

UNIT-2

INNOVATION: NEW PRODUCT DEVELOPMENT

Process of New product development:

The process of new product or service development – moving from idea through to successful products, services, or processes – is a gradual process of reducing uncertainty through a series of problem-solving stages, moving through the phases of scanning and selecting and into implementation – linking market-and technology-related streams along the way.

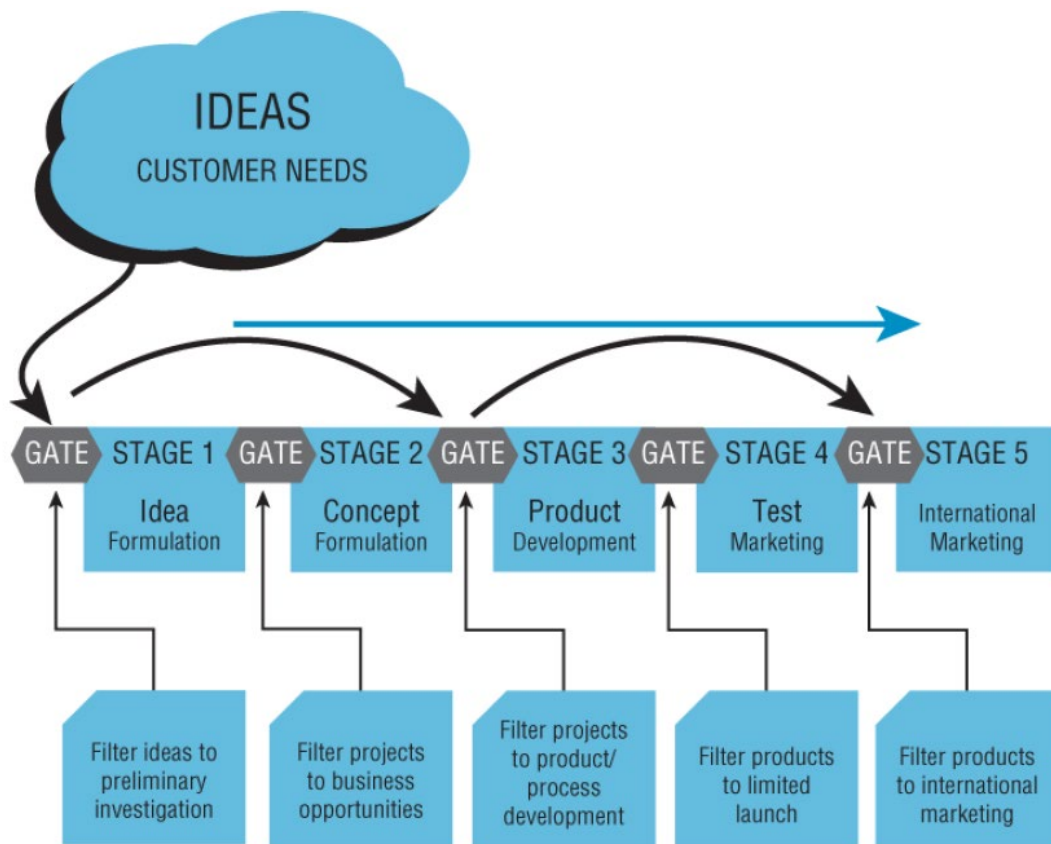


FIGURE 10.1 Stage-gate process for new product development.

As Cooper suggests, successful product development needs to operate some form of structured, staging process. As projects move through the development process, there are a number of discrete stages, each with different decision criteria or “gates,” which they must pass. Many variations to this basic idea exist (e.g., “fuzzy gates”), but the important point is to ensure that there is a structure in place that reviews both technical and marketing data at each stage. A common variation is the “development funnel,” which takes into account the reduction in uncertainty as the process progresses, and the influence of real resource constraints.

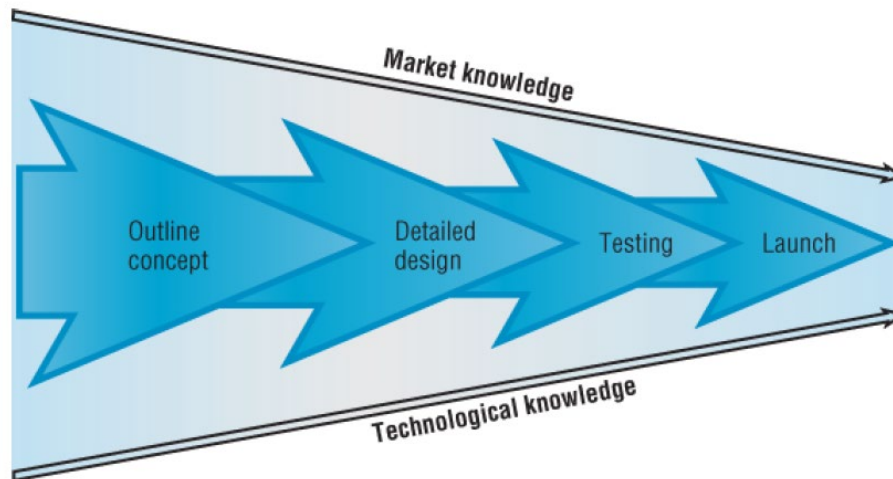


FIGURE 10.2 Development funnel model for new product development.

For ease of discussion and analysis, we will adopt a simplified four-stage model, which we believe is sufficient to discriminate between the various factors that must be managed at different stages:

1. Concept generation – identifying the opportunities for new products and services.
2. Project assessment and selection – screening and choosing projects that satisfy certain criteria.
3. Product development – translating the selected concepts into a physical product
4. Product commercialization – testing, launching, and marketing the new product.

