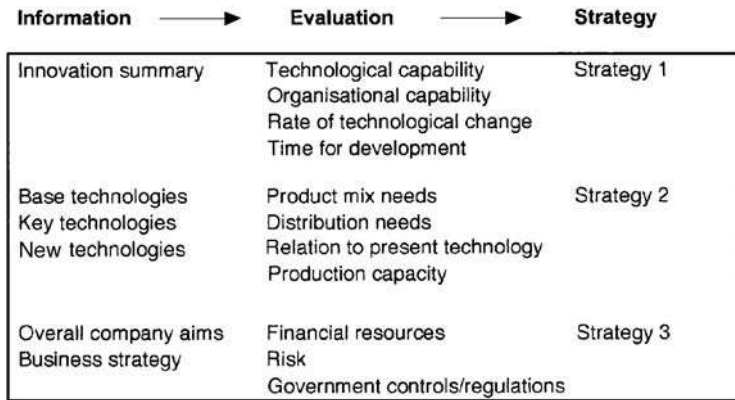
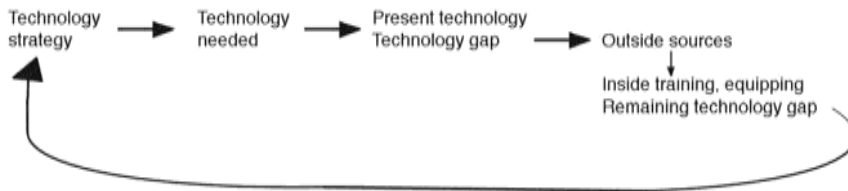


Fig. 2.7 Building the technology strategy.

may appear an attractive advance but may give product changes that are not recognised by the consumers or may even be unattractive to the consumer. Irradiation is a long-time technological innovation that has not come to be used because of consumer resistance to it. Genetically engineered crops are another instance today. It is also important to study the technological need, possession and lack of technology in the company and outside sources of technology, in developing the technology strategy:



In looking at new raw materials, some factors to study are shown in Table 2.4. Raw materials are an important technological area for innovation in the food

Table 2.4 Factors in raw material innovation

Materials

- New agricultural and marine resources/materials
- New processed raw materials, ingredients
- New packaging materials

Constraints and new freedoms

- Social constraints on raw materials changing
- Availability/costs of raw materials changing
- Government controls on raw materials changing
- Effects of economic/political changes on materials
- Changes in company standards for materials

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industry, but consumer and political pressures today indicate that more care must be taken in sourcing them, so that the development and the production environment and methods are visible. Saying that the raw material pathways in international trade are too complex will not be an answer in the future – this may see more joint ventures in raw materials innovations.

In the food industry, it is critical to combine the necessary production, processing and marketing technologies in technology innovation to ensure a successful innovation.

Think break

1. What are the basic technologies in raw materials, processing, distribution, marketing in your company?
2. What are the key technologies in each area?
3. What new technologies do you see developing in each area in the future?
4. Does your company have the competencies for these new technologies?
5. If not how could the company acquire them?

2.2.3 Combining strategies – market and innovation

The important first step in market innovation is to identify the target market segment (Schaffner *et al.*, 1998). The company must group consumers, industrial customers, retailers or food service organisations into coherent groups which have similar behaviour, attitudes, needs and wants, so that the same marketing method can be used for all members of the group. Once the target market is identified, then the information on which to build the market innovation strategy can be collected. The innovation strategy can stay with the present target market, expand this into similar market segments, or look for new market segments in the national or international markets. In a true innovation, it can be creating a new market.

The marketing orientation in the business strategy is guided by the company's interpretation of consumer or customer needs and wants. This is implemented in the marketing strategy. The overall marketing strategy is based on developing the consumers/customers' concept of the company and also their concept of different product areas. As consumers' behaviour, needs and wants change, the company needs to adapt and develop an innovation strategy in parallel with these changes. The company needs to be flexible and change its relationship with the consumers as consumers change. The innovation strategy is based on the company/consumer relationship and also the product/consumer relationship:

Company ↔ Consumer ↔ Tangible product

In the case of the tangible product in the supermarket, the consumer is relating to the brand, the company and the product.

In the case of the food service, there is also the service relationship where seller, buyer and product interact:

Consumer ↔ Food service provider

Product

In the take-away or restaurant or institution, the consumer is reacting to the service provider and the service as well as the food. In industrial marketing, the customer is also reacting to the seller as well as the product and the services provided.

In developing an innovation strategy in marketing, the company can be changing the consumers' concept of the company, the brand, the products and the services.

The marketing strategy is strongly related to the product strategy. It is influenced by the stage of the product life cycle the product has reached. Is the market innovation to launch a new product in a new market, to launch an old product in a new market, an improved product in the present market, relaunch a product in the present market? Or even to drop a product – also an innovation but with the aim of death instead of life?

Another important aspect of developing the market innovation is the competition and the company's competitive position. Is the innovation reacting to the competitors' actions or is it proactive, acting before the competitors? The positioning of the products relative to the competitors is important in building the market. The market segment may be the same but the positioning of the product to the segment may be the innovation. For example, a tin of baked beans is an everyday commodity product but the new positioning could be to change to a nutritional market segment and position the beans as a high-protein food. This may be too major a change!

The marketing innovation can also come from changes in the marketing technology, e.g. changing the communications, the retailers or other organisations in the market channel, the pricing methods. These changes can cause innovation in the methods of marketing. In evaluating the marketing innovation, sales and profits predictions are often used, but it is also important to study the consumers' reactions to the innovation, difficulties in accessing the market and the company's capability in entering the market.

2.2.4 Unification – the combined innovation strategy

In developing the company's innovation strategy, aspects of innovation in the product, technology and marketing strategies are combined with the innovation possibilities. The company has to decide which is the 'lead' innovation and then choose the other strategies to complement it. One company may decide that the critical innovation is to change from providing food for people to providing health to people. This will need to be combined with a major raw material and processing technology change from general food technology to pharmaceutical

technology. The knowledge, safety and ethical standards in selecting raw materials and in controlling processes will need to be higher. The company may need to acquire or merge with a pharmaceutical company to gain the knowledge and the facilities. The marketing strategy will also change – communication through the medical profession instead of TV advertising around general viewing programmes; selling through specialist health boutiques in the supermarket and through pharmacies; a different brand.

Another company may aim to stay as an energy food supplier for children, teenagers and young adults, and to increase their market size have decided to enter the international market. This will lead to a standard processing line (or kitchen facilities if they are in the food service industry) easily adapted to different national infrastructures; strong raw material and ingredients specifications; understanding of cultural needs as a basis of the advertising and public relations; building of an international brand.

This interrelationship of the various strategies is mapped out in Fig. 2.1, so that an interlocking overall business strategy can be built up.

2.3 Building up the innovation strategy

There are now a number of innovations that have passed the initial screening against the company's aims and then had their relationships with the product, marketing and technology strategies assessed. These need to be brought together into the final innovation strategy as shown in Fig. 2.8. Whatever direction its innovation strategy may take, a company needs the knowledge and techniques to create, design and develop the innovation, as well as the resources and implementation skills to bring it to fulfilment. There are many innovation strategies, and they can be combined in various ways, but they need to be analysed on their predicted outcomes before they are accepted into the company. So there is a need in building an innovation strategy firstly to study the total system and the company's situation in it and then to predict the changes that may occur in the system, and to state the optimal situation for the company in the future. In developing innovation strategies, a food company will consider its

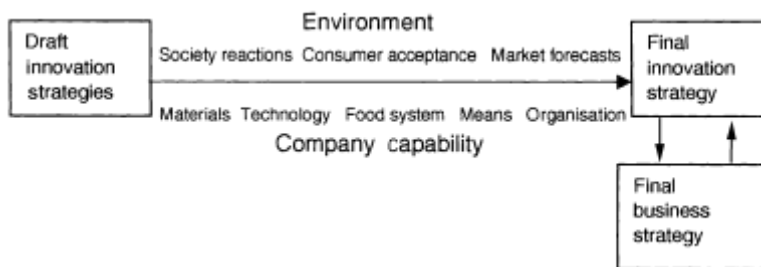


Fig. 2.8 Building the final innovation strategy.

raw materials, technology, markets, targeted consumers and their wants and needs, but need also to set out clearly:

- the company's place in the food system;
- the company's means of achieving the innovation aims;
- the company's organisation and resources for innovation.

