Technology and Innovation

Only study guide for MNE3033

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Reviewer/Critical reader
Dr René Pellissier

Department of Business Management
School of Management Sciences
University of South Africa, Pretoria

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MNB STYLE

CONTENTS

ORIENTATION

1 WELCOME

Example:

Dear Student

It is a great pleasure to welcome you to this module on technology and innovation. To make sure that you share our enthusiasm for this field of study, we urge you to read this overview thoroughly. Refer back to it as often as you need to, since it will certainly make studying this module a lot easier.

The field of Innovation and Technology is extremely dynamic and challenging. The learning content and activities contained in this learning guide will therefore provide you with opportunities to explore the latest developments in this field and help you to discover the field as it is practised today. We hope that you will enjoy the module.

2 PURPOSE OF THE MODULE

The purpose of this module is to help students acquire a sense of understanding and appreciation of Innovation and Technology and the critical role these play in development and in business.

3 LINK TO OTHER COURSES/MODULES

This module is not a "stand alone module". It forms part of the BCom Management degree or the specialisation in Entrepreneurship. You need to pass module MNE202Y before you can do this module. Apart from that, you will find lots of exciting ways to implement what you learn here in your other studies and in business.

4 MODULE OUTCOMES

When you have worked through this module, you will be able to

— explain what innovation is
— explain the basic theories, sources and process of innovation
— explain the notion of intellectual property (IP)
— discuss the management of innovation in terms of technologies, strategies and organising

5 FRAMEWORK OF THE MODULE

The framework of this module is as follows:

Topic 1 What is Innovation?	**Topic 2** What does Innovation involve?	**Topic 3** How do you manage Innovation?
Study unit 1: Introduction to Innovation (Chapter 1 in Smith)	Study unit 4: Theories of Innovation (Chapter 4 in Smith)	Study unit 8: Technology strategy (Chapter 8 in Smith)
Study unit 2: Types of Innovation (Chapter 2 in Smith)	Study unit 5: Sources of Innovation (Chapter 5 in Smith)	Study unit 9: Entrepreneurs (Chapter 9 in Smith)
Study unit 3: Technological Change (Chapter 3 in Smith)	Study unit 6: The process of Innovation (Chapter 6 in Smith)	Study unit 10: Funding Innovation (Chapter 10 in Smith)
	Study unit 7: Intellectual Property (Chapter 7 in Smith)	Study unit 11: Organising for Innovation (Chapter 11 in Smith)

6 COMPOSITION OF THE STUDY/LEARNING PACKAGE FOR THE MODULE

The study material is made up of the study guide, textbook and study material, all of which will be provided during the course of your studies. You are welcome to consult the websites listed at the end of this module for more information.

7 The approach to teaching and learning in this module

7.1 Suggestions on how to approach your studies in this module

Tutorial Letter 101 and the learning guide will explain to you how to approach the learning. We shall also tell you how to use all the other resources (eg SMS, peer collaboration groups, learning centres and career counselling). As a distance

education student, it is important that you know whom to contact when you have academic and administrative enquiries, and you also need to know how to manage your time, etc.

In the learning guide we make a definite distinction between the parts of the prescribed book that you have to read and those parts that you have to study.

— **Studying**

The sections that you have to study are clearly indicated and form the basis of assignments and examinations. To be able to do the activities and assignments for this module, to achieve the learning outcomes and to be successful in the examination, you will need an in-depth understanding of the content of these sections in the learning guide and prescribed book. To get an in-depth understanding of the learning material, you must, firstly, accept responsibility for your own studies. Secondly, learning is not the same as memorising. In the examination, you will be expected to show that you understand and can apply the information, not just remember it.

— **Reading**

The learning guide will sometimes tell you to read a certain section in the prescribed book or the learning guide. This means that you should take note of the table of contents of either the prescribed book or learning guide, because the table of contents usually contains useful background information or offers another perspective or further examples. It will give you some context, improve your ability to take notes and improve your understanding of the study material.

You will need to spend at least 120/240 hours on this module [depending on whether you are doing a semester module or a year course]. This includes approximately 40/80 hours of reading and studying the learning material, 40/80 hours of activities and assignments, and 40/80 hours of preparation for the examination. We encourage you to follow the proposed time schedule provided in Tutorial Letter 101.

You may wish to read more widely than just the learning guide and the prescribed book. When you read information in the prescribed book or in other sources, you should not simply accept it without question. Indeed, we urge you to question all the ideas and information that you come across.

To test your understanding of the ideas that you learn about in this module, you should try to apply them to real situations.

7.2 Importance of completing activities, assignments and self-assessment questions

7.2.1 Activities

You will come across various types of activities in this learning guide:

— reflecting on work covered

— completing assessment questions
— doing self-evaluation

If you want to succeed in passing this module, it is crucial that you complete all the activities in the learning guide and the assignments. Firstly, the activities in the learning guide will assist in your understanding of the work by testing your specific knowledge.

7.2.2 Assignments

Assignments for this module will be provided in Tutorial Letter 101. The completion of assignments is crucial in helping you achieve the learning outcomes. By completing the assignments, you will get a feel for the type of question you can expect in the examination and obtain first-hand feedback from the lecturer. The assignment questions also give you the opportunity to apply the theory to a case study or a practical situation related to your own workplace. With each assignment you will be informed of the purpose of the assignment and which module outcomes will be assessed by the assignment. We will also supply the criteria for assessment so that you can determine your knowledge base in the subject.

Details of the assignments with their associated assessment criteria and the format and requirements of the examination are provided in Tutorial Letter 101.

7.2.3 Assessment questions

At the end of each section you will find a list of possible assessment questions based on the work done in that section. We advise you to work through these questions carefully, since they give you the opportunity to practise writing examination questions. Self-assessment plays a very important role in the mastery of learning outcomes and you should therefore complete the self-assessment activities in the learning guide.

You will find most of the answers to these questions in the learning material in the learning guide and prescribed book. We believe that you should not have any unpleasant surprises in the examination. It is therefore in your own interests to work through these assessment questions.

7.2.4 Assessment of the module

You will be assessed during the semester on your assignments and in the examination at the end of the year/semester. The assessment criteria will be transparent and directly linked to the outcomes of the module.

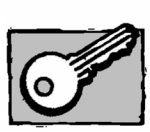
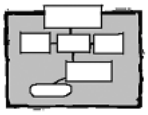
The compulsory assignment mark(s) will count with your final assessment towards your total mark.

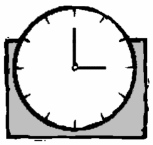
Further details of the assessment and examination requirements of this module are provided in Tutorial Letter 101.

8 USE OF ICONS

Example:

The icons that will be used in this learning guide are listed below, together with a description of what each means:

Icon	Description
	**Key concepts.** The key concepts icon draws your **attention** to certain keywords or concepts that you will come across in the topic or study unit.
	**Learning outcomes**. The learning outcomes indicate what aspects of the particular topic or study units you have to master and demonstrate that you have mastered.
	**Mind map**. Mind maps are provided to help you understand the relationship between various parts of the learning material.
	**Study.** The study icon indicates which sections of the prescribed book or the learning guide you need to study and internalise.
	**Read.** The read icon will direct you to read certain sections of the prescribed book for background information.
	**Activity**. The activity icon refers to activities you must do in order to develop a deeper understanding of the learning material.
	**Reflection**. The reflection icon requires you to reflect on the important issues or problems dealt with in the study unit.
	**Assessment.** When you see the assessment icon you will be required to test your knowledge, understanding and application of the material you have just studied.
	**Feedback.** The feedback icon indicates that you will receive feedback on your answers to the self-assessment activities.

Icon	Description
	**Multimedia**. The multimedia icon indicates that you have to refer to any audio, video, DVD material that may be included in your study material.
	**Time-out.** The time-out icon indicates that you should take a rest because you have reached the end of a study unit or topic.

9 HOW YOU WILL BENEFIT FROM THIS MODULE

To increase your likelihood of success, you should do the following:

— Study the prescribed tutorial matter conscientiously according to the guidelines provided
— Discuss the subject matter with colleagues and specialists
— Attempt and complete the activities and assignments
— Apply your knowledge in practice
— Prepare properly for the examination
— Contact us in the event of an academic problem

10 WHAT YOU CAN EXPECT FROM UNISA

Example:

You can expect us to do the following:

— We will provide you with up-to-date and relevant learning material which is regularly compared with, and benchmarked against, similar local and international programmes.
— We will keep the learning material in line with the needs of industry and commerce by consulting regularly with the profession, and with industry leaders and government officials.
— We will help you by giving you the opportunity to develop competencies and skills at a certain level. The outcomes correspond to the National Qualifications Framework (NQF) level 6. The level descriptors of the NQF will be taken into account when we assess you.
— We will support you whenever you need help. You may contact us by making personal appointments; you can either phone us, send us an e-mail or use the Internet. We understand that studying through distance education is more challenging than attending a residential university.
— We will provide you with clear indications of what we expect from you in terms of your assessment.
— We will give you timeous feedback on assignments. We will return your assignment with our feedback within three weeks after the due date if you submitted the assignment before the due date.

11 CONCLUSION

We hope you will enjoy your studies! We are certainly looking forward to being your partners in this module.

Best wishes

Your lecturers in Technology and Innovation

Topic 1

What is innovation?

1.1 INTRODUCTION AND AIM OF THE TOPIC/THEME

The aim of this topic/theme is to explain to you what innovation really is and what types of innovation there are.

1.2 LEARNING OUTCOMES

In this study unit, we shall focus on the following specific outcome: understanding what innovation is and how it affects our daily lives.

1.3 CONTENT OF THE TOPIC

— Study unit 1: Introduction to innovation
— Study unit 2: Types of innovation
— Study unit 3: Technological change

Study unit 1

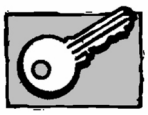
Introduction to innovation

Contents

1.1 LEARNING OUTCOMES

At the end of this study unit, learners will be able to

— appreciate the importance of innovation for business and the national economy
— distinguish between invention and innovation
— describe the steps involved in undertaking innovation
— distinguish between individual and corporate innovation
— appreciate the factors that can cause innovations to fail



1.2 KEY CONCEPTS

— Invention
— Innovation
— Diffusion
— Technical entrepreneurs

1.3 OVERVIEW

Today, we use products and services that were once unknown to humankind. And yet we seldom ask where and how these ideas originated. To understand innovation we need to ask ourselves what innovation is and who the innovators are.

1.4 INTRODUCTION TO INNOVATION

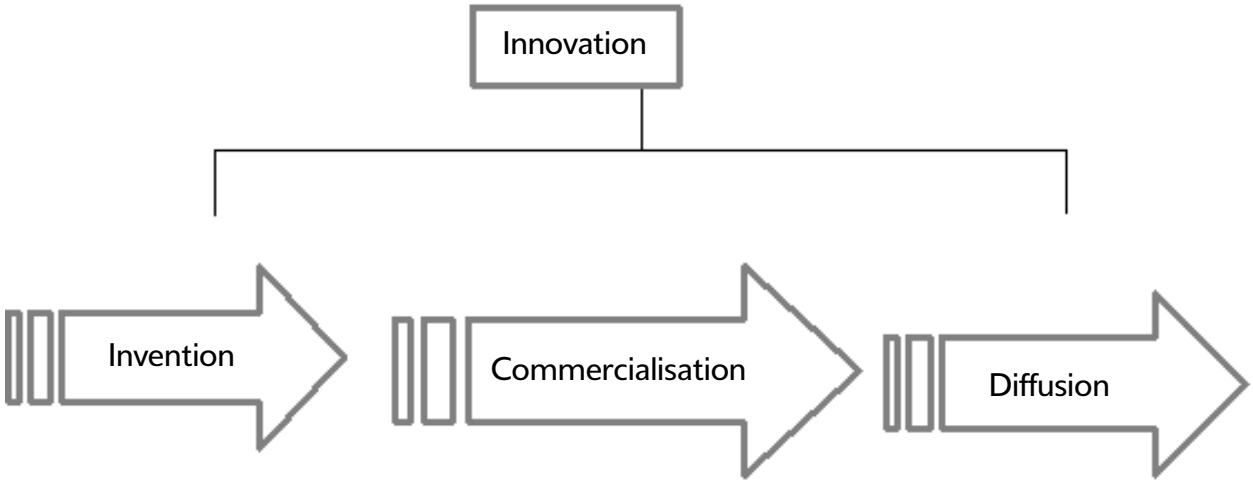
1.4.1 What is innovation?

Although the words *innovation* and *invention* are often used interchangeably, there is a significant difference between the two concepts. Innovation is a subset of invention. Innovation requires a different range of capabilities. There are numerous definitions of invention and innovation. Invention can best be described as discovering something new, while innovation is changing what has been invented and applying it commercially. According to the United Kingdom Department of Trade and Industry (2004:), innovation is described as follows: "innovation is the successful exploitation of ideas".

According to Smith (2006), innovations are making inventions relevant to business. When inventions have been put on the market and are commercially viable, innovation can be said to have occurred.

Study Smith (2006), pages 3 to 6.

1.4.2 Invention — innovation — diffusion



— Inventions involve new ideas, new discoveries and new breakthroughs.
— Innovations are inventions that have gone through a process to arrive at a usable product or service that is commercially viable.
— Diffusion is the stage where innovations become widely used and, in time, extend to other fields.

Front wheel drive was first introduced by Mini. This was a new invention that was taken by Mini and transformed into a marketable feature and became accepted by the consumers (innovation). Front wheel drive was later introduced by many other motor vehicle manufacturers in their own small vehicles (diffusion).

New ideas/products/services (inventions) are invented and then turned into commercially viable products/processes/services (innovation), which become widely used in different industries (diffusion).

Study Smith (2006), pages 6 to 8.

1.4.3 Who are the innovators?

Inventors come from all walks of life. Inventors are usually people or teams of people who come up with new ideas by applying their creative processes to solve a specific problem. Innovators, on the other hand, tend to be individuals or organisations that see the commercial potential of such inventions and put their resources together to transform the inventions to something that can be sold. Innovators are often organisations that have the financial and human resources, as well as the marketing, manufacturing and distribution capabilities to put the product onto the market.

Study Smith (2006), pages 8 to 11.

1.4.3.1 Technical entrepreneurs

Technical entrepreneurs invent ideas/product/services and can see the commercial potential of their ideas. They then proceed to adapt their ideas into useable and commercial products/services. They have both the creative characteristics of an inventor and the business characteristics of an innovator. An example of this is the creator of the Creepy Crawly pool cleaner. He developed a product that is now used by thousands of pool owners and has recently sold the business.

1.4.3.2 Women and innovation

Women have been innovators for decades. Correcting fluid, for example, was developed by a typist who needed a way to correct errors in her typing without having to re-type everything.

1.4.3.3 Corporate innovators

In the past, innovation was done by individuals who came up with solutions to everyday problems. Today, innovation is in the hands of large corporations. This is because these companies have the resources to establish large Research and Development (R&D) divisions that can dedicate time and resources to coming up with commercial solutions to certain problems. Companies such as IBM and 3M have dedicated large sums of money to R&D and their R&D budgets often exceed the GDP of many countries.

By Sasha Planting

Financial Mail Innovations, 02 June 2006.

www/http//free.financialmail.co.za/innovations/06/0602/ann.htm

I recently met someone who was oblivious to the fact that SA inventors are responsible for developing the Kreepy Krauly; dolosse; Pratley Putty; Computicket (the world's first online booking system); Appletiser; the Colindictor; APS therapy to relieve arthritis pain; and the CAT scan (though claiming this is a local invention is a bit of a stretch). I could go on. Call me naive, but I was under the impression that everybody knew this.

Perhaps they can be excused, these inventions are all about 30 years old.

What they do need to know is that brilliant inventions are being cooked up by South Africans every day and, if anything, faster than ever as the entrepreneurial culture takes root. In recent years, South African inventors have come up with the Speedball, a radar technology that measures the speed of objects such as cricket and tennis balls; technology to accurately forecast floods, called "nowcasting" which also uses radar technology and computer-based mathematical techniques; the low earth orbiting satellite, Sunsat; radio frequency identification technology; kelp-based agrochemicals; set-top boxes which decode digital broadcast signals; cell phone banking; prepaid electricity and water meters; and South Africa's first locally developed 4x4.

What is interesting is that most of the products on these lists sprang from small companies and individual inventors.

Though large companies in South Africa dominate much of the day to day media narrative, we should be aware that many of the innovations that are advancing industry and enlightening society spring from small companies.

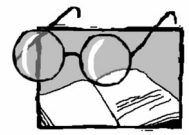
Entrepreneurial businesses are shaping our world far more than many believe.

1.4.4 Why do innovations fail?

For every successful innovation that is brought to market there is at least one that fails. Although these failures are not made public, they are numerous. A good innovator will learn from these failures and persevere until he or she can bring a good idea to market. The main reasons for these failures are:

— Use of inappropriate technology. New technology may have replaced the old technology used by the innovators.
— Marketing. Innovators need to understand their market and keep up with the changes in this market.
— Public relations and distribution. The market needs to be informed of the new innovation and needs to gain access to it.

Most failures are for managerial reasons, not because they are bad ideas. It sometimes takes a few attempts before the innovation is ready and accepted by consumers.



Study Smith (2006), pages 11 to 13.

1.5 ASSESSMENT

(1) Explain the difference between invention and innovation. Which do you consider the most important and why?
(2) Outline the stages involved in the process of innovation.
(3) Explain what is meant by an "organisational innovation".
(4) What are the benefits to be gained from being the first to market an innovation?
(5) What is the link between innovation and risk?
(6) What impact do process innovations tend to have on an organisation?
(7) What personal qualities do you consider are essential for successful innovators?
(8) Explain why, today, many innovations are the result of organisational rather than individual activity.

Answers to assessment

(1) Invention involves new ideas, new discoveries and new breakthroughs. These are then developed via a lengthy process of experimentation and testing to arrive at a working invention. However, these inventions are normally not ready for the market at this stage.

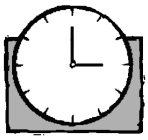
Innovation includes not only invention, but also activities such as design, manufacturing, marketing, distribution and product support. These activities form part of the exploitation/commercialisation that is an essential part of innovation.

(2) Invention — commercialisation — diffusion.
(3) Many inventions come from individuals, but some organisations encourage innovation within the organisation. Organisational innovation is innovation that occurs within an organisation.
(4) Being the first to market an invention has many benefits, such as the following: it establishes the market trend, educates the market about the product, creates brand awareness and moulds and shapes an untapped market. The "first-to-market" product becomes the norm and consumers tend to measure followers against this norm.
(5) With innovation there is always some form of risk. Because an innovation is new, the risk is that the market may reject it.
(6) Process innovations change the way in which the organisation functions and the way in which business is conducted. The assembly line was an innovation that changed the way in which manufacturing organisations operated, making them more efficient and productive.
(7) Innovators are people that take calculated risks, are not afraid of failure and are creative.
(8) Because it has become so expensive and competitive to bring new innovations onto the market, it is often only the larger organisations that have the resources

(financial and human) to do this. Also, market competition is forcing organisations to become innovative and organisations can no longer wait for individuals to come up with new ideas.

1.6 SUMMARY

Innovation is everywhere and impacts on all of us daily. For market-related reasons, only a few inventions become successful innovations. If an innovation fails, this tends to be for management and marketing, rather than technological, reasons.