Meaning and Classification of New Product:

According to Musselman and Jackson:

"A product is said to be a new product when it serves an entirely new function or makes a major improvement in a present function."

According to Kotler :

"New product mean original products, improved products, modified products and new brands which are developed by the firm through its own research and development efforts and includes those products which the consumers see as new. A new product is thus perceived differently by different people. It is a need satisfying concept with benefit for buyers bundle of need satisfying features, for marketers, a way to add value for intermediaries, an opportunity to design, for R&D and to assemble and process for production department.

According to Limpson and Darling :

"Product development involves the adding, dropping, and modification of item specifications in the product line for a given period of time, usually one year".

Development of new product:

The actual development of new products is the process of transforming business opportunities into tangible products.

Defining a new product:

Rogers and Shoemaker (1972) stated that whilst it may be difficult to establish whether a product is actually new as regards the passage of time, so long as it is perceived to be new it is new. This is significant because it illustrates that newness is a relative term. In the case of a new product, it is relative to what preceded the product. Moreover, the overwhelming majority of so-called new products are developments or variations on existing formats.

Table 1 Different examples of ‘newness’

- Changing the performance capabilities of the product (for example, a new, improved washing detergent)
- Changing the application advice for the product (for example, the use of the Persil ball in washing machines)
- Changing the after-sales service for the product (for example, frequency of service for a motor car)
- Changing the promoted image of the product (for example, the use of ‘green’-image refill packs)
- Changing the availability of the product (for example, the use of chocolate-vending machines)
- Changing the price of the product (for example, the newspaper industry has experienced severe price wars)

Table 2 A new product has different interpretations of new

- **New product A**
- A snack manufacturer introduces a new, larger pack size for its best-selling savoury snack. Consumer research for the company revealed that a family-size pack would generate additional sales without cannibalising existing sales of the standard-size pack.
- **New product B**

An electronics company introduces a new miniature compact disc player. The company has further developed its existing compact disc product and is now able to offer a much lighter and smaller version.

- **New product C**

A pharmaceutical company introduces a new prescription drug for ulcer treatment. Following eight years of laboratory research and three years of clinical trials, the company recently has received approval from the government's medical authorities to launch its new ulcer drug.

Classification of new products:

It is worthy of note, however, that only 10 per cent of all new products are truly innovative. These products involve the greatest risk because they are new to both the company and the marketplace. Most new product activity is devoted to improving existing products. At Sony, 80 per cent of new product activity is undertaken to modify and improve the company's existing products. The following classification identifies the commonly accepted categories of new product developments.

1. New-to-the-world products:

These represent a small proportion of all new products introduced. They are the first of their kind and create a new market. They are inventions that usually contain a significant development in technology, such as a new discovery, or manipulate existing technology in a very different way, leading to revolutionary new designs, such as Dyson's vacuum cleaner.

Examples: Apple's iPad, 3M's Post-it Notes and Guinness's 'in-can' system.

2. New product lines (new to the firm)

Although not new to the marketplace, these products are new to the particular company. They provide an opportunity for the company to enter an established market for the first time. For *Example:* Google, Sony and Microsoft have all entered the smartphone market to compete with market leaders Apple and Samsung.

3. Additions to existing lines (line additions)

This category is a subset of new product lines above. The distinction is that, whilst the company already has a line of products in this market, the product is significantly different from the present product offering, but not so different that it is a new line. The distinction between this category and the former is one of degree.

Example: Hewlett-Packard's colour ink-jet printer was an addition to its established line of ink-jet printers.

4. Improvements and revisions to existing products

These new products are replacements of existing products in a firm's product line.

Example: Hewlett-Packard's ink-jet printer has received numerous modifications over time and, with each revision, performance and reliability have been improved.

5. Cost reductions

This category of products may not be viewed as new from a marketing perspective, largely because they offer no new benefits to the consumer other than possibly reduced costs. The difference between this category and the improvement category is, simply, that a cost reduction may not result in a product improvement.

6. Repositioning

These new products are, essentially, the discovery of new applications for existing products. This has as much to do with consumer perception and branding as technical development. This is, nonetheless, an important category. Following the medical science discovery that aspirin thins blood, for example, the product has been repositioned from an analgesic to an over-the-counter remedy for blood clots and one that may help to prevent strokes and heart attacks.

In practice, most of the projects in a firm's portfolio are improvements to products already on the market, additions to existing lines (line extensions) and products new to the firm, but already manufactured by competitors (new product lines). Figure 14.6 illustrates the average project portfolio within firms. Here, 70 per cent of new products are improvements, cost reductions and additions to existing lines.

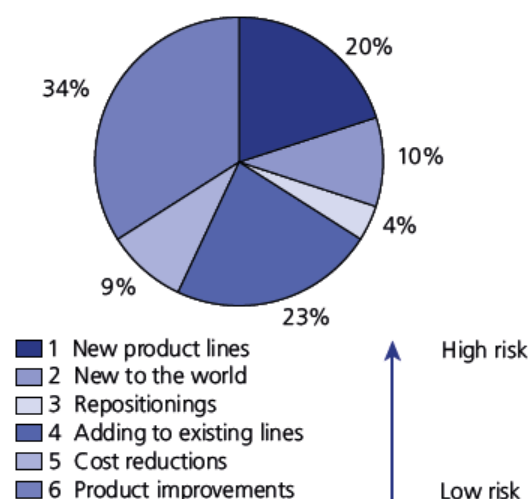


Figure 14.6 The average new product portfolio

7. Repositioning and brand extensions

The concepts of brand extension and repositioning appear as two distinct elements within classifications of new product development. When it comes to brand extension Tauber's (1981)

growth matrix categorizes a firm's growth opportunities using two different dimensions: product category and brand name used. The resulting matrix is shown in Figure 14.7.