2.3.1 The company's place in the food system

The two main food channels are the fresh product channel and the processed product channel. The fresh products channel has increased a great deal in importance in the last few years and it is predicted to grow further because of improved distribution technology and consumers' evident wish for fresh products. The processed products have been the mainstay of the food industry because of their enhanced storage life and the amount of variation that can be achieved in the products. The next decision is to decide on the stage of the food system: production, ingredient processing, manufacturing, distribution or retail. There is increased innovation in the production sector with many new types and varieties of fruits and vegetables; farming of an increasing variety of fish; organic farming; new types of animals. This is as well as genetic engineering, which up to now has concentrated on farming methods, such as resistance to herbicides and higher yields, rather than potential for product innovation. Innovations from the ingredient processors have increased markedly and this is an increasingly powerful part of the food industry. Food manufacturing has mainly concentrated on incremental changes, with some new innovations such as UHT processing and extrusion. The retail sector is a continuous area for innovation, both inside the supermarkets with own label products, organic products and boutique stalls, and outside with the increase in food stores associated with petrol stations and the rising growth of takeaways and restaurants. Some possible innovation strategies for the various stages in the food industry are shown in Box 2.2 (Earle 1997).

Vertical integration has been an important innovation strategy in the past, for example in the chicken industry, and in large multinationals which have combined ingredients processing with food manufacturing. Recently in some companies there has been a breaking of the integration with selling off the ingredients processing section by large food companies and of contracting farmers instead of owning farms in the production, processing and marketing integration. Retailers increasingly have a high degree of integration, although not always ownership, with production, processing and manufacturing, and are more strongly involved in innovation in the food system. Food manufacturers are increasingly directed in innovation by the food ingredients' processors and the retailers. It is interesting to speculate how the food manufacturers will develop innovation strategies in the future; it would appear that today's strong influence on their innovations of retailers and ingredients suppliers may make them redundant in innovation or spur them into new directions.

Box 2.2 Some possible innovation strategies for the various stages in the food system

Food service – Fast foods is an area which will develop further in the global scene, with international foods from fusion of meals and snacks from different countries.

In some countries, particularly the USA, the fast food companies could develop more fresh take-home meals or part meals.

Retailers – New developments will start in the USA to cope with the changing consumer needs. There could be innovation in types of stores, the present supermarkets' domination changing into different types of stores – fresh food markets, convenience stores, take-home meals outlets. Increasing use of the Internet in retailing.

Manufacturers – In seeking 'total food technology', the manufacturer could seek innovations in the retail sector, developing new retail outlets which they could own or be in joint ventures with other manufacturers or retailers. Two possible innovations are:

- marketing a specialised group of nutritionally designed products through nutrition boutiques;
- cooperation with fast food outlets to develop a new combined manufacturing and retail system to provide fresh meals or part meals for taking home.

Ingredients' processors – This is an innovative sector at the present time and one can only see them increasing their industrial marketing to have cooperative programmes with their customers, both food manufacturers and food service, and increasingly involving farmers and fishers.

Farmers and fishers – They could increasingly manage a 'fresh' chain from the farm and sea to the 'fresh' supermarket and to the food service outlet. There could be closer relationships with the food processors in developing new food ingredients by animal, plant and fish breeding. Ownership could ensure that new varieties and more sustainable production methods are linked directly to the needs of the consumer.

Source: After Earle, 1997.

2.3.2 The company's means of achieving the innovation aims

In the innovation strategy, the company needs to decide the means for achieving the innovation: grow own technology, acquisitions, mergers or licensing. These are all methods of bringing the innovation to fruition and the choice depends on

resources in the company, time available, costs, risks involved and the probability of success.

If the decision is to develop the innovation within the company, there has to be the decision on whether the change has to be incremental or discontinuous. This means that the management decides if the innovation is to grow from the present base or if this is to be a completely new direction – maybe a new plant or a new market or a new product platform. In the industry, is it strengthening its position, changing position or moving out? Is the company organisation staying the same, gradually changing or completely changing? There also needs to be a specification of risk – high, moderate or low risk.

This is really setting the company philosophy for innovation. A large company may say that it has different types of innovation in different parts of the company – some strategic business units may be high risk, discontinuous change, growing their own technology; other strategic business units can be low risk, incremental changes, acquisitions. But usually the company has one philosophy; there may be venture parts of the company that have a different philosophy. The degree of risk in an innovation strategy varies with the company; two different companies may decide to develop the same product for the same market – for one it is high risk and for the other it is low risk (Souder, 1987). Two companies developing frozen bread dough and two developing low-fat beef are compared in Table 2.5.

Table 2.5 Innovation strategies and their risks in different companies

Frozen bread doughs

The innovation is frozen bread dough as a consumer product in supermarkets

- A small baker marketing bread in its local area is looking at an innovation strategy for marketing frozen bread doughs to supermarkets nationally. This is a high-risk venture as both the technology and the market are new to the company.
- A large baking company which is marketing cakes, biscuits and frozen pastry to supermarkets is considering marketing bread doughs to supermarkets. This is a low-risk venture because it has the technology and the market already and it is a new product to expand the range.

Low-fat beef

The innovation is a production method for growing beef cattle to produce low-fat beef

- A group of farmers is setting up a new processing and marketing cooperative to market the beef in the local market as gourmet products for high-class restaurants. This is an innovation with a high capital cost for plant, but a low risk as the farmers are already selling beef in this market, and know it well. The risk is that the market may be too small to carry the capital cost.
 - A meat company, with processing facilities and marketing system selling beef to hamburger processors in an overseas market, is seeking to set up a marketing system in the overseas country through meat importers and restaurant distributors. This is a high-risk venture as the company does not know the marketing system for beef to restaurants, and also the consumers' requirements for low-fat beef which is grass-fed. There is no capital cost for equipment, but costs in setting up the marketing system.
-

Think break

1. How does your company regard risk in innovation?
2. What type of innovation strategy does your company use most often: company change, organisational change, technology change, marketing change, market change or consumer needs and wants change?
3. What are the company's methods for making each of these changes— internal development, licensing, acquisition, merging or outside contracts?

2.3.3 The company's organisation and resources for innovation

It is important that the company sets out the innovation strategy clearly for all to read because it is going to be the basis of the criteria for decisions in setting up the product development programme and also during the individual product development projects. The innovation strategy is the basis for all innovation in the company, and the basic strategy leads to the company direction for innovation. For example many large food companies want to keep their position in the industry consolidated with some growth, and this would likely be associated with incremental changes, low risk, gradual company organisation change, and internal technology with acquisitions when necessary to acquire new technology. The small company with a new technology and wishing to grow would combine discontinuous change, with high risk and major company change, and would grow its own technology. It is important to recognise the interrelationship of the innovation strategy with product development. All product innovations of course lead to new products, but most processing innovations and marketing innovations and even some of the organisational innovations lead to new products. So the innovation strategy has to be studied and incorporated when building the product strategy.

The innovation strategy as a basis for product development defines:

- the innovation areas and the types of innovation;
- the overall aims of the innovations;
- the growth in sales revenue/profits expected;
- the aims of the innovations in growing the present markets or diversifying into other markets;
- the resources and the timing available for the innovation strategy and the individual innovation programmes;
- the company organisation for innovation.

In the innovation strategy within the business strategy, there is a need for top management to outline the type of organisation, and the resources of people, finance, time and equipment, which will be provided for the development of the innovation. An innovation strategy without defining the means for carrying it out is apt to be slow in actioning, and some parts of it may never be put into

action. The Board of Directors needs to balance the company's ideal innovation strategy and the company's capabilities and resources before finalising the innovation strategy.

2.4 Getting the innovation strategy right

The company in its yearly development of business plans may be adjusting or rolling forward the present innovation strategy or/and developing a new innovation strategy. Developing a completely new innovation strategy could result in forming a new company or a new strategic business unit in the present company if there is a major change requiring new technology and marketing. The rolling forward of the present innovation strategy is an incremental process. A change of innovation strategy results in major company changes and is obviously expensive in resources of people, time and money. Hence the reason for a number of companies not considering new innovation strategies and becoming conservative and stagnant. Whether it is a rolling change or a new innovation strategy, there is a need every year:

- to determine if the focus of the innovation strategy needs to change;
- to study the balance of innovation areas in the strategy;
- to analyse the innovation areas both operationally and strategically;
- to determine the company's capabilities and organisation for the innovation areas.

The innovation strategy for the company is a portfolio of strategies that needs to continue achieving the overall aims of the company in the changing business strategy.