Study unit 2

Types of innovation

Contents

2.1 LEARNING OUTCOMES

When you have worked through this study unit, you will be able to

— define the different forms that innovation can take, such as product, process and service innovation
— differentiate and distinguish between the different types of innovation, such as radical and incremental innovation
— describe each type of innovation
— analyse different types of innovation in terms of their impact on human behaviour, business activity and society as a whole

2.2 KEY CONCEPTS

— Product innovation
— Process innovation
— Service innovation
— Incremental innovation
— Radical innovation
— Modular innovation
— Architectural innovation
— Innovation typology

2.3 OVERVIEW

Although it may seem simple to take an idea from the invention through to the innovation stage, there are many steps that need to be taken before an idea becomes commercially viable. Innovations take various forms and some innovations are more disruptive than others. In this study unit, we shall look at the various types of innovations and the value of innovation typology.

2.4 TYPES OF INNOVATION

2.4.1 Making sense of innovation

New innovations are everyday occurrences. They come in every shape and size imaginable and take the form of various products, services or processes. We need to try and group innovations together in identifiable groups.

The first method is to group innovations into categories of products, services or processes. These groups are very broad and do not differentiate between items in each group.

The second method is to look at the novelty associated with the product. Some innovations are new to the market and bring with them a high degree of novelty (eg the iPod). Others involve smaller product changes that have a limited novelty value. Novelty means different things to different people.

2.4.2 Forms of innovation

As stated, one method groups innovations together according to their use, namely product, service or process.

2.4.2.1 Product innovation

When you try to think of new innovations that have had a definite influence on your life, you are likely to think of new products such as the cellphone or iPod. This group is the easiest to categorise. This is because these products are tangible products that either help to solve everyday problems or make life easier. However, there are also new industrial products available, such as machinery and equipment.

Product innovation is usually associated with a high novelty value that attracts consumers. Many companies focus on product innovations in terms of "product development".

2.4.2.2 Service innovations

Service innovations possess less novelty value and are therefore often overlooked. These innovations often change the way that we do business (eg In The Bag, Woolworths Internet shopping service). Computer technology has had a drastic impact on services. Customers are more discerning and speed and quality of service is expected. The Internet has enabled many businesses to reach markets that were previously unreachable and offer new services.

2.4.2.3 Process innovation

As far as the public are concerned, process innovations are regarded as the least

important, although it is these innovations that probably have the biggest impact on our lives. The novelty value of these innovations is seen as low, and therefore they seem to be less exciting. An example is e-mail, which has radically changed the business process of many organisations. E-mail has, in fact, created the "virtual office", which allows people to communicate and do business 24 hours a day.

Another example of this sort of innovation is the assembly line which, as we know it today, was first introduced in 1913, when Henry Ford found a dramatic way to reduce manufacturing effort. Today, almost a century later, we take the assembly line for granted. This is an example of just how drastically process innovation can change our lives.

Study Smith (2006), pages 22 to 26.

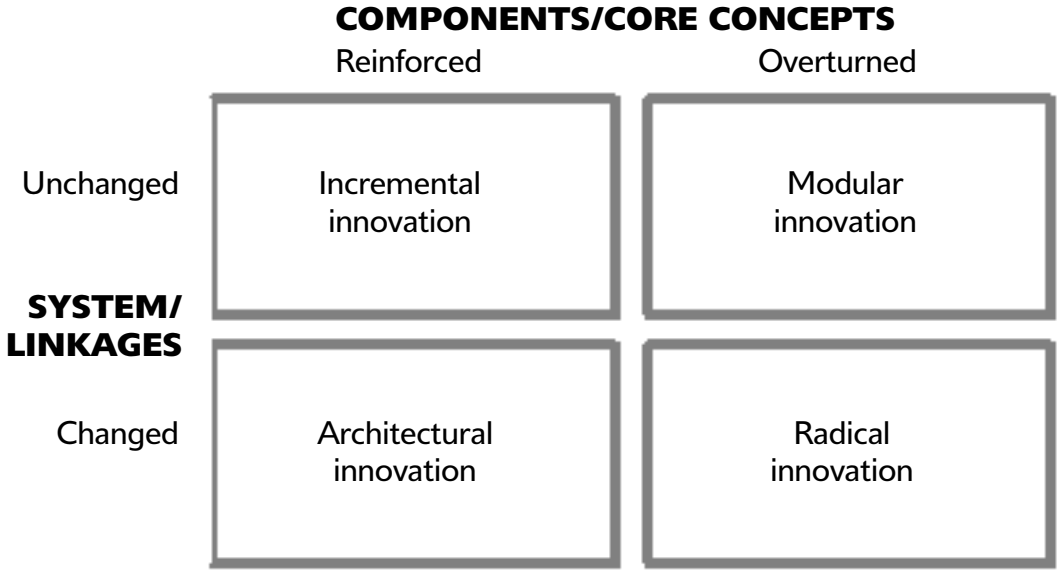
2.4.3 Types of innovation — theory

Using the novelty based theory to distinguish between different types of innovation is subjective and not detailed enough.

Henderson and Clark (1990) came up with a method of classifying innovation into more clearly distinctive groups. Products, services and process can be classified into groups based on the elements of the innovation; the two types of innovation are radical and incremental innovation. Radical innovation describes products/services/process that are new to the market. Incremental innovations refer to smaller changes made to existing products (eg cosmetic changes to design or packaging). According to Henderson and Clark, all forms of innovation require two distinct types of knowledge.

— Component knowledge: this refers to knowledge about each of the components that perform a well-defined function within the broader system of the product.
— System knowledge: this refers to knowledge about the way the components are integrated and linked together.

By using component and system knowledge, Henderson and Clark differentiate between four types of innovation:



2.4.3.1 Incremental innovation

Incremental innovation groups together those products that have been changed by improving the components. These are not changes to the products themselves, but improvements to the existing components (eg changes to packaging).

2.4.3.2 Radical innovation

This refers to a completely new design and entails the use of a new set of components linked together in a new architecture (eg the iPod).

2.4.3.3 Modular innovation

Modular innovation uses the design and architecture of an existing product and then employs the use of newly designed components (eg the clock-radio).

2.4.3.4 Architectural innovation

In this case, the design and components remain the same, but new linkages are used (eg Sony Walkman).

Study Smith (2006), pages 26 to 33.

Activity

DISRUPTIVE INNOVATION: A SURPRISING SOLUTION

By Sasha Planting

www/http://free.financialmail.co.za/innovations/06/0505/ann.htm.

Clayton Christensen, one-time White House fellow, former assistant to two US secretaries of transportation, and a Rhodes scholar, is today a Harvard Business School professor and business author. He is best known for ideas on "disruptive innovation", encapsulated in his books *The innovator's dilemma* and *The innovator's solution*. Ahead of a trip to South Africa, he spoke to Innovations.

Historically, less than 10% of companies can sustain the growth that creates above-average shareholder returns. Why so difficult?

There is a limit to the ability of a customer to use the improvements that companies make to their products. Yet companies continue to sell customers these improvements. This gives competitors with cheaper and simpler — but not always better — products the opportunity to edge their way into the market. This happens because incumbents are focused on their most profitable products and customers. They may not see that a product or service pitched at another market or "less valuable" customers could be a major threat. These threats are made harder to see because traditional business school teaching has enshrined data-driven decision making. Data is from the past. Seeing the future requires theory, not historical data.

What is disruptive innovation?

It is an innovation — not necessarily technical — that results in a more economical

way to create products that are more affordable and simple to use. Dominant companies may ignore these innovations because they don't initially interest their main customers. There are two types of disruptions — low-end disruptions and new-market disruptions. The first refers to new, lower-cost offerings to existing over-serviced customers, typically the bottom end of another company's customer base. Incumbents willingly sacrifice this market, then pay the price when the challenger's technology improves and they start eating into the incumbent's primary market from below. Intel generated US$40bn in revenue by thinking around this problem. It saw the under-serviced, low-cost PC market as an opportunity. Its lower performance Celeron chip has disrupted the Pentium chip, its best-selling product.

New-market disruption creates a new market sector. If there are people who are trying to get something done, but they can't do it for themselves, they have to rely on the expensive and inconvenient help of experts. A challenger would provide a product or service mix that is cheaper and easier to use. Think of e-Trade or Schwab (the first online stockbrokers). A disruptive innovation is not about more intense competition in the same area — it's about a different business model with different distribution channels, different selling, different advertising, and support.

How has your thinking on disruptive innovation changed since you first started writing about it in 1997? Do you still maintain that disruptive innovations eventually grow to dominate the market? I started off thinking it was a technological problem, that disruptions occurred when a new company with deeper expertise entered the market. I've come to recognise that technology is simply the enabler, while the disruption is caused by the strategy or new business model deployed. The best disruptions are brought about when an entirely new business model is introduced to an industry. This makes it difficult to copy. Discount retailing is one example. Enabled by technology and low overheads, the retailer cuts margins in order to turn the stock more frequently. However, sustaining the disruption requires that the higher-cost competitor stays put. Should they enter the low-cost market they once disdained, then the disruption will not be sustained.

Is disruptive innovation important for all companies?

Yes, particularly in healthy times.

How should companies begin their thinking around innovation?

It's too complex to explain here, it's in my books, but briefly there are patterns in strategic approaches and management techniques that make it possible to vastly improve the probability of finding and developing disruptive innovations. The *Innovator's solution* focuses on those patterns.

How should companies allocate their R&D spend?

Only 70%–80% of a company's budget should be spent on sustaining innovations (ie incremental improvements to products or processes). The balance should be on disruptive innovation. Most companies under invest in this area.

Should companies ring fence their innovation efforts?

Yes, you do need to set up a separate organisation or division for new innovations. That is because the economics on a new product are different; you need a different strategy and strategy-making process; you need to allow the new business to evolve without the pressure that one places on divisions or companies that are already performing well. I am advising my larger clients to acquire small businesses, rather than start them themselves. In this way they are still able to feed the dinosaur. Do small companies have the edge over larger companies when it comes to innovation?

Only in the sense that it is hard for big companies to disrupt their key product or core strength and selling-point. For instance, for Microsoft the disruptive technology

is Linux. Though Linux may not challenge Microsoft on the desktop [where Microsoft is dominant], on the webserver Linux is becoming the standard. As computing moves from the corporate network to the Internet network, Microsoft will be left behind. The danger for Microsoft is that the company is not yet feeling the crisis financially — but being awash in cash does not change the fact that there is a crisis coming.

Is open source a truly disruptive technology?

It has the potential. It is a powerful force and we have not yet seen its full effect. The key is the modularity, not the freeness.

Which markets have been disrupted and which are ripe for disruption?

Google is disruptive to the advertising business; regional airlines that make money on short hops are disruptive to traditional airlines; and mobile banking is a disruption. An example close to home is that of the Zambian mobile phone operator Celpay. Using low-cost cellphones from China, the company provides low-income users with banking services (on a technology platform developed by Mosaic in South Africa). Now 2% of Zambia's GNP is transferred via Celpay. This is very disruptive. If you were a bank wanting to enter that market you would have to buy Celpay. Markets that are ripe for disruption include legal services and health care — where fees are high and customer satisfaction is low.

http://free.financialmail.co.za/innovations

2.4.4 The value of innovation typology

Categorising innovations into four groups is not a simple task. There are overlapping attributes and the categorising process may be very subjective. Innovations are not homogenous, but vary. By categorising innovations, however, we can group together subjects that are similar and it is easier to distinguish true innovations from products that are simply described as "innovation".

By categorising innovations it is easier to see the influence of technologies. Technologies influence the whole system of innovation.

We now know that technology follows an evolutionary process. When a new technology is brought onto the market, there are plenty of followers that claim to have the same capabilities. This, in turn, leads to a "shakeout", after which period only the true and successful technologies remain and thus become the standard (eg the Internet).

Study Smith (2006), pages 33 to 38

2.5 ASSESSMENT

(1) What type of innovation would you class the iPod as and why?
(2) What is the value of being able to categorise innovations?
(3) Identify two process innovations which have had a big impact on society.

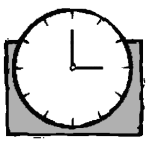
(4) Differentiate between component knowledge and system knowledge.
(5) Why are only a small proportion of innovations usually radical innovations?

Answers to assessment

(1) A radical innovation is a product innovation that brings together a new dominant design that has been put together in a unique architecture, thus creating new uses for these components.
(2) In order to understand the value and degree of innovation, it is easier to categorise innovations into groups. The different groups each require a different marketing approach (eg a radical innovation requires marketing that teaches the consumer about the product and its uses). Incremental innovation is more easily accepted by consumers for the simple reason that they are already aware of the product. Incremental innovation normally comes about when the user requires a slight improvement to the product.
(3) The best known process innovation is probably the assembly line created by Henry Ford. The e-procurement process, which allows individuals within companies to purchase on the Internet, while still following the internal approval process, now makes it possible for businesses to make their purchasing function faster and more cheaply.
(4) Component knowledge is the knowledge of each of the components that performs a well-defined function within the broader system of the product. System knowledge refers to knowledge about the way the components are integrated and linked together.
(5) Radical innovation is often associated with the introduction of a new technology. In some cases, this will be a transforming technology.

2.6 SUMMARY

Innovation does not necessarily mean a new product, but may be a change in the way in which business is conducted (process innovation) or a new form of service (eg Internet banking). New disruptive technologies often give rise to radical innovations — radical innovations refer to a totally new product/service/process. The fax machine was an example of a disruptive technology that revolutionised communication. Innovations include simple changes to products right through to brand new products that can be used for entirely new purposes.



Study unit 3

Technological change

Contents

3.1 LEARNING OUTCOMES

At the end of this study unit, you will be able to

— distinguish between science and technology
— describe the nature of technology
— analyse the link between technological change and the long-wave cycle
— describe the phases of the long-wave cycle
— differentiate and distinguish between technological paradigms and technological trajectories

3.2 KEY CONCEPTS

— Long-wave cycle
— Technology paradigms and trajectories
— Kondratiev long wave

3.3 OVERVIEW

We tend to believe that no previous generation has been affected by technological change in the way we have. In fact, this is not true. Technological change has been experienced over the centuries. The type of technology may well be different, but the

impact is similar. We are now in the 5th cycle of technology change, which is characterised by computers and telecommunications. Previous technology waves include cars and electronics (4th wave), electricity, chemicals and steel (3rd wave), railways and steam power (2nd wave) and cotton, iron and water power (1st wave). We will now look at technology and the link between technology and innovation.

3.4 TECHNOLOGICAL CHANGE

3.4.1 The nature of technology

In the new millennium, we have become accustomed to technologies, the effect they have on our lives and the fact of constant change.

Technology is defined as the "application of science" and, as such, affects each and every one of us daily, whether we are referring to technology used by consumers or manufacturers.

Exploring innovation, Smith, D. 2006, describes technology as: "the human activity which is devoted to the production of technics — or technical related intellectual products – and whose root function is to expand the realm of practical human possibility".

Science is described as "that form of human activity which is devoted to the production of theory-related knowledge of material phenomena whose root function is to attain an enhanced understanding of nature" McGinn (1991, p. 8).

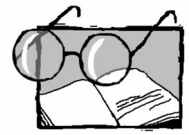
Science is all about understanding, while technology is all about how to make things. For technology to succeed it is not always necessary to understand the details behind the science, but to be able to apply the science.

Science involves the process of observation, the development of hypotheses and the systematic collection of data in order to arrive at an explanation.

Technology, on the other hand, is embedded in products, services, people and organisations.

Although science and technology are different, they are dependant on each other for the reasons mentioned above.

Changes in technology leads to changes in innovation. Technologies become the catalyst between science and innovation.



Study Smith (2006), pages 44 to 45.

3.4.2 Long-wave cycle and technological change

The speed at which technologies change differs over various periods of time. The Internet was a radical and fast technological change. The technologies involved in the design and manufacture of motor vehicles has been slower.

It can be said that technologies change in cycles. A technology that is new on the market initially changes rapidly until stability is reached. Technologies are constantly changing, but radical changes seem to happen at the beginning of the technology's life cycle.

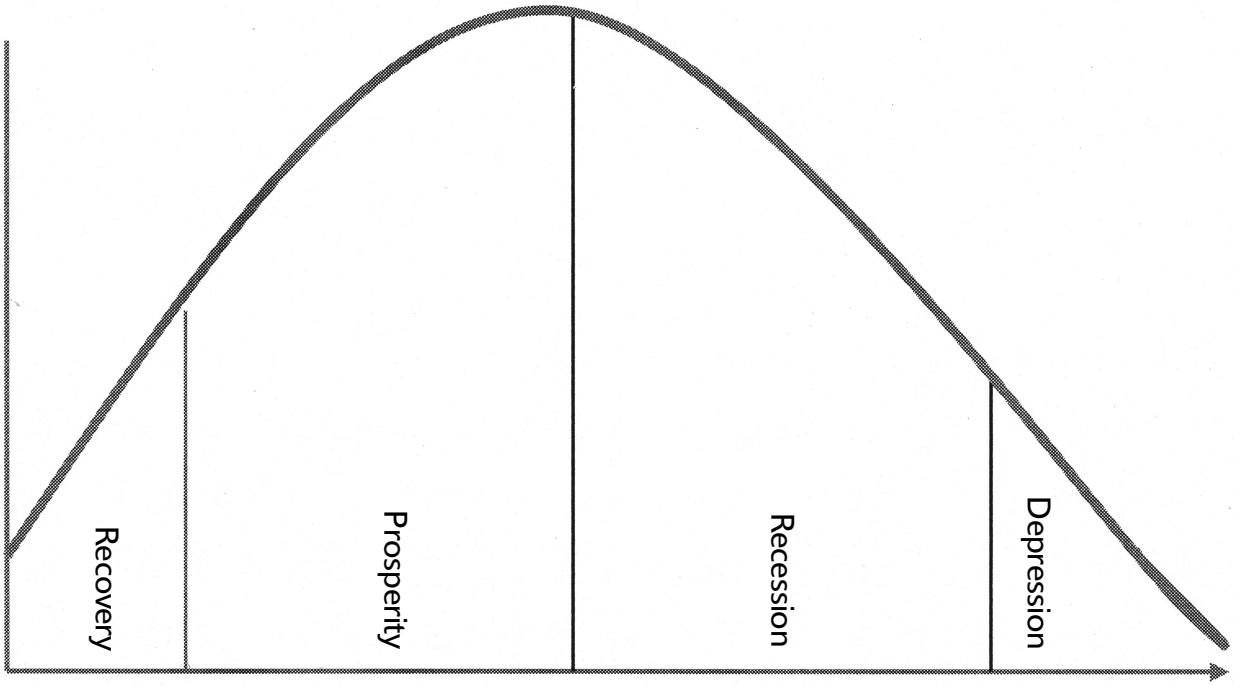
It is now clear that the technological life cycle does not follow the business life cycle. Nicholai Kondratiev was the first to describe the idea of long life cycle. Where the business life cycle is seen to be between 5–10 years, the technological life cycle is much longer (eg computer technology has been developing rapidly since the 1980s). This is called the long-wave cycle.

Examples of Kondratiev's long-wave technology cycles are:

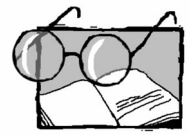
— Cotton, iron, water power 1780 to 1830
— Railways, steam power — 1830 to 1880
— Electricity, chemicals and steel – 1880 to 1930
— Cars, electronics, oil — 1930 to 1980
— Computers, telecommunication — 1980 onwards

By analysing the above examples it becomes clear that the long-wave cycle may extend over 50 years, unlike the business cycle, which lasts between 5-10 years.

The figure below shows that the long-wave cycle follows a predictable course:



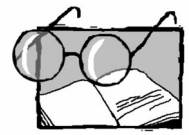
— In the recovery phase, discoveries are developed into new opportunities for investment, growth and employment.
— In the prosperity phase, a broader market is reached through diffusion.
— In the recession phase, technlogical advancement is limited owing to pricing competition.
— In the depression phase, the price competition comes to a head, which leads to declining profitability.



Study Smith (2006), pages 45 to 50.

