1 KEY ASPECTS OF INNOVATION MANAGEMENT

Innovation – n., introducing something new

Oxford English Dictionary

INTRODUCTION

Innovation: yes, but how? Every year, the latest surveys by government organizations and leading consultancies show the importance of innovation for companies in both the service and manufacturing sectors. The surveys also show that successful innovation management requires 'orchestration from the top'.[1] But in practice, recognizing the need for effective innovation management and achieving it are two vastly different things. Ten years ago Peter Drucker said that how to manage innovation was a largely unanswered question.[2] But in the past decade the tools and techniques for managing innovation have advanced significantly – enough for *The Economist* to recently state that innovation management is no longer an art but is 'becoming a practical science'.[3] So, to get ahead, managers need to quickly develop the range of skills they need to be able to manage innovation effectively.

This book was written to meet the needs of both managers and MBA students. It presents an integrated view of the skills, tools and techniques needed to successfully develop and implement an innovation strategy. The choice of tools and techniques which are presented was based not only on an extensive review of the literature but also on the authors' own experience in industry, teaching, research and consultancy. The book is relevant to organizations in the service, manufacturing and not-for-profit sectors and it gives many company examples.

Managing innovation is complex and so there are no 'quick fixes', 'no universal solutions'.[4] The challenges of managing innovation are also compounded by the fact that many ideas that are effective in one organization cannot be easily transferred; it is not simply a case of *adopting* best practice, managers need to *adapt* ideas to the specific situation their company faces. This book describes the results of management research and it does not try to oversimplify the issues. Where the results of research are ambiguous, or solutions to innovation problems are difficult to manage, these are clearly identified. Similarly, we assume that innovation is a capability to be developed, not necessarily an end in itself – companies consciously need to decide when and where to apply this capability.

Too many companies focus on just one area of innovation management – typically ideas generation – although there are other aspects of innovation management that are equally important. Leading organizations take a broader view and consider a range of issues including idea generation, implementation and business culture (see Mini Case 1.1). In this sense, innovation management is like competing in the Olympic pentathlon; excellent performance in one discipline alone will not guarantee a gold medal. Based on our research, we have characterized the main issues of innovation management by five different elements, which we will refer to as the *Pentathlon Framework*. This framework is presented in this chapter and also forms the structure of the book. The Pentathlon Framework has been used extensively in our teaching and our work with many leading organizations.

This chapter introduces the role and characteristics of innovation, and the emerging science of innovation management. It covers the following:

- The drivers of innovation.
- Characteristics of innovation.
- The Innovation Pentathlon Framework.
- The structure of this book.
- A detailed case study on NTT-DoCoMo, a Japanese company in the service sector, which shows how a broad approach to innovation can lead to successful market segmentation.

INNOVATION DRIVERS

Few markets are stable and four main factors (as shown in Figure 1.1) create the need for innovation: technological advances, changing customers, intensified competition and changing business environment.

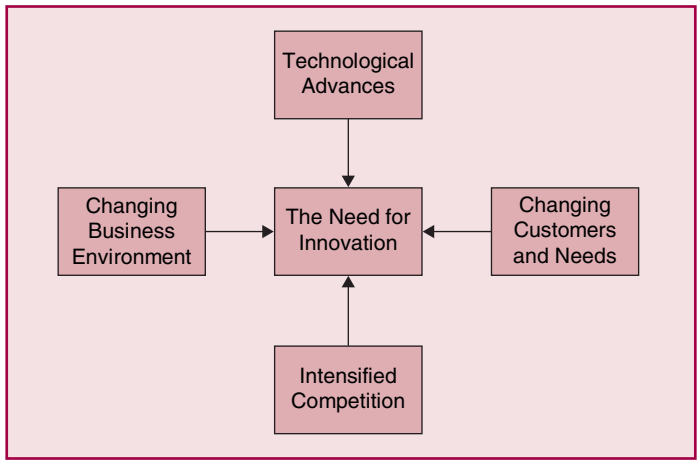

Figure 1.1 Drivers of the Need for Innovation (modified from Sheth and Ram)

Source: Sheth, J. N. and Ram, R., *Bringing Innovation to Market: How to Break Corporate and Customer Barriers* (New York: Wiley, 1987).

Technological Advances

There are numerous examples of new technologies having a major influence on business. For instance, logistics is being revolutionized by RFID technology – radio frequency identification labels – which automatically transmits information about the nature and location of articles. Nano technology is increasingly being used in products, such as 'easy to clean' surfaces. New technologies often create new industries and both biotechnology and multimedia have created significant employment over the past decades.[5] In addition, new applications of established technologies are constantly emerging. For instance, sophisticated electronics are now an important aspect of car design. With the vast array of technological developments, even multinational companies that used to conduct all their own basic research cannot keep abreast of all of the developments, using internal resources alone. This is one of the drivers towards *Open Innovation*, the sourcing of ideas and technology across organizational boundaries. (We will cover Open Innovation in Chapters 4 and 10.) Organizations need to monitor the progress of both the technologies they currently use and also that of potential substitutes.

Technology is equally important for service companies and R&D is increasingly having a major impact on how service companies do business. For example, banks are developing technologies that will allow them to have customized services for specific customer segments. FedEx, the leading courier services company, has always recognized the importance of investing in technology and led much of the development of hand-held bar code readers, which enabled them to provide the first parcel tracking capability. Bank of America and other leading service organizations have created innovation departments to monitor new technology and test it with actual customers (see Mini Case 1.1 on Metro AG).

Mini Case 1.1

Metro AG's 'Future Store' – Prototyping a Supermarket

Technology can help companies in the service sector make it easier for their customers to receive a service and reduce costs. Take the retail trade, where RFID 'smart-tag' technology is poised to make a big impact. Chip manufacturer Intel and supply chain software giant SAP have joined forces with the world's fifth largest retailer, the German company Metro AG, to create a fully running prototype of the supermarket of the future, in the small town of Rheinberg, Germany.[6]

Products in the supermarket are all labelled with RFID in order to automate stock keeping and make shopping easier for customers. Each shopping trolley has a touchscreen computer with a scanner, and as the customer selects each item, it is scanned in. The computer displays a range of useful information. This includes detailed product information on the item scanned, the total amount spent, special offers, the customer's 'standard' shopping list and a map with the customer's position in the store. The biggest advantage is that the items in the trolley do not need to be unloaded at the

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cashier's desk and this saves time for the customer. The trolley's computer automatically indicates the total amount to be paid and, having paid the cashier, the customer can simply push their trolley to their car. Queuing is virtually eliminated.

Metro has called the project the 'Future Store Initiative' and through the extensive use of technology is looking for major increases in supply chain efficiency. The main limitation is that smart tags are still relatively expensive and so are not viable for every individual item in every supermarket. The cost of tags is falling quickly, though, as they become more widely used.

Manufacturing companies often use prototypes to gain detailed customer feedback on new products. Extending the idea to the testing of a new service concept is a bold approach that few service companies have yet contemplated. Metro's prototype is helping the company to identify 'real advantages for both the retail industry and consumers'.[7] And the rollout of the concept across other locations in Germany is expected soon.

Changing Customers and Needs

The second driver of innovation is the changing characteristics and requirements of customers. Demographics show that many markets will evolve. For instance, the ageing population in the West will change many consumer markets. In contrast, other markets (for example, Southeast Asia) are largely made up of young consumers with different aspirations. The earnings in many newly industrialized countries will soar and demand for particular products and services will develop. The Whirlpool Corporation has recently launched the 'Ideale', the world's cheapest automatic washing machine, which retails at around $150 in countries such as Brazil and China.[8] Similarly, Tata's Nano car will have a big impact.

Changing customers also means that traditional market segments are disappearing or fragmenting and companies will need to adjust their product ranges accordingly – for example, car manufacturers now target over fifteen key segments in the US, as opposed to only five in the late 1960s. Contrast this to the type of market faced by Henry Ford! At the same time, there is the pressure for more environmentally acceptable, better value for money products and services. As basic needs are met, there is an additional challenge to innovation – determining customers' *hidden needs* (see Chapter 5).

Intensified Competition

The third driver shown in Figure 1.1 is growing competition. Logistics costs have plummeted and, consequently, 'safe, home markets' are being threatened by foreign competition. Companies may also face competition from sources normally outside their industries. An example of this is the bicycle industry in Japan where Nippon Bicycle has taken a significant share of the market by offering made-to-order, highly customized mountain bikes with a fast delivery

time. Interestingly, Nippon is owned by the consumer electronics company Panasonic, which has made use of its expertise in logistics to become successful in a new market.

Changing Business Environment

Business environments change and are always subject to change – sometimes gradual and sometimes radical.

Gradually markets have become more open as the market economy has been embraced by most governments and through the efforts of trade groupings such as the European Union and North American Free Trade Association. In addition, the regulations affecting specific markets are being relaxed in many Western countries (for example, the de-regulation of transport, post and telecommunications). An example of changing regulations that could drastically change one market is the US Food and Drug Administration's (FDA) planned faster approval of generic drugs.

Many companies have focused on cost cutting. A gradual reduction in the resources required for key business processes has been achieved. A continued focus on efficiency gains will bring only diminishing returns and cost-reduction myopia needs to be replaced by a focus on increasing revenues and profits through new products and services.

Economic cycles have a radical impact and the financial crisis of 2008 will influence innovation for some time to come. Downturns (which are discussed in Chapter 2) drive many companies to cut their investments in innovation but the winners which emerge have continued to invest.[9] In financial services, the crisis will certainly lead to a more stringent risk analysis and higher-risk financial products will probably be regulated.

Responding to the Environment – Strategic Intent

Although the four external forces provide the drivers for innovation, how an organization chooses to respond to them depends on *Strategic Intent*: the aims of the key stakeholders, including senior management. As we observe in Chapter 4, developing an innovation strategy involves comparing how an organization is expected to perform in the future with stakeholders' expectations: any difference points to where innovation is required.

Innovation management is multifaceted; it includes ways to motivate employees, select clear performance measures and create a positive business culture. It also includes an emphasis on R&D in manufacturing firms (or the creation of innovation groups in service organizations), new products, technology and process innovation, see Mini Case 1.2. Overall, this shows the wide range of approaches to stimulating and managing innovation that need to be considered. The main theme of this chapter is to introduce *how* innovation can be managed. But, before we can discuss *managing innovation*, we need to establish the characteristics of *innovation* and the terminology that we will be using in this book.

Mini Case 1.2

Manufacturing and Service – Innovation Initiatives

Many companies are taking initiatives to improve their innovation performance and the 3M Company's highly publicized initiatives have become icons of innovation management. With a portfolio of over 60,000 products, where do you start if you want to increase innovative levels rapidly? 3M has launched a host of initiatives to drive innovation. The cornerstone has been a focus on a clear measure of innovation performance – the percentage of revenues generated by new products. For example, in 1995 the company aimed (and succeeded) in generating 30 per cent of revenues from products less than four years old. In 1997 tougher goals were set including 10 per cent of revenues from products less than one year old. The use of tough, financially based measures is only one aspect of 3M's initiatives. Their approach to stimulating creativity is legendary – employees are allowed 10 per cent of their time to work on ideas and projects that they have themselves devised.