2.4.1 Analysis of mix of innovation projects

In the area of new product innovations, there is a need to analyse the mix of new products to see if the new product relates to the present product mix and to the company's innovation strategy position. Cooper (1998) identified four types of companies in innovation strategy development:

1. Prospectors – the industry innovators.
2. Analysers – the fast followers.
3. Defenders – the holders of secure positions.
4. Reactors – the responders to competitive pressures.

His analysis of their project types is shown in Table 2.6.

The emphasis here is on products but it is indicative for all innovations. There are companies seeking innovations that will change the company; others that wish to innovate in their present area and situation. Souder (1987) called these respectively promotive and restrictive organisations. In the promotive organisation, growth and innovation were the important goals; acquisition and product

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Table 2.6 Project types by business strategies

| Project type | Prospector | Analysers | Defender | Reactor |
|--|------------|-----------|----------|---------|
| New-to-the-world (%) | 30 | 6 | 7 | 0 |
| New-to-the-firm (%) | 15 | 16 | 17 | 8 |
| Additions to existing product line (%) | 22 | 42 | 40 | 48 |
| Improvements to existing products (%) | 11 | 16 | 11 | 13 |
| Repositionings (%) | 8 | 8 | 9 | 11 |
| Cost reductions (%) | 15 | 17 | 21 | 12 |
| Number of firms | 30 | 22 | 22 | 4 |

Source: From *Product Leadership: Creating and Launching Superior New Products* by Robert Cooper. Copyright © 1998 by Robert G. Cooper. Reprinted by permission of Perseus Book Publishers, a member of Perseus Books, LLC.

diversification were cited as means. Growth and innovation were ranked higher as goals than market share maximisation, profit maximisation and company stock (share price) maximisation. In restrictive companies, market share, stock price and profit maximisation were often ranked higher than growth. It is important to see that the mix of proposed innovation projects fits into the company's overall desire to be a prospector, analyser, defender or reactor.

Think break

1. Where would you place your company – prospectors, analysers, defenders or reactors?
2. Does analysis of your new products in the last five years agree with this?

2.4.2 The company's capabilities and organisation

The company organisation is also a necessary part of the analysis for the innovation strategy – is it a centralised, rigid top-down organisation or a fluid organisation with lower-level managers in major decision-making positions over resources and direction? The type of organisation has a major influence in deciding whether innovations are suitable for the company. The knowledge and the resources in the company are also determining factors. If the company does not have the knowledge or the ability to collect and analyse information to create the knowledge, then the innovation strategies are restricted. There needs to be a long-term commitment to technology and technological knowledge to build strongly innovative strategies. Also if there is not sufficient discretionary capital for new ventures, then there is difficulty in funding the more innovative

strategies. Souder (1987) summarised some of the qualities of an innovative organisation:

- Willingness to accept change, altered behaviour and disruption.
- Long-term commitment to technology.
- Patience in permitting ideas to gestate, and decisiveness in allocating resources to these ideas having the greatest commercial prospects.
- Willingness to confront uncertainties and accept balanced risks.
- Alertness in sensing environmental threats/opportunities, and promptness in responding to them.
- Openness of internal, cross-departmental communications; diversity of internal talents and cultures; existence of many external contacts and information sources.
- A climate that fosters the natural confrontation and resolution of interdepartmental rivalries and conflicts, and the development of reciprocal role-persons.

This checklist for studying the innovation characteristics of a company has not been bettered over the years, and should be regarded as fundamental to the evaluation of the company for innovation.

2.4.3 Strategic and operational analysis

This is a very important step in ensuring that innovation can be successful in the company. It is the time when the people to be involved in the projects are brought together with the people who have been developing the business strategy and the innovation strategy. It is both a creative and an analytical exercise. The creative abilities of the designers and developers will start giving 'flesh' to the innovation strategy. The outcomes of the various sub-innovation strategies and then the innovation strategy as a whole need to be predicted.

This needs to be an interactive, multifunctional, multidisciplinary activity in the company, so that the various departments and people who are going to be involved in the projects are knowledgeable about the strategies and have been involved in prioritising them. There may be a need for consultants to provide information and for facilitators to conduct the discussion but this has to be an internal, creative activity. The company group as a whole needs to feel that it has been involved in developing the innovation strategies so that they will take them on enthusiastically through the next stages. The Board members need also to be involved in some of the discussions so that they have an understanding of the knowledge and the abilities for innovation in the company. They also indicate where the company is focused for the future and the goals that they see the company has to achieve. Such an interactive building of innovation strategies can be simple in the small company – it probably does it continuously over cups of coffee or pints of beer. But even a small company must do it formally at least once a year. In the larger companies, it may be more difficult but with interactive computer systems the discussions can evolve without too many large meetings.

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For major strategy changes, this identification and ranking of the innovation possibilities can take some time. It is essentially a creative process followed by an analytical step, which is reiterated time and time again. Everyone needs to have the same interpretation of the proposed innovation strategy and the necessary outcomes. For ranking, various techniques may help from simple scoring on the ranking factors, to use of the Delphi method. Again there needs to be discussion on differences in the scores, and re-scoring until agreement is reached. Some factors to study in the combined discussions are shown in Fig. 2.9.

It is important to identify innovations that:

- will fail;
- cannot be accommodated in the company;
- will need an effort beyond the resources of the company;
- will take too long to complete or have an indeterminate end point;
- will cause a problem because there is not the necessary integration of design, production, marketing.

It is also important to identify innovations where the technology is uncertain, or where the transfer from basic or strategic research to development needs advanced and difficult technological research.

Predicting the outcomes of the innovation strategy, in particular the prediction of success, may be intuitive and subjective at this stage. But of course there are levels of success that will need to be predicted if decisions are to be made on the projects. Both the resources available and changes in the environment will affect the outcome of the innovation – changing a probable success into an actual failure. So the important success targets for the company are identified, and then the external and internal environments. The individuals in the group make predictions on the outcomes for each success measure. They may be subjective descriptions such as:

Complete dud Doubtful Should be OK Probable success Out-of-this-world
Or on scales:

Definitely a failure _____ Definitely a success

Alternatively the Q sort method can be used in which a set of cards, one for each individual strategy, is given to each group member. Group members sort them individually into five categories from definitely a success to definitely a failure, or just into two categories – Yes, a success/ No, a failure (Green *et al.*, 1988). It is important after each rating of the company measures to show the participants all the scores, and then to repeat the scoring. If the scores are widely different and consensus is not being reached, then further discussions need to be held. It is important not to do just a success or failure for the overall innovation, but to do it on the individual measures to see where differences are occurring.

The problems in these subjective measures are that some innovations, which could be successful, are dropped and that some failures are carried on. It is better at

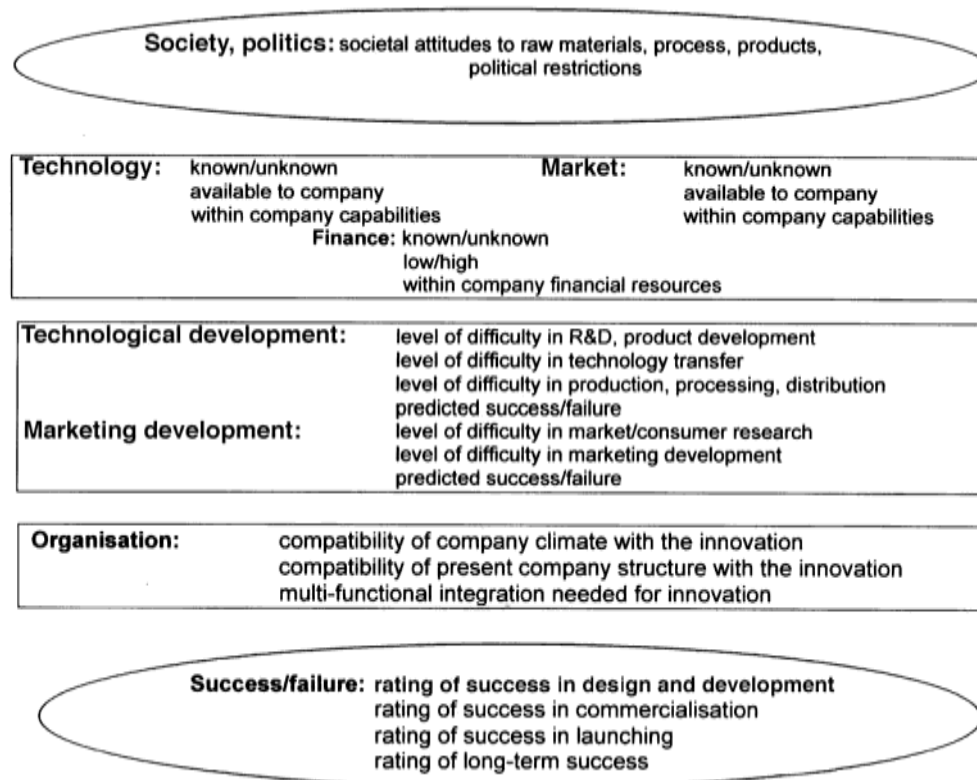


Fig. 2.9 Factors for discussions on innovation strategies.

this preliminary stage to give the project the benefit of the doubt and keep it in for the later stages. Another problem might be that all the projects are mediocre, but one feels that as they are ranked, the top five should be chosen. It is very important to be critical and to recycle rather than go on. It is much cheaper to recycle than to take below-standard strategies on to the next more expensive stages. Maybe you need other people in the group to give more creative and useful ideas!