3.4.3 The Internet: our very own long wave

We are now in the midst of the 5th long wave, namely the Internet, computers and telecommunication. There are still new breakthroughs and computer technologies are expanding all the time. This transformation is not simply about technology. The Internet has changed the way we interact, the way we entertain ourselves, and the way we do business.



Study Smith (2006), page 51.

3.4.4 The implications of the long-wave cycle

— The model of technology change shows that technology does not just accelerate with no end, but that there will be a downturn.
— Product innovations that are created early on during the wave, will give rise to changes in process innovations as the technology diffuses through different industries.
— During the long-wave cycle different types of radical innovation in the early phases will give way to more incremental innovations in the latter stages of the cycle.
— The long-wave cycle shows that some technologies have a profound impact while others have a much smaller impact.
— The long-wave cycle shows how technological changes go hand-in-hand with institutional changes (eg the Internet has brought education to many people who, previously, simply could not be reached).
— The long-wave cycle shows the impact of technologies and the costs associated with such technologies. The price of DVD players has dropped dramatically over the last two years as these technologies are copied by competitors, thus leading to a price war.

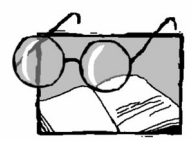
Study Smith (2006), pages 52 to 53.

3.4.5 Technological paradigms and trajectories

The technological paradigm delimits the field of science. A boundary of knowledge is set within which certain principles are established. These principles define the innovation process in terms of:

— the field of enquiry
— the problems to be solved
— the procedures used
— the generic tasks to which it is applied
— the properties it exploits
— the materials technology it uses

A radical innovation will cause a paradigm shift (eg Internet shopping is now a way of life). This can lead to serious difficulties for those businesses that operate in a way that makes new technologies difficult to introduce. For example, the Internet has seriously threatened the survival of the travel industry. Travel agencies' biggest income was derived from the sale and issue of airline tickets. However, consumers can now buy tickets over the Internet when and where they want to. Travel agencies have therefore had to find alternative ways to supplement the loss of income from the sale of tickets.



Study Smith (2006), pages 53 to 58.

3.5 ASSESSMENT

(1) Distinguish between technological paradigms and technological trajectories.
(2) Why do process innovations tend to occur during the later phases of the long-wave cycle?
(3) What is technology? Use examples to illustrate your answer.
(4) Distinguish between science and technology.
(5) What is the Kondratiev long-wave cycle?
(6) What is meant by the term "diffusion" and why is it an important aspect of innovation?

Answers to assessment

(1) The technology paradigm borrows heavily from science, in particular the notion of scientific paradigms used to identify particular scientific schools of thought (Kuhn, TS. 1970. *The structure of* scientific revolutions. Chicago: University of Chicago Press). According to Dosi (1982), technological paradigms represent a general area or field of technology in which the search for innovation is conducted by a significant group of innovators, within a particular historical context. The technology trajectory forms a development path traced out as a given technology develops. Trajectory is a subset of paradigm, so it is impossible to have a cluster of technology trajectories or directions whose outer boundaries will be defined by the paradigm.
(2) With surplus capacity and diminishing returns during the 3rd phase, which is the recession stage of Kondratiev's long-wave model, there is a limit to technological advances and price competition becomes intense. It is at this stage that the focus on innovation shifts to process innovations.
(3) Technology can be described as the application of science. Technology is concerned with practical knowledge of how to do things and how to make them. For example, computer technology is used in communication, manufacturing and research.
(4) Technology is embedded in artefacts such as equipment and machines, while

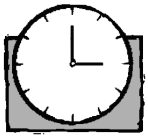
science is all about understanding such equipment and machines. Science involves the application of systematic rigorous methods of enquiry in order to develop logical, self-consistent explanations of phenomena.

(5) The cyclical pattern of innovation was analysed by Kondratiev and it was Kondratiev who was the first to put forward the idea of a long cycle; this is known as Kondratiev's long-wave cycle.

(6) Diffusion is the stage where innovations become widely used and, in time, extends to other fields.

3.6 SUMMARY

In this study unit, we learned that technology has been around for centuries. Technologies change over long periods of time and follow a pattern which is described by the Kondratiev long-wave model. We are now in the 5th technology wave — namely, computers and telecommunication. The Internet is the best example of 5th wave technology.



Topic 2

What does innovation involve?

1.1 INTRODUCTION AND AIM OF THE TOPIC/THEME

The aim of this topic/theme is to explain to you the theory behind innovation and what it is based on. We shall also look at the steps needed to bring about innovation and how to protect the idea from being exploited by others. Finally, we shall discuss how the inventor can capitalise on his or her invention.

1.2 LEARNING OUTCOMES

In this unit, we shall focus on the following specific outcome: understanding the theories behind innovation, the steps involved in the innovation process, and the tools one can use to protect innovative ideas.

1.3 CONTENT OF THE TOPIC

— Study unit 4: Theories of innovation
— Study unit 5: Sources of innovation
— Study unit 6: The process of innovation
— Study unit 7: Intellectual property

Study unit 4

Theories of innovation

Contents

4.1 LEARNING OUTCOMES

At the end of this study unit, learners will be able to

— discuss the main theories associated with technological innovation
— apply theories to the analysis of innovations
— demonstrate the predictive capability of theories in the analysis of innovations
— evaluate the most appropriate theories for the analysis of innovations
— state the practical benefits of being able to apply innovation theories

4.2 KEY CONCEPTS

— Technology S-curve
— Punctuated equilibrium
— Dominant design
— Absorptive capacity

4.3 OVERVIEW

We have seen that there are different types of innovation, but to understand the

pattern of innovation we need to look at the theory surrounding it. By understanding the theories surrounding innovation, we can predict the outcomes, make comparisons between innovations and identify the patterns of innovation.

4.4 THEORIES OF INNOVATION

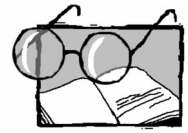
4.4.1 Who needs theories?

Theory can contribute to our understanding of innovation, by looking, in particular, at three specific issues: complexity, populism and success/failure.

Innovation is a complex matter. It involves turning a technological and scientific invention into a practical, useable and marketable product or service. Theory can help us to analyse the phenomenon and it helps us cross the boundaries, so to speak, between business and science.

We often read of new innovations that make large sums of money for the innovator, and it is often said that all that stands between you and success is a good idea. However, the media does not tell the whole story. They tend to focus on the product and the innovator and ignore what had to be done to achieve this success. Theory puts the "story of invention" into context.

We all like to read the success stories in the media, but the fact of the matter is that the media glamorises success and ignores failure. Theory helps us to make sense of what it takes to be a success and also enables us to examine the failures and what we can learn from them.



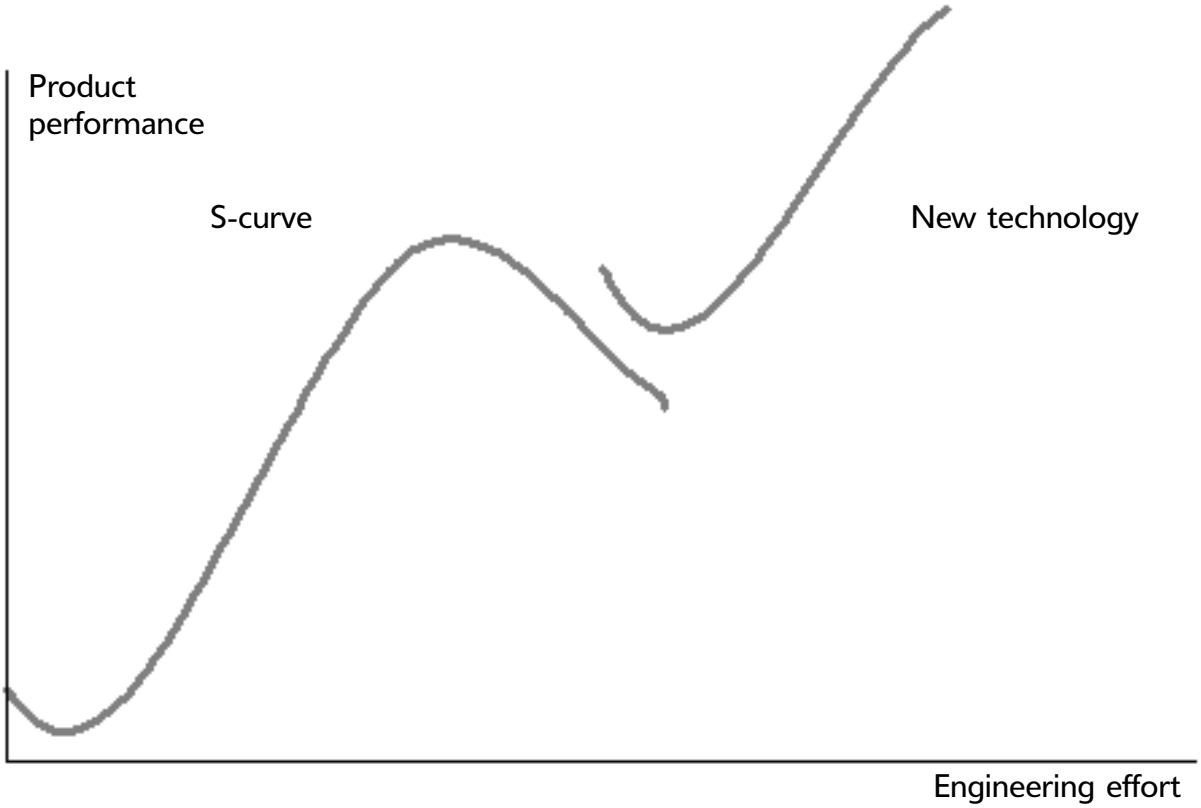
Study Smith (2006), page 66.

4.4.2 Theories of innovation

There are many theories of innovation. We shall now look at a few in more detail:

4.4.3 Technology S-curve

The learning curve shows that the investment in a new technology is much higher in the earlier stages. Once the technology has been mastered, it requires much less effort and investment to get that technology to perform as desired. Eventually, the technology will be so thoroughly exploited that it will be time for a new technology to take its place.



Technology S-curve (**Source:** Foster 1986)

Technologies have a limited lifespan. Technology matures and, as it does, it becomes harder to improve on its performance. The development of computer mainframe technology became so complex that a radically new technology was needed to start of a new life cycle. Computer technicians got so caught up with developing bigger and faster computers that they became "monster machines" that only the very large organisations could afford. A radical change occurred when the personal computer (PC) diverted attention back to the real issue, which was storing and using information for business. The PC made technology more affordable and within the reach of almost everyone. There is still a market for the mainframe technology, albeit a slow growing one.

According to Christensen (1997), the S-curve offers a valuable way of looking at the current situation and helps us predict the future. When the technology reaches maturity, the innovator needs to look for a new technology.

Study Smith (2006), pages 67 to 69

4.4.4 Punctuated equilibrium

A radical innovation often leads to incremental innovation. An example here is the radical change that occurred when DVDs were put onto the market, to replace the video recorder. Most DVDs were read-only and there were significant problems and expense in trying to offer the features of the video recorder using the superior

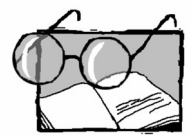
technology of DVD. As a result, incremental changes were made to the DVD until it could offer the same features of the video recorder at an acceptable price. The DVD technology was highly disruptive, and led to the discontinuation of the video recorder, but the technology is now stable. No amount of time and effort can replace the technical advantages of the DVD.

With the new technologies come new skills, new abilities and new knowledge. Many companies are entrenched in old traditions and it becomes difficult for them to make the switch to the new technologies. The problem of sunk costs (see study unit 3) could prevent an organisation from making the necessary changes as quickly as its competitors. Furthermore, management might have a personal commitment to the old technology and internal politics sometimes hamper the transition to the new.

All these factors could be limiting on an organisation, meaning that it will confine itself to incremental innovations, thereby prolonging the period of equilibrium. However, sooner or later, the new and radical technology will lead to discontinuities that will upset this equilibrium.

Times of technological and market uncertainty create a gap, enabling new entrants to enter the market.

The theory of punctuated equilibrium has its limitations, given that it is a theory of technology and does not enable us to understand the innovation itself. However, this theory does have a link with reality, in that disruptive technologies do cause innovations to "move" into new fields.



Study Smith (2006), pages 69 to 72.

4.4.5 Dominant design

The dominant design is the design that becomes the norm for the market. All players in that specific market will conform to the dominant design. Dominant design theory (Nordström and Biström 2002" p 713) looks at the pre-paradigmatic phase, where there are several different designs and many ideas are thrown around. The paradigmatic phase is the time when one of these ideas becomes the dominant design and where everyone else follows suit.

Microsoft Windows software has, as everyone knows, become the dominant design for all PC software developers. IBM, Apple and others had competing products, but in the end opted to use Windows as the standardise platform. Their software runs on Windows and the hardware is often shipped with Windows already loaded.

A dominant design comes about when the consumer favours one particular product. The factors that the consumer favours is not always technical, but can lie in various attributes such as packaging, price or ease of use.

Dominant design theory stresses the fact that the consumer has an important say in whether the idea will succeed or fail. It also stresses standards. This is especially important in the computer industry, where competing products need to be able to run on a standardised platform and where such products often need to integrate with one

another. Dominant design theory looks at an organisation's business strategy, and that strategy may not be looking at all the macro economic factors that could influence the success of its innovations.

Study Smith (2006), pages 72 to 75.

4.4.6 Absorptive capacity

The theory of absorptive capacity takes into account both the internal dimensions of innovation (ie the organisation's learning and knowledge transfer ability), as well as the external dimensions (ie the evolution of technology). This theory looks at the organisation's capacity to absorb the external factors (trends and standards) and assimilate this by using its internal factors (knowledge and skills). The greater the organisation's capacity to understand and master external trends, together with its own internal expertise and innovation, the better its outputs will be.

This theory is heavily based on the organisation's ability to transfer knowledge (internal and external) across all functions within the organisation. Good communication is brought about by shared knowledge and expertise.

Absorptive capacity focuses on the organisation's ability to learn and how it uses its knowledge to think up new ideas. Three factors are vital in order for an organisation to learn and to be able to use this knowledge:

— Exposure to relevant knowledge, where staff tap into their networks to stay ahead of new developments.
— Presence of prior related knowledge is needed so that staff can assimilate new knowledge.
— Diversity of experience that enables staff to recognise new external ideas and trends and apply appropriate new knowledge.

Absorptive capacity is more sophisticated than other theories since it looks at how the organisation acquires new knowledge and how it applies such knowledge. Many organisations fail because, although they spot new trends, they cannot assimilate and apply these trends in their own organisation. This theory also brings together ideas about technology, networks and the organisation's learning ability.

Study Smith (2006), pages 76 to 78.

4.4.7 How theory helps the innovator

Theories of innovation make the following contributions:

— A theory is a descriptive contribution that describes the events, the course of events and how the events are linked together, thus providing an account of the innovation process.

— An analytical contribution that explains why/how the innovation came about and why it was successful. Theory looks at patterns and points of commonality in innovation.
— A predictive contribution that explains why an innovation has succeeded/failed and what actions need to be followed or avoided. The best predictor of future behaviour is past behaviour and what can be learned from previous experiences. The benefits of prediction are:
    — The course of events associated with innovation can be anticipated
    — Problems and difficulties can be predicted
    — There is scope for planning, which means that resources can be used more effectively.
    — There is a greater likelihood of success.

Study Smith (2006), pages 78 to 80.

4.5 ASSESSMENT

(1) Why do innovations often come from outside the industry?
(2) What is the significance of knowledge transfer according to the theory of absorptive capacity?
(3) According to the theory of punctuated equilibrium, why is the rate of innovation not constant?
(4) Explain what is meant by a technological discontinuity and show how such discontinuities are linked to theories of innovation.
(5) Use the theory of the Technology S-curve to distinguish between radical and incremental types of innovation.

Answers to assessment

(1) Organisations often fall into a cycle that does not lend itself to radical innovation. This cycle can be caused by entrenched traditions; here, the organisation has become so ingrained in the way it does things that it fails to see new opportunities. Alternatively, organisations have spent money on existing technologies and it is too expensive too discard these technologies for new technologies. The internal political environment of the organisation may not lend itself to radical new innovations, either owing to a strong commitment to existing technologies or because of management's training and knowledge. There may be a commitment to the old technologies and this will cause management to disregard any new technologies or ideas. New ideas then will come from outside and only when it becomes a threat will management embrace a new technology.
(2) Knowledge lies within people and can come from various people in different capacities. According to absorptive capacity theory, knowledge transfer happens between functional divisions and may come from outside networks. Good

communication between these parties will enable knowledge transfer. Absorptive capacity relies heavily on knowledge transfer, both from internal and external sources.

(3) Punctuated equilibrium is an evolutionary theory. Technology does not evolve on a continuous basis, but via a succession of "fits and starts". According to Tushman and Anderson (1986), "technology change is a bit-by-bit cumulative process until it is punctuated by a major advance."

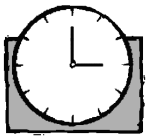
(4) When a radical technological change takes place, people will start to embrace this technology and the old technology will be phased out. This is called technological discontinuity and is linked to punctuated equilibrium theory.

(5) In the early stages of a new technology, investment in engineering effort will deliver significantly improved performance. This, in turn, will create an opportunity for radical innovation. Successive amounts of additional engineering effort will produce ever greater improvements in performance. Eventually this will begin to reduce in terms of the relationship between input and performance until, eventually, a point will be reached where increasing engineering effort produces diminishing performance returns. When this "natural limit" (of the technology) occurs, incremental innovation can still take place. When a new technology replaces this old technology, the cycle repeats itself.

4.6 SUMMARY

Theories of innovation offer many benefits, especially in the uncertain world of innovation.

Innovation theories are predictive and thus allow us to indicate the likely course of innovation and its impact. Theories help us to make sense of innovation.



Study unit 5

Sources of innovation

Contents

5.1 LEARNING OUTCOMES

At the end of this study unit, learners will be able to

— review the innovation process
— distinguish the different ways in which the innovation process can commence
— analyse the diverse sources of innovation
— evaluate the relative importance of different sources of innovation

5.2 KEY CONCEPTS

— Association
— Adaptation
— Analogy
— Serendipity

5.3 OVERVIEW

In this study unit, we will look at where innovation comes from. Although Research and Development contributes to innovation, there is not necessarily a connection between R&D and innovation. We can now look at the diverse sources of innovation and what may be the starting point for innovation.

5.4 SOURCES OF INNOVATION

5.4.1 Insight — a flash of genius

Ideas come from anywhere. Once a problem has been recognised, an organisation normally brings a group of people together to brainstorm ideas. However, this does not always lead to innovation. Innovative ideas suddenly come to a person, sometimes after years of studying the problem and without any logical explanation. These ideas can occur at any time and to anyone, not only experts. Innovative ideas sometimes come about when least expected (eg 3M's post-it stickers). This product was designed for a totally different purpose. The design did not fit the purpose. Only once someone else looked at the discarded design did 3M see the potential for the design. In short, it was an outsider who had the insight to see the commercial use of the product.

Once these innovations occur we often think them as a stroke of genius. Yet, with the culmination of chance, knowledge and experience, many insights come about when least expected. Many innovative ideas are now seen as simple and obvious, and yet they probably only came about after years of research and failure.

That said, there appears to be some logical pattern that idea generation or insight takes:

— Association
— Adaptation
— Analogy
— Serendipity/chance

5.4.1.1 Association

Association is best described in the example above. It involves bringing together two different areas of unconnected ideas and having the insight that an idea from one area may be able to solve a problem in a completely different area.

With 3M, an idea that was discarded was seen as having commercial potential by someone working in another field of expertise.

5.4.1.2 Adaptation

Adaptation comes about when an idea used in a different field is adapted to solve a problem in another (sometimes similar) field. The same insight is used in a different application, and sometimes requires adaptation to solve the problem.