Johnson & Johnson, the health-care products company, has innovation as one of its core values. To support a coherent view of innovation throughout the company, the company has identified three ways in which innovation supports the business: it forges a vision of the future; fuels business growth; and promotes continuous learning. Regular articles in the company's magazine give examples of successful innovation within the company, with process innovation being given as much attention as new products.

Service organizations are increasingly focusing on innovation and using new approaches to improve customer service. For example, American Express and Mastercard are looking at how new 'contactless' technology can avoid credit cards having to be swiped through a reader and thus speed up the process of payment. Others such as HSBC and Bank of America have a broad interest in innovation. For example, HSBC management have strongly communicated to staff the importance of innovation, and used workshops to generate ideas for new or improved customer services. Bank of America generates many ideas for new services and tests these with real customers in a number of 'prototype branches' in the Atlanta area. Hospitals are applying process management concepts, which were originally developed in the manufacturing sector, such as just-in-time management. Health-care providers are looking at all of the factors that influence patient outcomes and are finding that making hospital environments more pleasant can have a positive impact on patients' health. And the organizational culture of hospitals is also being investigated, so that they can be made more open to innovation.

So there are many different ways in which organizations are trying to stimulate innovation.

CHARACTERISTICS OF INNOVATION

Although the need for more innovation is widely recognized, there are different opinions on what innovation means in a business context. Many employees think primarily of innovation as breakthrough products like the iPod but this is a narrow view, as we will see.

The dictionary definition of *innovation* – introducing something new – is clear, but this does not help managers or employees understand the nature of innovation sufficiently. It focuses on newness and can lead us to overlook the fact that innovation can be based on modifying existing ideas. The dictionary definition also fails to give insights into the following questions. What are the most important types of innovation? How can innovation lead to sustainable competitive advantage? What is the most effective way to boost the innovation performance of an organization? This book answers these questions and this section looks at the following:

- Definitions of innovation.
- The different *dimensions* of innovation.
- The different *degrees* of innovation.
- The *phases* of an innovation.
- The functional areas involved.

Definitions of Innovation

Various definitions of innovation have been developed and these will be reviewed, in order to develop our terminology. Managers and employees may have a range of opinions on the real nature of innovation in their business environment. Therefore, establishing a clear understanding of the characteristics of innovation is essential in organizations, where diffuse views on innovation arising from different functional perspectives will hinder the implementation of innovation strategy.

The importance of understanding innovation was first recognized by the Austrian economist Joseph Schumpeter in the 1930s. His work on innovation strongly influenced the field of economics and this will be discussed in Chapter 2. Schumpeter considered five different aspects of innovation and, although developed over 70 years ago, his definition is comprehensive[10]:

1. The introduction of a good (product), which is new to consumers, or one of increased quality than was available in the past;
2. Methods of production, which are new to a particular branch of industry. These are not necessarily based on new scientific discoveries and may have, for example, already been used in other industrial sectors;
3. The opening of new markets;
4. The use of new sources of supply;
5. New forms of competition, which lead to the re-structuring of an industry.

Michael Porter defined innovation 'to include both improvements in technology and better methods or ways of doing things. It can be manifested in product changes, process changes, new approaches to marketing, new forms of distribution, and new concepts of scope ... [innovation] results as much from organizational learning as much as from formal R&D'.[11] This definition covers very similar points to Schumpeter's but indicates that the source of

innovation can originate from an organization's learning and not just its R&D department.

Both Porter and Schumpeter use the word 'new' in their definitions, but it should not be forgotten that many commercial innovations are not totally original and Everett Rogers, an expert on how innovations spread through markets, reminds us that innovation '... is an idea, practice, or object that is perceived as new by the individual or other unit of adoption'. The perception of newness is important rather than originality as such.

The definition from the Organisation for Economic Co-operation and Development (OECD)[12] is 'innovation consists of all those scientific, technical, commercial and financial steps necessary for the successful development and marketing of new or improved manufactured products, the commercial use of new or improved processes or equipment or the introduction of a new approach to a social service. R&D is only one of these steps'. Similar to Porter's definition, this indicates that R&D is not the only element of innovation, but the OECD definition adds understanding of the steps involved and points out that innovations are also important in social services.

In the service sector, the term innovation can be confusing.[13] A useful definition is, 'innovations in the service sector comprises [*sic*] new services and new ways of producing or delivering services as well as significant changes in services or their production or delivery'.[14]

Psychologists view innovation as a social process, 'the intentional introduction and application within a role, group, or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, organization or wider society'.[15] This indicates that the emergence of innovative ideas depends on the culture of an organization.

Comparing the various definitions of innovation, it can be seen that there are several common elements *what* is changed (such as product or process changes); *how much* is changed (whether it is completely new or only perceived as such); the *source* of the change (sometimes technology); the *influence* of the change (for example, its social or commercial value).

Dimensions of Innovation

Figure 1.2 shows what we will refer to as the *Dimensions of Innovation*. These also apply to the service sector but we will first discuss how they apply to manufacturing. *Product Innovation* is important and can be thought of as the first dimension of innovation. However, opportunities for sustainable competitive advantage can be missed if an organization focuses solely on product innovation (see Mini Case 1.3 on Gillette). Companies in the manufacturing sector can also create services to help differentiate their products – *Service Innovation* is the second dimension. Improvements can also be made to the manufacturing and delivery process (normally referred to as *Process Innovation*). Companies can also use *Business Process Innovation*; optimizing

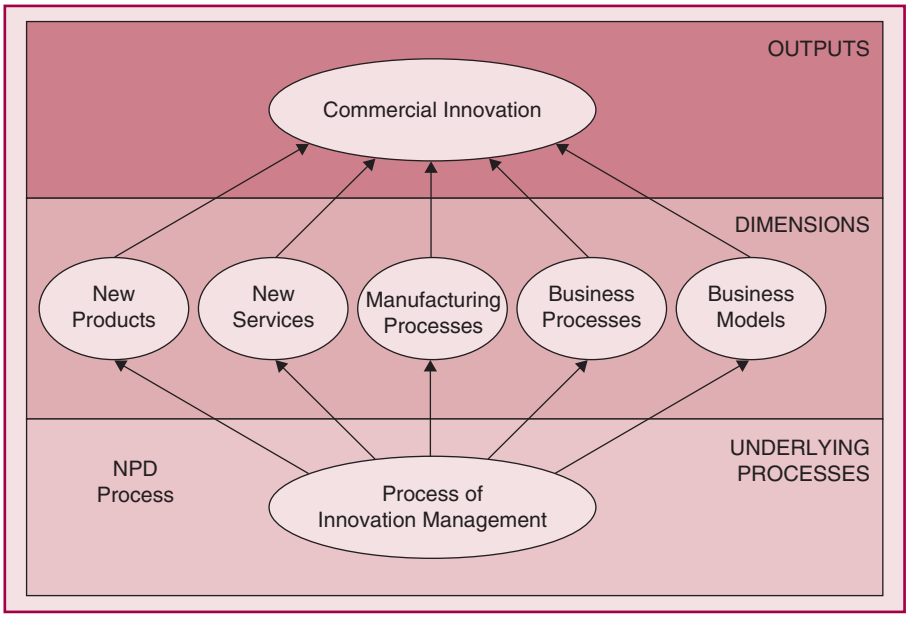

Figure 1.2 The Dimensions of Innovation in the Manufacturing Sector

processes to make it easier for customers to do business with the company (for example, order fulfilment). Finally, *Business Model Innovation* can be a key source of commercial innovation.

Mini Case 1.3

Gillette – First-to-Market Risks

Some managers perceive innovation to be inextricably linked to a first-to-market strategy. Breakthrough products such as the iPod have captured the imagination of many people, who now perceive innovation as consisting of radically new products. Unfortunately, this view can lead managers to forget the biggest downside of being first-to-market – competitors may copy your innovation if you do not think of ways to protect it. What is worst, competitors may learn from the limitations of the first-to-market product and the 'copy' can be better than the original!

The Gillette 'Mach 3' razor was a first-to-market product. Gillette developed this advanced razor, with its characteristic three blades set at different very precise angles, at a very high cost. A UK supermarket chain was quickly able to introduce a good copy of the product at a fraction of the development costs. This made Gillette more dependent on expensive television advertising in trying to protect sales of their product. When products are easy to copy, competitors can even 'leapfrog' the original features and the Wilkinson Sword Company introduced a four-blade razor. Now the market even has a five-blade product!

It is not only for academic purposes that it is important to define innovation clearly. Promoting a clear understanding of the nature of innovation throughout a company is one of the key roles of top management because innovating in a number of dimensions can enable sustainable competitive advantage. Most products are relatively easy to copy and patents seldom give sufficient protection. For example, Cannon worked round several hundred patents owned by the Xerox Company in the development of their first and very successful photocopier. Leading companies know that their products and services will be copied. To combat this, such firms are focusing on other dimensions of innovation, such as manufacturing processes, to ensure sustainable competitive advantage[16] (contrast Mini Case 1.4 on Tetley's to the earlier one on Gillette). Taking what we will call a *multidimensional* view of innovation leads companies to search for ways to complement product innovation through service, process, business process and business model innovation.

Mini Case 1.4

Tetley's Teabags – Sustainable Competitive Advantage[17]

Tetley is a market leader in the world teabag market and originator of the round teabag. On the face of it, the round teabag was only an incremental change from the traditional square version. However, through the process innovation required to support the production of the new product, Tetley gained sustainable competitive advantage. When the company developed the round teabag, it knew that with suitable marketing, this new product could capture significant market share. Advertising copy was based around the better cup of tea that would result from bags where the tea could circulate better. Tetley knew that competitors would quickly try to copy this product innovation. So the company decided not to discuss it with its normal supplier of manufacturing equipment. Instead, it hired Cambridge Consultants Ltd to develop a new manufacturing line for round teabags. When the new product was introduced, the competition was unable to obtain similar manufacturing equipment quickly and Tetley maintained its lead.

Tetley became part of Tata Tea in 2000, forming the world's second largest tea company. Tata Tea is itself a subsidiary of the Tata Group, a successful, growing conglomerate with a reputation in India for doing business responsibly. In addition to tea, Tata also has interests in a broader group of beverage companies which includes Eight O'Clock Coffee in the USA and Mount Everest Mineral Water, with its Himalayan brand of mineral water in India.

Andrew Dobson, Director of Global Innovation at Tetley says, 'Innovation is critical. It's really important to continually bring new and fresh things to market which surprise and delight, whether that's simply a new blend or flavour, an entirely new product or a new route to market. It's also vital to stand out from the crowd and consistently communicate what makes the Tetley brand unique and better than its competitors. A good product is one thing but in our competitive environment, it is equally important to be innovative at getting our message over to consumers. The objective of our innovation programme is to be one step ahead of our competitors and develop brands and

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products that offer consumers both functional and emotional benefits. We've built a reputation as pioneers in the tea industry – we were the first to launch the teabag, the first to "change the shape of the market" by introducing round teabags in 1989 and then the "no-drip" drawstring bags in 1997, and the first big "black tea" brand to really branch out into new and exciting varieties such as green tea and rooibos. We're always looking for new ways to revolutionize the tea industry and our relationship with the Tata Group gives us access to greater resources and exposure to a different culture which is global, acquisitive, fast moving and responsive to change'.