Think break

Choose two recent products developed by your company, and score them for chances of success

- as if this prediction had been done at the outset of the development; and
- after the development was concluded with the benefit of hindsight.

Do this using three different methods of scoring. Score some of the factors in Fig. 2.9, as well as the overall prediction of success

2.4.4 Quantitative analysis of most suitable strategies

After ranking, the innovation strategies that could lead to success are identified. Now the predicted outcomes and inputs need to be more detailed. Usually this means more financial analysis and determination of the probabilities of achieving these outcomes. A range of predicted sales revenues and the related costs of development and launching the innovation, need to be determined so that possible outcomes such as break-even times, return on investment (ROI), present values, can be analysed. The sales revenues and profits can be predicted for 3–5 years or the life of the innovation. Some important outcomes and costs, and their relationships to probabilities of success and project timing are shown in Fig. 2.10. Increasing the money spent on the project can reduce the times and may increase the sales revenues and the probability of success, so it is important to make predictions on these inter-relationships.

The pipeline timing for the innovations needs to be predicted to ensure there is a flow of innovations throughout the future years and that innovations are not jumbled for both timing and resources. There is a need to predict the resources needed for the innovations: raw materials, plant, equipment and distribution system; but most important are the human resources. There is a need to predict the skills and knowledge needed for the innovation and to relate this to the skills and knowledge available in the company. If they are not available, how can they be met? It is surprising how little consideration has been taken of this in recent years – much knowledge and skills have been lost permanently and it is difficult to find new skills and knowledge. In the middle of the last century, there was a philosophy to keep the experienced people going a little longer as you bring in the new people, gradually absorbing the old knowledge and skills into the new minds as well as

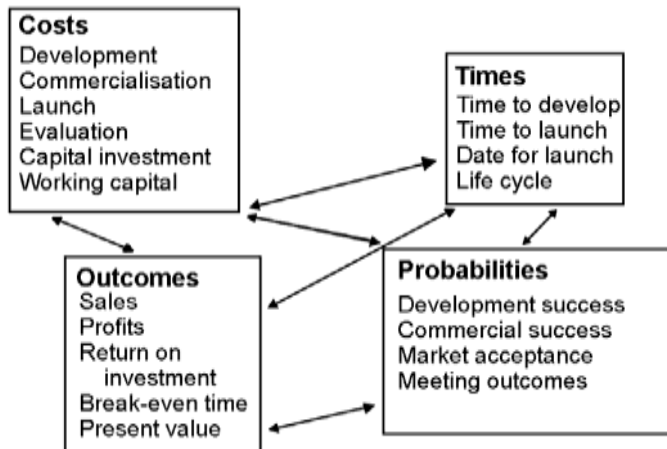


Fig. 2.10 Quantitative analysis of innovation strategies.

acquiring new skills from outside. For example, one salt manufacturing company, in changing from processing in open salt pans and marketing salt bricks and sticky crystalline salt, to triple-effect evaporators and free-flow salt, kept both going side-by-side so that the old operators and their customers were kept as the new customers and operators developed. There was only one problem – marketing sold the new salt to stall holders in the markets in West Africa; they still wanted the old sticky salt because peaks of salt could be formed in the tin cans used to measure salt for sale! This was an important selling point. So research had to start again – on making the running salt into sticky salt!

To sum up, it is important that the innovation portfolio:

- is balanced in levels of innovation, in timing of development,
- achieves the company’s objectives,
- is readily acceptable to the markets,
- blends with the societal and political needs and attitudes,

and that:

- resources are available, in particular knowledge and skills,
- company cooperation is organised,
- company personnel and organisation can make the innovations happen.

The innovation portfolio is the basis for the next few years, which can roll onward with yearly tweaking, and with major changes perhaps every 5–8 years. But the major changes need to be developing through the years and not be suddenly introduced. If there is a dramatic change caused by a major advance in technology or a major social upset such as a war or a major entry into the industry, then there does need to be a fast reaction in the innovation portfolio and a dramatic change in the company. Emergency reactions are part of developing innovation strategies and portfolio.

2.4.5 Decisions

Decision making is the key activity in innovation from the business strategy to the evaluation of the results of the practice of the innovation. At this stage it is major decision making of the top management who must:

- accept the innovation strategy into the business strategy;
- provide the resources;
- set up the organisational structure for the innovation; and
- determine the measures against which the innovation has to be judged throughout its development and in the final application.

Top management is given the knowledge to do this, but it must decide what knowledge is needed. Knowledge costs money and usually the depth and width of knowledge are set by the money that top management makes available. It is important that this triangular relationship between knowledge, finance and decision making is understood by both top management and the people providing the information. There can be excess costs, inadequate information and poor decision making!

There are 10, 20, 50, maybe even 100 innovation strategies in a large, multinational company. How can they be compared and the decisions made? The decisions can be made on the financial analysis alone but this is dangerous at this early stage. The top management needs also to be given scoring on the other measures, which have been given as important aims for the company. Management can be presented with separate analysis of the different innovations, but needs to be shown the outcomes and inputs of different mixtures of innovations in possible innovation portfolios. It is the total picture that is necessary and not just the individual innovations. Sometimes the directors on a Board make a decision on one innovation strategy at one meeting and another at the next meeting, and the decisions can be counter-productive. It is the yearly presentation of the long-term innovation portfolio that is necessary for good decision making.

Think break

For the two company products that you chose in the last Think break, imagine that you are preparing for a presentation to the company's Board of Directors, so that they can select the most suitable innovative strategy for further development. Outline each innovative strategy and then using some of the factors in Figs 2.9 and 2.10, analyse the viability of each innovative strategy and the suitability for the company. How would you present the innovation strategies and their analysis to the Board?

2.4.6 Total innovation management

This decision-making process leads to the **total innovation management** for the company – direction, areas, resources and timing (Voss, 1994). The innovation

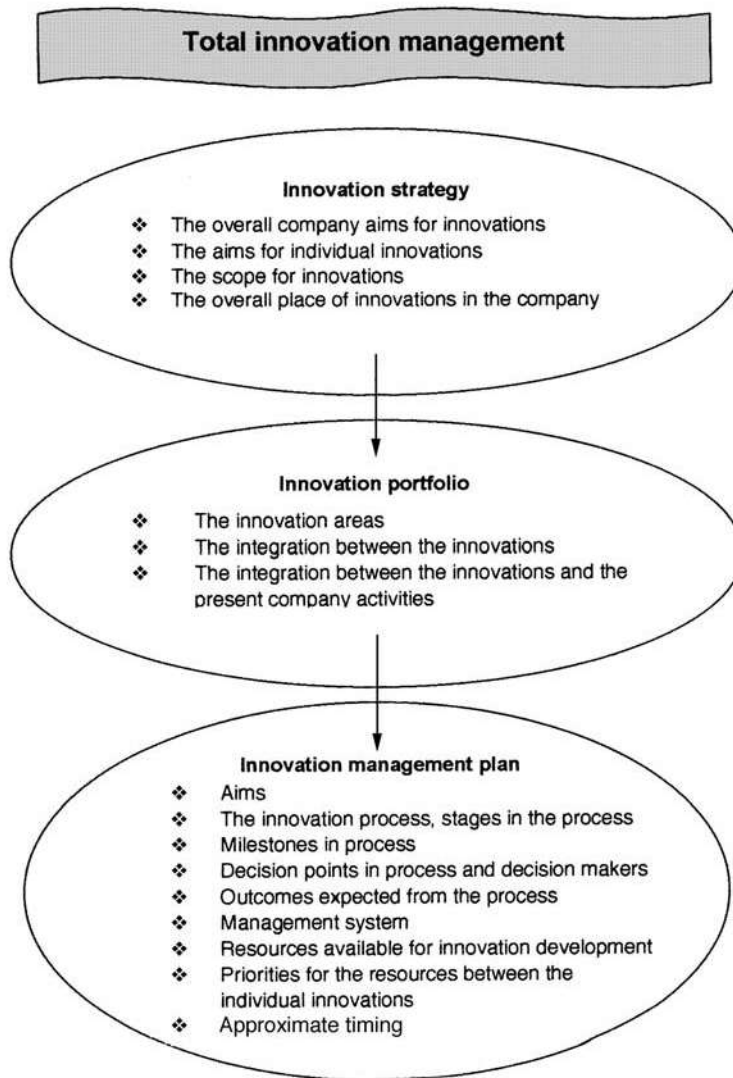


Fig. 2.11 Total innovation management.