5.4.1.3 Analogy

Where a principle used in one area is used for a different purpose elsewhere, it is described as an analogy. Velcro was designed after years of studying how burs stuck to fabric and fur. This insight lead to the use of velcro as an alternative to the zip fastener.

5.4.1.4 Serendipity/chance

Serendipity means a "happy accident". Insights come about by complete chance and can then be applied to real problems. Penicillin was discovered by chance during a study of fungus.

Study Smith (2006), pages 86 to 88.

5.4.2 Sources of innovation

As we have seen, innovation can come from anywhere, although we can narrow it down to insights that comes from either organisations or individuals. Furthermore, these organisations and individuals fall into certain categories:

— individuals
— corporate undertakings
— users
— outsiders
— spill-overs
— process needs

5.4.3 Individuals

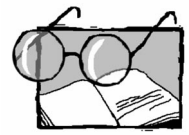
When we talk about innovation, we often assume that all innovations come from individuals since it is these innovations that often receive the most publicity. Well-known examples of such innovations are the telephone (invented by Alexander Bell) and, more recently, the spreadsheet (first developed by Dan Bricklin). Indeed, two-thirds of all innovations come from the individuals.

This is because there are far fewer restrictions on individuals (or small businesses) than there are on employees working in large organisations.

Factors that encourage individual inventors

(a) Recent years have shown a phenomenal growth in small businesses.
(b) Small businesses now work with large organisations (through joint ventures and strategic alliances).
(c) While large firms may have the resources and technologies, smaller firms usually have a better knowledge of the technologies.
(d) Spin-off companies are created when employees from large organisations take the knowledge and experience they have gained with these organisations with them and go off to start their own businesses. Examples are Microsoft and SAP.

(e) Large organisations are slower to adapt to new, disruptive technologies. Small businesses, however, in effect "grab" the opportunity and are flexible enough to embrace disruptive technologies as these are invented.

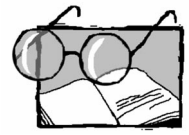


Study Smith (2006), pages 88 to 89.

5.4.4 Corporate undertakings

Given the pace with which technologies change, it is often only the big organisations that have the resources to follow the trends. Firms such as IBM spend more on R&D than some countries' GDP. If they are to retain their competitive edge, large organisations know they must spend large sums of time and money on innovation. In the pharmaceutical industry, where development of new products can take many years or even decades, large firms have the financial resources and cash flow advantages over small businesses.

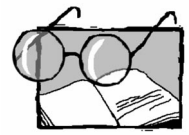
However, there is no proof that the size of the organisation has any correlation with the number of innovations that are successful. There are several large organisations that have large R&D budgets, but are not known for introducing any significant innovations.



Study Smith (2006), pages 89 to 90.

5.4.5 Users

Innovations in the construction industry, medical and science industries often come from the users themselves. These users need to find solutions to solve problems within their job quickly and efficiently. They have insight into the problem and know what sort of solution will work. These innovations are then handed over to larger or specialised organisations to distribute as commercially viable products/processes or services.



Study Smith (2006), pages 90 to 92.

5.4.6 Outsiders

Scientists and researchers often work within the constraints of rules and conventional wisdom, both of which are generally accepted and seldom questioned. Outsiders, perhaps through ignorance, are more likely to challenge these ideas and practices. This may lead to products being used in ways that were not foreseen by the original designers or the development of new products. Outsiders come with an open mind, are willing to challenge existing ideas and often have outside networks that can help in creating new product ideas.

Study Smith (2006), pages 92 to 94.

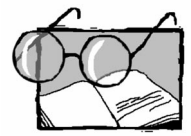
5.4.7 Spill-overs

Spill-overs come from organisations that have developed an idea but either choose not to pursue the idea or do not think it is worth patenting. Other organisations may see the potential in the idea and "run with it". This is very common in today's electronic market, where companies bring out a new product, only to find that their competitors copy and improve their initial idea very quickly. Although there are ways, such as copyright, patents and intellectual property rights that can protect new ideas, there are loopholes and timing issues that other organisations can sometimes exploit.

Study Smith (2006), pages 94 to 96.

5.4.8 Process needs

With the ever-increasing threat of competition, firms are constantly looking for better and faster ways of doing things. The assembly line that Henry Ford developed increased productivity and efficiency and is still used today. Products and services are copied by competitors and new ideas are constantly entering the market. To sustain their competitive advantage quickly, it is often more important for organisations to reduce their costs and compete on the pricing front.



Study Smith (2006), page 96.

Activity

Where inventive ideas mature into innovative solutions that can be rapidly developed and deployed.

IBM's employees are its strongest asset, and when more than 50,000 of them took part in an online jam-session, the value of each employee's role in innovation crystallised into a need for global action. IBM responded by exploring a new approach to suggestion boxes, based on the jam format, IBM's dedication to open collaborative innovation and an understanding of idea-rich communities. An exploratory pilot at IBM Research quickly evolved into the company-wide ThinkPlace program, where inventive ideas mature into innovative solutions that can be rapidly developed and deployed.

ThinkPlace is unique because the ideas are out in the open — anyone in the company can suggest ideas, comment on them, refine them, express support or even explain why the idea might not work. More importantly, the ideas that employees think have the greatest potential to grow the business, solve existing problems, or improve IBM's culture will automatically be considered.

Behind the scenes, a global network of subject matter experts use data mining tools

to track the most promising ideas and help manage top-rated ideas through the formal review processes. Additional business methods then carry the idea forward for implementation.

"We're taking the best aspects of jams, wikis and online communities and applying them to our understanding of innovation in the 21st century," said Nick Donofrio, senior vice president, technology and innovation, and one of the executive sponsors of the ThinkPlace program. "We're blessed with more than 300,000 of the most innovative employees in the world, but it hasn't always been clear how they could share their ideas — until now. ThinkPlace provides an open, collaborative and global platform for tapping into their collective expertise."

These expert innovators have helped lay the groundwork for IBM's success, not only because of the ideas that find their way into IBM products and solutions, but because the processes themselves are a valuable new approach to spurring innovation from within — both for IBM and for its clients.

http://domino.research.ibm.com/comm/www_innovate.nsf/pages/ourselves.thinkplace.html June 2006

5.4.9 Whose innovation is it anyway?

During the 20th century, it was individuals who were responsible for the majority of innovations. However, towards the end of the 20th century, innovations started coming from larger organisations rather than individuals.

This is primarily due to the development of science, legislation and safety requirements, and the amount of money required to do any form of research today. That said, outsiders and external parties are very much involved in innovation — largely because they work in collaboration with large organisations. It has become common practice for large firms to co-operate with individuals/small firms by creating joint ventures, strategic alliances, technology agreements and licensing agreements. Both parties bring unique capabilities to the project, making this combination highly effective.

Study Smith (2006), pages 97 to 101.

5.5 ASSESSMENT

(1) Which of the four forms of insight do you consider the most important and why?
(2) Which of the four theories of innovation gives prominence to outsiders as a source of innovation?
(3) Why are industry "insiders" sometimes prevented from engaging in innovation?
(4) If the sources of innovation are diverse, what are the implications of this for companies that are keen to innovate?
(5) How significant is serendipity/chance as a source of insight that can lead to innovation?

Answers to assessment

(1) Adaptation, association, analogy and serendipity are all forms of insight and each one has its place in innovation. Serendipity requires prior knowledge and experience before it can be recognised and applied. This is a rare combination and only happens once in a while. Association also requires some insight into the existing idea and its field and it is rare that a person has expertise in both the area of the original idea and the area of application. Analogy is where a principle used in one situation is used for a different purpose in another (situation). This is probably the simplest form of innovation, although it requires an open mind to see the possibilities. Analogy makes it possible to use a principle that applies to one situation in another situation. This tends to occur when an innovator is challenged with a certain problem and actively seeks solutions in other areas.

(2) Absorptive capacity.

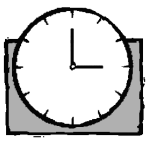
(3) Insiders are often so entrenched in the norm that they do not see better ways of doing things. Also, the insider often does not have the necessary network for obtaining knowledge that is relevant to the innovation process.

(4) Companies keen to innovate must make sure they are not isolated from the outside world and make a point of being open to outside ideas. It may even be necessary to buy in ideas from the other sources, given that R&D alone is no guarantee of innovation. Innovation can come from anywhere, which is why individuals/users/outsiders can be a threat to the organisation. This same threat could, however, be an opportunity for the organisation, because many innovative sources cannot put their ideas on the market owing to their lack of financial, management and manufacturing expertise.

(5) When an innovator keeps an open mind he may stumble onto new ideas. Serendipity is a rare occurrence and requires knowledge and expertise before it can be recognised.

5.6 SUMMARY

Innovation, by its very nature, can come from anywhere and at any time. Innovations also come in different forms. We need to know what the forms and sources of innovation are so that we can keep a look out for new ideas ourselves.



Study unit 6

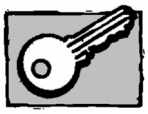
The process of innovation

Contents

6.1 LEARNING OUTCOMES

At the end of this study unit, learners will be able to

— differentiate between commercialisation and invention
— describe the various sources of innovation
— distinguish the steps in the innovation process
— describe the different activities associated with the process of innovation
— evaluate the techniques available to facilitate the process of innovation
— differentiate and evaluate the five models of the innovation process



6.2 KEY CONCEPTS

— Insight
— Design
— Development
— Production engineering
— Pilot testing
— Full-scale manufacturing
— Technology push
— Demand pull
— Coupling
— Integration network

6.3 OVERVIEW

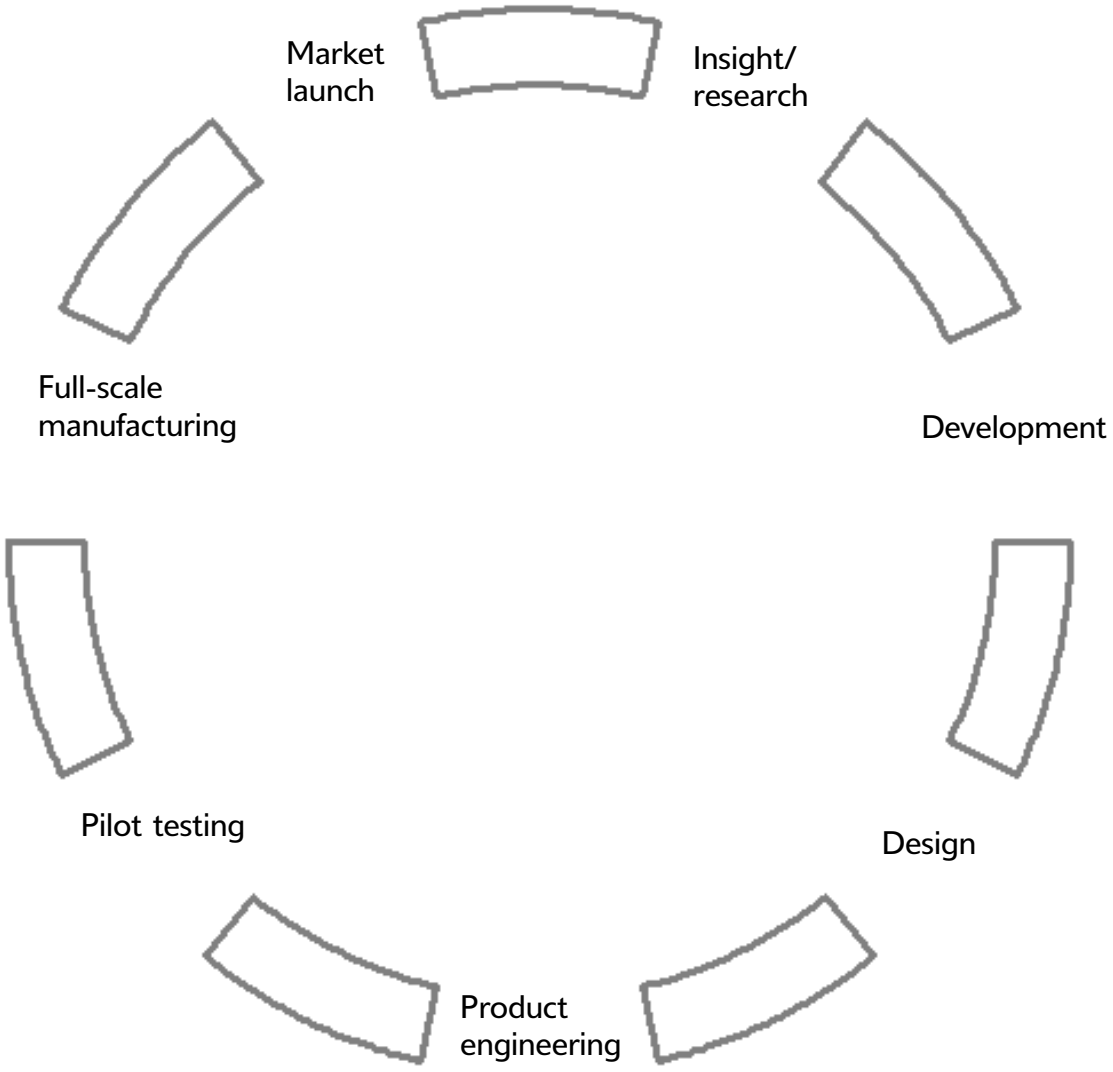
Although it might seem as if innovation happens in a haphazard manner, any process of innovation involves certain underlying steps. Some steps are more obvious than others and some are more important than others.

6.4 THE PROCESS OF INNOVATION

6.4.1 The steps in the innovation process

In real life it is difficult to break down the steps in the innovation process. Some inventions involve more defined steps than others in the process of turning them into a commercially viable product. It is not always easy to differentiate between the different steps.

Generic model of the innovation process:



Insight and development form part of the R & D stage, and the other steps form part of the commercialisation phase.

6.4.1.1 The R & D phase

(a) Insight/research

As we have seen, ideas can come from anywhere. Although these two sources of ideas are very different from each other, there is often some overlap between them.

(b) Development

This step involves taking the idea and turning it into a working product. This phase will produce a product that can be showcased and used for feasibility studies, but will still need extensive work to get it ready for the market. This phase involves a lot of testing, model development and prototypes.

6.4.1.2 Commercialisation

(a) Design

Once the product has been tested and is a working prototype, the designer is responsible for adding the attributes required by consumers. For example:

— The precise shape of the product
— The tolerances to which it will be manufactured
— The materials to be used in manufacture
— The process by which the product will be manufactured

The design phase will include the drawings which will specify the form of the product and also the details of geometry, materials and tolerances of all the components that make up the final product. The design has to appeal to the consumer. Manufacturing details will specify the process of manufacture and try to make the process as cost-effective and easy as possible. All this will have to be done within certain budgetary constraints.

(b) Product engineering

This phase is concerned with the mass production of the product. The decision of whether the product will be manufactured in-house or whether it will be outsourced is made during this phase. Outputs are measured against inputs. There is a choice between four types of processes:

— Jobbing. This is where general purpose equipment is used to make one product (normally to a unique design).
— Batch systems. This involves the use of general-purpose equipment combined with special-purpose tooling. These products are produced in lots or batches.
— Line systems. This is dedicated equipment used for mass production (normally line production).
— Continuous process. This is found in process industries such as oil refineries and chemicals.

(c) Pilot testing

Once it has been confirmed that the product can be made cost-effectively, further testing will be required to ensure that it is acceptable to the market. Pilot testing has less to do with developing the product and more to do with ensuring it is safe for the consumer to use.

(d) Full-scale manufacturing

During this phase, machinery is tested to ensure that it is functioning and interacting effectively. The commissioning process is intended to prove the system and ensure that it is functioning as planned. Manufacturing staff are recruited and trained and manufacturing can then begin. Manufacturers normally use the ramp-up system; this means they initially start producing small quantities and then increase capacity as they become more familiar with the process and product.

(e) Market launch

This phase requires the co-ordination of activities such as:

— Ensuring that retail outlets have appropriate stocks.
— Booking advertising space.
— Designing and producing advertisements.
— Booking exhibition space.
— Ensuring that literature about the product has been designed, written and printed.
— Informing the press and ensuring that they have had time to familiarise themselves with the product.

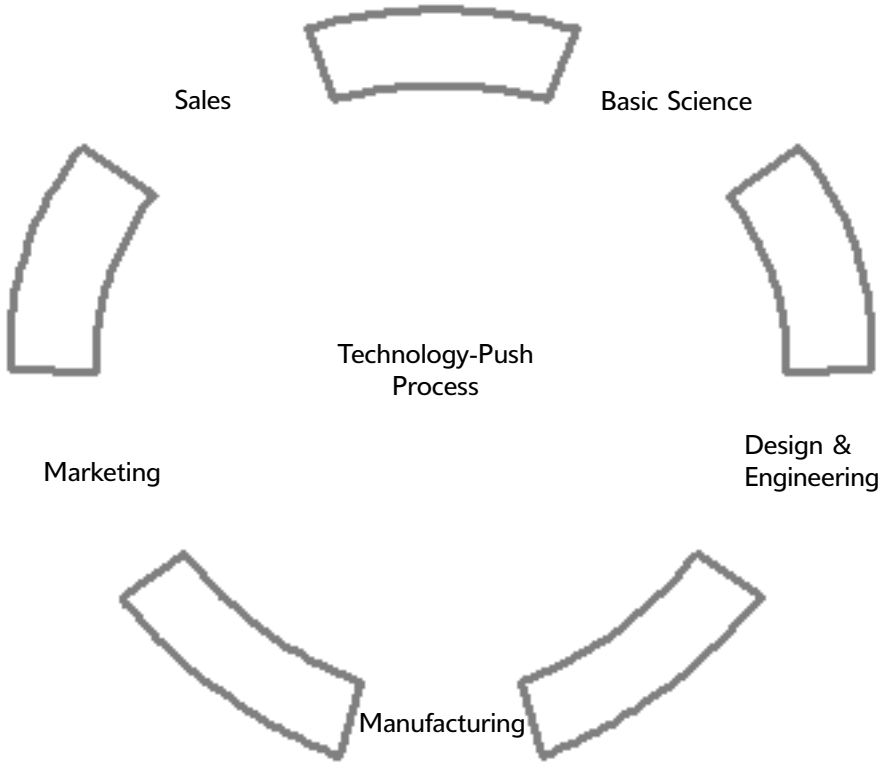
Study Smith (2006), pages 107 to 119.

6.4.2 Models of innovation

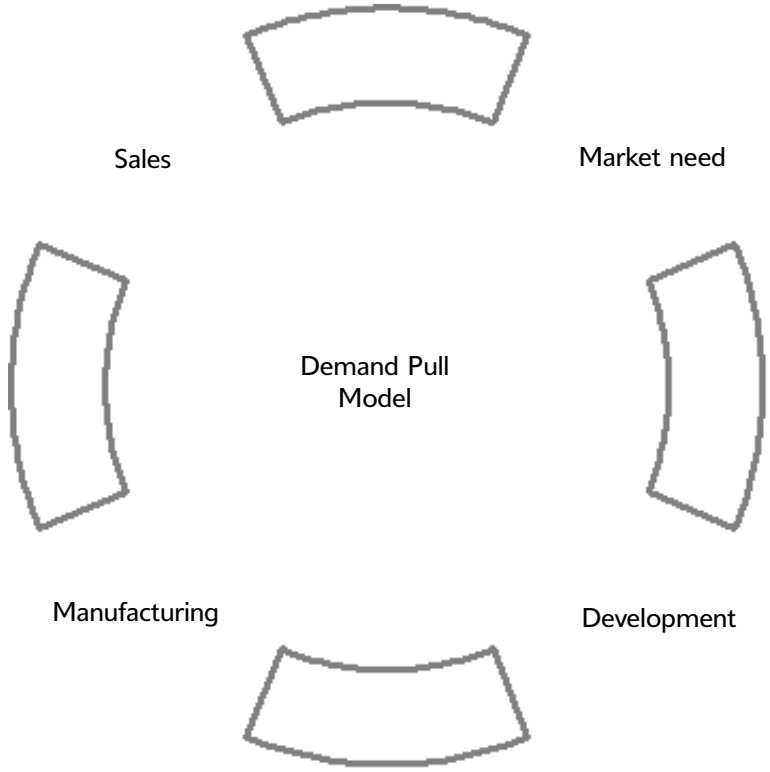
We have looked at the generic model of the innovation process, which enables the activities associated with innovation to be spelt out. However, over the last century various other models have been identified, such as:

— technology-push model
— demand-pull model
— coupling model
— integrated model
— network model

(1) The technology push model is similar to the process described above. This model is based on the premise that innovation is driven by R & D. It follows the sequential steps, but is a bit naïve as far as the process is concerned.