Management need to drive the underlying processes that stimulate innovation within a company (Figure 1.2). Some innovation management processes will be formally defined and documented, such as the new product development (NPD) process. Others will be less tangible, such as idea generation, or the management of company culture. Therefore, managers face a real challenge in managing innovation.

In a modern manufacturing company, the line operators are not simply responsible for manufacturing products. They are also given full responsibility for constantly improving the manufacturing processes (through continuous improvement and other means). Some companies even talk about their operators being 'process owners'. Senior managers need to see themselves as the process owners for innovation management and not simply as managing the outputs of new products and services. With this different perspective, managers should view the innovation processes within their organizations as one of their biggest assets.

Dimensions of Innovation in Services

Typically, the dimensions of innovation are different in the service sector. For example, the human dimension can give opportunities for innovation (see Mini Case 1.5 on Les Concierges).

One insurance company we worked with was concerned that its output of new products was low and decided to examine its overall innovation performance. A group of senior and product managers took part in a workshop to identify all of the dimensions of innovation relevant to their markets. To stimulate the team to come up with ideas, the discussion was based on the parallels to innovation in manufacturing companies (Figure 1.2).

The workshop results are summarized on Figure 1.3. New products – in this case new insurance policies – are important for competitive advantage. However, a range of other dimensions was identified. This included customer profiling to identify and contact customers with a unique value proposition; closer contact with third parties to help them contribute more to innovation (as most of the insurance policies were underwritten by suppliers); use of different sales channels (including banks, the Internet and brokers); and the creation of innovative

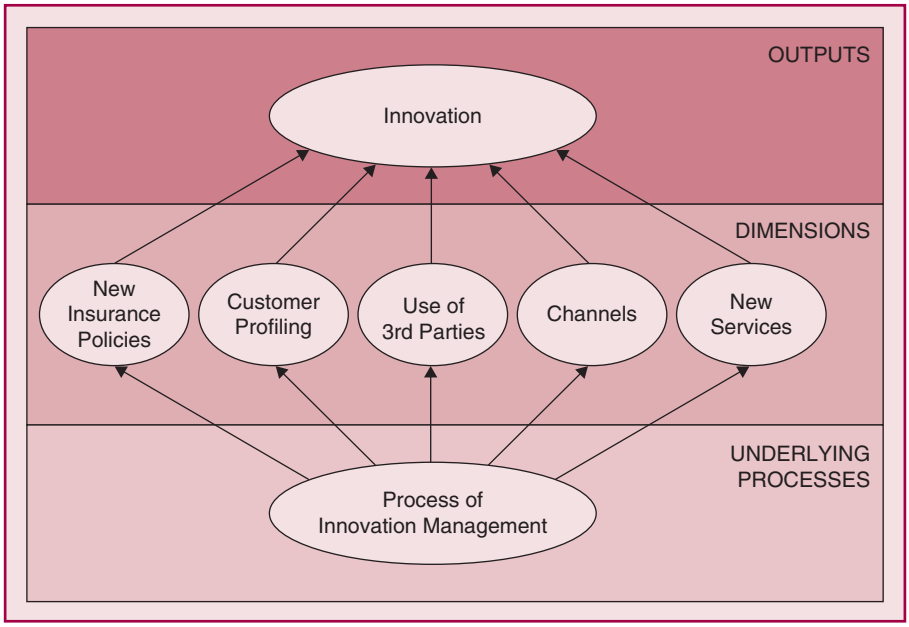

Figure 1.3 The Dimensions of Innovation for an Insurance Company

Source: Based on unpublished research by Goffin.

new services – typically better ways for customers' enquiries to be handled – in order to increase customer loyalty.

As a result of the workshop, the insurance company recognized that they had more possibilities to innovate than they had previously thought. Now, as each new product is developed, the company looks at each of the dimensions shown in Figure 1.3, with the goal of making their new insurance products 'hard to copy'.

Mini Case 1.5

Les Concierges – Serving Indian Professionals[18]

The 'cash rich, time poor' market segment consists of professional people who are top earners but because of their demanding jobs and family commitments have very little spare time. Providing services for this segment in India has allowed founder and CEO of Les Concierges, Dipali Sikand, to build a business of over $1M with over 350 staff. The company was started in Bangalore, the centre of India's software industry, but it is now active in half a dozen Indian cities.

The idea behind Les Concierges is simple and extends the concept of the 'travel desk' operated by travel companies for large employers. Sikand's business targets large employers (rather than individuals) and offers to make their employees' life easier by helping them with some of their personal and family organizing. This means that a company can help its employees focus more on their work and Les Concierges has posted

one or two of its staff to 70 companies, mainly in the information technology industry. The host company provides a desk and an intranet connection for Les Concierges and then the 'help desk' can go live, offering four categories of service: shopping, everyday tasks, entertainment and travel. The host company pays a retainer each year based on its number of employees (but it sees the return through increased employee productivity) and a transaction fee is normally paid by the employee (who saves precious time in a busy schedule).

The interaction with customers is highly important and Sikand refers to this as 'high touch'. She has hired almost exclusively women, as she feels that they are more sympathetic to customers' needs. With such empathy, Les Concierges can often delight its end-customers by coming up with original ideas for birthday presents and the like. The importance of the behind-the-scenes organization is also recognized and Sikand has concentrated on making this high-tech – including proprietary software to track each customer transaction and coordinate the many tasks that are each day passed to outside suppliers. The idea behind Les Concierges may be simple but recognizing the need and developing a 'high-touch, high-tech' solution are Sikand's real innovations.

The above discussions on service and manufacturing demonstrate the multidimensional nature of innovation. Recently, the R&D manager of an industrial safety equipment company told the authors 'if I ask five different people at our company what innovation is, I will get at least five different answers'. Many organizations lack a common understanding of the need for innovation. AXA Insurance had a similar experience and their visual 'definition' of innovation will be discussed in the main case study at the end of Chapter 3.

Degrees of Innovation

Innovation can be dramatic. Breakthroughs such as penicillin, the Walkman personal stereo, the ubiquitous Post-It, the iPod and the iPhone are the most common examples that people use when they talk about innovation. However, it is important to recognize that there are different *degrees of innovation*. There can be breakthroughs, which are normally referred to as *radical* innovations. They may create new markets or completely change existing ones. In addition, though, there are *incremental* innovations, small changes to existing products, services or processes that can also be important.

Although radical innovations often capture the imagination of the public, a lower degree of innovation is much more common. Research investigating over 100 companies showed that 84 per cent of product innovations were 'line extensions' (that is, incremental innovation) and that on average 62 per cent of revenues came from such products.[19] As might be expected, though, 38 per cent of revenues (and 61 per cent of profits) came from the radical product innovations.

The degree of innovation – from no change, to incremental, to radical – is an important concept. Consultants Booz-Allen and Hamilton proposed that

Table 1.1 Degrees of Product Innovation

	Degree of product innovation	Old/new product development
1.	Improvement and revisions of existing products	Old
2.	New products that provide similar performance at lower cost	Old
3.	Existing products that are targeted to new markets	Old
4.	Addition of products to an existing product line	New
5.	Creation of new product lines	New
6.	New-to-the-world products	New

Source: Booz-Allen and Hamilton, *New Products Management for the 1980s* (New York: Booz-Allen and Hamilton Inc., 1982).

there are six degrees of product innovation (Table 1.1). The first degree is the improvement of existing products to provide improved performance or greater perceived value to customers. Developing new products that provide similar performance at lower cost is the second degree, followed by existing products that are targeted to new markets. New products that supplement a company's established product lines is the fourth degree. Another form of product innovation is the creation of new product lines. The last degree is defined as 'new-to-the-world' products that create entirely new markets. Table 1.1 shows that three categories are related to 'old product development' and three to 'new product development'.

The degree of innovation is somewhat ambiguous; some observers will view certain innovations as radical, whereas others will perceive them as incremental. This discourse is often heard in academia, but the search for an unambiguous definition is probably not a very productive one, since the degree of innovation is context dependent.

Evaluating Dimensions and Degrees

The concepts of the dimensions and degrees of innovation can be used to analyse the competitiveness of individual innovation projects and also a company's portfolio of innovation projects. We will refer to this as *Dimensions* & *Degrees analysis*. Consider the example of a project to develop an incremental product. This product might not be very competitive, as it is based on previous products and similar to the competition. Table 1.2 shows a typology and the tick in the column 'product' indicates that it is an incremental product innovation ('improvements'). Although the degree of product innovation is low, the new product could be supported by related services, which can be

Table 1.2 Example Analysis of Dimensions and Degrees

	***Degrees* of Innovation**	***Dimensions* of Innovation**				
		Product	**Service**	**Process**	**Business Process**	**Business Model**
1.	No innovation				√	
2.	Improvements	√				√
3.	Similar performance at lower cost		√			
4.	Targeting new markets					
5.	Addition to an existing product line					
6.	Creation of new product line(s)					
7.	New-to-the-world			√		

provided at lower cost (see tick under column 'service'). In the manufacturing process, radical innovation is planned in the way the product will be produced, as this will lead to a sustainable advantage in terms of lower costs. Table 1.2 is useful because it forces organizations to think how they can innovate across the various dimensions and become more competitive. For example, the Mars Group, manufacturers of confectionary and other products, always considers where their prowess in manufacturing can be utilized for each new product.

Table 1.2 can also be used as the basis for reviewing the range of innovation projects that a company is in the process of implementing. Each individual project can be analysed and then the overall balance in the portfolio, for instance, the mix between incremental and radical products, can be determined and compared with the goals of the innovation strategy. Organizations are not typically able to develop radical products all the time, as these normally require significant resources, are high risk and need high levels of creativity. Table 1.2 can prompt ideas on how to make less innovative products more competitive.

Innovation and Continuous Improvement

Continuous incremental improvements to manufacturing processes or service operations can lead to higher-quality output at lower cost and may add up over time to significant increases in performance. Many manufacturers have and continue to reap rewards from continuous improvement – *kaizen* in Japanese. The challenge for management is to communicate to employees the potential contribution of continuous improvement to overall innovation.

The service sector is now adopting continuous improvement and other techniques to improve processes. An intimate part of the service delivery process is the interaction between a company's employees and the customer. Although

the service delivery process is intimately dependent on people, this does not mean that constant improvements are not possible. On the contrary, continuous improvement is essential in the service sector because even small improvements are quickly recognized by customers and can increase satisfaction levels significantly.

Figure 1.4 summarizes the relationship between incremental improvement and innovation. The dimensions of innovation are plotted on the horizontal axis, in order of the size of the impact they typically make on the running of the organization, from process changes to completely new business models. The degree of innovation is plotted on the vertical axis. Incremental improvements to processes occupy the bottom left corner; this is the domain of *Quality Management* (kaizen etc.), where steady improvements are made to the way the business runs, without significantly changing its nature. In the upper right-hand corner is truly revolutionary change when major alteration is made to the very business model of the firm. Examples would be Virgin's move from a record label into transatlantic travel, or Nokia moving from logging into mobile phones.