strategy sets the direction for innovation, the portfolio specifies the areas and the management plan outlines the process for innovation and the measures for following the innovation as shown in Fig. 2.11. In organising the innovation portfolio, it is necessary to have a careful study of the resources and time available. There is a need to place a priority on the individual innovations and ensure that they are following the company's business aims over time. There is also a need to consider the present activities in the company and to ensure that the innovation portfolio fits in with the use of resources and time. In other

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words, the innovation portfolio is not a plan on a green field, it is being applied into a present system.

The innovation management plan shows how the company is bringing these innovations to fruition – it sets out the process that will be used, and the methods of controlling the process and the outcomes expected from the process. General milestones need to be clearly spelt out. Again there is a need to show how the innovation management is related to the day-to-day management of the present activities. It is important that company staff recognise how this is to be done at the beginning of the development and not be presented with it late in the development.

Management needs to unite the innovation strategy with the innovation portfolio and the business plan for the present activities to produce the total innovation management plan. Total innovation management includes all the key processes of product development – product design, process development, product commercialisation and product launching; as well as the other innovation areas such as technology change, technology acquisition, marketing change, marketing acquisition, organisational change and organisational acquisition. Each process interacts with each other and the interfaces between them need to be considered in developing the final innovation strategy and management. The aim of total innovation management is to increase the efficiency and the effectiveness of innovation in the company, leading to strong, focused, development of the company. The company stops jumping on bandwagons and buzz words, sometimes diversifying and sometimes returning to core business, sometimes innovative and sometimes conservative. It understands where it is going, how it is going to get there and when it is going to get there.

It is important at this point to analyse the innovations again to see if the decisions to include them need to be changed because of greater possibility of failure, lack of resources or poor timing.

Think break

1. Define innovation summary, innovation strategy, innovation portfolio, innovation management.
2. How could all of these be combined in your company into total innovation management?
3. Do you think this is a useful method for organising innovation in your company?

2.5 Focusing the product development programme

Now that the general areas for innovations have been identified and are securely embedded in the overall business strategy and plan, the product development part of innovation needs to be recognised and developed. The product development may be coming from a major market change or from a new processing

development or a new raw material or even a reorganisation of the company into different units or subsidiaries; as well as specific product innovations identified as needed by the company. It is important to recognise that the product development comes from different innovation areas. Also the product development needs to be associated with the present product mix and its predicted future development. This is the start of creative activity in the product area. Given the innovation strategy direction, what can we do in product development?

2.5.1 Relating to the core competencies

It is important that the product development strategy is related to the technology and marketing strategies in the overall innovation strategy. The product development is related to the present core competencies of the company and, even more importantly, the developing core competencies of the company (Katz, 1998). It is also important to identify where the core competencies are in the food system – with the retailers and food service, with the retail or food service manufacturing companies, the ingredient processors, the producers, or the surrounding market research companies, advertisers, university departments, research organisations or consultants. The basic direction in the innovation strategy for product development is to identify how a unique and superior product can be developed to satisfy consumers' known and unknown needs and wants. Some products and their underlying technologies identified by Katz (1998) are shown in Box 2.3.

These examples are mostly large American companies with some European multinationals and Japanese companies, and may not be indicative of the food industry in other countries. But Katz identified some of the key technologies that are the basis of product development in these companies. It is interesting to see for example how rheology in different facets is a common core technology. The core technologies can also be divided into science-based and engineering-based. In some cases the author identified the core competency clearly, in others they were confused – maybe this is typical of companies. Some can identify core competencies, others are less sure. In no place were the marketing and consumer competencies identified – just as important core competencies as is organisational capability in product and processing technologies.

2.5.2 Relating to the product mix

The product portfolio is the collection of products produced by the marine and agricultural farmers and harvesters; manufactured and marketed by the food ingredient processor and the retail foods manufacturer; and for the retailer and food service, the food products marketed. In large companies in the food industry, there are many products in a product mix so that they are usually grouped into product areas, which are further subdivided into product lines. A product line is a group of products that are related, either used for similar purposes or possessing similar characteristics (Schaffner *et al.*, 1998). The

Box 2.3 How major core competencies affect development of hot new products

| Products | Core competencies | Companies |
|------------------------------|---|---|
| Low-fat meat products | Particle size analysis, protein-fat interactions, actual fat reduction in tissues, flavour improvement carbohydrate chemistry | Swift-Eckrich, Kraft Foods, Doscocil Food Service Co., Nestlé, Lean & Free Products, National Starch and Chemical |
| Fruit and vegetable products | Physical structure, biochemical changes in ripening, flavour chemistry, breeding, biotechnology, enzymes, antioxidants | Kagome Kabushiki Kaisha, Tropicana Products, Ocean Spray Cranberries |
| Coffee products | Structure and biotechnology of coffee beans, co-spray drying, glass transition technology, particle size management, caffeine effects, compaction | Nestlé, Procter & Gamble, Kraft Foods |
| Tea | Antioxidants, phytochemistry, flavours, colour development, oxidation and antioxidants, enzymes, cloud emulsions | Lipton, Nestlé, Procter & Gamble, Mitsui Norin Co., Sky Food Co., Coca-Cola |
| Chocolate | Phytochemistry, cold extrusion, viscosity, low-calorie fats, rheology, flavours | Nestlé, Hershey Foods, FMC Corp., M&M Mars |
| Dairy products | Texture, flavour, nutrition, foaming, heat denaturation, particle size, protein stabilisation, ultrafiltration, mineral separation, microbiology | Kraft Foods, Schreiber Cheese, P&G, Nestlé, Calpis Food Industry, Danone, GalaGen |
| Grain products | Rheology, refrigeration, glass transition, retrogradation, nutrition, flavours, extrusion, refrigerated doughs | Nestlé, Kellogg, General Mills, Pillsbury |

Source: Based on material from Katz, 1998 by permission of Institute of Food Technologists, Chicago, Ill.

Table 2.7 Characteristics of the product mix

| Products | Marketing | Finance |
|--------------------|------------------------|------------------|
| Types of product | Types of market | Sales revenues |
| Product platforms | Market segments | Profits |
| Product lines | Consumers | Market potential |
| Product ages | Industrial customers | |
| Product images | Food service customers | |
| Product attributes | Competing products | |

product mix is live and evolving. It is currently profitable and as it changes, its profitability needs to continue to achieve the aims of the company. This does not mean that every product in the mix is profitable – there are other aims for products in a mix. They may complement other products, extend a line to give it variety, fill a place in the market, and so on.

The product mix is a mixture of products at different stages in the product life cycle: from new products to products that are at the end of their life cycle and dying. It is this variation of age that gives the mix its evolving character. The product mix also has variations in the sales revenue and the profits: some products are the major revenue earners and some the major profit earners. So the product mix has characteristics shown in Table 2.7. Sometimes products are also grouped according to the types of raw materials and methods of processing and distribution, for example, cereal products and meat products, frozen products and canned products.

2.5.3 Analysis of the product portfolio

In analysing the product mix so as to incorporate the innovation and product strategies for product development, one has to be aware of what changes can do to the product mix in the long term. Rash decisions based only on the innovation strategy may affect some of the products or even the whole mix, causing imbalance and an overall loss of market potential and profitability. Some important factors to consider are:

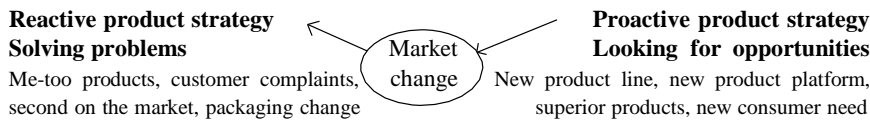
- possible changes of product portfolio with time;
- reactive and proactive strategies;
- market change and technology change from the innovation strategy;
- target revenues and profits from business strategy.