(2) The demand-pull model is dictated by the market. This model acknowledges consumer sophistication and consumer wants and needs. In the demand-push model, the ideas are generated by the market, that is, consumers' wants and their needs. The weakness of this model is that there is a real threat of "technology incrementalism". This is where the organisation spends its efforts on small improvements required by consumers and in the process misses the opportunity of radical innovation based on new technologies.



(3) *The coupling model.* Businesses acknowledge that the above two models work in a linear sequence. Each department works on its own piece of the process without giving input into the next department. The coupling model acknowledges that both technologies and the market are sources of new ideas. Although there are still distinct functions, these stages interact with each other and are interdependent.
(4) *The integrated model.* This encapsulates the advances in IT technologies. Functional teams are brought into the development cycle right from the beginning. These functions are integrated from the start, which means that problems are dealt with early on.
(5) *The network model.* This brings together the best of all fields — either from within the organisation or from the outside, as necessary. Expertise from the outside is brought in through joint-venture teams, alliances, agreements and contracts. Consumer expectations are such that companies have to produce products quickly and efficiently. The network model allows companies to build on existing internal and external expertise to accommodate consumer expectations. Outsiders experts bring with them new ideas and new technologies that would take the organisation too long to create internally.

Study Smith (2006), pages 119 to 128.

6.5 ASSESSMENT

(1) Why is innovation often a lengthy process?
(2) Where do innovations come from?
(3) What is the difference between research and development?
(4) Where do teams fit into the integrated model of innovation?
(5) Explain how the technology-push and demand-pull processes of innovation are related to different types of innovation.
(6) Which theory of innovation best explains why firms are increasingly using the network model?
(7) What do you consider to be the most important feature of the coupling model and why?

Answers to assessment

(1) Innovation is a lengthy process because the idea has to be taken right through to commercialisation. This involves several steps. These steps differ, depending on the nature of the innovation and include insight, development, design, production engineering, pilot testing, full-scale manufacture and market launch.
(2) Innovation can originate with individuals, teams or within organisations. It can come about owing to changes in technology that improves a way of doing something (technology push), because of a user request (demand pull), because of

a combination of market factors and technology (coupling), or in the form of integration, where all departments work together on a project or through networks.

(3) Research is normally conducted by large organisations that are looking for new ways of doing something. This often translates into new technologies. Development is about turning ideas and technologies into products.

(4) In the integrated model, the different functions of the organisation are represented in a team. This team consists of people from various functions (eg manufacturing, marketing and finance) who work together on a project. This speeds up the process, since the different disciplines are included from the outset.

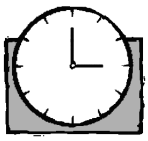
(5) The demand-push innovation model tends to focus on the available technologies and how they can be used. This model brings out new innovations based on new technologies and is not always accepted by the market. Demand pull, on the other hand, is driven by the market. These are innovations that the market needs or wants. This model ignores emerging new technologies that could lead to radical innovations.

(6) Absorptive capacity.

(7) The presence of ''feedback loops''. The lines of communication between the various functions carry two-way traffic. In the coupling model, one has a series of distinct functions or stages, and these interact with each other and are interdependent.

6.6 SUMMARY

Understanding the process of innovation leads us to see what it entails and allows organisations to structure themselves in a way that makes for better innovation. The strength of the organisation should be mixed with market factors. This could mean that an organisation needs to manage its shortcomings by networking with others that has the expertise it lacks.



Study unit 7

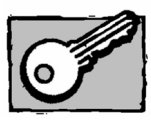
Intellectual property

Contents

7.1 LEARNING OUTCOMES

At the end of this study unit, learners will be able to

— explain the rationale behind the various rights associated with intellectual property
— identify the various types of intellectual property rights (IPR)
— state the benefits conferred by intellectual property rights
— state the remedies available to those whose intellectual property rights have been infringed
— show how intellectual property rights can be used to create value for their creator



7.2 KEY CONCEPTS

— Patents
— Registered design
— Trademark
— Copyright
— Passing off

7.3 OVERVIEW

Once an idea has originated, the inventor will be reluctant to put this onto the market simply because the inventor will be wary of the competition getting hold of the idea. It is important to note that there are ways of protecting ideas so that the inventor/ innovator has time to establish the product before it is copied by others. This makes it possible for the inventor to benefit financially from his idea. In this study unit, we will look at the various ways in which ideas can be legally protected.

7.4 INTELLECTUAL PROPERTY

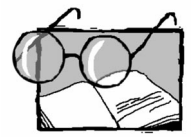
7.4.1 Intellectual property and intellectual property rights

Many an inventor or creator has had the experience of seeing other people copy his or her design, thus robbing the inventor of any financial gains he or she might have made, which is why there is now a reluctance for people to come up with new ideas.

Designs, concepts, intellectual property and literary works can be protected through what is known as intellectual property rights, at least for a period of time. After he or she has passed certain stringent tests, the owner of the intellectual property can apply for legal recognition for his or her work. This law will allow the owner to prohibit others from exploiting his or her intellectual property, thus making it possible for the inventor to reap the benefits of his or her creation.

Intellectual property rights can take many forms:

— Patent: the owner registers a patent of his/her creative design.
— Trademark: the owner can register a trademark to protect his/her reputation.
— Copyright: this is to protect creative ideas from being copied (normally applies to literary works).
— Passing off: this is inherent protection of the owner's reputation.



Study Smith (2006), pages 134 to 135.

7.4.2 Patents

Patents are designed to prevent an idea being copied by others. A patent is valid for 20 years. This gives the owner the opportunity to reap the financial benefits before competitors are allowed to enter the market. The function of the patent is obviously to encourage innovation.

When applying to the Department of Trade & Industry to patent a creation, the creator has to show that his or her invention is new. He needs to meet three criteria for the patent to be recognised:

— *Novelty of the idea.* The invention must be new.
— *Inventive steps.* The steps required to bring about this innovation must not be obvious to those familiar with the field.

— *Industrial application.* There has to be an industrial use/application for the innovation. This means that scientific discoveries will not be patentable; only products, apparatus or devices are patentable.

Not everything can be patented. Scientific theories, mathematical models and aesthetic creations (such as art and literature) cannot be patented. These creations are protected by other forms of intellectual property rights.

The owner of a patent has legal recourse if his or her creation is copied by others. He will have to prove to the courts that his design was copied after the patent was registered.

7.4.2.1 Patents

A patent is an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something, or offers a new technical solution to a problem. The patent provides protection for the owner, which gives him or her the right to exclude others from making, using, exercising, disposing of the invention, offering to dispose, or importing the invention. The protection is granted for a limited period (generally 20 years).

7.4.2.2 Services of patents experts

In terms of the South African Patents Act, individuals may file their own provisional patent applications. It is however, advisable for applicants to seek the assistance of the Patent Attorneys.

If a provisional patent is filed and the invention is then made public, the strength and breadth and scope of protection ultimately obtained will depend on the wording and content of the specification, the broad definitions and detailed description of the invention. The Patent Office takes precautions to maintain confidentiality, but cannot be held responsible for what occurs outside the office.

Patent attorneys and agents are familiar with international requirements and are thus in a position to draft provisional specifications in an internationally acceptable fashion, thus encouraging protection both in South Africa and abroad.

South Africa is one of 124 countries that accepts the Patent Co-operation Treaty (PCT). This Treaty allows an individual to file an international application as well as a national application. The international application will designate countries in which the applicant seeks protection. Extra fees are payable for this type of registration.

The Patent Office cannot accept any responsibility for the loss of rights arising if the invention becomes public and is copied and the provisional specifications have not been properly drafted.

7.4.2.3 What is the lifespan of a patent?

A patent can last up to 20 years, provided that it is renewed annually before the expiration of the third year. It is important to pay an annual renewal fee to keep it in force. The patent expires after 20 years (from the date of application).

7.4.2.4 What can be patented?

Section 25 of the Patent Act, Act 57 of 1978, deals with this question and is worded as follows:

> 25. Patentable inventions
>
> (1) A patent may, subject to the provisions of this section, be granted for any new invention which involves an inventive step and which is capable of being used or applied in trade and industry or agriculture.
>
> (2) Anything which consists of:
>
> (a) a discovery;
>
> (b) a scientific theory;
>
> (c) a mathematical method;
>
> (d) a scheme, rule or method for performing a mental act, playing a game or doing business;
>
> (e) a program for a computer; or
>
> (f) the presentation of information
>
> shall not be an invention for the purposes of this Act.

The *Patent Journal*

This is a journal published by the Government Printers on a monthly basis, and this contains information on patents, trademarks, designs and copyright on cinematographic films in South Africa. The *Patent Journal* is obtainable from Government Printers (Pretoria).

www.cipro.co.za

7.4.3 Registered designs

Design rights are an automatic form of design protection. Although design rights are automatic, the designer still has to prove that the design is original and that these rights only cover the shape and configuration of the article and do not extend to two-dimensional designs. Design rights protect the design from being copied for ten years from the date that the product was first marketed.

7.4.3.1 Designs

What is a design?

Essentially a "design" is about shape and visual features. Some designs are necessitated by function and others are aesthetic. Design is about the shape, form, appearance, pattern, ornamentation and configuration of a product or article (eg the design of a piece of jewellery).

There are two types of design which can be registered:

1. An aesthetic design

   (a) Has to be new and original
   (b) Beauty is in its shape, configuration or ornamentation
   (c) Must be able to be produced by an industrial process

2. A functional design

   (a) Has to be new and not commonplace
   (b) Where the shape or configuration is necessitated by the function
   (c) Must be able to be produced by an industrial process

7.4.3.2 The lifespan of a design

— Protection is given to aesthetic designs for a period of 15 years, and to functional designs for 10 years.
— Registered designs have to be renewed annually before the expiration of the third year, as from the date the design was lodged.

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7.4.4 Trademarks

A trademark protects the distinctive features of a person's activities. This could cover logos, words, pictures or identify particular goods or services of an organisation. It is symbolised by the use of after the name or logo.

Trademarks, as you know, are playing an ever-increasing role with the advent of relationship marketing and branding. Registering a trademark gives the owner the exclusive use of a brand, name, logo or slogan. The most recognised brand Coca-Cola has given the company the exclusive use of the name. The more unusual trademarks include the Coca-Cola bottle, the colour green and the colour yellow.

Items that can be registered as trademarks are:

— domain names
— logos
— music
— slogans
— colours
— shapes

For a trademark to be registered by the Department of Trade & Industry, it must comply with the following criteria:

— Fall under the group of items (as above) that can be registered as trademarks.
— It must be distinctive.
— It must be non-deceptive (this means it must not mislead the public that the product has attributes that are not present).
— It must not conflict with any other trademarks already registered.

7.4.4.1 Trademarks: what is a trademark?

A trademark is a brand name, a slogan or a logo. It identifies the services or goods of one person and distinguishes these from the goods and services of another. Examples include:

— Brand Name: COCA COLA, AQUAFRESH
— A slogan: "Everything keeps going right Toyota"
— A logo: The Nike tick, or the MacDonalds "M"
— Specific shape: The Coca-Cola bottle

Thus a brand name is a word or combination of words (eg Kentucky Fried Chicken). A slogan is a short phrase or a sentence and a logo is a distinctive picture or symbol. These provide a product with a distinctive identity in the marketplace. They can apply to both products and services.

Once a trademark (brand name, slogan or logo) has been registered, nobody else can use this trademark, or one that is confusingly similar. If this happens, legal action may result.

7.4.4.2 Must a trademark be registered?

A trademark can only be protected as such and defended under the Act if it is registered. Un-registered trademarks may be defended in terms of common law. The registration procedure results in a registration certificate which has legal status, allowing the owner of the registered trademark the exclusive right to use that trademark.

CIPRO (Companies and Intellectual Property Registration Office) administers the Register of Trade Marks, which is a record of all the trademarks that have been formally registered.

7.4.4.3 What is the lifespan of a trademark?

A registered trademark can be protected forever, provided it is renewed every ten years upon payment of a renewal fee.

www.cipro.co.za

7.4.5 Passing off

Passing off has no requirements for registration and is used to avoid misrepresentation by other companies. Passing off stops companies from implying that their products are those of another company.

Study Smith (2006), page 143.

7.4.6 Copyright

Copyright gives the owner of a creative effort the automatic and exclusive right to use his or her creation. Music, film, art and literary works are examples of works that are protected by copyright. Copyrights protect works from being copied and sold without permission. Computer software is protected through copyright. The creator of the work is given the copyright and this enables him or her to use, sell or assign the rights of the works as he or she sees fit.

Copyrights protect works against:

— copying and reproducing
— adapting
— distributing
— issuing and renting
— public performance
— broadcasting

The ownership of copyright does not always belong to the creator of the work. For example, if the work was created while the creator was in the employment of a company, the rights belong to the company and not to the individual.

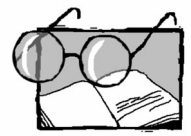
Copyright timescales differ:

— Literary, musical, artistic and dramatic works — 70 years or the author's lifetime
— Films, TV, radio — date of broadcast plus 50 years
— Publishers' rights — date of publication plus 25 years

Study Smith (2006), pages 143 to 145.

7.4.7 Licensing

A licensing agreement gives the company the right to produce a product the intellectual property rights of which belong to another company. In other words, licensee produces the product with the owner's consent. Small companies with intellectual property rights can often not afford to produce the product themselves and give large companies the rights to produce these products for a fee. Amstel Larger and Heineken beer are produced locally by the SAB under licence from the original owners.



Study Smith (2006), pages 145 to149.

7.5 ASSESSMENT

(1) Which of the following items would not meet the criteria required for a registered design?

- portable CD player
- a rubber sealing ring for the door of a washing machine
- a corkscrew

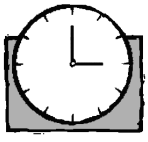
(2) Why are trademarks an increasingly important part of intellectual property?
(3) What is meant by "novelty" where patents are concerned and why is it important?
(4) Why do inventors need to take particular care before publishing their inventions?
(5) What is meant by the term "passing off"?

Answers to assessment

(1) A rubber sealing ring for the door of a washing machine.
(2) The trademark is given for a name, slogan or a logo. This mark distinguishes the organisation or product from competitor products. Trademarks are becoming increasingly important, because it is the organisation's brand name and is associated with other factors (eg quality and service).
(3) Novelty refers to something new. This means that something that has not been seen before. It is therefore crucial to get the timing right for registering the patent. The patent should be registered before it is shown to the outside world, otherwise it could lose its novelty value.
(4) If the inventor has not taken the necessary precautions to stop others from using his or her design, this design could easily be copied by others. The inventor will then lose out on the financial rewards of his or her invention.
(5) This is effectively a common law version of trademark registration. "Passing off" is based on the principle that a trader must not sell goods under the pretence that they are someone else's goods. To do so is to commit passing off.

7.6 SUMMARY

The law is there to protect innovators and their ideas. There are different categories of legal protection for different stages in the innovation process. It is important to understand which law protects which part of the innovation process. The inventor should make sure that the correct protection is in place before trying to put his or her idea on the market. The law protects the innovator and allows the innovator to reap the financial benefits of his or her idea.



Topic 3

How do you manage innovation?

1.1 INTRODUCTION AND AIM OF THE TOPIC/THEME

The aim of this topic/theme is to explain to you the challenges facing the innovator and ways of dealing with these challenges.

1.2 LEARNING OUTCOMES

In this study unit, we shall focus on the following specific outcome: the problems facing the innovator and how to deal with these problems. We shall also focus on how to structure the business in a way that facilitates innovations.

1.3 CONTENT OF THE TOPIC

— Study unit 8: Strategy
— Study unit 9: Entrepreneurs
— Study unit 10: Funding innovation
— Study unit 11: Organising for innovation

Study unit 8

Strategy

Contents

8.1 LEARNING OUTCOMES

At the end of this study unit, learners will be able to

— distinguish between the different types of strategy
— appreciate the part that business strategy plays in an organisation that achieves its long-term objectives
— explain the nature of technology strategy
— recognise the various innovation strategies available for exploiting innovations

8.2 KEY CONCEPTS

— Business strategy
— Technology strategy
— Ansoff Product-Market matrix
— Acquisition
— Development
— Selection
— Exploitation
— First mover strategy
— Follower strategy

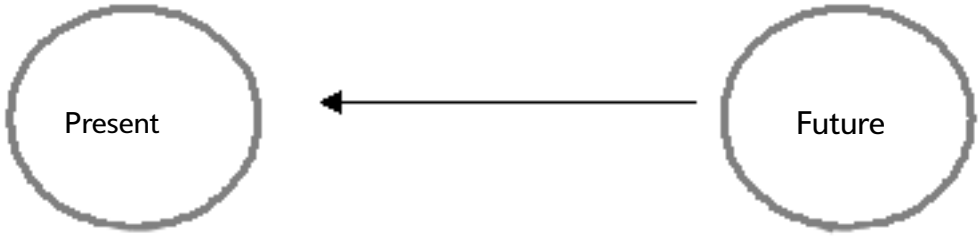
8.3 OVERVIEW

Once an idea has been formulated, the innovator needs to make significant decisions about how to exploit this idea for his or her financial benefit. The choices made now may well have serious and long-term consequences; these choices are, in effect, strategic decisions that will have a long-term effect on the organisation and the innovation. In this study unit we will look at the types of strategic decision that need to be taken and then discuss the different types of strategies that can be followed.

8.4 TECHNOLOGY STRATEGY

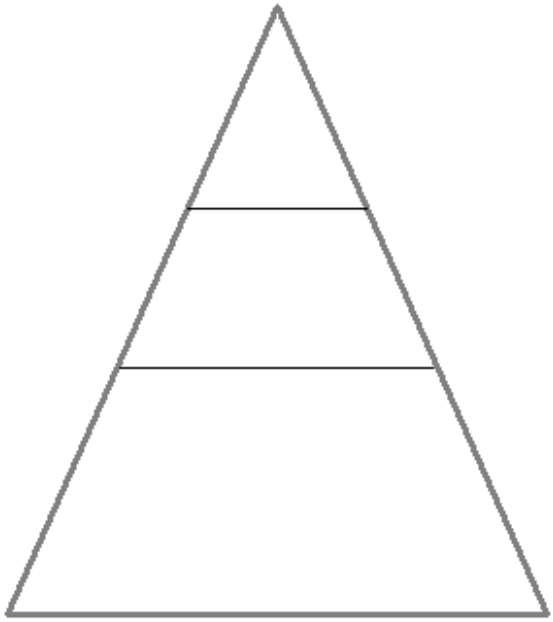
8.4.1 The nature of strategy

Managers make decisions every day. These decisions are part of the organisation's operation and do not necessarily influence the company in the long term.



Strategy looks backward from the future to the present and looks at all the long-term implications that need to be addressed.