In the bottom left-hand corner, the well-established techniques of quality management such as the work of Deming can be used.[20] It should be remembered that if incremental improvements are difficult to copy, then they give sustainable competitive advantage and should be classed as innovation.[21] The area between these two extremes is the realm of innovation management. Here, research and practice now provide many useful tools and insights and a complete and coherent approach is emerging. For this reason, in this book we place

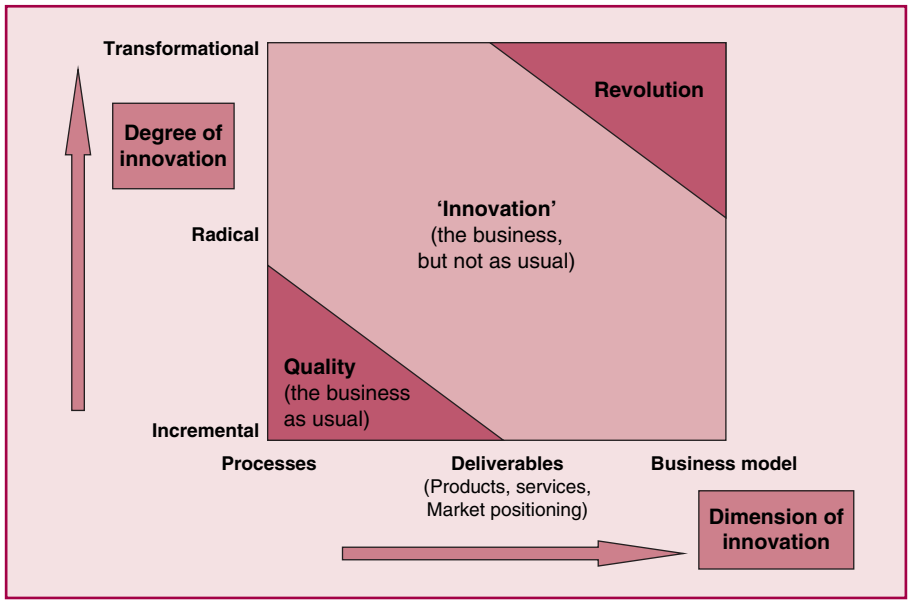

Figure 1.4 Continuous Improvement and Innovation

strong emphasis on a balanced broad approach to managing innovation. Some argue that incremental improvements are not innovation; we believe that there is no value in agonizing over where the boundary between incremental improvement and innovation lies. However, the further one moves up the diagonal on Figure 1.4, the more difficult the management challenge becomes and the more the techniques presented in this book are required.

Phases of Innovation

Any innovation must progress through a number of *phases* before it is commercially viable. This is true, irrespective of the type of innovation – whether it is a new product, a new service, a new process, an improved business process or any combination of these. All innovations begin with the generation of ideas and the road to implementation and commercial success can be a long and difficult one. Many ideas will fall by the wayside. For example, in the pharmaceutical industry, ideas for new drugs are based on novel chemical structures called 'new chemical entities' (NCEs). These take years to develop, test and to introduce to the market. The majority of NCEs are rejected along the way for one reason or another (for example, undesirable side effects) and typically only one NCE in a thousand will be commercially successful.

Figure 1.5 shows the typical phases of innovation, with a funnel of ideas being generated. Some ideas are filtered out immediately whereas others progress further and are developed into *concepts*. Such a concept might be

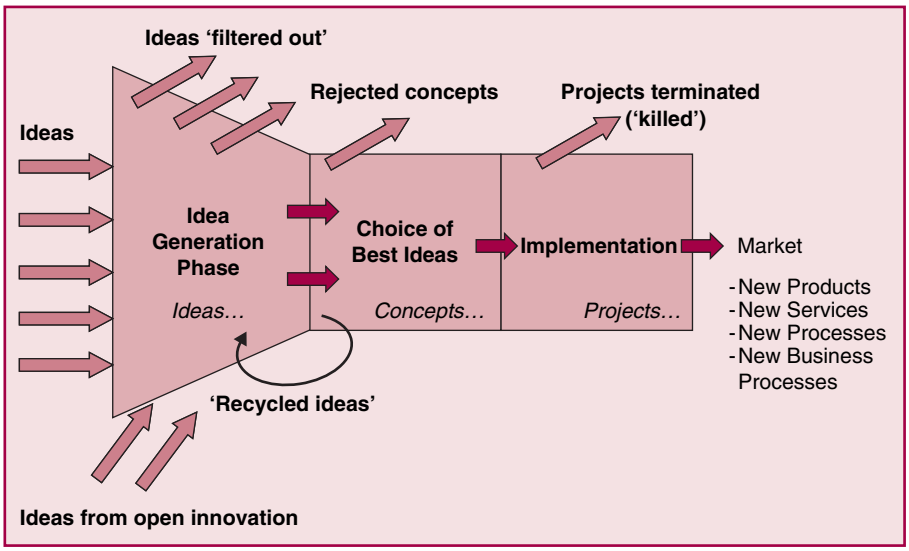

Figure 1.5 The Typical Phases of an Innovation ('The Development Funnel')

Note: The idea to compare the phases of an innovation to a funnel goes back to at least to: Majaro, S., *The Creative Gap* (London: Longman, 1988).

prepared by a small team from different functional areas of the business working together part-time over a few weeks or, for more complex ideas, the process of developing the concept will take longer. At the concept stage, an idea for a new product or new service will have been formalized to the extent that some questions such as the size of the potential market and the best way the product or service can be designed will have been considered (although these questions will not have been answered to a high level of detail). Similarly, each concept will have been analysed as to the investment required and the potential return. Normally, management decides on which concepts will be selected to become *projects* (the implementation phase), and the way in which an organization chooses concepts may not be transparent to many of the employees. Certain concepts may be rejected as currently uninteresting, to emerge later as 'recycled ideas'.

Obviously, the innovations developed will have varying levels of success. The analogy to a funnel used in Figure 1.5 is not new; Simon Majaro of Cranfield School of Management has used it for many years. Kim Clark and Steven Wheelwright from Harvard Business School have also used it as a basis for discussions with managers on the typical phases of innovation.[22] They had managers draw their own versions of the funnel and found that managers perceived that the different phases often overlap, problems are common and so iterations are necessary. Therefore, it must be recognized that Figure 1.5 is a simplification. For example, ideas may well be modified and refined several times as they are turned into useable concepts, so the boundary between the *idea generation phase* and the *choice of best ideas* may not be clear-cut. And a project may be modified or cancelled during *implementation* when new information shows that the project is not viable (although most companies will require a firm go/no go decision at some point).

Innovation throughout the Organization

An essential point to note is that if an organization is to be fully effective, every part of that organization needs to actively contribute to innovation. Innovation should not only originate in the R&D department in a manufacturing company, or the strategic planning group in a service operation. The functional areas that should be involved are:

Research and Development: for many managers, R&D is *the* source of innovation and it is true that this function should drive many of the ideas for new products and services in a company. However, companies that rely solely on R&D can fall into the trap of producing sophisticated products that the market does not require. This has been recognized by a leading economist who said 'the proper management of innovation is much more than establishing and maintaining a research and development laboratory that produces a great deal of technical output'.[23] Service companies may not have an R&D department but leading ones have the equivalent, with titles such as 'service innovation

group' (time:matters, Germany) or 'innovation development team' (Bank of America).

Marketing: has a key role to play in innovation. It needs to identify customers' needs, through creative forms of market research. It needs to be involved throughout the whole process of innovation, including product definition, pricing decisions, positioning and the product launch. Good marketing should make the difference between a good idea and a successful product.

Operations: this function, which is often called *production* or simply *manufacturing* in the manufacturing sector, also should contribute to innovation. Unfortunately, many operations managers do not perceive that they have a key role in driving innovation. This limits the ability of a company to obtain longer-term competitive advantage, as process innovations are harder to copy than product innovations. Service sector companies often underestimate the potential of operations to contribute to innovation.

Finance and Accounting: is normally not perceived as being able to make a contribution to innovation. However, it can provide essential support in calculated return on investment for innovation projects.[24] At the high-tech company Verigy, the controlling function plays a key role in determining which projects offer the best combination of low risk, high return and a good match to the available resources. The finance function can also help develop effective pricing packages. An example of this is the 'power by the hour' leasing offered by Rolls-Royce, the aero engine manufacturer.

Human Resource Management: is involved in hiring, developing and motivating good people, the essential and challenging aspects of innovation management. The creative atmosphere of small teams can easily be lost as organizations grow and so the human resource function can and should proactively support the maintenance of culture of innovation in their organization.

Outside Resources: have been recognized as essential for *Open Innovation*.[25] For example, suppliers in the automotive industry conduct significant parts of the product development for car manufacturers. Similarly, universities and research institutes can enable small organizations to economically partake in the development of new technologies, and develop new core competencies.

The task of general management is to stimulate the cross-functional teamwork that is needed for effective innovation. Researchers have identified the friction and lack of understanding that commonly arise between different functions, particularly marketing and R&D.[26] Achieving effective interaction between different functional areas is a key task for management and Akio Morita, the late Chairman of Sony recognized this saying, 'this is the job of top management – to arrange good communications [between functions]'.[27]

Our discussion on the characteristics of innovation has shown its broad nature and next we will discuss the findings of research on how innovation can be managed.

KEY RESEARCH ON INNOVATION

Innovation is an area in which both economists and management researchers have been active. Throughout the chapters of this book, the pertinent research will be presented but here we will give an overview of the field, in order to understand how the different topics interrelate. This will help us develop a framework through which to view and plan the management of innovation.

The three levels at which innovation has been researched are as follows:

- The *macro level:* research on the sources and impact of innovation within economies and industries;
- The *micro* or *company level:* investigations of how companies manage innovation and the advantages that it brings them in terms of revenues and profits;
- The *project level:* which looks at the management of innovation projects, particularly NPD.

It is surprising how many of the articles in the popular management press are based on anecdotal evidence – cursory investigations that have questionable validity because, for example, they looked at a very limited number of companies or companies in very specific business environments. As a result, innovation management is plagued with 'quick fixes' – approaches that have worked at one company and which their proponents claim are universal solutions. There are no panaceas for the management of innovation and the context in which an organization finds itself plays a key role. In assessing how the results of research can be applied in managing innovation, it is important to consider both the internal and external validity of the studies that are being described.

Macro-Level Investigations

For many years economists have researched innovation, and in the 1800s it was recognized that new products impact the economy. Schumpeter realized that process innovations in manufacturing can have a strong impact and can threaten established industries. Economists normally use measures of innovation such as R&D expenditures, the number of major innovations generated in an industry over time, and patent counts.[28] The studies made at the macroeconomic level fall into two categories: research on the factors that influence innovative performance, and the spread and influence of innovation.