		Product category	
		New	Existing
Brand name	New	New brand	Flanker
	Existing	Brand extension	Line extension

Role of Innovation in New Product Development:

Abernathy and Utterback (1978) suggested that product innovations are soon followed by process innovations in what they described as an industry innovation cycle. A similar notion can be applied to the categories of new products. The cycle can be identified in a wide variety of industries.

1. New-to-the-world products (Category 1) are launched by large companies with substantial resources, especially technical or marketing resources.
2. Other large firms react swiftly to the launch of such a product by developing their own versions (Categories 2 and 3).
3. Many small and medium-sized companies participate by developing their own new products to compete with the originating firm's product (Category 4). Substantial success and growth can come to small companies that adopt this strategy.
4. As competition intensifies, companies will compete in the market for profits. The result is determined efforts to reduce costs in order to improve these profits, hence there are many cost reductions (Category 5).

Key Factors or considerations in New Product Development Strategy:

It is more useful to view the new product development process as a series of linked activities. Figure 17.2 attempts to identify and link together most of the activities that have been associated with the NPD process over the years. This diagram represents a generic process model of NPD.

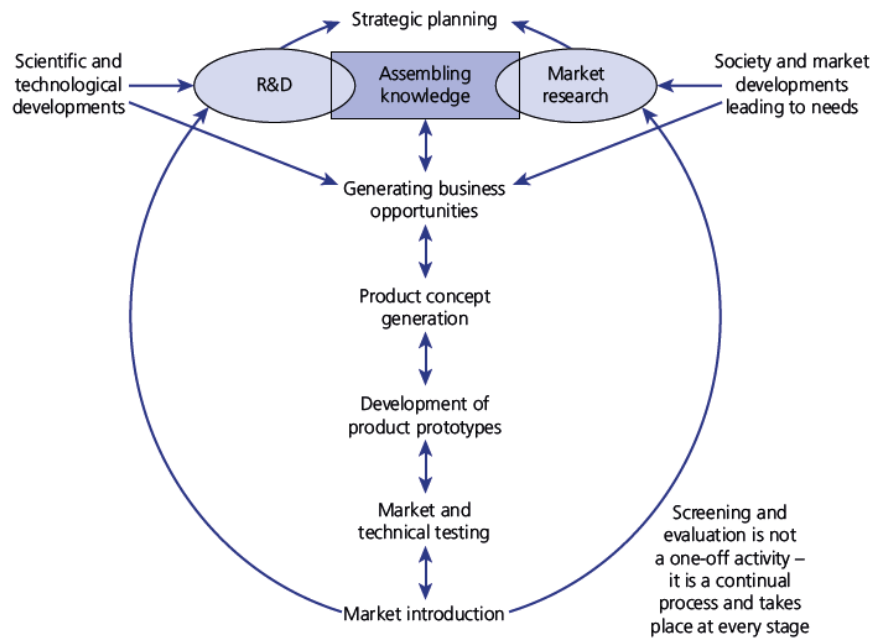


Figure 17.2 The NPD process as a series of linked activities

The range of product development strategies that are open to a company introduces the notion that a new product can take many forms. These strategies are given in the below figure.

Increasing technology newness →			
Products objectives	No technological change	Improved technology	New technology To acquire scientific knowledge and production skills new to the company
No market change	Sustain	Reformulation To maintain an optimum balance of cost, quality and availability in the formulae of present products	Replacement To seek new and better ingredients of formulation for present company products in technology not now employed
Strengthened market To exploit more fully the existing markets for the present company's products	Remerchandising To increase sales to consumers of types now served by the company	Improved product To improve present products for greater utility and merchandisability to consumers	Product line extension To broaden the line of products offered to present consumers through new technology
New market To increase the number of types of consumer served by the company	New use To find new classes of consumer that can utilise present company products	Market extension To reach new classes of consumer by modifying present products	Diversification To add to the classes of consumer served by developing new technology knowledge

Figure 14.4 New product development strategies

Key factors or Strategies:

It should be clear that establishing a direction for a business and the selection of strategies to achieve its goals form an ongoing, evolving process that is frequently subject to change. This is particularly evident at the product strategy level (Figure 14.2 illustrates the main inputs into the decision making process). The process of product strategy is the creative process of recognizing genuine business opportunities that the business might be able to exploit. It is commonly referred to as ‘opportunity identification’.



Figure 14.2 Main inputs into the decision-making process

The following factors play an important role when developing new product development strategy.

Ongoing corporate planning:

In large organizations this can be a very formal activity involving strategic planners and senior managers with responsibility for setting the future direction of the business. In smaller organizations this activity may be undertaken by the owner of the business in an informal, even ad hoc way. For many businesses it is somewhere in the middle of these two extremes. The effects of any corporate planning may be important and long term. For example, the decision by a sports footwear manufacturer to exit the tennis market and concentrate on the basketball market due to changing social trends will have a significant impact on the business.

Ongoing Market planning:

Decisions by market planners may have equally significant effects. For example, the realization that a competitor is about to launch an improved tennis shoe that offers additional benefits may force the business to establish five new product development projects. Two of these projects may be established to investigate the use of new materials for the sole, one could be used to

develop a series of new designs, one could look at alternative fastenings and one could be used to reduce production costs.