Strategy comes into play when managers look at the organisation's long-term plans. A strategy is a map for the entire organisation on how it intends to accomplish its goals and objectives in the long term. Strategic decisions are made by top management, and impact on each and every employee in the organisation.



Top management: Strategic
How do we compete in the business environment?

Middle management: Functional
Which technologies should be used?

Lower management: Product
How do we innovate

Business strategy looks at the company as a whole and how the organisation can achieve its long-term goals within the environment in which it operates.

Functional strategy contributes to the business strategy by customising the business strategy for each individual function within the organisation (eg the marketing strategy).

The product strategy looks at the long-term development of products within the parameters of the functional strategies, the ultimate goal being the achievement of the business strategy.

Study Smith (2006), pages 157 to 158.

8.4.2 Business strategy

The business strategy is a set of decisions and actions that result in plans designed to achieve the company's objectives (eg wealth creation, growth and fulfilling certain social responsibilities). These decisions are future oriented, they have multifunctional or multi-business consequences and they take into account the organisation's external environment. To survive in a constantly changing environment, organisations need to make decisions that will enable them to achieve strategic competitiveness and make above-average returns. Business strategy is about how to "win the league" and not on "how to win the game".

A business strategy improves the organisation's ability to prevent problems from occurring in the first place by

— getting employees involved, which improves their understanding of the organisation's long-term plan and makes them more motivated
— reducing gaps and overlaps in employees' activities (because strategy clarifies roles)
— reducing resistance to change

Many books have been written on this subject. Two widely used models are:

— Porter's generic model
— Ansoff's product-market matrix

Ansoff's product-market matrix regards markets and products as the main focus. The fundamental question here is: should the organisation seek new markets outside the current markets or should it look for new opportunities within its current market? Ansoff examines products in the same way. Innovation will be obviously be required when new products need to be developed.

Porter looks at how the organisation should compete. Porter's model focuses on:

— cost leadership
— differentiation

All business strategy models focus on what should be done to achieve long-term objectives and not how it should be done.

Study Smith (2006), pages 158 to 160.

8.4.3 Technology strategy

Technological innovations have obviously changed the way in which business is conducted (eg the Internet) and, as you know, technology itself is constantly changing. An organisation's survival not only depends on its products, but also in the way its uses technology, particularly if it wants a competitive advantage. Technology has also reduced the traditional barriers involved in doing business and organisations obviously need to use these technologies to their advantage.

Technology strategies, as the phrase implies, look at how to use core technologies to influence the organisation's long-term competitive advantage. Core technologies are technologies that are crucial to the organisation and that have a direct impact on their competitive advantage, (eg the Internet in the banking industry).

The organisation's technology strategy will look at the capabilities the organisation needs to use the technologies and which technologies can be used to achieve the business strategy. These technologies must be thoroughly understood and a strategy must be put in place to improve the organisation's capabilities. Technological strategies can help protect and improve an organisation's profitability in growth industries.

According to Burgelman et al (2001), technological evolution must be understood in both the organisational and industrial context. Together, these factors play an important role in technology strategy.

Organisations need to decide on how the organisation can acquire core technological capabilities and tools. To acquire technologies, organisations can choose any of the following methods:

— selection
— acquisition
— development
— exploitation

8.4.3.1 Selection

Technology influences our daily lives, and different technologies influence different industries. Some industries are very much technology-driven, while others use technology as a simple tool to accomplish certain smaller tasks. The decision about what technologies are needed in the organisation obviously forms a major part of its technology strategy.

Investment in technologies can be both expensive and time-consuming. It is better to make the right decision up front than trying to correct problems at a later stage. Since technology changes so rapidly, any decision needs to be taken with the long term in mind. Sunk costs are costs associated with transferring from one technology to

another. They are called "sunk costs" because it is often not possible to transfer the investment made in one technology (equipment, people and training) to a new technology and such costs are thus regarded as unrecoverable (hence the term "sunk"). Indeed, it is these "sunk" costs that often make organisations keep to older technologies rather than adopting new technology.

Technologies often come from outside the industry and need to be adapted to industry.

The technology decision has far-reaching effects on the organisation and is therefore part of the strategic decision-making process. The impact of changing technologies may well have an effect not only on products and services, but also on working practices, systems and skills.

Technology selection is therefore a key element in technology strategy.

8.4.3.2 Acquisition

The acquisition of technology not only refers to the purchase of new software or hardware.

Technology is constantly changing and it is obviously impossible for organisations to change their technologies at the same rate. Instead, in order to keep up with trends, organisations build up a technology base and acquire new components when they can. However, it is necessary to evaluate this technology base periodically and decide whether it is still meeting the organisation's requirements. It may be necessary to make a capital investment in acquiring a new technology. Indeed, whether to keep on using current technology or acquire new or different technologies is a problem facing all decision-makers in an organisation. The technology strategy will be a guide here.

There are various ways that organisations can acquire technologies:

— direct investment
— joint venture
— subcontracting Research and Development

Direct investment can take the form of capital investment, either through acquiring a package that can be written off as an expense or through mergers and acquisitions (when the acquisition of a company includes that company's technologies).

8.4.3.3 Development

The organisation can decide to develop its own in-house technologies. In today's world, development increasingly takes the form of research and development into previously acquired technology. Most forms of acquired technologies will need some form of development or customisation to fit the organisation. Although development normally falls within the organisation's internal functions, it can also be developed jointly with other organisations that have similar needs, either through alliances or joint ventures.

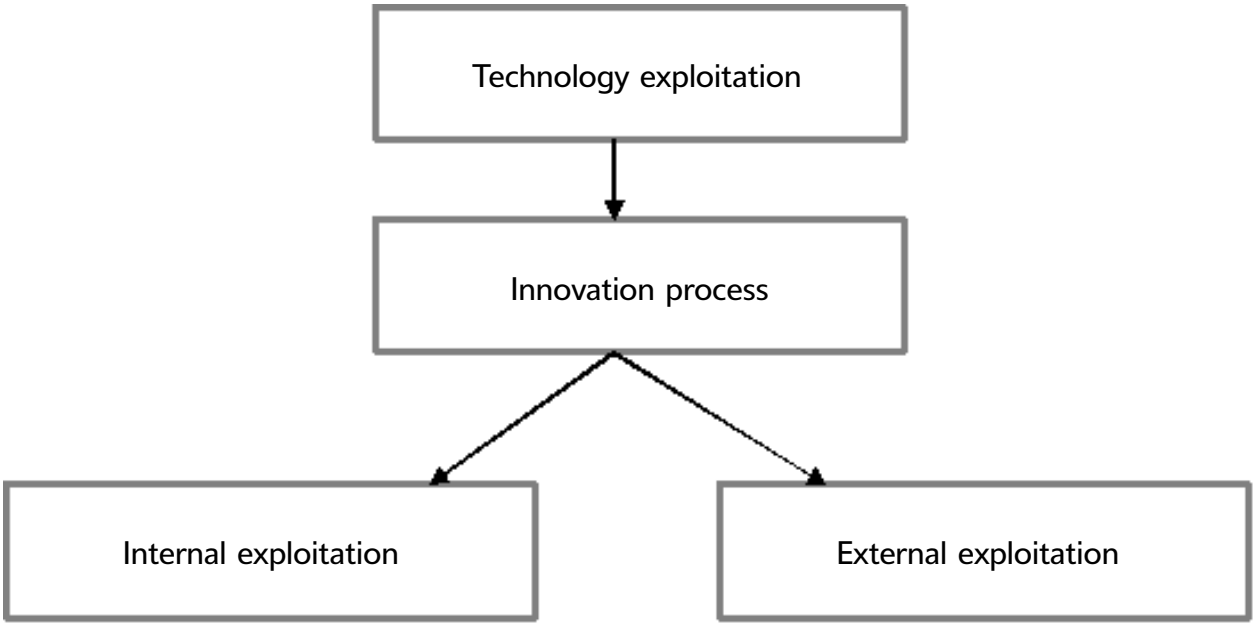
8.4.3.4 Exploitation

As with all investments, the organisation obviously wants a return on its investment in any technology, and it is innovation that properly exploits technologies.

With exploitation and innovation come risk and investment. Innovation and technology bring uncertainty, which is a risk to any organisation. The technology itself may prove to be a failure (technological risk) or the market may not want the product (market risk).

The decision-makers need to weigh up certain factors and determine how long it will be before they get a return on their investment. They may well need to fund this innovation for a few years before it shows any significant return.

The next decision will be whether to carry out the innovation internally (internal exploitation) or whether to hand it over to an outside organisation (external exploitation) specialising in such risks. These decisions will be based on risk and funding potential. If the risk is high, it will probably be better to hand it over to an outside organisation. The organisation will also have to weigh up the advantages/ disadvantages of investing money in such a project. The investment could be used in an area of the organisation that has quicker returns.



— Internal exploitation

Direct investment

This requires a firm to invest time, money and people in the exploitation of a technology that it can sell to other organisations (in the long term). Since this is not the organisation's core competency, it will require manufacturing facilities, experience and expertise, as well as marketing and distribution capabilities. And, of course, financial resources will be needed to fund the project. Finally, it may well be a long time before the exploitation shows a return.

Derivative strategy

This is where a new technology is applied to an existing product. Re-innovation is a feature of several products that have entered the market; this involves making small improvements to the product after it has been launched. This is common practice in

the computer industry, where products are improved after they have been released. Derivative strategy greatly reduces the time and cost it takes to put a product on the market.

— External exploitation

This involves selling the technology to an outside party so that this outside party can exploit the project. At the same time, by protecting its intellectual property (patent), the organisation can still reap some financial benefits from the technology it has developed.

Reasons for external exploitation:

(a) Lack of resources
(b) Lack of knowledge
(c) Poor fit with the company's business strategy
(d) Lack of reach

The sale can take the form of:

— Licensing: where the organisation still retains control of the intellectual property rights

The organisation will choose to use the knowledge, access to finance and motivation of the licensee to exploit the technology and, in return, will be paid a licensing fee.

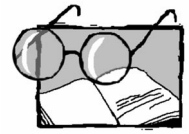
There are three reasons why licensing may well be better than in-house development:

(a) Complementary assets in production and marketing
(b) Transaction costs associated with acquiring complementary assets
(c) Competition in the final product market

— Spin-offs

Here the organisation creates a new organisation in order to exploit the technology. Spin-offs are often used where the technology is not core to the organisation. The spin-off company operates as a separate entity. This allows the organisation to focus on its own core competencies, while the spin-off organisation exploits the new technologies. The subsidiary company can be sold off by:

(a) a company flotation via an initial public offering (IPO)
(b) a management buy-out where the company is sold to its managers
(c) being sold to a venture capital organisation
(d) being sold to another company



Study Smith (2006), pages 160 to 172.

8.4.4 Product/innovation strategy

The innovation strategy is a plan for carrying out innovation. Here are a few strategies that can be followed:

8.4.4.1 First mover strategy

First-mover strategy refers to the organisation that is first in putting the new product on the market. Being first often enables the company to gain a dominant market position. Other advantages of being first are that the consumers are willing to pay more (novelty price) for a product, since there is no competitive product in the marketplace and the first mover sets consumer expectations; also the first mover can build a strong market share before competitors enter the market. The disadvantage of being a first mover is that the market is unaware of the product and needs to be educated. Furthermore, the market may take time to endorse the product or may reject the product completely.

8.4.4.2 Follower/imitator strategy

There are certain advantages in the "wait-and-see" strategy; as the name implies, this is when an organisation watches the first mover and decides whether or not it is a good market to enter. Attractions to the follower/imitator strategy are:

— Free rider effects: Costs are carried by the initiator that does not have to be incurred by follower (eg marketing costs).
— Imitation costs: Costs can be reduced by imitating the first mover's product without spending large sums on research and development.
— Scope of economies: Costs can be shared between products.
— Learning effects: The initiator will spend money on correcting faults, whereas the follower will get it right first time.

The disadvantage is that the first mover may have already captured the biggest market share. Customers may be reluctant to change over to a new brand.

Study Smith (2006), pages 172 to 175.

8.5 ASSESSMENT

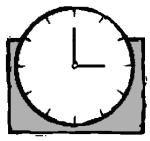
(1) What is the difference between strategic and operational decisions?
(2) As far as business decisions are concerned, what is meant by the long term?
(3) What is the main focus of business strategy?
(4) What are Porter's generic strategies?
(5) How do businesses acquire technology?
(6) What are sunk costs and how do they affect technology strategy?
(7) When is licensing likely to be an attractive technology strategy?

Answers to assessment

(1) Strategic decisions are taken at top management level and influence the organisation's long-term plan. Operational decisions are decisions made daily that influence the organisation in the short term. Operational decisions should be based on the organisation's strategic plan, so that everything fits in with the organisation's ultimate plan.
(2) Long term is regarded as one year or longer.
(3) The business strategy focuses on the strategy of the business and looks at the long-term future of the business. It examines the business and its divisions as a whole and how the organisation competes in the industry.
(4) Cost leadership, differentiation and focus.
(5) Direct investment, joint venture or subcontract R&D.
(6) Sunk cost is the investment already made in a technology. When a new technology is introduced, the cost of the previous technology cannot be carried over to the new technology and is therefore seen as unrecoverable, in other words, sunk. Sunk costs will have a definite influence on deciding whether or not it is financially viable to lay out more investment in new technology.
(7) Licensing is attractive when the innovator wants to retain the patent, but does not have the resources (eg finance, manufacturing and marketing capability) to exploit the innovation. For a licensing fee, the inventor organisation will allow another organisation to exploit its invention.

8.6 SUMMARY

The long-term plan of the organisation is included in the business strategy. This is a map of how the organisation would like to compete in the industry. The technology strategy is aligned with the business strategy to help the organisation achieve its long-term goals. There are different types of strategies that the organisation can follow with a view to meeting its long-term objectives.



Study unit 9

Entrepreneurs

Contents

9.1 LEARNING OUTCOMES

At the end of this study unit, learners will be able to

— explain the nature of entrepreneurship
— distinguish between different categories of entrepreneur
— identify the key characteristics of technical entrepreneurs
— categorise technical entrepreneurs
— analyse the factors that lead to the growth and development of technical entrepreneurs

9.2 KEY CONCEPTS

— Entrepreneurship
— Technical entrepreneurship
— Technology innovators
— Application innovators
— Market innovators
— Paradigm innovators

9.3 OVERVIEW

Innovations, as we have said, tend to come from large organisations. Having said that, technology is changing so rapidly that it is becoming increasingly apparent that small organisations and individuals are also a source of innovations. These are individuals who start up small, technically based businesses and such businesses are found all over the world.

9.4 TECHNICAL ENTREPRENEURS

9.4.1 Innovation and entrepreneurship

As we said earlier on, many of the products or services we use today had their origins in garages and kitchens. These entrepreneurs had the following in common:

— They had an idea and then transformed that idea into a commercially viable product.
— Technology was at the heart of all these innovations, whether it was using a new technology in an existing application, new materials, using technology in a new way, or creating a new technology for a new application.
— The innovator had to create a business around his/her invention, and not the other way round. In order to exploit the innovation, the entrepreneur had to find his/her own resources (because large organisations where unwilling to back the venture).

Technical entrepreneurs are individuals who base their innovation on technology and create a business in the process. Since individuals obviously do not have the resources of existing organisations, their businesses start small and most grow as they achieve commercial success. However, there are also specialist innovations that tend not to grow in the same way.

Study Smith (2006), pages 181 to 182.

9.4.2 Innovation and large corporations

In a world of mass production, scientific management and economies of scale, it is often only the large organisations that can afford to be more innovative. Large corporations such as 3M and IBM have the ability to take a portfolio approach to carrying out innovation and, of course, their financial and marketing capabilities are a definite advantage when it comes to innovation. Costs of failures are offset by successes, so these organisations can afford to fail from time to time. However, we need to remember that small companies have the flexibility needed for innovation. Large organisations often use innovations developed by small businesses in their own product development and can diffuse these innovations quickly. Once diffusion has occurred, these large organisations can then move into mass production, thus reducing costs.

Study Smith (2006), page 182.

9.4.3 Small firms

In South Africa there has been a significant drop in job creation by large organisations over the last couple of years. Instead, it is small businesses that have become an essential source of economic growth. The South African government is encouraging small businesses and they see the importance of these entities in the country's overall economic growth rate. In short, small businesses are creating both job opportunities and wealth.

Small businesses use their external networks of knowledge and expertise as a means of staying abreast of technological changes. Many small businesses have joined forces with large organisations through strategic alliances and various joint ventures. Small businesses can move quickly and are not hampered by bureaucracy and red-tape.

Study Smith (2006), pages 183 to 186.

The Silicon Valley Small Business Development Center is sponsored by the US Small Business Administration, the California Community College Economic & Workforce Development Initiative, and the Foothhill-De Anza Community College District. The Silicon Valley SBDC is dedicated to the success of small business persons and entrepreneurs in the Greater Silicon Valley including Santa Clara County and Southern San Mateo County.

The path travelled to start, run, and grow a business is filled with a variety of obstacles that often result in costly set-backs, or even failure. Travelling this path alone can be overwhelming and is extremely risky. The Silicon Valley SBDC's experts have travelled the path and can assist with overcoming the obstacles, or can even eliminate them altogether. The result is lower risk and increased probability of success.

The Silicon Valley SBDC offers numerous services to small business. These services include free expert consulting services, concentrated training, information resources, multiple locations and various seminars.

www.siliconvalley-sbdc.org/29/06/2006

9.4.4 Entrepreneurship

There is more to being an entrepreneur than being a manger or an inventor. Indeed, entrepreneurship is a skill that combines a number of different elements. An entrepreneur is someone who can see the business potential of an innovation.

Entrepreneurs are not a homogenous group; they come in all shapes and sizes. There are different perspectives on who entrepreneurs are and what they do:

9.4.4.1 Economic

The entrepreneur is able to use his or her disruptive influence to initiate change, thus creating opportunities. In this perspective, the entrepreneur is a component of the economic system

9.4.4.2 Psychological

This perspective suggests that certain individuals have a particular aptitude for entrepreneurship, including:

— an internal locus of control
— a need to achieve
— a willingness to take calculated risks
— a need for autonomy and independence

This perspective is obviously somewhat limited since people change over time. Nor does it take into account environmental factors.

9.4.4.3 Behavioural/processual

People develop behaviours in response to situations. These behaviours can be identified as typologies designed to reflect the context of entrepreneurship. They include:

> Entrepreneur, quasi entrepreneur, administrator and caretaker, craft owner, promoter and professional manager and artisan, entrepreneur and manager.

Study Smith (2006), pages 186 to 189.

9.4.5 The technical entrepreneur

The term ‘‘technical entrepreneur’’ is used to describe individuals who have ventured out on their own; these are often spin-off companies that rely heavily on technical knowledge and expertise. These businesses are also called New Technology-Based Firms (NTBF). They are found in high-technology businesses such as computer services, medical equipment, precision instruments and pharmaceuticals. They specialise in the supply of specialist requirements or specialist services. This form of entrepreneurship is closely linked to innovation. The technical entrepreneur has four characteristics:

— They were affiliated with the source of the technology before they established their own company.
— The company’s central business idea is based on exploiting advanced technological developments or acquiring a source of technology.
— The company is independent.
— The company is entrepreneurial, that is, it is controlled and managed by an entrepreneur or a group of entrepreneurs.

Other features, such as the use of networks as a source of knowledge, form part of the technical entrepreneur. This type of entrepreneur has tacit knowledge and taps into his or her network in order to apply this knowledge.

9.4.5.1 Occupational background

Technical entrepreneurs used to be regarded as academics with no real business knowledge. However, research done by Jones-Evans in 1995 showed that these entrepreneurs are, in fact, often people who have worked in similar areas for large corporations (which they leave to start their own "spin-off" company).