Typical of the studies on the factors that influence performance are those looking at the size of companies. Part of Schumpeter's work was the recognition that larger companies are at an advantage when it comes to innovation, because of the economies of scale they have in R&D.[29] Much research has focused on the size of companies and innovation, and it has been shown, for example, that entrants are more likely to develop pioneering products and small firms are important innovators.[30] The effects of educational levels and national culture on product innovation have also been investigated (by looking at the correlations

between qualification levels and patent counts), and similarly the success rate of government policies that aim to support innovation.[31] The field of *development economics* is also relevant to the study of innovation. This has looked at the reasons why developing countries remain behind advanced countries. Factors such as infrastructure, human capital (in turn, determined by health and education), and the availability of credit to fund innovation all influence growth.

Studies on the diffusion and impact of innovation are numerous and Everett Rogers has conducted some of the key studies in this area. Innovations are adopted slowly at first, but as they become known and information is more widely communicated, they can be embraced by the market.[32] As an innovation is widely adopted, this stimulates growth through sales of new products and services. It may change the basis of competition or the structure of an industry. Innovation has also been shown to drive long-term business cycles, and to directly influence employment levels.[33] The work of economists on innovation is useful in demonstrating the interaction between the market environment and the firm. It indicates to firms the gravity of conducting a thorough analysis of their business environment and hence Chapter 4 will focus on this topic.

Although the relationship between industry structure, company size and innovation has received considerable attention, economists have seldom investigated the actions of individual companies.[34] Management researchers from a number of disciplines including marketing, strategy, organizational behaviour and operations management have been active in this area and their findings provide many insights.

Micro-Level Investigations

Managing innovation is a challenge because of the wide range of factors influencing its success or failure, including the allocation of resources, the skills of key staff, the generation of ideas and the organization of development teams.[35] As innovation is a process, it is far from clear how companies can best improve their performance,[36] or what the key aspects of innovation management are.

One of the most common forms of research at a company level has been the quest to unearth the characteristics of innovative organizations. The companies chosen for these studies are normally large, have a reputation for being innovative and exhibit high market share and growth. For example, leading companies develop over twice as many new products, develop them faster, use more technologies and compete in more geographical markets.[37] The limitation of such studies has been demonstrated by a meta-study, which showed that over half the key factors identified were unique to specific studies.[38] This strongly demonstrates the need to consider context carefully when attempting to take innovation best practice from one company to another. In this book we will point out the contextual issues and always stress that in innovation management it is not a question of *adopting* best practice but *adapting* it.

It has been recognized that innovation should play a central role within business strategy.[39] Innovation should be fully evaluated during strategic planning

and clear processes are needed to manage the development of new products and services. Technology can be a prime component of innovation and therefore it should be given full management attention.[40] The work of Kim Clark of Harvard shows that general managers must investigate the value of technology to their organizations.[41] In manufacturing firms, R&D needs not only to develop new products but it must also give a lead to other departments in becoming a continuously innovating company.[42]

Michael Tushman of Harvard has been a major contributor to the study of organizations and innovation. He and others determined that the organization and the culture of a company strongly influence innovation.[43] Firms need to be good at coordinating the work of different functions and managing the linkages to other organizations. It has been shown that leading companies often change their organizational structure and so executives need to create organizational architectures that are both efficient and adaptive.[44] Company culture is recognized as being fundamental in supporting innovation; however, culture is a concept that can be difficult to manage.[45] Studies have concluded that the innovative companies display certain cultural attributes. These include the propensity to experiment, and the capability to motivate employees to be creative and to develop radical ideas. Successful projects are often discussed within such organizations and these 'stories' help focus the organization on the values of innovation.

Project-Level Investigations

The third level at which researchers have investigated innovation is the project level. Most of the projects studied have been new product development ones but we should bear in mind that the challenges faced are similar for new service products and also in the management of process innovation projects. New services are also essential and process innovation – developing efficient manufacturing – is often a key source of competitive advantage because it is difficult to copy.[46]

Studies of new-product development projects are extremely common. Unfortunately, the success rate for new products has been found to be very low.[47] This is due to the many problems that can occur at every stage of product development: from the creation of ideas, to the introduction of products onto the market.[48] Researchers have looked at these problems and the main findings can be grouped into the following main articles on the benefits of faster NPD, the need for robust NPD processes, teams, techniques for accelerated development and evaluation of product development.

Faster New Product Development

Much has been published on the need for companies to develop new products faster.[49] The time required to develop and introduce a new product to the market is referred to as *time-to-market* or *cycle time*. It has become essential for

companies to have short cycle times, and faster NPD has been a key focus in manufacturing for nearly twenty years.[50]

Fast cycle time is considered to have two main advantages. If a product is a totally new concept, then being first-to-market enables a company to define key market requirements before competitors enter the market. In established markets, being faster leads to increased profit and market share. Although the advantages of short cycle times appear clear in the popular business literature, they are not backed by unequivocal evidence and the link between fast cycle time and profitability is weak. To make NPD not only fast but also efficient, there are a number of requirements. These include a clear process, teamwork and leadership.

The NPD Process

Much has been written about the need for a clear new-product development process, which defines the responsibilities of different functions, such as R&D and marketing, at different phases of NPD. Robert Cooper and Elko Kleinschmidt of McMasters University in Canada have published the definitive studies on the NPD process. One investigation looked at companies' practices and led to the well-known *Stage-Gate*™ approach.[51] In this approach, management meets at the end of each stage of product development and has to approve the progression to the next stage. The functional areas within a firm have clearly defined responsibilities at each stage, to ensure that an effective new product or new service product is developed. Most companies in the service and manufacturing sectors have developed formal processes based on Cooper and Kleinschmidt's recommendations. It has been found that companies with formal NPD processes were more satisfied with their performance.[52] However, having a process alone will not necessarily lead to faster NPD. Firms need to collect data on NPD projects, so that companies can learn from the past and improve by, for example, avoiding bottlenecks in the process.[53]

Team Organization and Leadership

The skills and the motivation of people working on product development are crucial and such teams need to be well organized and led.[54] Steven Wheelwright and Kim Clark have investigated many aspects of product development teams. A widely applied approach is to draw members from a number of functions to ensure that all aspects of the business are considered at the design stage. For example, R&D and manufacturing will consider how to make the product easy to manufacture. Although they can be difficult to implement, it has generally been recognized that cross-functional teams have made NPD more efficient.[55] The people chosen to lead NPD teams need particular skills in motivating the team and managing communications both within the team and externally. Research has shown that problems in managing new product teams are also prevalent in the service sector.[56]

Techniques for NPD

After the importance of faster NPD was recognized at the end of the 1980s, there followed a wave of prescriptive articles on the techniques that could be used to achieve it. Many of these articles were based on anecdotal rather than hard evidence.[57] One technique hailed as a major advance in reducing cycle time was *Quality Function Deployment* (QFD) – a Japanese method for ensuring that customer requirements are accurately captured – but this method is not a panacea.[58] (We will discuss QFD in Chapter 7.) There are many techniques for improving NPD but the use of one of these alone or several in combination will not, in itself, guarantee reduced cycle times. Bringing products to market faster is just not that simple – the situation and the way techniques are implemented play a key role.[59]

Overall, the perceived value of tools and techniques for new product development is a contentious area. Whilst many of the articles in the popular management literature have extolled the benefits of certain tools, the evidence on the utility of such tools is thin. Managers need to deal with this by recognizing that there are no 'quick fixes' and the application of any tool or technique to speed NPD will take time and effort to make it effective within the particular situation faced by the organization in question.

Evaluating NPD Projects

If NPD is to be improved, then the efficiency of the process, and not simply the success of the product, needs to be evaluated. Several studies have found that many companies do not evaluate their projects effectively because suitable measures are unavailable. Few companies capture accurately the time-to-market and this type of measurement is essential because, without it, valid comparisons are impossible. Abbie Griffin of the University of Illinois has studied the topic of NPD measures extensively and recommends that metrics should cover the outcomes and characteristics of the project (inputs) and the process of NPD itself.[60] However, it has been recognized that 'the performance of individual projects can be influenced by idiosyncratic factors ... that may be difficult to duplicate from project to project'.[61]

Service Innovation Research

We lament the fact that most of the research on innovation has focused on products and not services.[62] Although from a historical perspective this is understandable – most economies were manufacturing-driven when innovation research first started – today, the developed economies are mainly service-driven. Fortunately, researchers are slowly catching up and our knowledge of the impacts and management of service innovation is improving.

A major issue in the macro-level studies of the service sector is that the categories of innovation used in manufacturing studies (product, process and service

innovation) are difficult to apply in services. Often innovations in the service sector do not neatly fit into these categories as, for example, a service product is often difficult to differentiate from the way it is delivered.[63] Measures of 'innovation' in services are also more difficult than in the manufacturing sector; for example, the spending on innovation related activities is difficult to ascertain.[64]

Studies in the service sector have looked at the nature of innovation (and how it is different from the manufacturing sector). Such research has concluded that in addition to new service development, ways to improve quality and delivery, to lower costs and to make innovations harder to copy are all important aspects of service innovation (see Mini Case 1.6 on Singapore Airlines). Because of the intangible nature of service products, service innovation can be challenging to manage and it is recommended that managers adopt formal process management to increase service innovation levels.[65] In Chapter 3, we will focus on the contrast between innovation in the service and manufacturing sectors.

Mini Case 1.6

Singapore Airlines – Sustainable Competitive Advantage[66]

Singapore International Airlines (SIA) has regularly been voted the world's best airline in surveys by travel magazines such as *Condé Nast Traveler* and the quality of its services is legendary. Its business strategy is based on a solid service product and attention to every detail of the way it is delivered. A first-to-market innovation strategy has been an important part of SIA's approach for years.

The SIA product itself – air travel – is reliable and the range of routes offered has been extended through alliances with other airlines. The way the service is delivered by SIA is designed to achieve maximum customer satisfaction and includes both people and technology related ideas. Cabin staff are renowned for being friendly and helpful and this has been strongly promoted through the *Singapore Girl* advertising. Staff receive longer and more detailed training than that offered by other airlines. For example, all cabin trainees spend time in homes for the aged in order to understand the problems faced by older travellers (a growing segment worldwide). Technology is also constantly updated and the aircraft fleet is one of the most modern in the industry. Having more modern aircraft has helped SIA differentiate their service product; passenger areas have larger than average seating, and a French fashion house designed the décor and all of the service ware (including the tableware). In-flight services have been constantly enhanced and the list of firsts here is long: first in-flight telephones; first in-flight fax machines; first Dolby surround sound and personal video screens in coach class; first to introduce electronic tickets but the company still allowed flexibility in allowing flight confirmations by telephone, fax or email.

It is interesting to note that competitors have quickly copied the technology-based innovations, whereas the quality of the service provided by staff has been harder for competitors to follow. In managing service innovation, a key question is how can service operations be made hard to copy?

MANAGING INNOVATION – THE CHALLENGE

Research has demonstrated the complexity of managing innovation at both the company and project level. Many aspects need to be considered, as do different functional areas. So, can an integrated approach be achieved? How can the recommendations from the different fields of research be related to the situation facing an organization?