The possible changes can be firstly divided into incremental changes and discontinuous changes. What are the products that need some new packaging, an extension of the flavours in the product line, a relaunch as a newer product, a cost reduction, a new image? Do any of these changes relate to an innovation strategy? Is the innovation strategy to keep with present product platforms but add improvements and variety? If the innovation strategy is to move the product portfolio in a new direction – perhaps to a new market – what new product areas could be introduced? So it is a case of balancing the possible product mix

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changes with the innovation strategy and also with the long-term balance of the product mix.

It is also important to understand from the business strategy, if the company wants to have reactive or proactive strategies. A reactive product strategy deals with problems as they arise. A proactive strategy is planning ahead to take advantage of opportunities.



The company may have a mixture of these – most of the resources being for proactive strategies but some resources kept for reactive projects in case unidentified problems arise such as new competing products. Each strategy has its place. The question is not which is right or wrong but which is specific to the overall business strategy. Defensive strategies can be imitating competitors' products, always being second and better – allowing the competitor to be on the market first and then introducing a new product. Another common defence strategy is to respond to consumers' requests – some companies base their products on consumers' complaints.

The proactive strategies may be technology-based, with emphasis on producing technically superior products, or marketing-based, building products to satisfy consumer needs. The innovation strategy is integrated with the technology and the marketing strategies and will identify the possible changes that can be made. Product ideas are developed based on these changes. The product designers need to be involved at this stage, creating ideas for the innovation strategies and gradually developing a library of new products. These new product ideas need to be analysed to see that they satisfy the aims of the innovation strategy. But they must also be compatible with the present and predicted product mix and can fit into marketing and production constraints such as production capabilities and quantities, distribution methods and quantities, product and company images.

Think break

1. Identify some reactive product development strategies that your company used in the last five years. What changes caused these reactions?
2. Identify some proactive product development strategies that your company has used in the last five years? What instigated these product development strategies?

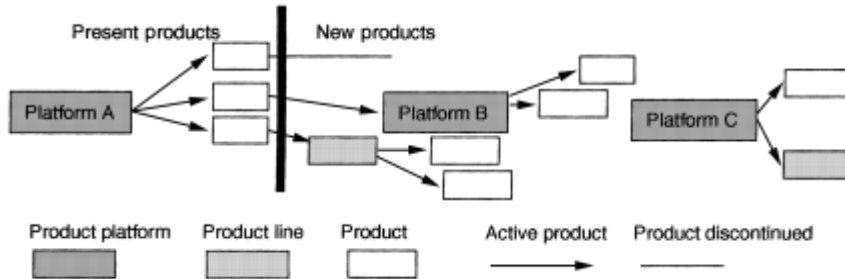


Fig. 2.12 Planning on a product map.

2.5.4 Planning a new product portfolio

After this product-idea generation related to the innovation strategy and a preliminary screening of the new product ideas, a map of the company's product mix for the next few years can be developed. The incremental product changes and the new products are fitted into the product mix over time. The aims of the product mix and the constraints on the product mix are defined, then the actual planning of the product introductions over time developed. This is the blueprint or the map for the future of the product mix and for the product development portfolio (Clark and Wheelwright, 1993) as shown in Fig. 2.12.

At this time the product idea is only a simple description, with identification of the use and some attributes, and may be a relation to competing products. The relationship of the product to the other products in the mix needs to be identified. There is also identification of the target market and the technology area. A range of costs and/or prices may also be identified. The timing of the introduction of the improved products and the new products is also identified.

In studying the proposed product mix, it is useful to divide products into groups according to growth potential, technological capabilities and market position as shown in Fig. 2.13. It is important to analyse the products in this way,

| | | |
|------------------------------|--|--|
| High growth potential | High growth potential Weak market position High technological capabilities or Low technological capabilities | High growth potential Strong market position High technological capabilities or Low technological capabilities |
| | Low technological capabilities or High technological capabilities Low growth potential Weak market position | Low technological capabilities or High technological capabilities Low growth potential Strong market position |
| Low growth potential | Weak market position | Strong market position |

Fig. 2.13 New product groupings.

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Table 2.8 Categories for new product areas

| Type | Description | Level of innovation |
|-----------------------------------|--|--------------------------|
| New product platform | A completely new technology and/or market | Very high, discontinuous |
| New direction on present platform | A new product line/product | High, continuous |
| New-to-the-world single product | A single innovation not related to a platform, new technology | Very high, discontinuous |
| Revamping a product platform | New focus, add new products, drop old products, another market | High, continuous |
| Product line relaunch | New packaging, new image, change in product variety | Moderate, continuous |
| Product relaunch | New packaging, new image, product change | Moderate, continuous |
| Product line extension | Add new products | Low, incremental |
| Product improvement | Improve attributes, use, image | Low, incremental |
| Product cost reduction | Reduce costs of production, marketing | Very low, analysis |

comparing the predicted markets with the technological capabilities. If the new product areas seem unsatisfactory or if they present major problems to the company capabilities then they need to be recycled back to the management group that developed the innovation strategy. The remaining product areas provide the basis from which the product development strategy is developed.

2.5.5 Categorising the new product portfolio

The product areas from the innovation and product strategies need to be built up into a new product development portfolio. The new product areas are categorised as shown in Table 2.8. There are many systems of categorising new product ideas, for example new-to-the-world, new product lines, additions to existing product lines, improvements and revisions, repositionings and cost reductions (Cooper, 1998). The categories in the table are useful for the food industry where the product mixes are large and there is continuous change to cope with supermarket wants.

Think break

1. List last year's product development projects in your company and divide them into the categories in Table 2.8.
2. Compare this with the previous year's product development projects categorised in the same way.

3. Are they different or is there a typical pattern?
4. Do you think this pattern might change in the future?

2.6 Developing the product development strategy

The first stage in designing the product development strategy is to produce more detailed descriptions of the products, and determine how their development can be organised within the specified resources and any other constraints that may have been identified in the final innovation strategy by top management. The individual projects are identified and their aims, outcomes and constraints. These are developed from the innovation strategy by the product development team and will need to get final agreement from management. The team will have to confirm that the projects are in agreement with the total innovation management programme. It is important that the team predicts the probabilities for success and failure as more knowledge is developed about the project.

2.6.1 Identifying the PD Process, outcomes and activities

To develop this knowledge, the product development team or product development management needs:

- to outline the development needed;
- to determine the outcomes of the different stages of the project;
- to identify the activities needed in each stage of the project;
- to study the present knowledge and resources;
- to identify the knowledge and resources needed;
- to identify problems in design, commercialisation and launching;
- to time the project overall and for different stages.

In outlining the development needed, the team will have the black boxes of the four stages in the product development process – product strategy development, product design and process development, product commercialisation and product launch. From the innovation management plan, it needs to recognise the outcomes needed overall and those needed at different points in the product development process. Then the team can identify the major activities needed in each black box. As will be discussed in the next chapter, it may already have a framework for the product development process for projects at the different levels of innovation, and therefore can relate the project into the particular framework. The team also needs to identify any problem areas in the product development process for each project – any risks of failure in the product or the project.

From this, the team can identify the knowledge and resources needed for each project and relate this to the present knowledge and resources available. Where there are shortfalls, it will need to identify possible sources. In the case of

knowledge, if it is not in the company and there is not information outside, the team will need to identify how this knowledge can be created and when it is needed. The team can also start to time the overall project and the stages in the project.

2.6.2 Prediction of success of products

It is very important at this stage to identify what could be major failures. From the top management's identification of the necessary outcomes from the innovation strategy, the requirements of the product mix development and from previous measures used by the company in measuring success in past projects, the team needs to develop a group of measures for those product areas (see Chapter 1 for possible measures of success/failure). They can be quantitative, such as meeting certain sales revenues or profits, product costs, project costs, time for development or time to build sales. They can be qualitative, such as developing a unique or superior product; achieving the quality of execution of the technological activities in development, production and marketing; attractiveness to the market.

For high-level innovation it is important at this time to study the synergy between:

- product and the market;
- technical needs of the project and the company's development, engineering and production resources and skills;
- marketing needs of the project and the company's marketing skills and resources.