Technical entrepreneurs fall into four groups:

1. Research technical entrepreneur

This group comes mainly from an academic or research background and possesses a varying degree of business knowledge.

2. Producer technical entrepreneur

These entrepreneurs come from an industrial background and have been involved with product development. They normally come from large industrial organisations and have an engineering, design or project management background. They all have a strong technical background and some also possess managerial experience.

3. User technical entrepreneur

This group of entrepreneurs has had extensive consumer experience. They often come from a marketing/sales background. They use the demand-pull process of innovation, and they base their business on what the consumer wants and needs. The consumer dictates what type of product/service the entrepreneur will sell. Technical entrepreneurs have a generic knowledge of technology and use their informal relationships with consumers to develop new applications.

4. Opportunist technical entrepreneur

This group of entrepreneurs has identified an opportunity in the market. They may not have much technical background, but they know how to use their networks to exploit an opportunity. Their business knowledge and their ability to recognise an opportunity is more valuable to their business than their technical knowledge.

9.4.5.2 Markets and technology

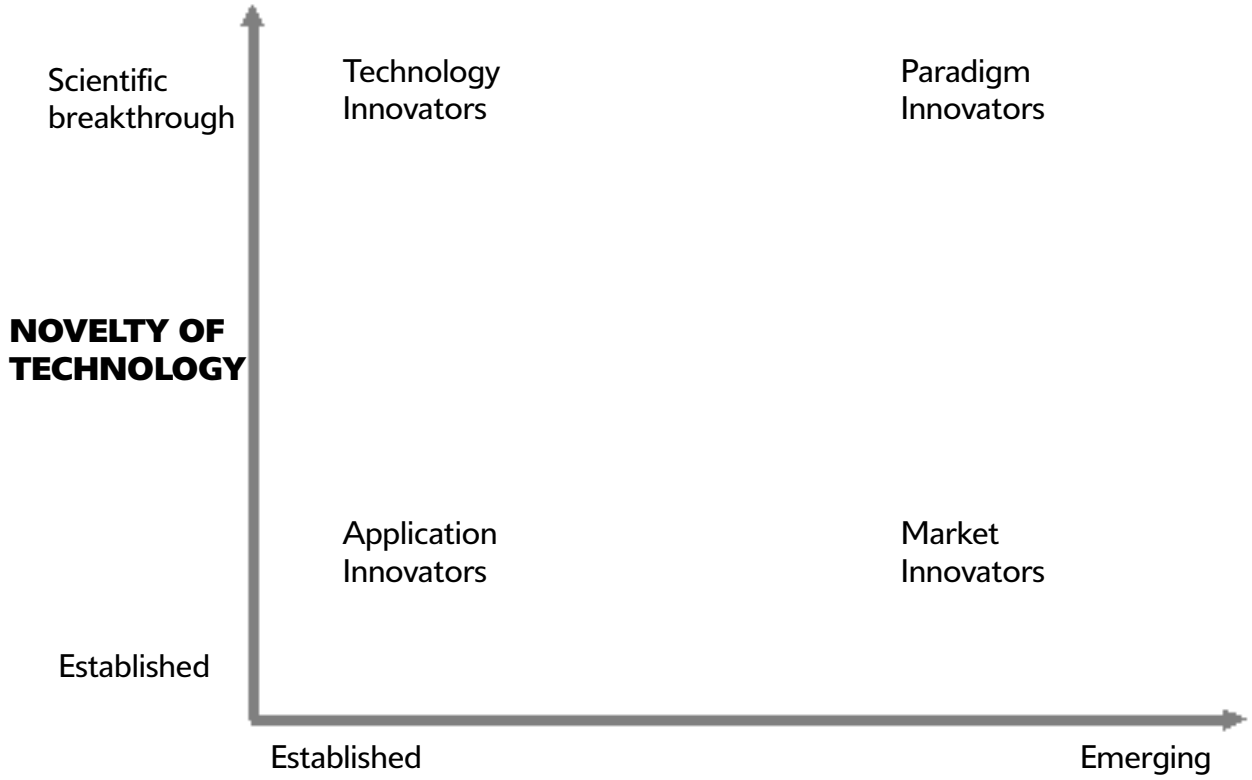
According to research done by Autio, also in 1995, entrepreneurs' technical background may vary and, technically, the venture may range from highly intensive to less intensive. Some entrepreneurs will come up with breakthrough or novel innovations, while others will use their technical expertise to improve existing products/services.

There is also a difference in the target markets. If existing markets are targeted, the

entrepreneur provides a "complementary" innovation or, alternatively, the entrepreneur may provide "revolutionary" innovations, that is, something that is completely new to the market.

New markets can be created where the product has never been seen before or, alternatively, existing innovations can be diffused throughout the market.

Technology/Market Taxonomy



Source: Autio. 1995. *Entrepreneurship and regional development.* Taylor & Francis.

— The application innovator uses established technology in established markets to produce complementary products.
— The market innovator uses existing technologies to create new markets.
— The technology innovator relies on new technologies to penetrate established markets.
— The paradigm innovator develops new products using new technologies and creates a new market.

9.4.5.3 Towards a synthesis

By combining the research of Jones-Evans (1995) and Autio (1995), we can synthesise the features of technical entrepreneurs into a new model. The new model combines three main factors that influence technical entrepreneurship:

— Antecedent factors. These include features of the entrepreneur's personal life, such as personality and background.

— Parental experience. This refers to the entrepreneur's previous experience with other organisations where they were employees.
— Environmental factors. These refer to the degree of novelty associated with the new venture.

Study figure 9.3: Factors affecting new venture formation by a technical entrepreneur: exploring innovation. Smith, D.

Study Smith (2006), pages 189 to 202.

9.5 ASSESSMENT

(1) What is the role of the entrepreneur?
(2) What is the difference between a manager and an entrepreneur?
(3) Identify the different types of technical entrepreneur, showing how they differ.
(4) What is a technical entrepreneur?
(5) Why have small firms increasingly been recognised as an important source of innovation?

Answers to assessment

(1) Entrepreneurs create job opportunities and contribute to the wealth of a country.
(2) A manager needs to manage a business and its people. A true entrepreneur needs skills that go beyond managerial skills. Entrepreneurs can see the commercial benefit of an invention and take it through the development stage to the point that it becomes a marketable product. Entrepreneurs sometimes need to manage their own businesses, but they tend to be those who have the vision and ability to see the "bigger picture".
(3) There are four groups of technical entrepreneurs:

— Research Technical Entrepreneur.

This group comes mainly from an academic or research background and their business knowledge varies.

— Producer Technical Entrepreneur

These entrepreneurs come from an industrial background and have been involved with product development. They normally come from large industrial organisations and have an engineering, design or project management background. They all have a strong technical background and some also possess managerial experience.

— User Technical Entrepreneur

This group of entrepreneurs has had extensive consumer experience. They often come from a marketing/sales background. They use the demand-pull process of innovation and they base their business on what the consumer wants and needs. The consumer dictates what type of product/service the entrepreneur will sell. They have a generic knowledge of technology and use their informal relationships with consumers to develop new applications.

— Opportunist Technical Entrepreneur

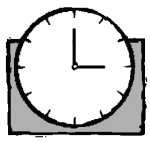
This group of entrepreneurs has identified an opportunity in the market. They may not have much technical background, but they know how to use their networks to exploit an opportunity. Their business knowledge and ability to recognise an opportunity is more valuable to their business than their technical knowledge.

(4) Cooper (1971) describes the technical entrepreneur as "a company which emphasizes research and development or which places major emphasis on exploiting new technical knowledge. It is often founded by scientist and engineers, and usually includes a substantial percentage of professional technically trained people."

(5) The small company is the seedbed for the successful high-growth firms of the future. Small companies can create employment and, through their networks, can gain access to sophisticated technology and technological expertise.

9.6 SUMMARY

Silicon Valley has brought to the forefront the small business and entrepreneur and the role these can play in innovation. These businesses are flexible, although they are constrained by lack of resources. They are often associated with high technology and have a significant role to play in the economy of any country.



Study unit 10

Funding innovation

Contents

10.1 LEARNING OUTCOMES

At the end of this study unit, learners will be able to

— describe the funding problems associated with innovation
— analyse the way in which innovators reduce and minimise capital requirements
— identify the different sources of capital available for innovation
— identify the various forms of capital available for innovation
— evaluate the circumstances when particular forms of capital are most likely to be appropriate
— identify some of the agencies that can help with funding innovation

10.2 KEY CONCEPTS

— Cash-flow gap
— Financial bootstrapping
— Business angels
— Corporate venturing
— Venture capital

10.3 OVERVIEW

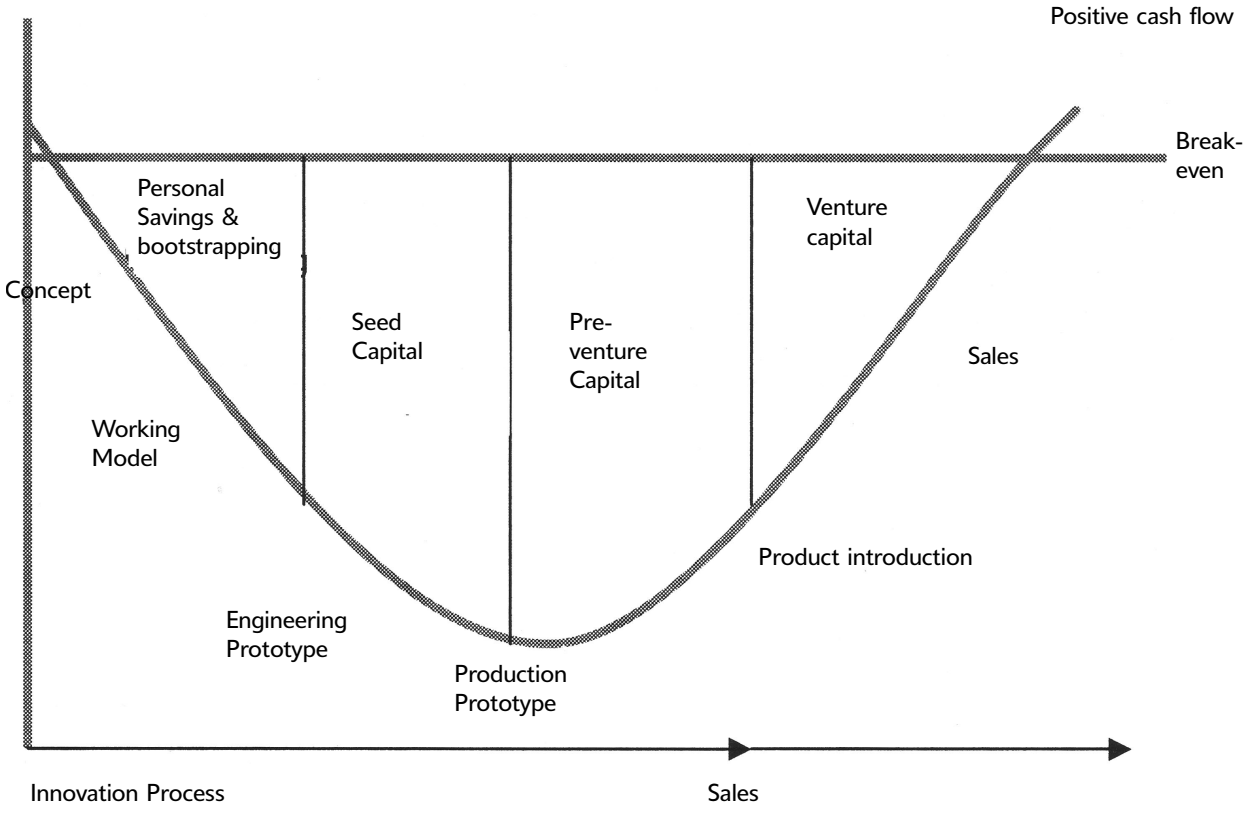
Innovation requires funds for development and this development obviously has to occur before the product can be put on the market. This causes cash flow problems, which is why many innovations never get put on the market. In this study unit, we will look at the various ways that this problem can be overcome.

10.4 TECHNICAL ENTREPRENEURS

10.4.1 Innovation cash flow

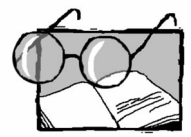
10.4.1.1 The cash-flow gap

Innovation is all about taking an invention and turning it into a commercially viable product or service. An invention starts as an idea, and turning this idea into an innovation obviously takes time and resources. It can be a long time before disruptive technologies and radical innovations are accepted in the market which, in turn, means that there will be a large financial outlay long before the financial returns can be realised (if ever). Large amounts of money on marketing, manufacturing and distribution have to be spent before a product is even launched. Needless to say, none of this is an option for small businesses and entrepreneurs, which is why inventors often turn to large organisations for assistance in the innovation process.



As can be seen in the diagram above, there is an outlay of cash from the concept process through to the sales process. The time taken to reach a positive cash flow will differ from product to product. Radical innovations may require substantial investment before showing a positive cash flow.

Upfront costs will include materials, electricity, legal fees, cost for protecting intellectual property and research. These costs are normally paid for by the inventor. Once a prototype has been developed, the inventor will need "seed capital" to fund further development. This type of funding can be obtained from informal investors or venture capitalists. Once the idea has been tested and is ready to be introduced, further capital will be needed which can be obtained through Initial Public Offering (IPO).



Study Smith (2006), pages 208 to 210.

UNDERSTANDING MONEY

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Starting without money

Starting a business will always cost you money, but there are ways of doing it that could prevent you from having to come up with a lump sum. The trick here is to start off very slowly, developing your ideas and your products in your spare time, doing your own research, selling a few products to test the market, getting feedback from customers, etc.

Here are some tips:

- Don't quit your day job: If you are fortunate enough to be employed, use your current income to experiment with your business idea. Work on your products at the weekend, and talk to people who already are in the industry you plan to enter. Talk to prospective customers about what they think of your idea, and give them samples to look at or try out. Also talk to the suppliers of the equipment and materials you will need. This will pave the way for you to make some sales of your product, so that you can be sure that there is a market. It will also hopefully give you some cash to start putting aside.
- Work out (and use!) a business plan: Taking a slower approach to starting your business will give you the time to think through all the hurdles and challenges that can and do arise. A business plan is a useful tool to help you through this thinking process. Start working on a business plan as soon as your ideas begin to come together, then develop and modify your plan as your ideas develop and change. (Remember: a business plan is never cast in stone. It is there to ensure that you know what you're aiming at, and that you've thought about how you'll get there. The plan, it is said, never survives the first battle! So you need to keep updating it.)
- Build up sales before you launch: Ideally, get a few regular customers before you go into the business full-time. Try out some inexpensive marketing techniques. You may even consider employing someone on a temporary, part-time basis to build on the success of your first few sales and to build up a customer base. This will take the pressure off you when you launch the business officially, and give the business a bit of time to "warm up" before you try to draw a salary from it.

- Get some suppliers on your side: One of the cheapest forms of 'credit' can be your suppliers. While you should never drag your heels when it comes to paying your debts, you might be able to find some material suppliers who will agree to give you a few months to pay while you are starting up. This could benefit your business enormously, as you could get supplies without having to go to a lender for the money; and from the suppliers' point of view, you could become a good customer for them.
- Phase your business into operation gradually: Depending on the type of business you plan to start, it may be possible to get it going gradually, reducing the amount of money you need to put in initially. There may be certain products that will sell better than others, with less infrastructure or with less capital outlay. Start with these, and get the cash flowing. Be strict about putting a portion of this cash aside to fund your expansion into other products.
- Get as much paperwork out of the way as possible: Attend to all the regulatory requirements (such as trading licences early), so that it doesn't waste your valuable selling time once your business is launched. Register your company or CC, get your tax requirements sorted out, register for VAT if necessary, find out what insurance you will need, open your business bank account, etc.
- Get your systems in place early: Don't launch before you have a proper record-keeping system, invoicing system, book-keeping system, customer care system, etc. These will form the foundation of your office administration, and will keep your business running on oiled wheels. Get this organised early, as you will be working flat out when you launch to visit possible customers, to present your product, and to produce what the orders require.

www.seda.org.za

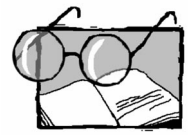
10.4.2 Financial bootstrapping

During the early stages in the innovation process, innovators are strapped for cash and need to find "innovative" ways of finding funding. One such way is known as "bootstrapping". This is where the innovator finds legitimate ways of not paying for goods/services or paying a lower price. There are two bootstrapping strategies available:

— Using creative ways of acquiring finance without recourse to banks or raising equity from traditional sources.
— Minimising or eliminating the need for finance by securing resources at little or no cost.

Finance can be acquired through channels other than formal financial institutions (eg friends and family).

Costs can be kept to a minimum by working from home, which is both convenient and rent-free. The innovator can use facilities that belong to the parent company, use second-hand equipment, and get help from friends and networks on a part-time basis without having to pay for their services.



Study Smith (2006), pages 210 to 211.

10.4.3 The founder, family and friends

The founder of the company can use his or her own personal savings or mortgage his or her home to obtain funding for the innovation process. Some founders continue in their full-time job and work on the idea in their spare time. Further funding can be found from family members who are happy to support the innovator. Friends often see the potential of the idea and are willing to assist both financially and with their own personal knowledge.

Study Smith (2006), pages 211 to 212.

10.4.4 Government funding

There are several government initiatives that can help the innovator. Here are two examples of how government assists small businesses:

10.4.4.1 Khula Enterprise Finance Limited

Khula Enterprise Finance Limited is an agency of the Department of Trade and Industry established in 1996 to facilitate access to credit for SMMEs through various delivery mechanisms. These include commercial banks, retail financial intermediaries (RFIs) and micro credit outlets (MCOs).

Khula also provides mentorship services to guide and counsel entrepreneurs on various aspects of managing a business. Khula is a wholesale finance institution, which means that entrepreneurs do not get assistance directly from Khula, but through the various bodies referred to above.

An impact study done by the Bureau of Market Research in 2001 showed that more than 1,5 million people have benefited directly or indirectly from Khula's assistance since 1996. This is a remarkable achievement, given the reluctance of the formal banking sector to lend to small businesses (owing to the perceived market risk).

10.4.4.2 The Industrial Development Corporation

www.idc.co.za/default.asp.June 2006

IDC finance is available for projects within South Africa, the SADC region and the rest of Africa. We see our role as one of assisting you financially. We do not pursue shareholding control or management participation. Finance is only made available after comprehensive risk studies.

The IDC has developed a range of financial products suited to different environments and needs. Below is a list of the IDC's Financial Products.

Financial Products:

- Commercial Loans
- Equity
- Quasi-Equity
- Bridging Finance
- Shareware housing
- Guarantees
- Suspensive sales
- Wholesale Finance
- Export Finance
- Import Finance
- Support Programme for Industrial Innovation

10.4.5 Banks

Most banks are reluctant to finance high-technology innovative ideas. However, there is a drive from within the banking sector to assist small businesses.

Study Smith (2006), pages 214 to 215.

10.4.6 Business angels

Business angels are informal investors that take an interest in the idea and, in their personal capacity, provide the innovator with funding. Business angels are self-made, wealthy people who are prepared to take a financial risk and do not necessarily expect to get a return on their investment.

10.4.6.1 Active business angels

(a) Entrepreneurs: these are business angels who are self-made and wealthy individuals. They do not take much interest in managing the venture. They often base their decision to invest on the personality of the innovator.
(b) Income-seeking: these are business angels who wish to get a high-return on their investment and who generally invest smaller sums. They often do not have an entrepreneurial spirit themselves and base their investment decision on their wish to make extra income; they tend to lend to industries they are familiar with.
(c) Wealth-maximising: although this group only have a minority stake in the venture they often get involved in the management of the venture. Most have acquired their own wealth through inheritance.
(d) Corporate business angels: corporate businesses that make investments in ventures in which they see some potential.