Need for a Framework

Innovation management often requires managers to match 'technical' expertise, in areas such as technology, project management and finance, with 'soft' skills in managing people and creativity. The skills needed for technology management relate closely to engineering and the physical sciences, whereas the soft skills are closer to the social sciences, and finance is covered in business education. Few managers have been educated in all of these areas. In addition, developing new products, services and processes is inherently uncertain and this requires managers to be aware of techniques for dealing with risk. Due to its complexity, the management of innovation requires a mix of skills which makes it a fascinating challenge.

In many ways innovation management is in its infancy. Although there are tools, theories and approaches, there is not yet a clear methodology to help managers improve innovation performance. A similar situation existed in the 1980s in the area of quality management, where even the meaning of 'quality' was being debated (for example, should an 'internal' or 'customer' viewpoint be adopted?).[67] Quality management tools, such as Statistical Process Control (SPC) and cause and effect figures were emerging, as were approaches to people management such as quality circles (groups of manufacturing employees meeting on a regular basis to discuss how their work could be made more efficient). Today, this collection of tools and techniques has been combined into the widely recommended methodology of 'Six Sigma' quality management.[68] The Motorola Company was largely responsible for creating this integrated approach. Currently, innovation management has not reached this level of maturity and probably never will. Therefore, no integrated methodology is available and managers are faced with the challenge of having to select and combine ideas from different areas of thinking.

In our own research, it emerged that managers identify many facets to managing innovation: they cite strategy (for example, whether to be first-to-market, or to follow); people management (for example, motivating teams); and good project management (for example, in striving to meet challenging time-to-market goals).[69] Integrating these facets of innovation management is difficult, and the director of one manufacturing company said he really needed a 'systematic way to encourage and manage innovation'. Taking the main areas of the research literature at the company and project level, a framework has been developed to illustrate the main elements of innovation management and their relationships.

The Innovation Pentathlon Framework

Figure 1.5 gave a simple representation of the way a business generates and implements innovation: the process of innovation within an organization or, as Wheelwright and Clark termed it, the *development funnel*. The funnel illustrates the process of idea generation, selection and implementation, but it does not show the link to a firm's strategic intent (the importance of which emerged from our discussion of the research literature), or the link to a company's culture.

Building on the development funnel work, two extra elements – *innovation strategy* and *people and organization* – needed to be added. This is because senior managers perceive the importance of linking the portfolio of projects to their overall strategy and supporting the innovation levels of their organizations through effective people management. As its name suggests, the *Innovation Pentathlon* framework identifies five, what we will term, *areas* or *elements* of innovation management, as shown in Figure 1.6. In each of the five areas, there are a number of key topics to be managed:

Innovation strategy: developing and implementing an innovation strategy requires top management to focus on a number of issues. Assessing market trends and determining how these drive the need for innovation in the company's chosen sector(s) is the first step. The role of technology, the opportunities it can open and how to acquire expertise in the relevant technologies need to be considered. Management needs to communicate the role of innovation within

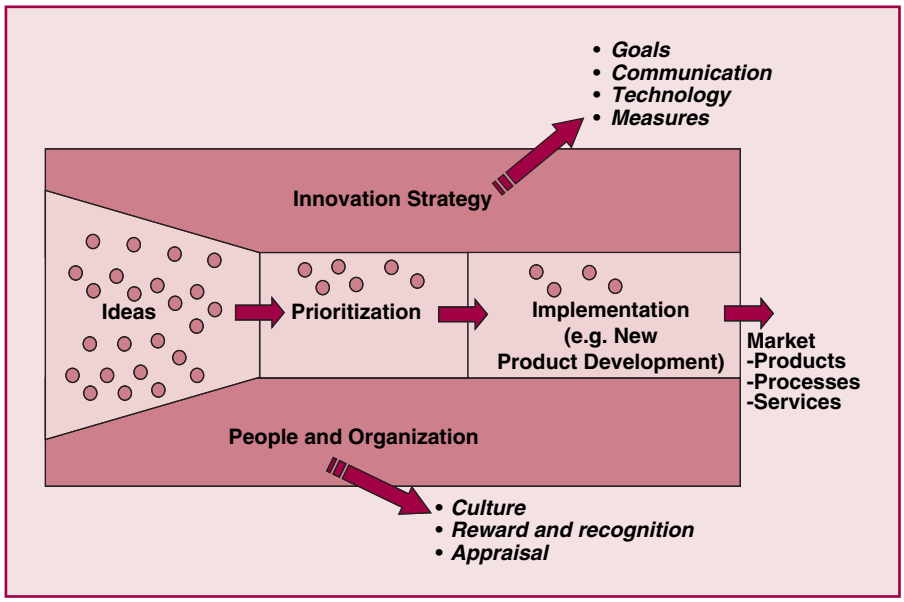

Figure 1.6 The Innovation Pentathlon Framework

a company – product, service, process and business process innovation – and match the resources to the strategy. For example, first-to-market approaches require particular capabilities in R&D and market development. Lastly, gauging innovation performance through the use of appropriate measures is essential.

Ideas: are the raw material for innovation and managers need to create an environment that supports creativity at both the individual and team level, and makes use of creativity techniques. Creativity should harness the knowledge both within and outside the organization. A large number of ideas need to be generated, which address customer requirements for products, services and streamlined processes. Good ideas blend technical, customer and market requirements. As innovation includes new products, services and new or improved processes, the scope for idea generation needs to be kept wide and should involve external sources.

Prioritization: an efficient process is required to ensure that the best ideas are chosen for development into new products, services and process innovations. This requires suitable tools to analyse the risk and return of individual projects. The finite resources available for innovation projects need to be carefully assigned. Managers need to collate the information across the range of projects, to check that the portfolio of innovation projects is balanced and matched to the company's innovation strategy. Collecting information on portfolio decisions, so that in the future management teams can review and learn from their previous decisions.

Implementation: this phase should focus on quickly and efficiently developing new products, services or processes, or a combination of these. Faster development times can be achieved through effective cross-functional teams, prototyping and testing. Commercialization is the last step in implementation and, for example, a successful market launch is essential for new products. The implementation process is an area where companies can learn from each project, so that the future performance can be greater.

People and organization: underlying innovation are many issues related to the management of human resources. These include hiring and training policies, job design and creating effective organizational structures, which will increase innovation outputs. Creating a *culture of innovation* in which employees are motivated to be constantly innovative is fundamental. Effective reward and recognition programmes will need to be maintained.

The Pentathlon Analogy

Innovation management has been previously compared to a marathon.[70] It certainly needs constant and long-term attention from managers and in this sense the analogy to a marathon is valid. However, the implication that innovation management is a matter of high performance in a single discipline is misleading. Managing innovation is more complex and requires good performance in a number of areas. A better analogy is a pentathlon, where good performance in five disciplines – the five areas – is essential.

There are two key points to note about the Pentathlon Framework. First, each of the five elements is, in itself, a complex area and so it is not surprising

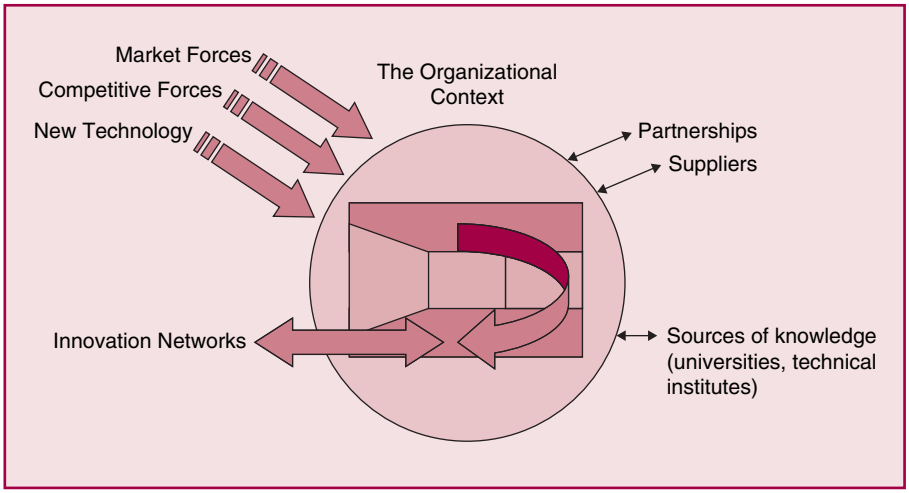

Figure 1.7 The Innovation Pentathlon Framework in Context

that innovation management – which is made up of these interrelated factors – is hugely challenging. Second, top performance in one area alone will not lead to long-term competitiveness. Similarly, many companies confuse innovation with creativity and so focus on generating more ideas, without considering how the best ideas can be selected, resources allocated and implementation quickly achieved. Overall, the framework allows us to split a large topic into more understandable and manageable parts.

The Pentathlon essentially represents the innovation processes within one organization. The context – the business situation – strongly influences innovation management and this is shown in Figure 1.7, where the market and other forces directly impact how an organization should manage its innovation. The figure also indicates that an organization must look outside its boundaries to increase innovation levels and the concept of *Open Innovation* has become very popular over the past few years. For example, links to suppliers and technical institutes are increasingly important (the main case study at the end of this chapter on NTT-DoCoMo looks at partnerships and alliances).

Applying the Framework

The Pentathlon Framework can be applied to identify the areas of innovation management in which an organization is both strong and weak. To demonstrate this, two short examples will be given, one from the service sector and one from manufacturing. Each of these has been disguised to ensure confidentiality and Figures 1.8 and 1.9 indicate the areas of innovation management where the companies were weaker. (In Chapter 9 we will also describe an *innovation audit* – a detailed method for identifying strengths and weaknesses using the Pentathlon Framework.)

Example 1

International Bank – Innovation Processes

A business division of a major international bank spent time considering the lessons it could learn from innovation management in the manufacturing sector. Two conclusions were quickly reached: the bank's innovation strategy needed to be rethought and new service-product development needed a better process.

Having observed that most manufacturing companies have Stage-Gate processes, the bank identified that its NPD was weak and lacked a formal process. The approach that existed was bureaucratic, with many approvals required (for example, over ten managers needed to agree to a new advertising copy). Consequently, a new process was designed for developing new service products, including streamlined approvals.

Idea generation was also identified as a weak element in the bank's innovation management. Regular cross-functional workshops were introduced to generate initial ideas. The bank's management was impressed by the way that leading manufacturers used prototype products to get qualified feedback from customers. Consequently, the bank focused on turning ideas as quickly as possible into 'service prototypes' (with, for example, material on explaining the new service to customers and proposed advertising).

The improvements at the bank were also closely linked to the overall innovation strategy, which was then clearly communicated to all staff.