Ongoing technology management:

In most science- and technology-intensive industries, such as the pharmaceutical and computer software industries, this activity is probably more significant than ongoing market planning. Technology awareness is very high. The continual analysis of internal R&D projects and external technology trawling will lead to numerous technical opportunities that need to be considered by the business. Say that a recent review of the patent literature has identified a patent application by one of the company's main competitors. This forces the business to establish a new project to investigate this area to ensure that it is aware of any future developments that may affect its position.

Opportunity analysis/serendipity:

In addition to the inputs that have been classified above, there are other inputs and opportunities that often are labelled miscellaneous or put down to serendipity.

Discoveries may not be expected, but in the words of Louis Pasteur, 'chance favors the prepared mind'.

A comprehensive list of several factors that influence the success of new product development is given in below figure.

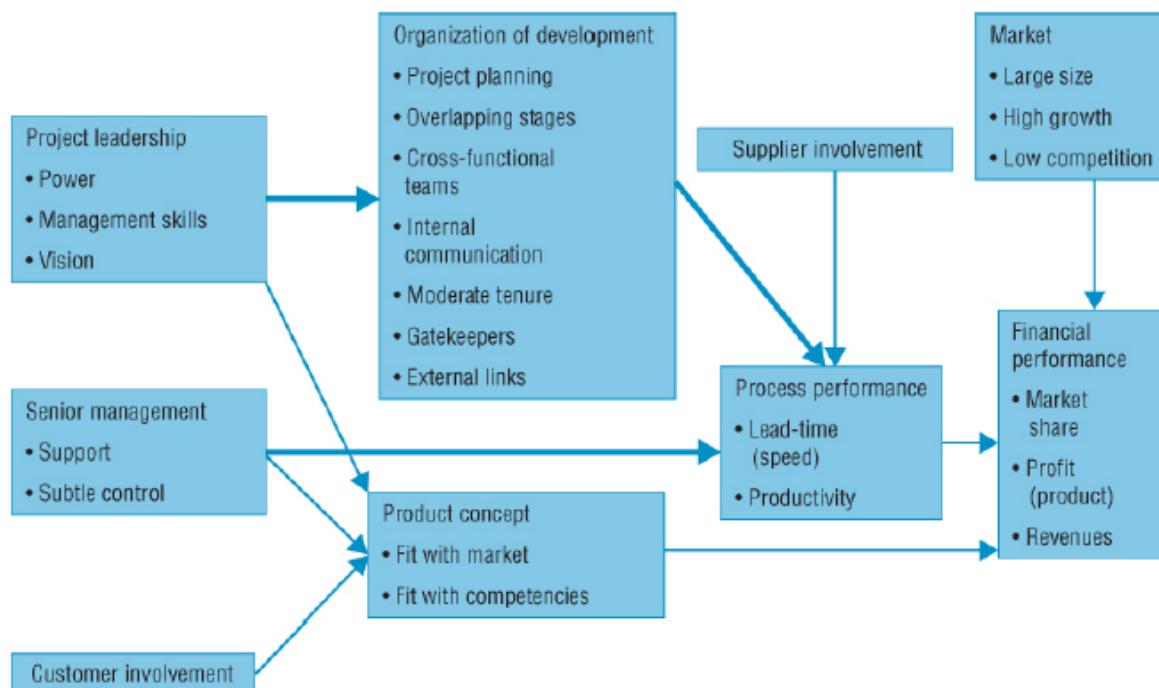


FIGURE 10.4 Key factors influencing the success of new product development.

Organizational Growth through New Product Development:

The interest expressed by many companies in the subject of developing new products is hardly surprising, given that the majority of businesses are intent on growth. The development of new products provides an opportunity for growing the business. It is worth reminding ourselves that new product development is only one of many options available to a business keen on growth.

One of the clearest ways of identifying the variety of growth options available to a business is using Ansoff's (1968) directional policy matrix. This well-known matrix, shown in Figure 14.3, combines two of the key variables that enable a business to grow: an increase in market opportunities and an increase in product opportunities. Within this matrix, new product development is seen as one of four available options. Each of the four cells considers various combinations of product–market options. Growth can be achieved organically (internal development) or through external acquisition. A criticism of this matrix is that it adopts an environmental perspective that assumes that opportunities for growth exist – they may not. Indeed, often consolidation and retrenchment need to be considered, especially in times of economic downturn. Each of the cells in the matrix is discussed briefly below.

	Current products	New products
Current markets	1 Market penetration strategy	3 Product development strategy
New markets	2 Market development strategy	4 Diversification strategy

Figure 14.3 Ansoff matrix

Source: Adapted from Ansoff, I. (1965) *Corporate Strategy*, Penguin, Harmondsworth; (1968) *Toward a Strategy of the Theory of the Firm*, McGraw-Hill, New York.

- **Market penetration**

Opportunities are said to exist within a business's existing markets through increasing the volume of sales. Increasing the market share of a business's existing products by exploiting the full range of marketing-mix activities is the common approach adopted by many companies. This may include branding decisions. For example, the cereal manufacturer Kellogg's has increased the usage of its cornflakes product by promoting it as a snack to be consumed at times other than at breakfast.

- **Market development**

Growth opportunities are said to exist for a business's products through making them available to new markets. In this instance, the company maintains the security of its existing products but opts to develop and enter new markets. Market development can be achieved by opening up new segments. For example, Mercedes decided to enter the small car market (previously the company had always concentrated on the executive or luxury segment). Similarly, companies may decide to enter new geographic areas through exporting.