10.4.6.2 Passive business angels

(a) Latent: These are very wealthy, highly educated, older individuals who do not have current investments in innovative ventures, but who have invested in the past.
(b) Virgin: The personal backgrounds of these business angels vary, but they all want to invest in a new venture, but have not yet done so.

Study Smith (2006), pages 215 to 218.

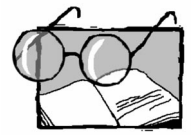
10.4.7 Corporate venturing

As mentioned under corporate business angels above, there are several large corporations that will be willing to invest in a new venture. In return they expect a share in the development. Large corporations will not only assist with financing, but bring with them a host of other expertise, such as marketing, management and manufacturing skills. Corporate venturing gives the corporation access to new ideas and skills, and allows them access to new, potentially lucrative markets.

Study Smith (2006), page 218.

10.4.8 Venture capital

The venture capitalist borrows money from institutional investors such as pension funds and life assurance companies and invests these funds in potentially lucrative ventures. Venture capitalists look for ventures which show high growth potential with the aim of making a capital gain when they withdraw their investment. This type of investor bridges the gap between investors who borrow from financial institutions and investors who borrow from family and friends.



Study Smith (2006), pages 218 to 219.

10.5 ASSESSMENT

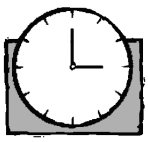
(1) Why is cash flow an important issue for technological innovation?
(2) What is the cash-flow gap?
(3) What is venture capital?
(4) What are business angels?
(5) What motivates business angels to risk their capital?
(6) Why are banks often reluctant to lend to small, high-technology businesses?
(7) What is the rationale behind the government making funds available to innovators?

Answers to assessment

(1) To turn an invention into an innovation requires cash for the manufacturing, marketing and distribution of the product. In short, vast amounts of cash are needed for the commercialisation of the product long before any returns become evident.
(2) The cash-flow gap is the period between which the cash is laid out and before any cash is received from sales. This period can be lengthy and provision should be made for this.
(3) Venture capital is capital that is obtained from organisations that have borrowed money from institutional investors (eg pension funds and life assurance companies) and use this to invest in companies with growth potential. These investors want to make a capital gain by the time they withdraw their money (some years later).
(4) Business angels tend to be high, net-worth individuals who seek capital gains during the time they invest in a company. They are informal investors in the sense that they do not belong to, or form part of, a recognised market.
(5) Business angels see the potential of the business and want to support the venture to the point that venture capitalists are prepared to invest in the business. Business angels want to support a good idea for a return on their investment (ie during the lifetime of that investment).
(6) Banks regard this type of venture as a high-risk venture. This is because many of these businesses do not succeed.
(7) Government supports innovation because it contributes to the country's wealth. Innovations bring job opportunities and stimulate the economy.

10.6 SUMMARY

It is not enough just to have a good idea. Large amounts of money needed to turn the idea into reality. These good ideas often come from small businesses and individuals that do not have the necessary money to turn the idea into a reality. Cash flow leads to problems simply because there is an initial high cash outflow before there is any cash inflow. There are several sources of investment, all of which are suited to different situations.



Study unit 11

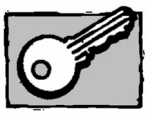
Organising for innovation

Contents

11.1 LEARNING OUTCOMES

At the end of this study unit, learners will be able to

— identify different corporate cultures and assess those likely to facilitate innovation
— analyse the forms of organisational structure that can be used to facilitate innovation
— evaluate the various organisational roles associated with innovation
— evaluate the contribution that organisational arrangements can make to the success or failure of an innovation



11.2 KEY CONCEPTS

— Power culture
— Role culture
— Task culture
— Personal culture
— Prospector
— Defender
— Analyser
— Functional, M-form and matrix structure
— Network structure
— Strategic alliances
— Corporate venturing

11.3 OVERVIEW

When innovations fail, we are inclined to believe that this is due to technology. However, there are other factors that also need to be taken into consideration (eg the market). Innovation does not occur in a vacuum. We shall now look at the organisational context in which innovations occur.

11.4 ORGANISING FOR INNOVATION

11.4.1 Overview

Innovation does not happen on demand. It can happen at any time, but innovation will be more prevalent in an organisation that is functioning correctly. The aspects which organisations need to look at are:

— Corporate culture: these are shared values throughout the organisation, and such values should allow for innovation.
— Architecture/structure: the organisation should group its people and processes in order to facilitate innovation.
— Roles: roles look at what each person should/should not be doing. Allocation of roles will help people to know what their part in the innovation process should be.

11.4.2 Corporate culture

A corporate culture is a system of shared meanings and values that distinguishes the organisation from others. The culture will shape and guide employees' behaviour. Although corporate culture is unwritten and cannot be prescribed, it is often manifested in symbols such as uniforms, company cars and titles. According to Handy (1993) corporate cultures differ:

— Power culture: power is centred on one individual. The organisation is led by one individual with strong ideas.
— Role culture: this culture is built on well-defined roles and responsibilities and is highly structured.
— Task culture: this is a very task-oriented culture, with people working together to achieve an objective.
— Personal culture: based on the personalities of individuals.

Miles and Snow (1978) had a different perspective on organisational culture. These authors identify three types of cultures:

— Prospector: the organisation is constantly looking for new products and opportunities to exploit.
— Defender: as its name suggests, looks to defend its current position by relying on systems with a high degree of control.
— Analyser: constantly analyses new ideas to try to understand whether these ideas can be incorporated in the current organisational structure.

Corporate culture is not designed, but usually evolves over time. Influences that can shape corporate culture are: history, size, technology and leadership.

The history of an organisation may have a significant influence on the culture as a result of certain "events" that have occurred over the years. For example, for many years, IBM sales teams wore non-prescribed "uniforms" of blue suits and white shirts. The people in these teams did not necessarily know why they followed this trend.

The size of the organisation obviously has an influence on its culture; large organisations are more structured to enable management to exert control. However, there are some large organisations that have maintained a small business culture, even though they have grown significantly over the years.

Rapid technological change tends to lead to a more flexible culture. This is because people become accustomed to change and, indeed, expect change.

A strong leader will be able to exert his or her personality on the organisation.

Some organisations are better at innovation than others. Innovative organisations have a culture that encourages innovation and allows people the flexibility to innovate. Handy's task culture creates this sort of environment.

Organisations that innovate will have the following characteristics

— outward looking and receptive to new ideas
— facilitate communication
— open and receptive to new ideas
— challenge established ideas
— accept and learn from failures
— encourage evaluation and reflection

Note that these characteristics do not guarantee innovation, but they allow for innovation.

11.4.3 The architecture of innovation

As with corporate culture, the structure of an organisation can hamper innovation, yet the right structure is no guarantee that innovation will occur. Burns and Stalker (1961) described a hierarchical structure with little innovation as a "mechanistic" structure, and organisations with more flexible individuals and more lateral communication as "organic".

11.4.3.1 Functional, M-form and Matrix structures

A functional structure, where different functions (eg marketing) are grouped together within a department is known as a "mechanistic" structure. This structure involves a great deal of control and does not allow the free flow of information required for innovation.

A multi-divisional or M-form structure changes the emphasis from functions to divisions. Each division has its own functions (eg finance and marketing departments). There may be central functions such as Research and Development that are shared by all divisions. Although the focus lies with products and markets and less with functions, there is still a real threat that some innovations will be disregarded because they do not "fit" into the organisation. M-Form is still a "mechanistic" structure.

The matrix structure is a more flexible structure that takes functional staff and allocates them to projects or regions. This structure allows for information flow between functions, the focus being on the project. This "organic" structure uses multi-disciplinary teams to do problem solving, making it more conducive to innovation.

11.4.3.2 Network structure

The network structure has become popular because it allows companies to focus on their core strengths while using expertise from outside to help them achieve their objectives. Companies such as Nike specialise in the design, marketing and distribution of their products, while the manufacturing of the products is outsourced to outside companies.

11.4.3.3 Strategic alliances

When companies collaborate on a project with a view to achieving the objectives of all parties concerned, strategic alliances are formed. Strategic alliances bring all shapes and sizes (of companies) together with a common purpose. The integration level can differ from highly integrated (eg joint ventures, where a separate organisation is created), to low integration (where agreements are made to supply components). Strategic alliances allow companies to combine their individual core competencies to achieve a common goal. The computer industry is well known for strategic alliances. For example, IBM has formed alliances with pharmaceutical companies to create vaccines and medication more quickly. An example of an unusual strategic alliance is described below.

BIRDS AND POWER LINES: CONFLICTS AND SOLUTIONS

by Chris van Rooyen.

Programme Manager, Eskom-EWT Strategic Partnership. 2006.

The strategic partnership between Eskom and the Endangered Wildlife Trust (EWT) was initiated 10 years ago on 1 April 1996. Prior to the establishment of this joint initiative, the management of wildlife interactions with Eskom infrastructure was often hampered by several factors. These included discontinuity, inadequate understanding of the causes and effects of certain interactions, little integration and co-ordination of effort, duplication of efforts, and application of ineffective solutions to problems. It was in an effort to address these problems that the Eskom-EWT Strategic Partnership was launched. The concept was a novel one: one partner was the biggest utility in Africa and one of the largest in the world, committed to the provision of affordable electricity for all South Africans, and the other was a non-government organisation committed to the conservation of endangered species and ecosystems in southern Africa. It was a leap of faith for both partners. Neither could have known then that it would evolve into a global leader in the field of co-operative environmental management, and serve as a role model to utilities and environmental groups world-wide.

The problem of negative interactions between wildlife and electricity structures is an international one and has been the focus of a vast amount of research. Up to 1996 the focus in South Africa was mainly on the impact of power lines on species that

might be biologically significantly affected, and on engineering solutions to the problem. However, by 1996, it became clear that co-operative management was the only way to tackle the problem effectively. Eskom recognised that without a proper, integrated management system incorporating biological, engineering and economic perspectives, any large-scale effort to reduce or eliminate negative interactions between wildlife and electricity structures was bound to run into difficulties sooner or later. The goal of the partnership is exactly that: to manage these interactions in such a way that they do not lead to species extinction or significant quality of supply problems.

Because of their size and prominence, electrical infrastructures constitute an important interface between wildlife and man. Negative interactions take many forms, but common problems are electrocution of birds, birds colliding with power lines, and birds causing short circuits in the electricity supply through various activities on electricity structures.

Electrocution on overhead lines is an important cause of mortality in large birds in South Africa. Electrocution occurs when a bird attempts to perch on an electrical structure and causes an electrical short circuit by bridging the gap between live components. Because of the large size of the clearances on most high voltage lines above 132 kV, electrocutions here are rare, as even the largest birds cannot bridge the gap between dangerous components. However, many thousands of dangerous low voltage structures — built in an era when bird electrocutions were not well understood — still dot the South African landscape.

Collisions are the biggest single threat posed by transmission lines to birds in southern Africa. Most heavily impacted upon are heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. Unfortunately, many of these species are threatened in southern Africa. Species vulnerable to power line collisions are generally long-living, slow-reproducing species. Some require very specific conditions for breeding, resulting in very few successful breeding attempts, or breeding might be restricted to very small areas. Good examples of this are the two flamingo species that occur in Africa, which have experienced erratic breeding success at a few critical breeding areas. They have not evolved to cope with high adult mortality, with the result that consistent high adult mortality over an extensive period could have a serious effect on a population's ability to sustain itself in the long or even medium term. The Eskom-EWT Partnership has conducted intensive research on power line collisions and has recently identified the 30 highest risk transmission lines in South Africa. These are now systematically investigated, and sections of these lines are identified for the fitting of anti-collision devices.

Apart from being killed by power lines, birds can also materially affect the quality of electricity supply through bird streamers. These are long streams of conductive excreta, which cause short circuits on high voltage lines. In 2000 a research team from Eskom found that approximately 20 per cent of all annual short circuits on the national Eskom high voltage transmission network were most likely caused by bird streamers. In response to this problem, Eskom, with the help of the EWT, launched a national bird guard programme in an attempt to eliminate streamer-related short circuits on a large proportion of affected transmission lines. The programme entailed the fitting of anti-perching devices (bird guards) on transmission towers to physically prevent birds from perching in high-risk areas. The programme has proved to be a great success, with suspected bird-related outages dropping consistently each year as more bird guards are fitted.

The original partnership agreement between the EWT and Eskom expired in March 2001. However, in view the success of the partnership, the parties decided to extend the agreement on an annually renewable basis.

Since 1996 a lot has happened — as the following facts and figures show:

- A total of 657 investigations of wildlife mortality have been performed on Eskom lines since August 1996, most by EWT volunteers (this is a mean investigation rate of 5.6 investigations per month).
- Following recommendations from the EWT, sections of power line and/or poles at 497 localities have been modified to eliminate further wildlife mortality.
- The EWT, through the partnership, played a crucial role in the National Bird Guard project to help trace a large percentage of faulting on transmission lines to birds perching and roosting on the towers.
- The EWT, through the partnership, conducts bird impact assessment studies for each new transmission line, providing vital information with regard to potential bird impacts and ways to minimise them.
- The EWT has presented papers on the partnership activities at 10 international conferences.
- In 1997 Eskom and the EWT jointly won the Edison Electrical Institute's Common Goals Award for outstanding electrical utility customer and community relations programmes.
- The EWT, through the partnership, is currently facilitating research on several topics, including the electrical properties of bird excreta, the influence of land use on bird numbers, the influence of unnatural mortality on cranes, and the nesting activity of large eagles on transmission towers.

Apart from these activities, several pro-active landscape-scale mitigation programmes have also been completed, based on research by the partnership that identified these localities as being of critical importance to birds in South Africa. This includes the Wattled Crane Marking Programme in the midlands of KwaZulu-Natal, where all the breeding territories of the critically endangered Wattled Crane in that province were identified and the power lines crossing those areas marked with anti-collisions devices. Efforts are currently under way in the Western Cape to launch a similar programme for Blue Cranes. Other notable initiatives include extensive modification programmes to mitigate raptor-unfriendly networks in the Northern Cape, North West and Eastern Cape provinces through anti-electrocution measures. A recent example is the Northern Cape Vulture Mitigation Programme that was completed in April 2005, where a total of 480 km of distribution lines in the Northern Cape were modified to prevent the electrocution of vultures.

The partnership concept has been introduced to other African power utilities through the Southern African Power Pool Committee. Hopefully, through this and similar forums, the spirit of co-operation pervading the partnership will eventually grow and extend across national borders as part of a broader African initiative.

11.4.3.4 Corporate venturing

Corporate venturing is not only about the way in which large corporations fund smaller businesses, but can also be used where large organisations create structures conducive to innovation. The organisation can create an internal unit that co-exists alongside the organisation, with the sole purpose of creating an environment in which innovation can occur.

Individuals are brought together for all part of the organisation. This team's sole

purpose is to develop new products or services. In a culture that encourages innovation, these individuals can be dedicated to a task or can perform the task in addition to their normal daily workload.

Dedicated business units are separate entities that are set up with the purpose of bringing an invention onto the market. These units can be disbanded when the product is ready for the market. These units have short-life spans for the simple reason that they cannot justify their existence in a profit-seeking business in the long-run.

New-venture departments lie within the existing organisation, but have a structure that allows for informality and stimulates innovative behaviour. Because these departments lie within the organisation, they are still subject to the organisation's controls and policies.

An independent-venture unit is a separate entity that is set up with the sole purpose of developing innovative products. These are separate companies that are either wholly owned by the company or part of a joint-venture. Being a separate legal entity, they often create their own culture, have greater freedom to experiment and are more focused. This type of unit can tap into the parent organisations experience and skills in areas where they are not strong (eg marketing and distribution).

11.4.4 Organisational roles

It is not only the elements at macro level that influence innovation, but also factors at micro level (eg people). To stimulate innovation within an organisation, employees take on formal and informal roles that will contribute to innovation.

11.4.4.1 Project leader

This formal role is performed by an employee who is closely associated with the project. Project leaders take a leadership role in co-ordinating functions, and use their technical knowledge to bring about innovation. The project leader is skilled in motivating multi-disciplinary teams and has good communication skills. As the title suggests, project leaders plan and control the project.

11.4.4.2 Product champion

The product champion is someone who has a vested interested in the project and who has the power and influence within the organisation to support and defend the project in difficult circumstances. A product champion is often known as an "advocate" and will help the project by "protecting" it from corporate politics and structures, thus ensuring its success.

11.4.4.3 Gatekeeper

Gatekeeping is an informal role. The gatekeeper has the ability to access knowledge (either their own or from a network) that can play a role in the innovation process. They act as a bridge between different parts of the organisation. They act as a conduit in transferring knowledge from one person to another. The strength lies in their network, background or social ties. They communicate both formally and informally.

11.4.4.4 Godfather

Senior managers often take on the informal role of "godfather", using their power and influence to support the project. They are discreet and can work their networks. They can also remove obstacles (eg lack of finance) or simply give moral support to the innovation team.

11.4.5 Making it happen

Innovation needs to be nurtured. This can only happen when the people involved with innovation are nurtured themselves. We have looked at some of the ways in which the human resources can be nurtured (ie through having the right culture, structure and roles). Innovation teams also need to be motivated, and good communication and leadership are both essential.

The correct culture, structure and roles will not guarantee success in innovation, but if these are lacking, failure is inevitable. The fact is that innovation is about human beings and their ability to solve problems. To get the most out of the organisation will require creating a comfortable environment that brings out the best in each individual.

11.5 ASSESSMENT

(1) What do you understand by the godfather role and why is it important for innovation?
(2) What is meant by "corporate culture" and how does it differ from national culture?
(3) What sort of corporate culture is likely to encourage innovation?
(4) What is a strategic alliance and why have organisations increasingly turned to them as a means of facilitating innovation?
(5) What are the potential drawbacks of the traditional functional structure of an organisation as far as facilitating innovation is concerned?

Answers to assessment

(1) The godfather role is one taken by senior managers, preferably working at board level. This role is one of providing "behind-the-scenes" support. The godfather may be able to help the innovation work its way through the obstacles of project evaluation, especially if he (or she) has inside knowledge of where the worst and most dangerous obstacles lie.
(2) "Corporate culture" refers to the internal workings of an organisation. Just as the national culture of a country influences things such as people's attitude to work, attitude to and the use of authority, equality and styles of decision making, so an organisation's corporate culture influences the process of innovation. Corporate

culture lies within the organisation and is unique to each organisation. National culture is more widely spread (to all the citizens of the country). Each country will have a unique culture.

(3) Handy's task culture is probably more likely to encourage innovation than his role culture. Organisations with a strong record of innovation will have a corporate culture that:

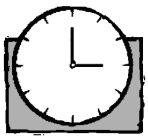
(a) is outward looking and receptive to new ideas, particularly from the outside
(b) facilitates communication
(c) is open and receptive to new ideas
(d) challenges established ideas
(e) accepts and learns from failures
(f) encourages evaluation and reflection

(4) The essence of a strategic alliance is that it involves some form of collaborative agreement between two or more parties designed to benefit the parties over the long term. Strategic alliances provide the necessary ''glue'' that allows organisations to work together on an innovation. Strategic alliances thus facilitate the use of a network model.

(5) The essence of the functional structure is grouping together different functional specialisation (eg marketing). While the functional structure can help to provide strong operational control, this type of structure does normally facilitate innovation. In this type of structure, lateral communication, which is essential to knowledge transfer, may be weak. Also, the emphasis on control may make the organisation unreceptive to new ideas.

11.6 SUMMARY

In this study unit, we looked at the different organisational factors that can contribute to the success or failure of an innovation. It is important to structure an organisation in a way that encourages innovation. Roles and responsibilities need to be outlined and the right environment needs to be created for innovation to occur.



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