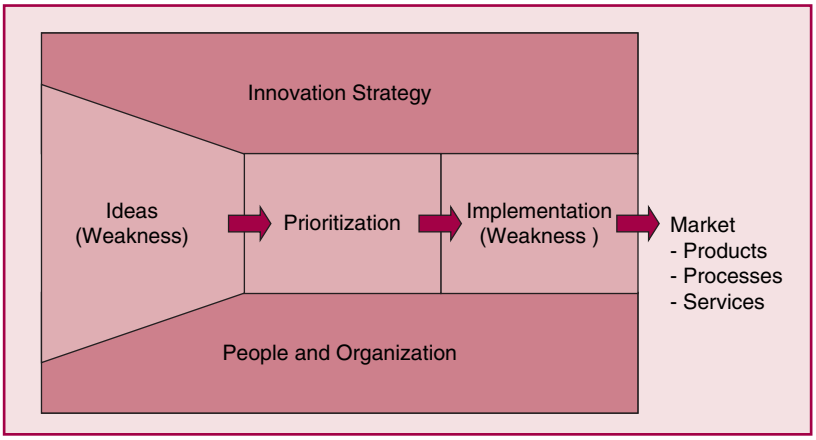

Figure 1.8 Innovation Management at an International Bank

Example 2

VehicleCo – Cross-Functional Creativity

Setting the right atmosphere for creativity is essential and the physical environment, the people and the business culture can all play a role. At a UK specialist vehicle manufacturer, which we will refer to as *VehicleCo*, much is the legacy of the charismatic

founder who still takes an active role in generating technical ideas and ensuring that they are commercially feasible. By asking critical questions about new products – acting in some ways as a devil's advocate – he has created a culture that blends three distinct elements. A focus on developing first-to-market technical solutions is blended with a strong commercial awareness in R&D, and an emphasis on constant 'prototyping'. Prototypes are used as the basis for both internal discussions on new concepts and for making discussions with customer groups more concrete.

The factory has an ideal physical environment for creativity; it is an open plan with marketing and R&D sitting together, separated from production by a glass wall. Similarly, only a glass wall separates the workshop used for producing prototypes and so its work is visible for all to see.

At VehicleCo cross-functional teams are used to develop all ideas. For example, although most companies use continuous improvement teams, these are normally only staffed by manufacturing employees. Marketing and other functions are represented in kaizen projects, to bring a commercial focus and 'outside ideas' to brainstorming sessions. Similarly, production people are present in new product-development discussions. Brainstorming has become synonymous within the company with mixing different functional perspectives. With such a strong cross-functional orientation, it is not surprising that the functional R&D organization has gone – replaced by business teams where R&D and marketing are combined in small groups with clear target markets. Over the past decade, the organization has been changed several times and is expected to change again. Employees see this as inevitable and not negative; it means the organization is flexible enough to react to market changes.

It would be wrong to leave the impression that VehicleCo have no issues with innovation management. They have only recently introduced an NPD process to solve problems with the quality of new products and transfer to production. Similarly, they have no review process to determine what can be improved from one project to the next.

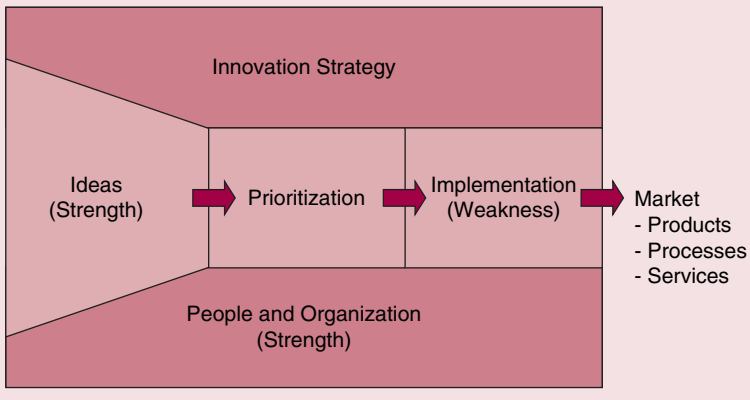

Figure 1.9 Innovation Management at VehicleCo

Limitations of the Framework

The Pentathlon Framework has limitations that we need to consider. First, it is a categorization of the main elements of innovation management and not a predictive model of innovation performance. The framework provides a visual means of visualizing and assessing all aspects of innovation management within an organization and can be used as a diagnostic tool. However, the five different elements of the Pentathlon are difficult to assess quantitatively and so care must be taken in concluding whether performance in one area is sufficient. Also, the interaction between the elements of the Pentathlon, for example, how changes in a company culture will influence the generation of ideas, are hard to predict and context-specific. Within these limitations, the framework enables clearer discussions on the nature of innovation (just as the development funnel enabled managers to better understand how ideas are developed into products). It can also be used as a communication tool, to explain to employees why, where and how improvements in innovation management are to be made.

THE STRUCTURE OF THIS BOOK

The structure of this book is based around the Pentathlon Framework with chapters as follows:

- *Chapter 2: Innovation and Economics* explains the economic impact of innovation.
- *Chapter 3: Contrasting Services with Manufacturing* discusses the innovation management issues in the service industries, compared with those in manufacturing. It also introduces much of the terminology of innovation management.
- *Chapter 4: Developing an Innovation Strategy* explains the first element of the Pentathlon Framework. It covers the importance of companies setting an appropriate innovation strategy based on analysis of their markets and resources.
- *Chapter 5: Generating Creative Customer-Focused Ideas* discusses how to generate ideas for new products, new service products and new processes. It covers approaches to improve both individual and organizational creativity.
- *Chapter 6: Selecting and Managing an Innovation Portfolio* discusses how to select the best ideas for commercialization and achieve a balance portfolio.
- *Chapter 7: Implementing Innovations* explains how innovation projects can be quickly and efficiently implemented and commercialized.
- *Chapter 8: Creating an Innovative Culture* discusses how to achieve a culture of innovation including the role of people management.
- *Chapter 9: Boosting Innovation Performance*. This chapter on innovation change management first discusses how to audit innovation performance. It then indicates how improvements can be made to increase overall performance

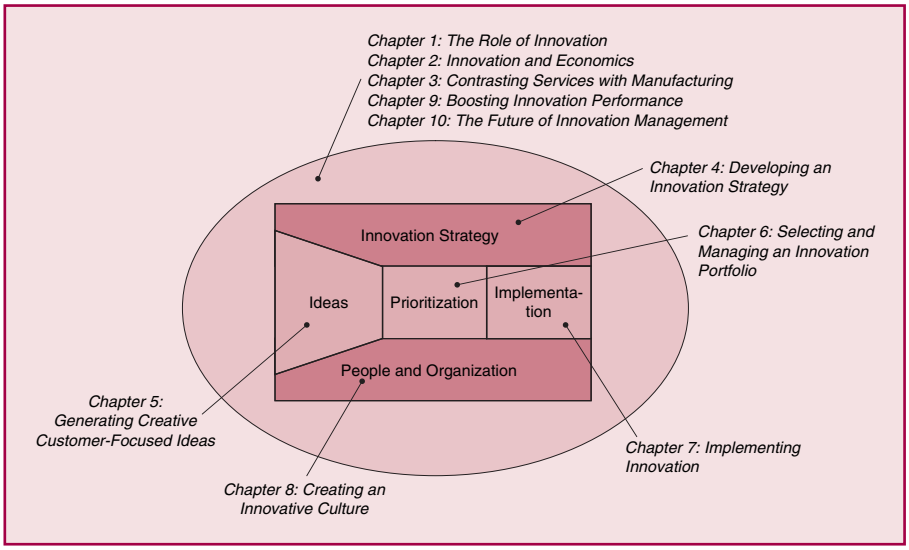

Figure 1.10 Chapter Structure and the Pentathlon Framework

since – as just like in a pentathlon – good performance in one area alone is not enough. Performance measures are also discussed.

- *Chapter 10: The Future of Innovation Management* concludes with directions for the future. As companies are becoming more effective at managing innovation, where will the leaders derive competitive advantage? This and other key trends are covered.

Figure 1.10 illustrates the structure of this book, showing that the five Chapters 4, 5, 6, 7 and 8 as being directly related to specific elements of the Pentathlon. The outer circle indicates that Chapters 1, 2, 3, 9 and 10 discuss topics that are related to the whole topic of innovation management.

Format of the Chapters

Each chapter follows a similar style:

- The relevant theory is discussed, in order to provide a solid theoretical understanding of the issues involved and insights into the latest research.
- The most relevant management tools and concepts are explained. These have been selected through an extensive review of the literature, and are based on our own experience of managing innovation and our consultancy work with organizations.
- Important terms related to innovation management are first shown in italics and then their meanings are explained.

- The theory and tools are backed by examples, including five or more 'box cases' (mini case studies) per chapter, selected to illustrate key aspects of how companies manage innovation in service, manufacturing and the not-for-profit sector.
- At the end of each chapter a longer case study is given with a set of questions for readers to consider. These main chapter case studies have been carefully selected to illustrate the challenges facing companies, how solutions have been developed and the main learning points from each chapter. Half the chapters have main case studies based on manufacturing companies and the other half focus on the service sector.
- A summary recaps the main points and gives practical recommendations for the management of innovation.
- Two or three annotated recommendations for readings – either books or papers – are given, for readers who want to go deeper into the topics covered in the chapter.
- References for each chapter are listed at the end of the book.
- The website www.palgrave.com provides additional notes and material for each chapter.

For this introductory chapter, our main case looks at the innovation management challenges facing a Japanese mobile telephony service provider, NTT-DoCoMo.

SUMMARY

Many reports and articles continue to be published on innovation management. However, improving performance of a company is still a real challenge for managers. Therefore, the aim of this book is to present ways to improve innovation performance through the development and successful implementation of an innovation strategy. This chapter showed the following:

- The need for innovation is increasing and is being driven by technology, customers, new forms of competition and the business environment.
- There are five main dimensions of innovation – product, service, process, business process and business model innovation. Companies need to identify which dimensions are important for them.
- Innovation has different degrees. It consists of not only breakthroughs (radical innovations) but also incremental improvements, which are equally important to companies in both the manufacturing and service sectors.
- Extensive research has shown that innovation management is complex and multifaceted. Its scope is wide, ranging from business strategy, managing technology and new product development to organization and people management. The Innovation Pentathlon Framework is a diagnostic framework for managing innovation.

MANAGEMENT RECOMMENDATIONS

- Determine the intended role of innovation in your organization and clearly communicate this to employees.
- Consider how innovation can be enhanced from contributions throughout the organization.
- Use analysis of Dimension & Degrees to identify whether your products or service products can be made more competitive.
- Use the Pentathlon Framework to pinpoint the areas of innovation management that your organization needs to improve.

RECOMMENDED READING

1. Anonymous, 'Something New Under the Sun: A Special Report on Innovation', *The Economist*, 13 October 2007. [Excellent overview of key issues in managing innovation and technology. Written in the characteristic style of the *Economist* – clear and to the point.]
2. Chan Kim, W. and Mauborgne, R., 'Value Innovation: The Strategic Logic of High Growth', *Harvard Business Review*, Vol. 75, No. 1 (January–February 1997), pp. 103–112. [Presents how product innovation needs to be complemented by service and other forms of innovation.]

CASE STUDY
NTT-DoCoMo, Japan – Partnerships for Innovation[71]

Before reading this case, consider the following generic innovation management issues:

- How can partnerships and alliances help a company in the service sector achieve its innovation strategy?
- How can service and product strategies of different companies be aligned to target specific customers segments?
- How can a service provider make it harder for competitors to copy innovations?