- **Product development**

Ansoff proposes that growth opportunities exist through offering new or improved products to existing markets. This is the subject of this chapter and, as will become clear, trying to establish when a product is new is sometimes difficult. Nonetheless, virtually all companies try to ensure that their products are able to compete with the competition by regularly improving and updating their existing products. This is an ongoing activity for most companies.

- **Diversification**

It hardly needs to be said that opportunities for growth exist beyond a business's existing products and markets. The selection of this option, however, would be significant in that the business would move into product areas and markets in which it currently does not operate. Many companies try to utilise either their existing technical or commercial knowledge base. For example, Flymo's knowledge of the electric lawnmower market enabled it to diversify into a totally new market. Indeed, the introduction of its GardenVac product led to the creation of the 'garden-tidy' product market. Whilst this is an example of organic growth, many companies identify diversification opportunities through acquisition.

Additional opportunities for diversified growth exist through forward, backward and horizontal diversification. A manufacturer opening retail outlets is an example of forward integration. Backward integration is involvement in activities that are inputs to the business, for example a manufacturer starting to produce components. Horizontal diversification is buying up competitors.

Managing Innovations

On the one hand, companies require stability and static routines to accomplish daily tasks efficiently and quickly. This enables the organization to compete today. For example, the processing of millions of cheques by banks every day or the delivery of food by multiples to

their retail outlets all over the country, demands high levels of efficiency and control. On the other hand, companies also need to develop new ideas and new products to be competitive in the future. Hence they need to nurture a creative environment where ideas can be tested and developed. This poses one of the most fundamental problems for management today.

Companies have to ensure that their products are carefully manufactured to precise specifications and that they are delivered for customers on time day after day. In this hectic, repetitive and highly organized environment, the need to squeeze out any slack or inefficiencies is crucial to ensure a firm's costs are lower than their competitors'. Without this emphasis on cost reductions, a firm's costs would simply spiral upwards and the firm's products and services would become uncompetitive. But, long-term economic growth is dependent on the ability of firms to make improvements to products and manufacturing processes. This means that firms need to somehow make room for creativity and innovation, that is, allow slack in the system. The firm needs to ensure there is a constant pressure to drive down costs and improve efficiency in its operations. At the same time, it needs to provide room for new product development and making improvements. The most obvious way forward is to separate production from research and development (R&D) but, whilst this usually is done, there are many improvements and innovations that arise out of the operations of the firm. Indeed, the operations of the firm provide enormous scope for innovation.

The basic problem confronting an organization is to engage in sufficient exploitation to ensure its future viability. Exploitation is about efficiency, increasing productivity, control, certainty and variance reduction. Exploration is about search, discovery, autonomy, innovation and embracing variation. Ambidexterity is about doing both.

In organizational terms, dynamic capabilities are at the heart of the ability of a business to be ambidextrous – to compete simultaneously in both mature and emerging markets – to explore and exploit. Ambidexterity entails not only separate structure sub-units for exploration and exploitation, but also different competencies, systems, incentives, processes and cultures – each internally aligned.

Organizational characteristics that facilitate the innovation process:

1. Growth orientation

Companies that are seeking growth are more likely to be interested in innovation than those that are not. For those companies whose objective is to grow the business, innovation provides a means to achieving growth. This does not imply that they make large profits one year then huge losses the next, but they actively plan for the long term.

2. Organizational heritage and innovation experience

A firm's heritage and culture is, undisputedly, considered crucial to the firm's technological capabilities, as it fosters and encourages widespread recognition of the need to innovate. In other words, it is the ability of the firm to convert technology into products that sets it apart from its competitors.

3. Vigilance and external links

Vigilance requires continual external scanning, not just by senior management but also by all other members of the organization. Within the research and development department scientists and engineers will spend a large amount of their time reading the scientific literature in order to keep up to date with the latest developments in their field. Collecting valuable information is one thing, but relaying it to the necessary individuals and acting on it are two necessary, associated requirements. An open communication system will help to facilitate this. Extensive external linkages with the market, competitors, customers, suppliers and others will all contribute to the flow of information into the firm.

4. Commitment to technology and R&D intensity

Most innovative firms exhibit patience in permitting ideas to germinate and develop over time. This also needs to be accompanied by a commitment to resources in terms of intellectual input from science, technology and engineering. It seems almost obvious to state that a firm that invests more in R&D will increase its total innovative output. But the relationship between R&D expenditures as a percentage of sales and commercial success is less clear-cut.

5. Acceptance of risks

It means the willingness to consider carefully risky opportunities. It also includes the ability to make risk assessment decisions, to take calculated risks and to include them in a balanced portfolio of projects, some of which will have a low element of risk and some a high degree of risk.

6. Cross-functional cooperation and coordination within organizational structure

Interdepartmental conflict is a well-documented barrier to innovation. The relationship between the marketing and R&D functions has received a great deal of attention in the research literature.

Scientists and technologists can be fascinated by new technology and may sometimes lose sight of the business objective. Similarly, the marketing function often fails to understand the technology involved in the development of a new product. Research has shown that the presence of some conflict is desirable, probably acting as a motivational force.

7. Receptivity

The capability of the organization to be aware of, identify and take effective advantage of externally developed technology is key. Most technology-based innovations involve a combination of several different technologies. It would be unusual for all the technology to be developed in-house. Indeed, businesses are witnessing an increasing number of joint ventures and alliances, often with former competitors discuss ideas and be creative.