The prediction of success at this stage has a wide range of probabilities and is mainly subjective. But it is important that doubtful projects are sent back to the previous decision makers and not carried forward into the later stages. It is important that they are not completely dropped as decisions may be made with insufficient information and sometimes even wrong information.

2.6.3 Types of new product development strategies

Cooper (1998) described the new product development strategy as 'a strategic master plan that guides your business's new product war efforts'. This may be a rather dramatic definition for commercial product development, but it does emphasise four very important points: it is strategic, focusing on particular outcomes; it is an overall master strategy binding product development projects together; it is a guide for the complete product development programme; it is part of the company's business. It is a binding of the product areas into the whole organisation – functional areas, knowledge and skills areas, people. This is why it is important to develop a truly effective product development strategy.

The product development strategy sets out in a master plan, the aim or aims, the projects, the resources and the constraints, so that all involved in new

product development are aware of the overall company policy for product development at this time. If the management wants integration of functional areas, more creativity in the company or more efficiency in product development, then the product development strategy can incorporate all of these into the overall aims.

Companies do have different overall product development strategies as shown in Table 2.9. In the food industry, all these strategies can be seen – and companies will say that they are successful for them. Historically there has been a preponderance of the low-budget conservative, which suits a market dominant position. As Cooper (1998) indicated from his studies, this strategy does achieve moderate results; the projects usually have a low failure rate, and the products are profitable – but wonders if the standards of success are high enough. It tends to yield a low percentage of new products in the product mix. It is a ‘steady as you go’ strategy, which shows no dramatic change.

It is important to consider together the drive from the consumer and the market and the drive from technology change in developing the product strategy (R.L. Earle and Earle, 1999). Balachandra and Friar (1997) suggested that a useful analysis is first to identify the context of the new product – is the

Table 2.9 Some product development strategies

| Strategy | Description | Products |
|-------------------------|---|---|
| Differentiated strategy | Technologically sophisticated Strong market orientation High degree of product fit | Premium priced Unique features and benefits Competitive advantage |
| Low-budget conservative | Low R&D spending Highly synergistic with present production and marketing | Me-too Undifferentiated Lower price |
| Technology push | Technology oriented Lacks strong market orientation Lacks market synergy Can be costly | Innovative Technology oriented May not fit consumer needs |
| Not-in-the-game | Simple, mature technologies Ill-defined market needs | Low technology Me-too Low risk |
| High-budget diverse | Heavy spending on R&D No direction, focus No synergy New markets New technologies | Innovative products High-risk products May not fit consumer needs |

Source: After Cooper, 1998.

Table 2.10 Relative importance of PD factors in different contexts

| Innovation | Contextual variables | | | Level of importance | |
|----------------|----------------------|----------|----------------|---------------------|----------------------|
| | Technology | Market | Market factors | Technology factors | Organisation factors |
| 1. Incremental | Low | Existing | Very | Low | Very |
| 2. Incremental | Low | New | Very | Low | Very |
| 3. Incremental | High | Existing | Very | Very | Moderate |
| 4. Incremental | High | New | Moderate | Very | Moderate |
| 5. Radical | Low | Existing | Moderate | Moderate | Moderate |
| 6. Radical | Low | New | Low | Moderate | Moderate |
| 7. Radical | High | Existing | Moderate | Very | Moderate |
| 8. Radical | High | New | Low | Very | Very |

Source: After Balachandra and Friar, 1997.

innovation incremental or radical, the market existing or new, the technology level low or high? Using this one can identify the important factors in product development for different mixes of these factors as shown in Table 2.10. These are suggestions by Balachandra and Friar, but it is a useful way to study the product development factors. Ali (1994) also emphasised that in developing a product, it is useful to know for what types of products the company should undertake particular activities. The analysis of environmental and situational factors (firm, project and market characteristics) is a necessary condition for effective planning of new product development.

2.6.4 The overall product development strategy

The product development strategy lies between the new product portfolio and the product development programme as shown in Fig. 2.14. They are interconnected and there is recycling between the three as the final product development management plan develops in the programme. The product development projects are being identified from the product portfolio, and the PD Processes and their management gradually built up. This is a creative as well as a controlled process as the ideas for the products and the projects are being developed.

The aims of the new product development strategy can be specific:

- the structure of the product mix;
- increase the percentage of sales from new products to 30% in five years;
- returns on investment from new products;
- specific products to be launched in each year;
- returns from specific products or sales in a new market.

But they can also be subjective, for example developing the image of a health-providing company, or products of superior quality. They can also be organisational, for example using up the slack production, developing a new distribution system, developing a new subsidiary. As stated previously, there

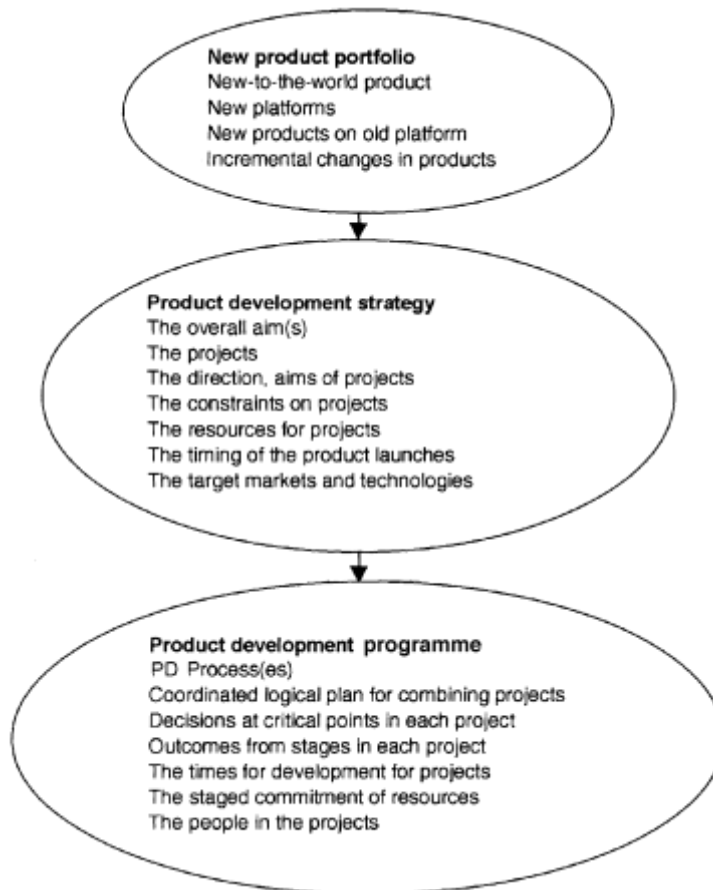


Fig. 2.14 Developing the product development programme.

may be aims for the organisation of the product development, for example being more systematic, separation of incremental and innovative product development, decreased time to market.

The individual projects and their aims, objectives and constraints are also starting to be developed although the detail may come later in developing the product development programme. The aim of the project, the ultimate outcome desired by the top management, is specified. This aim must be definite and not vague, straightforward and not complex. It must mean the same to all people, the management that are confirming it at this time, and the people who are developing the product commercialisation 6–12 months from now. This aim is the guide to the product development planning and also to the decision making during the project. It needs to be agreed in the product development strategy, although it may develop in detail as the product development programme is developed. It needs to state the type of product, the target market, the technology

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(or method of processing and distribution), the type of plant available, the marketing methods and the size of the market needed. There may be choices in this aim because there is a need still to study several methods of processing and marketing, and even several different markets.

There are also limits or guidelines developing for the total product development programme and the individual projects. They are specified levels of resources, and these need to be allocated to the different projects. The amount of spending on each project is always specified, but there is also a need to recognise the knowledge priorities, in other words people with different types of knowledge. Where are people with specific technological or marketing knowledge needed, where is there a need for creative design, strong financial analysis and consumer research? Where is there a need for different types of managers – senior/junior, leaders/controllers, knowledge leaders/system leaders? The resources of people, finance and equipment are limited and priorities and timing have to be determined. Some projects may have immediate priorities, because they have to be launched quickly or they are major projects that will take some time but need to be started immediately. There is also a need to identify how the new product development is to be achieved – internal R&D, internal product development, licensing, joint venturing or acquisitions (Cooper, 1998).

The timing of the product launches is set, since this is usually critical because of seasonal and other market conditions. The timings of particular stages such as product commercialisation which involve a great deal of resource from the functional departments and also need to be fitted into the present production and marketing, are outlined at this stage as they are the basis for developing the product development programme.