Today, NTT-DoCoMo is the top Japanese mobile telephone service provider with an enviable 60 per cent market share. The company was formed in 1992 when the Japanese government broke up the monopoly of Nippon Telephone and Telegraph (NTT) and the name comes from both an abbreviation of 'Do Communications over the Mobile Network', and a play on 'dokomo', the Japanese word for 'anywhere'. Although now the market leader, ten years ago the company was facing a serious situation. The Japanese economic situation was poor, handsets were heavy, subscriptions and call charges exorbitantly high, transmission quality was infamously bad and, to cap it all, DoCoMo was losing money.

TECHNICAL QUALITY UP, PRICE DOWN

Some managers might have decided to try and manage the crisis through cost cutting alone but CEO Kouji Ohboshi made heavy investments to develop both the transmission quality and DoCoMo's total coverage in Japan. Parallel to this, a pricing strategy was adopted with the aim of making mobile telephone services affordable for everyone. DoCoMo slashed prices and, although competitors followed, raised the number of its subscribers significantly – to the point where it has 44 million today. This growth was at the expense of what the industry refers to as ARPUs (average revenues per user) and so, from an early stage, it was clear to management that a strategy based solely on increasing call quality, market penetration and cutting prices was not sustainable.

One of the unusual characteristics of the Japanese mobile telephone market is that there is no direct channel by which mobile telephone ('handset') manufacturers can market their products. Every handset in Japan is provided as part of a service contract. In addition, Japanese law prevents DoCoMo from manufacturing equipment for retail sale.[72] Maybe this is what caused DoCoMo to take a broader view of innovation than many of the other service providers around the world and, in particular, not only to develop new services but also to take steps to strongly influence the design of manufacturers' handsets. Fortunately, through its history as part of NTT, external links to handset manufacturers such as NEC and Fujitsu were strong and this enabled DoCoMo to push for handsets with special features for specific market segments.

MATCHING SERVICES, SEGMENTS AND PRODUCTS

With ageing populations worldwide, many companies are trying to target what is often called the 'silver [haired] market' or 'silver segment' but DoCoMo has been particularly successful. Millions of new senior subscribers in recent years have adopted the Raku Raku ('easy-easy') range of mobile telephones, which have a set of features aimed at the particular needs of this segment. Today, 22 per cent of Japanese owners of mobile phones are over 50 years of age. The handsets were developed for DoCoMo by Fujitsu and have the following features:

- Larger keyboards;
- Larger text on the display and simpler user interfaces than most cell phones. In addition, a synthesized voice explanation can be enabled, for each key pressed;
- Colours available include 'traditional silver' and 'eternal pink'. The handset comes with a set of standard ringtone options to match users' tastes including the Japanese song 'Kawa no Nagare no Yoni', 'Raindrops keep falling on my head', and 'When the Saints go marching in';
- The latest version of the Raku Raku includes a pedometer function that measures how far the person carrying the phone walks, and sends daily emails to subscribers telling them how far they walked and how many calories they burned. According to the press release, this 'is particularly relevant to users wishing to regularly update their doctors with this data'.

In marketing the Raku Raku, DoCoMo has trodden a careful path. The company 'highlights its technical features but in its advertising always cleverly links these to

emotional benefits', says industry watcher Daniel Scuka of Wireless Watch Japan. 'For example, their adverts show grandparents operating the handsets easily and keeping in easy contact with their families ...and, of course, "age" is never directly mentioned in their marketing'. The deep understanding of older consumers has put DoCoMo and its suppliers in a strong position. A stream of new features with real benefits for silver segment customers is planned in 2009, such as advanced signal processing. This enables reduced background noise and can even slow down the speed at which someone's speech is heard on a handset.

It is not just for the silver segment that specific products have been deemed necessary. Japan has extensive mountains and many of its population enjoy outdoor activities, such as hill-walking and mountaineering. This is a segment that DoCoMo is also addressing with a corresponding handset, the 'Geofree II'. This has a set of features designed to appeal to those with an interest in outdoor activities:

- It is lightweight;
- It floats, is water resistant and shock-proof;
- It has a large (1.8 inch) liquid crystal display;
- It supports 'i-Area', a function that gives local information based on the unique base-station in which the handset is located;
- Matching its usage, the handset is marketed in colours such as 'active red' and 'dynamic blue'.

To understand its target segments, DoCoMo undertakes regular market research. Recent studies have looked at urban usage of mobile phones by 1000 adults,[73] how adolescents use wireless services and the particular functions they most want in their handsets – 600 young people were interviewed.[74] John Lagerling, a manager in the DoCoMo strategy team, says that the company is careful to make sure that its approach to market research is broad. 'We regularly conduct research outside the mobile telephone market, as we are interested to see how "lifestyle" changes affect customers' needs. Take for example the Geofree. Users' ideas provided the inspiration for the handset, supplemented with by research looking at the developments in the digital watch industry, where rugged designs combined with 'outdoor' features had been very successful. Combining a range of features in a handset offers outdoor sportspeople added safety – easy access to weather, local information and emergency services. You do not get these sort of insights for new products if you only research your own industry'.

Although the robust Geofree II, the handy Raku Raku, and handsets aimed at young people increase market penetration, this is not enough. 'Voice-based revenues' from these segments will not generate growth, as the Japanese market has matured and call rates remain an area of strong price competition. So non-voice services are also being developed.

NON-VOICE AND THE PORTFOLIO OF SERVICES

'Non-voice services have become a fundamental part of DoCoMo's strategy', says Scuka. Initially, these services were simple ones – such as downloadable, changeable ringtones (these have become a success story worldwide for service providers, generating

surprisingly high revenues). Once the downloadable ringtone feature had been strongly marketed and the market educated, further downloadable services were added such as '30K Applications', relatively small Java games, paid for on a one-off download fee. DoCoMo introduced their most prominent non-voice service in February 1999. This is 'i-mode' (Internet mode), a service that is generating significant revenues.

The idea behind i-mode involved making Internet access mobile and easy and now it is the world's largest mobile Internet service with 38 million subscribers. Handsets with an 'i' button and special menus were developed to meet DoCoMo's requirements for fast and efficient Internet usage. Not only the handsets have been optimized but also the websites that are available have been coordinated – including those 'authorized by DoCoMo' – and a new business model created. Internet access is priced on the amount of information downloaded rather than the access time and this, combined with the low basic rate of 300 yen ($2.4) a month for i-mode service, and one yen for a typical email, mean that it is good value for money.

Four categories of i-mode service are provided:

- 'Transaction' (e-commerce, banking and ticket booking through the websites of Amazon.com, Northwest Airlines and Citibank);
- 'Information' (for example, CNN news, Bloomberg market updates);
- 'Entertainment' (for example, Pokemon games, Hallmark e-greeting cards and hit songs);
- 'Databases' (for example, telephone directories, restaurant guides, etc.).

Each of these categories has a number of websites providing what the industry refers to as 'content'. DoCoMo has carefully selected content partners for the quality of their services, a willingness to optimize their websites for i-mode access, a willingness to accept site development risk and an interest in forming a partnership (in which DoCoMo brings more traffic to the content provider in return for a commission on the information charges levied).

Fast and easy access has been achieved by reprogramming websites using a subset of the programming language HTML, which increases access speed. The version of HTML used also allows new websites to be quickly created and this focus on keeping it simple has allowed independent programmers to create a wealth of unofficial i-mode content. Although 'unofficial' sites do not generate content commission for DoCoMo, the availability of extra content has been well received by customers and does generate a great deal of data traffic revenue for the carrier.

STIMULATING AND COORDINATING INNOVATION

Over 1100 engineers are employed in DoCoMo's R&D and spending on development has increased by four times since 1998. This investment pays for a very wide range of projects, from improvements to handsets to better networks to support the uninterrupted availability of services. DoCoMo's R&D has adopted a central coordinating role – including stimulating innovation – between the equipment manufacturers, content providers (websites) and platform vendors (network providers) as shown in Figure 1.11. In his role in the i-mode strategy department, Lagerling is responsible for

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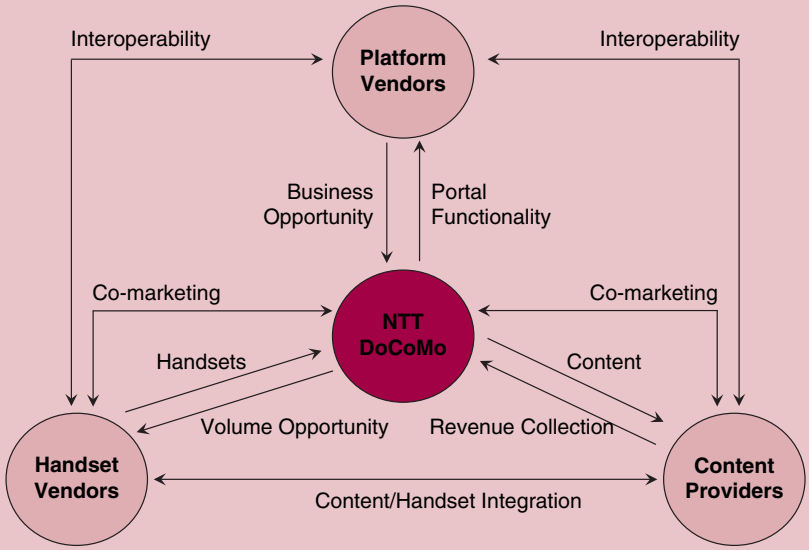

Figure 1.11 DoCoMo's i-mode Collaboration Concept – The 'Ecosystem'
Source: Adapted from: www.nttdocomo.com/corebiz/imode/why/strategy.html, used with permission.

managing some of these international collaborations. 'Our strategy is to view the value chain as an "ecosystem", in which all of the partners need to have a fair margin. If we as a company are too greedy, the system will not function well and relationships will suffer. Therefore, we share both risk and gain'.

From the figure it can be seen that handset vendors receive information from DoCoMo on specific product requirements and the potential sales volumes. This encourages close collaboration on handset NPD and often DoCoMo makes direct investments in such work, to ensure that new handsets are developed on time and these are 'integrated to the content' available. Close links with the content providers include joint work on website operability and co-marketing. The platform vendors are the third set of partners with which DoCoMo R&D has constant contact, as networks determine the availability and reliability of services. Availability is a key concern for Japanese users, as the country suffers from earth tremors and following these there is extreme usage of mobile telephones, as people check whether their relatives are alright. Therefore, network capacity needs to be planned to match these 'spikes' in usage. Overall, Lagerling says that 'subscribers judge the value of mobile Internet services on the basis of the quality of content'.

Mobile telephone service providers worldwide are looking for what they term 'killer applications' – services that mobile telephone users will use extensively and that will generate significant revenue growth for providers. DoCoMo is somewhat different in that it is not searching for one solution. Instead, it is looking to be the coordinator that

can constantly create the best mix of innovative services, handsets, content and reliable network platforms that provide customers with services that they will find essential to everyday life. 'We aim to provide our customers with the best possible range of services. That's only possible by developing our position within a sustainable network of innovative organizations', says Lagerling.