8. Space for creativity

Whilst organizations place great emphasis on the need for efficiency, there is also a need for a certain amount of slack to allow individuals room to think, experiment,

9. Strategy towards innovation

For the firm and those within it, however, it means that the firm has developed plans for the future regarding selection of markets to enter and which technologies may be appropriate for the firm. Recognizing that the organization possesses skills, technology and knowledge and that there are appropriate markets that suit these, requires careful planning, probably utilizing a project portfolio approach. This will involve further long-term planning, establishing a range of projects, some of which will subsequently provide opportunities that the firm will be able to exploit.

10. Diverse range of skills

Organizations require a combination of specialist skills and knowledge in the form of experts in, say, science, advertising or accountancy and generalist skills that facilitate cross-fertilization of the specialist knowledge. In addition, they require individuals of a hybrid nature who are able to understand a variety of technical subjects and facilitate the transfer of knowledge within the company. It is the ability to manage this diversity of knowledge and skills effectively that lies at the heart of the innovation process.

Organizational structures and Innovation

There have been numerous useful studies exploring the link between organizational structure and innovative performance.

‘Organic’, flexible structures, characterized by the absence of formality and hierarchy, support innovation more effectively than do ‘mechanistic’ structures. The latter are characterized by long chains of command, rigid work methods, strict task differentiation, extensive procedures and a well-defined hierarchy.

In general, an organic organization is more adaptable, more openly communicating, more consensual and more loosely controlled. As Table 4.3 indicates, the mechanistic organization tends to offer a less suitable environment for managing creativity and the innovation process.

Formalization

There is some evidence of an inverse relationship between formalization and innovation. That is, an increase in formalization of procedures will result in a decrease in innovative activity. It is unclear, however, whether a decrease in procedures and rules would lead to an increase in innovation.

Complexity:

The term complexity here refers to the complexity of the organization. In particular, it refers to the number of professional groups or diversity of specialists within the organization. For example, a university, hospital or science-based manufacturing company would represent a complex organization. This is because, within these organizations, there would be several professional groups.

Centralization:

Centralization refers to the decision-making activity and the location of power within an organization. The more decentralized an organization, the fewer levels of hierarchy are usually required. This tends to lead to more responsive decision making closer to the action.

Organizational size:

Size is a proxy variable for more meaningful dimensions, such as economic and organizational resources, including number of employees and scale of operation. Below a certain size, however, there is a major qualitative difference.

Table 4.3 Organic versus mechanistic organisational structures

Organic	Mechanistic
1 Channels of communication Open with free information flow throughout the organisation	1 Channels of communication Highly structured, restricted information flow
2 Operating styles Allowed to vary freely	2 Operating styles Must be uniform and restricted
3 Authority for decisions Based on the expertise of the individual	3 Authority for decisions Based on formal line management position
4 Free adaptation By the organisation to changing circumstances	4 Reluctant adaptation With insistence on holding fast to tried and true management principles, despite changes in business conditions
5 Emphasis on getting things done Unconstrained by formally laid out procedures	5 Emphasis on formally laid down procedures Reliance on tried and true management principles
6 Loose, informal control With emphasis on norm of cooperation	6 Tight control Through sophisticated control systems
7 Flexible on-job behaviour Permitted to be shaped by the requirements of the situation and personality of the individual doing the job	7 Constrained on-job behaviour Required to conform to job descriptions
8 Decision making Participation and group consensus used frequently	8 Decision making Superiors make decisions with minimum consultation and involvement of subordinates

Source: Slevin, D.P. and Covin, J.G. (1990) Juggling entrepreneurial style and organizational structure: how to get your act together, *Sloan Management Review*, Winter, 43–53.

Innovation management tools and techniques:

Developing successful innovative products does not always mean using the latest patented technology. Being successful at managing innovation is rather a way of thinking and finding creative solutions within the company. With this in mind, innovation management can benefit from well-established management principles to help the leaders of an organization sustain innovativeness and even recover from a period of stagnation, if applied correctly and vigorously.

We need to look at the range of tools and techniques that have been shown to be helpful to firms as they manage the innovation process. There are, however, some principles of good practice and Table 4.5 illustrates a wide range of tools and techniques. Many of these are very well known and have been used for many years, hence there is no need for an explanation of each one.

The key challenges in innovation for any manager or leader are (Deschamps, 2003):

- the urge to do new things;
- the obsession to redefine customer value;
- the courage to take risks;
- an ability to manage risk;
- speed in spotting opportunities and project execution;
- A shift in focus and mindset from business optimization to business creation.

Innovation Audit:

As in financial auditing, where the purpose is to determine the health of the firm, so too can firms undertake an innovation audit. The purpose of which is to uncover areas of strength and weakness and to see how to improve the firm's performance.

A simple but, nonetheless, useful audit is shown in Figure 4.9. This has been shown to provide a useful starting point for senior managers to consider how best to improve and where to invest resources.