In developing the product development strategies, it is important to specify the type of market – consumer/retail, industrial and food service. In the latter two, the service is as important if not more important than the product and really what is being developed is a product and service strategy. This means that the human factor becomes more significant and the human resource strategy has to be integrated with the product strategy, creating a new product/service that has to include communication and understanding. The service can be an improvement or a new service, just like the products, but consideration in developing the new service has to be given to the consumer and to internal staff participation (Atuahene-Gima, 1996).

Think break

1. Identify a project in your company that includes significant service development as well as product development.
2. What product development strategy can you identify for this project?
3. What are the aims for this project?
4. What are the outcomes identified for the whole project and for each of the four stages?

2.7 Planning the product development programme

The product development programme has to bring the strategy into a new product plan for the next few years. It is the directional and the controlling document for the product development projects (Lord, 1999). From the product development strategy, it can develop a rolling programme, which will be quite specific for timing and results for the next two years, but will be more general for future years. The projects have to be integrated in this programme so that the resources, particularly people and equipment, are being used efficiently. In recent years, there has been more emphasis on the integration of projects as this is where efficiency and improved quality of product development can be achieved. There are problems with the more innovative projects because it is not known how long it will take to create the new knowledge and bring it into the product design and the product commercialisation. But certainly for the incremental changes, this integration of projects can be achieved successfully.

The integration plan needs to take consideration of time, resources and knowledge. In developing the product development programme, it is important to recognise what knowledge is required at the different stages of the project and where this knowledge can be obtained or how it can be created. A great deal of product development knowledge is tacit knowledge in the individual heads and in interactive tacit knowledge in the company. This is a very important consideration in planning the product development programme, especially in large companies. An outsider may be asked to come in because a team is lacking knowledge; the outsider immediately asks why they are not consulting someone in the company who is an expert in this area. In building the programme, there has to be consideration of personnel and in particular their knowledge and skills. How knowledgeable are they in the multidisciplinary skills needed in product development? Seldom if ever, when interviewing people for product development do the company personnel ask how creative they are. They look at their academic record and their experience, but do not ask for proof of their creativity. In other industries, product designers customarily carry their portfolio of new products to interviews to show how creative they are; perhaps food product designers should be asked to do the same.

So the product development programme defines the projects, their integration, their timing, the resources they can use, the people involved in the project. Two other important parts to be included are firstly how decisions are to be made by top management at critical points in the project and how the costs are to be controlled. Critical points are always the points between the main stages of the PD Process. But in large projects there may be intervening critical points. For example a critical point is at the end of product development and process design. Because of the expense of scale-up, there may also be a critical point after the laboratory or small-scale trials to find the optimum product and process. At each critical point, decisions have to be made by senior management on whether the project is to continue as planned, slowed down or dropped. The outcomes of the previous development must provide the information for the managers to make

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these decisions. For example, at the end of the product concept development, the outcomes include product design specifications, some product mock-ups and a product report. The product report includes the technical feasibility, marketing suitability, consumer acceptance, future predicted project costs, prediction of sales revenue and profits, risks, probability of product success and probability of project success. The details of the product report vary with the company and the project. For the incremental change, management may want only to have the product design specifications, consumer acceptance, product costs, predicted price. It is very important that what is needed as outcomes at the critical points are clearly identified in the product development programme and agreed by the top management who are to make the decisions.

It is necessary to define any constraints on the project, from either company or environmental needs, particularly societal and political constraints. The company or the society may restrict the raw materials used, the political regulations may define some of the properties of the products or the processing method. There may also be cost constraints caused by the price range in the market, and the company's pricing structure. Constraints need to be identified as they outline the ball-park for the product, and the product development.

Finally the product development programme needs to define the measures of success for the individual projects and the programme. The standards for the final evaluation of the success of the products in the market also need to be set, so that the sales revenue, profits and time for sales to grow are all set long before the product is launched. The standard for the project organisation also needs to be set – what is the range of timing, what is the quality of the work expected in the project, what multifunctional integration is expected, what cost over-run can be tolerated?

As described here, developing the product development programme is a complex and difficult task. What has been said is more directly appropriate to large enterprises with multiple projects and large resources, but the principles are just the same, and just as significant, in much smaller companies. The same considerations apply. It is important to cover them comprehensively and carefully so that the possible failures and problems are identified before the major effort and money is spent, rather than in the middle of projects where cost can grow astronomically.

Think break

1. The product development programme includes a number of projects that have to run in parallel, and some that run in series. What problems do you see in planning the product programme to cope with all the projects?
2. How can you set up a system to control the programme, so that it runs efficiently with project stages and the overall projects completed at the right time?
3. How can the knowledge resources, that is the people with the correct knowledge and skills, be encouraged to work creatively so the quality of the project is optimum?

2.8 References

- ALI, A. (1994) Pioneering versus incremental innovation: review and research propositions. *Journal of Product Innovation Management*, 11, 46–61.
- ATUAHENE-GIMA, K. (1996) Differential potency of factors affecting innovation performance in manufacturing and service firms in Australia. *Journal of Product Innovation Management*, 13, 35–52.
- BALACHANDRA, R. & FRIAR, J.H. (1997) Factors for success in R & D projects and new product innovation: a contextual framework. *IEEE Transactions on Engineering Management*, 44, 276–287.
- CAMPBELL, H. (1999) *Knowledge Creation in New Zealand Manufacturing*. Masterate Thesis, Massey University, Palmerston North, New Zealand.
- CLARK, K.B. & WHEELWRIGHT, S.C. (1993) *Managing New Product and Process Development* (New York: Free Press).
- COOPER, R.G. (1998) *Product Leadership – Creating and Launching Superior New Products* (Reading: Perseus).
- EARLE, M.D. (1997) Innovation in the food industry. *Trends in Food Science and Technology*, 8, 166–175.
- EARLE, M.D. & EARLE, R.L. (1997) Food industry research and development, in *Perspectives on Food Industry/Government Linkages*, Wallace, L.T. and Schroder, W.R. (Eds) (Norwell: Kluwer Academic).
- EARLE, M.D. & EARLE, R.L. (1999) *Creating New Foods – The Product Developer's Guide* (London: Chadwick House Group).
- EARLE, M.D. & EARLE, R.L. (2000) *Building the Future on New Products* (Leatherhead: Leatherhead Food RA Publishing).
- EARLE, R.L. & EARLE, M.D. (1999) Innovation in the food industry. *Food Technology in New Zealand*, 34(6) 11–12, 22.
- FRATER, P., STUART, G., ROSE, D. & ANDREWS, G. (1995) *The New Zealand Innovation Environment* (Wellington: Business and Economic Research Ltd).
- GREEN, P.E., TULL, D.S. & ALBAUM, G. (1988) *Research for Marketing Decisions*, 5th Edn (Englewood Cliffs, NJ: Prentice-Hall).
- HEDGES, A. (1969) Innovation in food marketing & research. *Food Processing and Marketing*, Feb., 64–66.
- KATZ, F. (1998) Major core competencies affect development of hot new products. *Food Technology*, 52(12), 46–52.
- KUCZMARSKI, T.D. (1996) *Innovation–Leadership Strategies for the Competitive Edge* (Chicago: NTC).
- LORD, J.B. (1999) Product policy and goals, in *Developing New Food Products for a Changing Market Place*, Brody, A.L. and Lord, J.B. (Eds) (Lancaster, PA: Technomic).
- PINE, B.J. & GILMORE, J.H. (1998) Welcome to the experience economy. *Harvard Business Review*, July–Aug., 97–105.
- RIZVI, S.H., SINGH, R.K., HOTCHKISS, J.H., HELDMAN, D.R. & LEUNG, H.K. (1993) Research needs in food engineering, processing and packaging. *Food*

94 Food product development

Technology, 47(3), 26S–35S.

ROGERS, E.M. (1962) *The Diffusion of Innovation* (London: Free Press of Glencoe – Collier-Macmillan).

SCHAFFNER, D.J., SCHRODER, W.R. & EARLE, M.D. (1998) *Food Marketing – An International Perspective* (Boston: McGraw-Hill).

SOUDER, W.E. (1987) *Managing New Product Innovations* (Lexington: Lexington Books).

THRODHAL, M.C. (1982) National and multinational opportunities for the encouragement of innovation. *Food Technology*, 36(1), 101–102.

VOSS, C.A. (1994) Significant issues for the future of product innovation. *Journal of Product Innovation Management*, 11, 460–463.