Self-assessment of your organisation's ability to facilitate innovation		
1 Growth orientation	High	Low
2 Vigilance	High	Low
3 Commitment to technology	High	Low
4 Assemble knowledge	High	Low
5 Acceptance of risks	High	Low
6 Cross-functional cooperation	High	Low
7 Receptivity	High	Low
8 'Slack'	High	Low
9 Adaptability	High	Low
10 Diverse range of skills	High	Low

Figure 4.9 Innovation audit

Table 4.5 Innovation management tools and methodologies

Innovation management typologies	Methodologies and tools
Knowledge and technology management	Knowledge audits Knowledge mapping Technology road maps Industry foresight panels Document management IPR management
Market intelligence	Technology watch/technology search Patents analysis Business intelligence Competitor analysis Trend analysis Focus groups Customer relationship management (CRM)
Cooperation and networking	Groupware Team-building Supply chain management Industrial clustering
Human resources management	Teleworking Corporate intranets Online recruitment e-Learning Competence management
Interface management	R&D – marketing interface management Concurrent engineering
Creativity development	Brainstorming Lateral thinking TRIZ* Scamper method Mind mapping
Process improvement	Benchmarking Workflow Business process re-engineering Just in time
Innovation project management	Project management Gantt charts Project appraisal Stage-gate processes Project portfolio management
Design and product development	CAD systems Rapid prototyping Usability approaches Quality function deployment Value analysis NPD computer decision models
Business creation	Business simulation Business plan Spin-off from research to market

Innovation Management (Other concepts – additional material)

Figure 1.6 sets it out as a graphic that highlights the key questions around managing innovation.

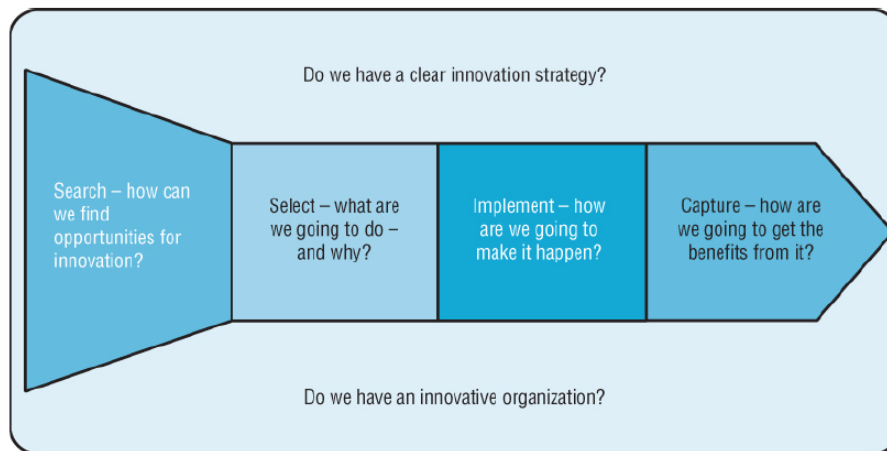


FIGURE 1.6 Simplified model of the innovation process.

Successful innovation management is primarily about building and improving effective routines. Learning to do this comes from recognizing and understanding effective routines (whether developed in-house or observed in another enterprise) and facilitating their emergence across the organization. And this learning process implies a building up of capability over time. It's easy to make the assumption that because there is a rich environment full of potential sources of innovation that every organization will find and make use of these. The reality is, of course, that they differ widely in their ability to innovate – and this capability is clearly not evenly distributed across a population. For example, some organizations may simply be unaware of the need to change, never mind having the capability to manage such change. Such firms (and this is a classic problem of small firm growth) differ from those that recognize in some strategic way the need to change, to acquire and use new knowledge but lack the capability to target their search, or to assimilate and make effective use of new knowledge once identified. Others may be clear about what they need but lack the capability in finding and acquiring it. And others may have well-developed routines for dealing with all of these issues and represent resources on which less experienced firms might draw – as is the case with some major supply chains focused around a core central player.

Building and Developing Routines across the Core Process

In the context of innovation management, we can see the same hierarchical relationship in developing capability as there is in learning to drive. Basic skills are behaviours associated with actions such as planning and managing projects or understanding customer needs. These

simple routines need to be integrated into broader abilities, which taken together make up an organization's capability in managing innovation. Table 2.8 gives some examples.

TABLE 2.8	
Core Abilities in Managing Innovation	
Basic Ability	Contributing Routines
Recognizing	Searching the environment for technical and economic clues to trigger the process of change
Aligning	Ensuring a good fit between the overall business strategy and the proposed change – not innovating because it is fashionable or as a knee-jerk response to a competitor
Acquiring	<p>Recognizing the limitations of the company's own technology base and being able to connect to external sources of knowledge, information, equipment, and so on</p> <p>Transferring technology from various outside sources and connecting it to the relevant internal points in the organization</p>
Generating	Having the ability to create some aspects of technology in-house – through R&D, internal engineering groups, and so on
Choosing	Exploring and selecting the most suitable response to the environmental triggers, which fit the strategy and the internal resource base/external technology network
Executing	<p>Managing development projects for new products or processes from initial idea through to final launch</p> <p>Monitoring and controlling such projects</p>
Implementing	Managing the introduction of change – technical and otherwise – in the organization to ensure acceptance and effective use of innovation
Learning	Having the ability to evaluate and reflect upon the innovation process and identify lessons for improvement in the management routines
Developing the organization	Embedding effective routines in place – in structures, processes, underlying behaviors, and so on

Learning to Manage Innovation:

We can imagine a simple typology (see Figure 2.3), ranging from organizations that are “unconsciously ignorant” (they don't know that they don't know) through to high-performing Knowledge-based enterprises.

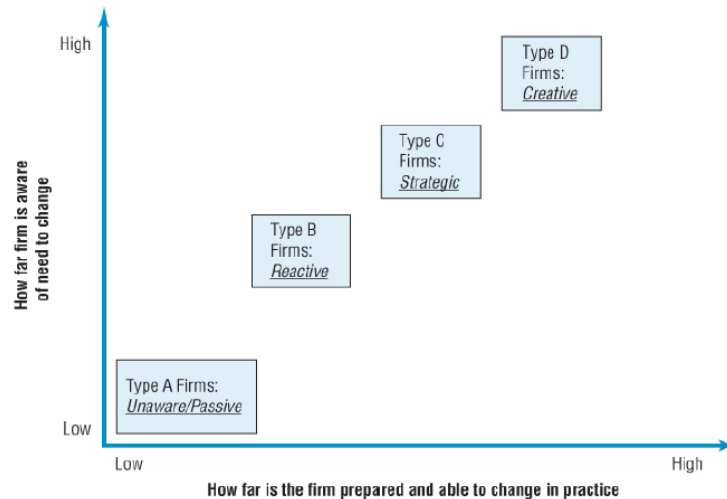


FIGURE 2.3 Groups of firms according to innovation capability.

Type A firms can be characterized as being “unconscious” or unaware about the need for innovation. They lack the ability to recognize the need for change in what may be a hostile environment and where technological and market know-how is vital to survival. They do not know where or what they might improve, or how to go about the process of technology upgrading and, as a result, are highly vulnerable. For example, if low-cost competitors enter – or the market demands faster delivery or higher quality – they are often not able to pick up the relevant signals or respond quickly. Even if they do, they may waste scarce resources by targeting the wrong kinds of improvement.

Type B firms recognize the challenge of change but are unclear about how to go about the process in the most effective fashion. Because their internal resources are limited – and they often lack key skills and experience, they tend to react to external threats and possibilities, but are unable to shape and exploit events to their advantage. Their external networks are usually poorly developed – for example, most technological know-how comes from their suppliers and from observing the behaviour of other firms in their sector.

Type C firms have a well-developed sense of the need for change and are highly capable of implementing new projects and take a strategic approach to the process of continuous innovation. They have a clear idea of priorities as to what has to be done, when, and by whom, and also have strong internal capabilities in both technical and managerial areas, and can implement changes with skill and speed. These firms benefit from a consciously developed strategic framework in terms of search, acquisition, implementation, and improvement of new knowledge. But they lack the capabilities for radical innovation – to redefine markets through new technology or to create new market opportunities.

Type D firms operate at the international knowledge frontier and take a creative and proactive approach to exploiting technological and market knowledge for competitive advantage and do so via extensive and diverse networks. They are at ease with modern strategic frameworks for innovation and take it upon themselves to “rewrite” the rules of the competitive game with respect to technology, markets, and organization. Strong internal resources are coupled with a high degree of absorptive capacity, which can enable diversification into other sectors, where their own skills and capabilities bring new advantages and redefine the ways in which firms traditionally compete or wish to compete.

Learned About Managing Innovation:

- Learning and adaptation are essential in an inherently uncertain future – so innovation is an imperative. Innovation is about interaction of technology, market, and organization.
- Innovation can be linked to a generic process that all enterprises – public and private sectors – have to find their way through.
- Routines are learned patterns of behaviour, which become embodied in structures and procedures over time. As such, they are hard to copy and highly firm-specific.
- Innovation management is the search for effective routines – in other words, it is about managing the learning process toward more effective routines to deal with the challenges of the innovation process.
- We have also argued that innovation management is not a matter of doing one or two things well, but about good all-round performance. There are no, single, simple magic bullets but a set of learned behaviors. In particular, we have identified four clusters of behavior, which we feel represent particularly important routines. Successful innovation is strategy-based:
 - depends on effective internal and external linkages
 - requires effective enabling mechanisms for making change happen
 - Only happens within a supporting organizational context.

How to Manage Innovation:

We can think of the innovation process shown in Figure 15.1 as a learning loop – picking up signals that trigger a response. As we’ve suggested, organizations should undertake some form of review of innovation projects in order to help them develop both technological and managerial capabilities. One way of representing the learning process that can take place in organizations is to use a simple model of a learning cycle (Figure 15.2).

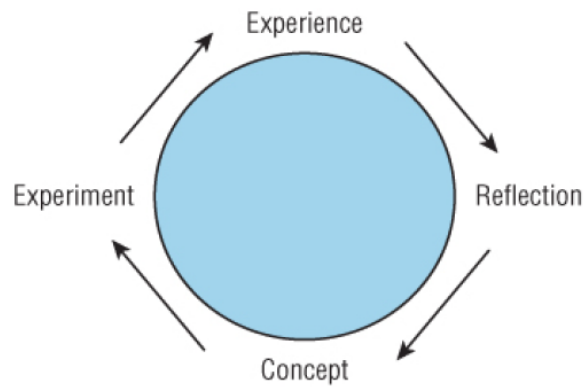


FIGURE 15.2 Kolb's cycle of experiential learning.

Structured and challenging reflection on the process – what happened, what worked well, what went wrong, and so on?

Conceptualization – capturing and codifying the lessons learned into frameworks and eventually procedures to build on lessons learned

Experimentation – the willingness to manage things differently next time, to see if the lessons learned are valid.

Honest capture of **experience** (even if this has been a costly failure) so we have raw material on which to **reflect**.

Effective learning from and about innovation management depends on establishing a learning cycle around these themes. In that sense, it is an “adaptive” learning system, helping the organization survive and grow within its environment.

But making sure that this adaptive system works well also requires a second learning loop, one that can “reprogram” the system to tune it better to a changing environment and as a result of lessons learned about how well it works. (It’s a little like a central heating or air-conditioning system – there is an adaptive loop that responds when the temperature gets hotter or colder in the room by modifying the output of the heater or air-conditioning unit.

This kind of “double loop” or generative learning is at the heart of the innovation management challenge. How can we periodically step back and review how well the overall system is working and adapt it to new circumstances? This is the challenge of building “dynamic capability”.